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Today's CSTNET

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Chinese American Networking Symposium 2004

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Agenda

- Introduction to CNIC
- CSTNET Overview
- CNGI and CSTNET
- GLORIAD and HK IOEP (HKLight)
- Conclusions

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Chinese Academy of Sciences (CAS)

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A Glance at CAS

- Founded on Nov. 1, 1949 on former Academia Sinica and Beiping Academy
- Most comprehensive R&D center in China
- Conduct R&D related to almost all aspects of science and technology
- Now about 100 institutes, 1 univ., 2 colleges
- 12 branch academies in major cities
- Total staff: 51,000; 37, 000 scientists & engineers
- Entitled to confer both Ph.D. and master degrees. Now a total of 30,000+ graduate students

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CNIC at a glance

- an institute of CAS, founded in April 1995
- an IT supporting and research institution established with the development of China Internet
- joined in the Knowledge Innovation Program in January 2002
- 270+ staff, 140+ graduate students

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Vision

- a supporting institution for building, operating and services of CAS' informatization (e-Science + ARP)
- a R&D base for next generation Internet technologies

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Missions

- Operation and services for CSTNet
- Information Services on Scientific Databases
- Services on Supercomputing
- Operation of CNNIC
- Services for office automation
- Research on network technology and applications (e.g. NGI, Grid)

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Departments

- CSTNet Network Center
- Scientific Database Center
- Supercomputing Center
- China Internet Information Center (CNNIC)
- Management Information Service Center
- Network Technology and Applications Research Laboratory (NTARL)

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CAS Infrastructure Update

Infrastructure	Item	By 2000	By 2004
Networking	core	1Gbps	**2.5Gbps**
	backbone	2Mbps	**155Mbps**
	International link	55Mbps	**620Mbps**
HPC	Peak TFLOPS	0.13	**5.5**
	Linpack TFLOPS	0.05	**4.2**
	Storage	2.1TB	**180TB**
Scientific Database	Member institutes	21	**45**
	Databases	180	**388**
	Data volume	725GB	**13TB**

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CSTNET

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Introduction of CSTNET

- Base on the NCFC and the network of CAS
- Opened the first Internet link of China 1994
- One of the top large scale networks in China
- .cn top domain service
- Cover more than 20 provinces, 100 institutes, and 1,000,000 end users
- Large scale upgrade in 2001-2005
- Bandwidths
  - Backbone 2.5G
  - MAN link 1G
- CNGI
  - 7 nodes (work with China Netcom)

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Introduction of CSTNET

- Efforts on:

  Upgrading IT Infrastructure

  Constructing Scientific Research Environment

  Developing Key IT Technologies

  Demonstrating Science Applications

- A better platform to support advanced science applications
- A good test bed for research on next generation Internet

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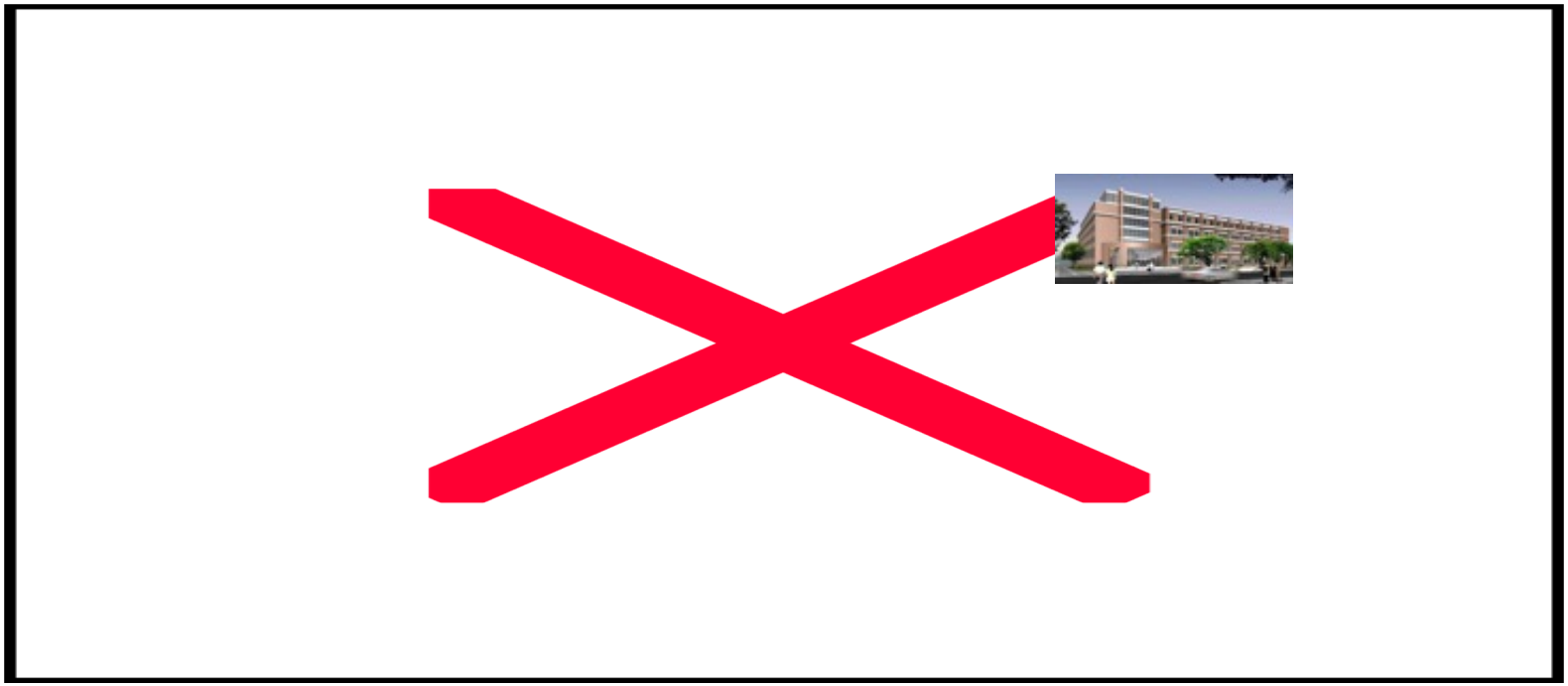
Nodes of CSTNET



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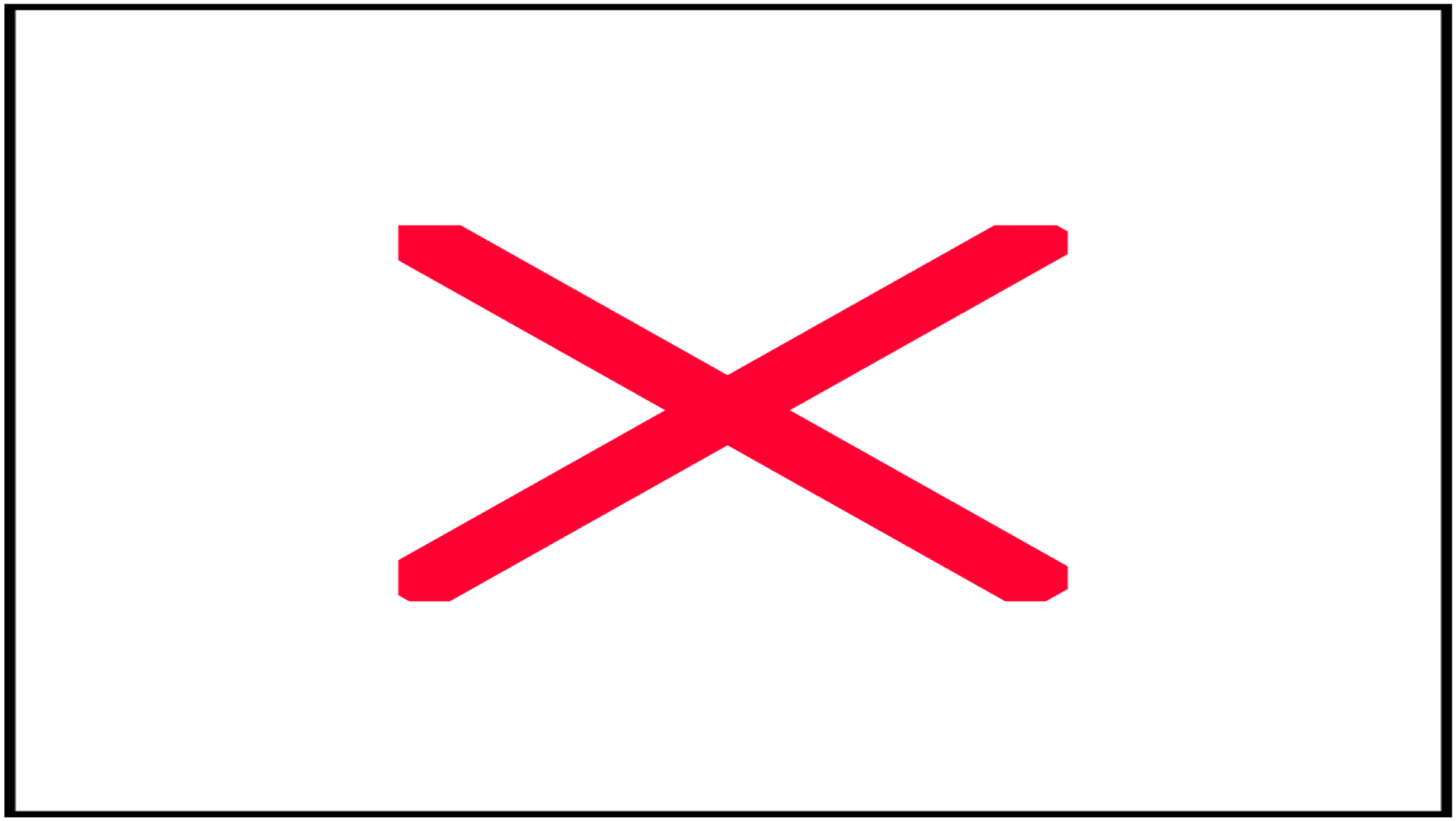
CSTNET Network Architecture



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Applications

- Information Services on Scientific Databases
- Services on Supercomputing
- Services for Management
- Research on network technology and applications (e.g. NGI, Grid)
- Supporting advanced S&E applications

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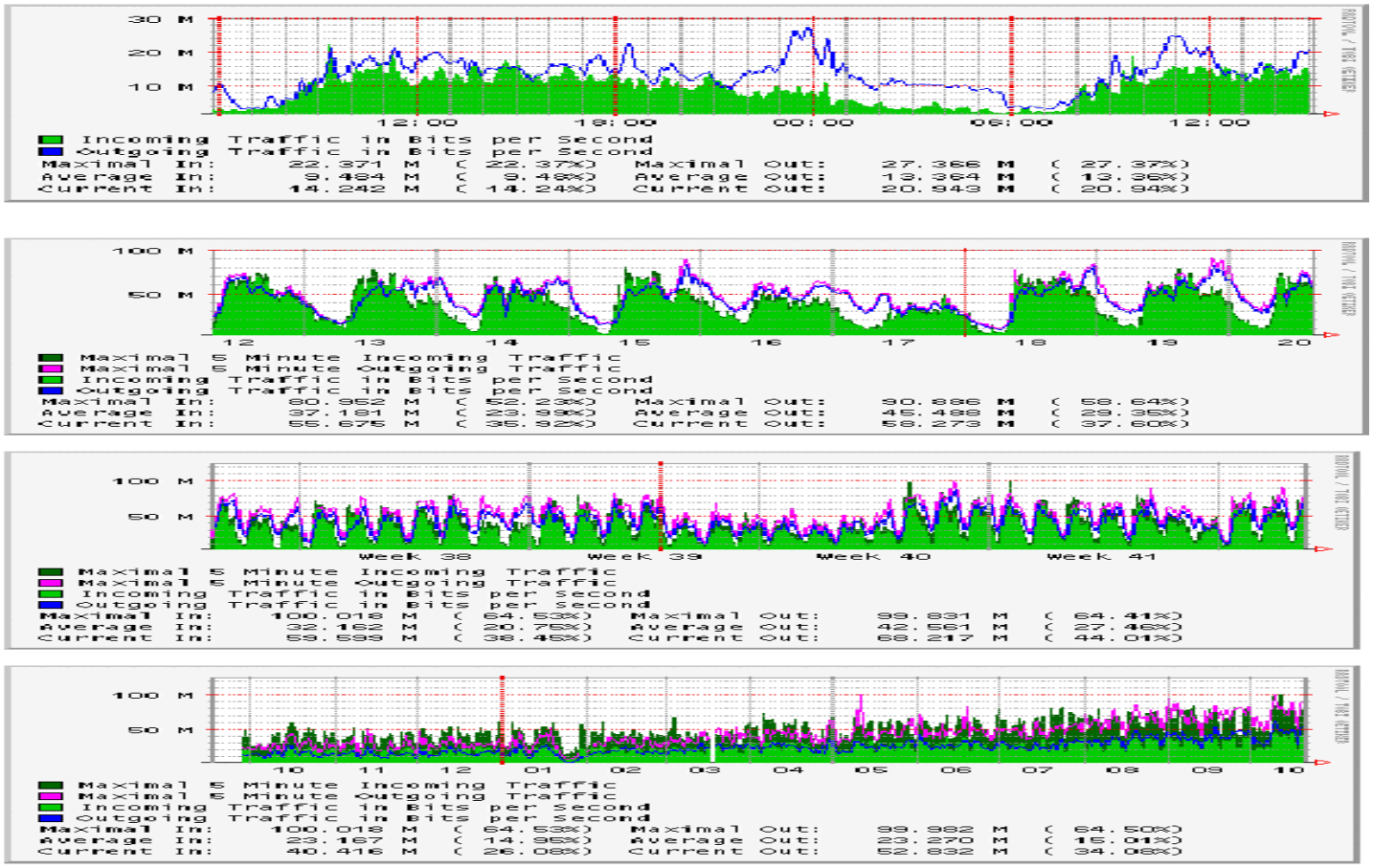
Our Network Management



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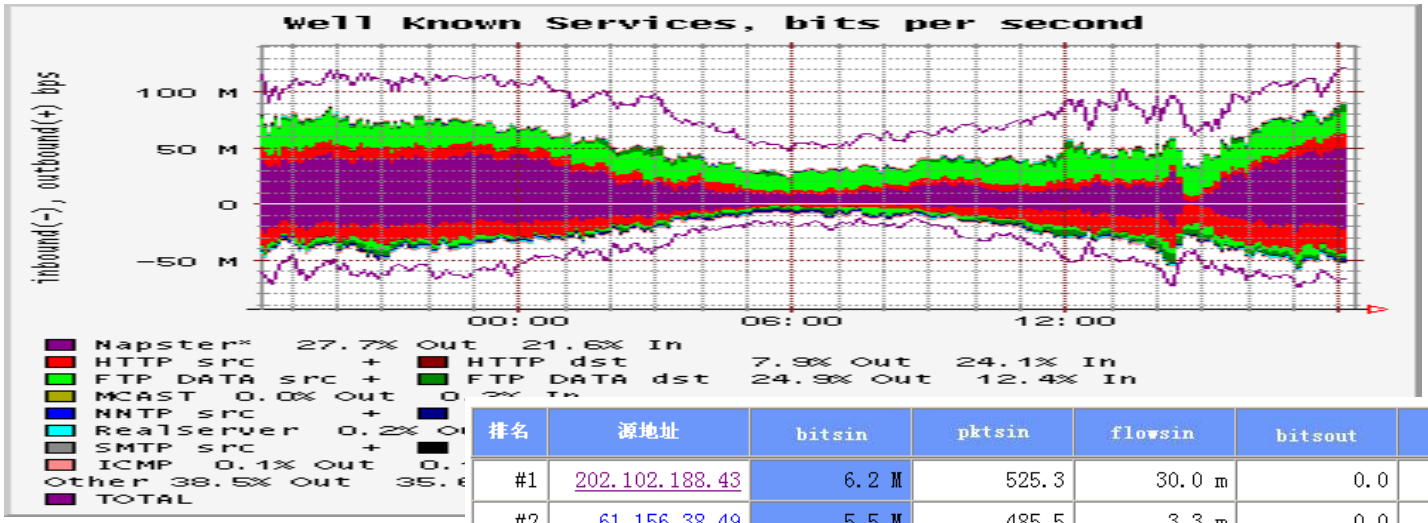
Know Our Users



排名	源地址	bitsin	pktsin	flowsin	bitsout	pktsout	flowsout
#1	202.102.188.43	6.2 M	525.3	30.0 m	0.0	0.0	0.0
#2	61.156.38.49	5.5 M	485.5	3.3 m	0.0	0.0	0.0
#3	221.216.167.161	4.1 M	494.5	6.7 m	0.0	0.0	0.0
#4	222.134.241.84	3.3 M	292.9	33.3 m	0.0	0.0	0.0
#5	61.50.213.229	2.9 M	261.5	53.3 m	0.0	0.0	0.0
#6	221.6.7.117	2.8 M	254.2	463.3 m	0.0	0.0	0.0
#7	218.9.183.66	2.8 M	230.7	6.7 m	0.0	0.0	0.0
#8	218.56.227.44	2.2 M	212.0	3.3 m	0.0	0.0	0.0
#9	222.134.100.154	2.0 M	219.9	3.3 m	0.0	0.0	0.0
#10	211.154.222.56	2.0 M	231.8	15.4	0.0	0.0	0.0

统计样本的时间为：Thu Oct 14 11:35:00 2004

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Network Security Work

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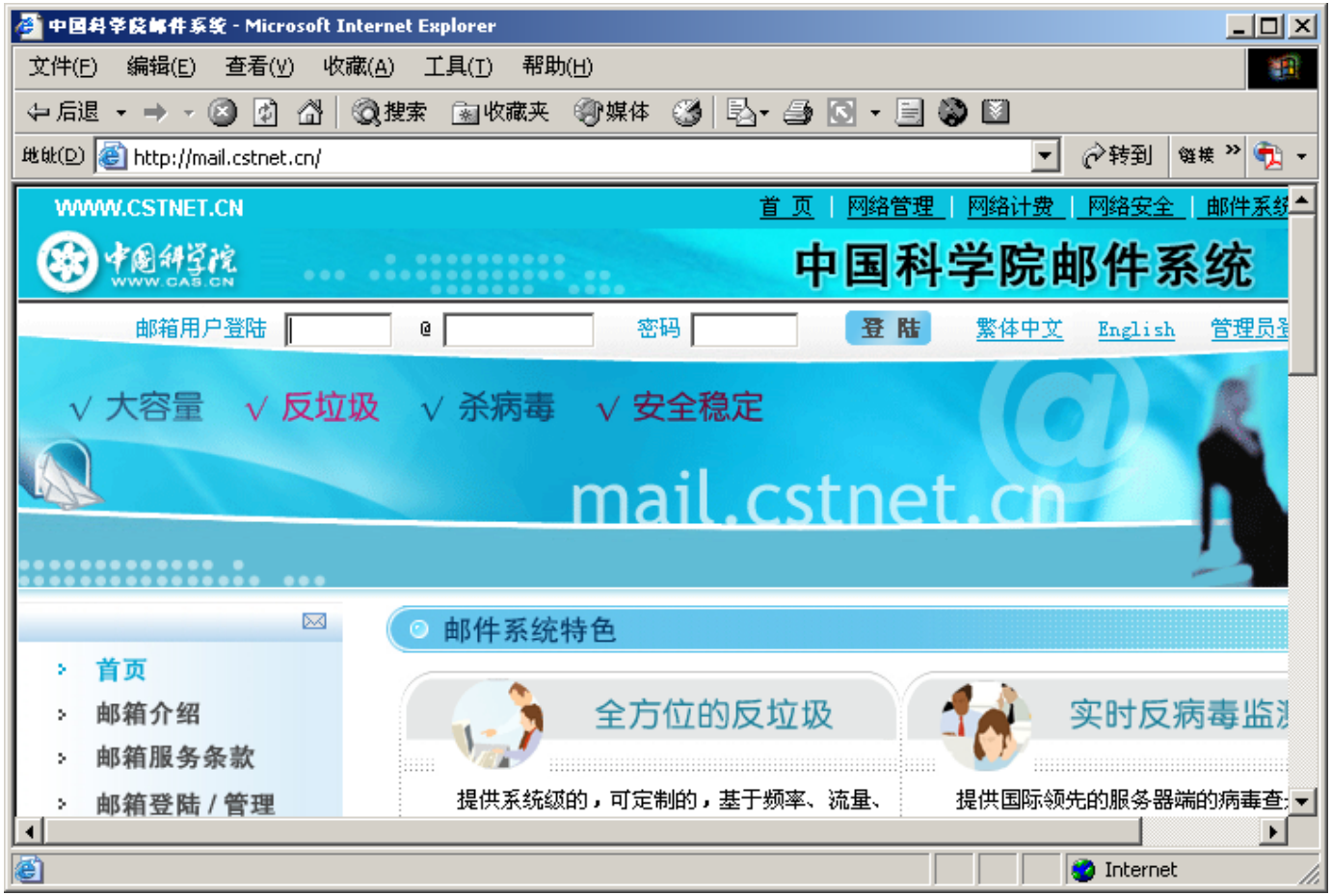
What We Do Now



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International Collaboration

- PRAGMA, 2002
- GLORIAD, Jan, 2004
  - NCSA(US), Kurchatov Institute(RU)
- KISTI、NICT…
- Internet2
- APAN
- …

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Applications in CNGI

- Video stream
- Network Grid
- Environment monitoring
- Remote control, virtual lab
- Mobile and wireless applications
- Advanced manufacturing
- Remote education, digital library
- Medical care

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Key Issues to be addressed by CNGI

- Standard study
- Large scale routing (BGP implementation…)
- Large Scale multicast
- QoS
- Mobility
- Management (BOSS)
- Migration from IPv4 to IPv6
- Accounting and business model
- …

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CNGI progress

- Phase one
  - From 2003 to end of 2005, setup the demo network
- Phase two
  - From 2006 to 2010, large scale deployment throughout China

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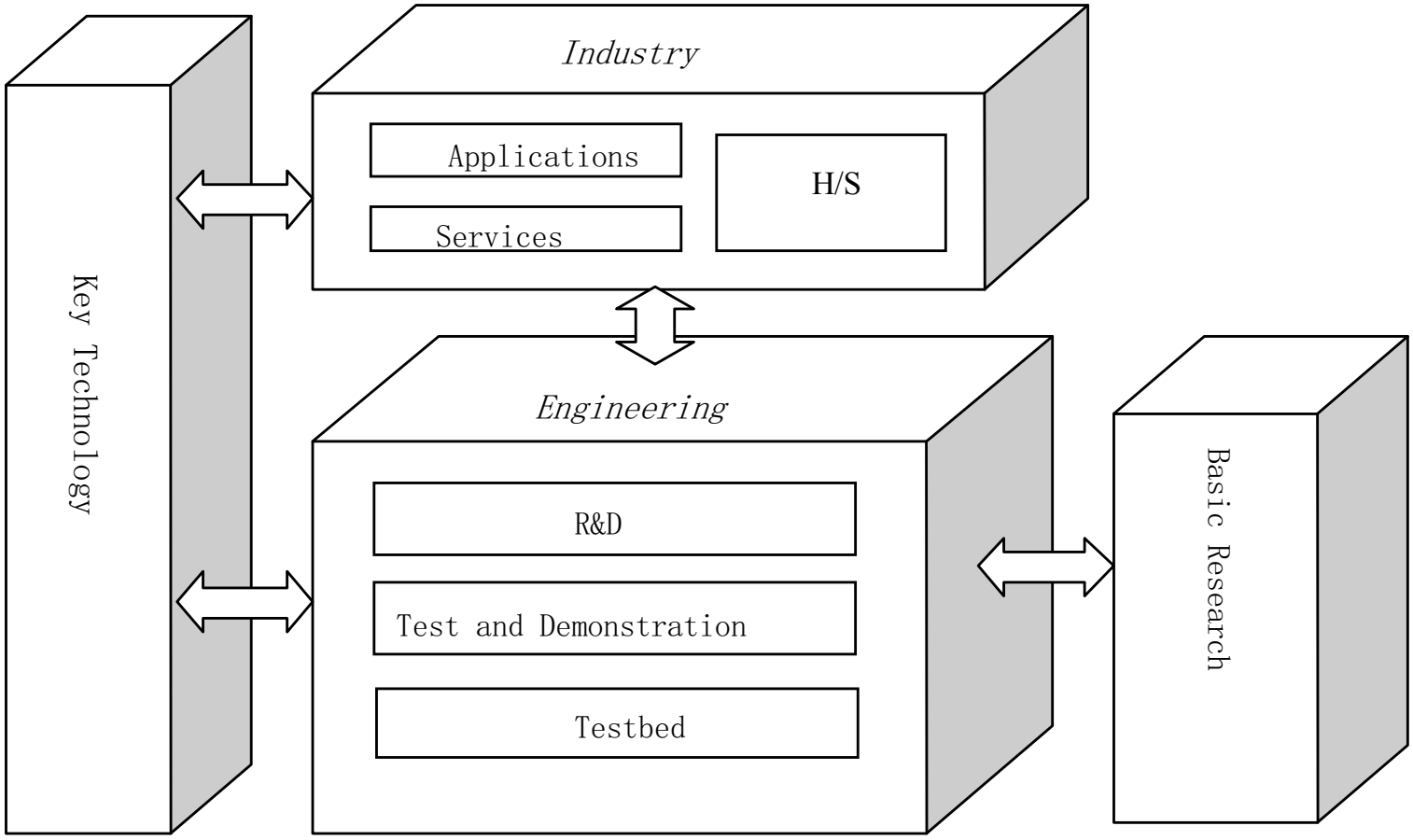
CNGI Structure



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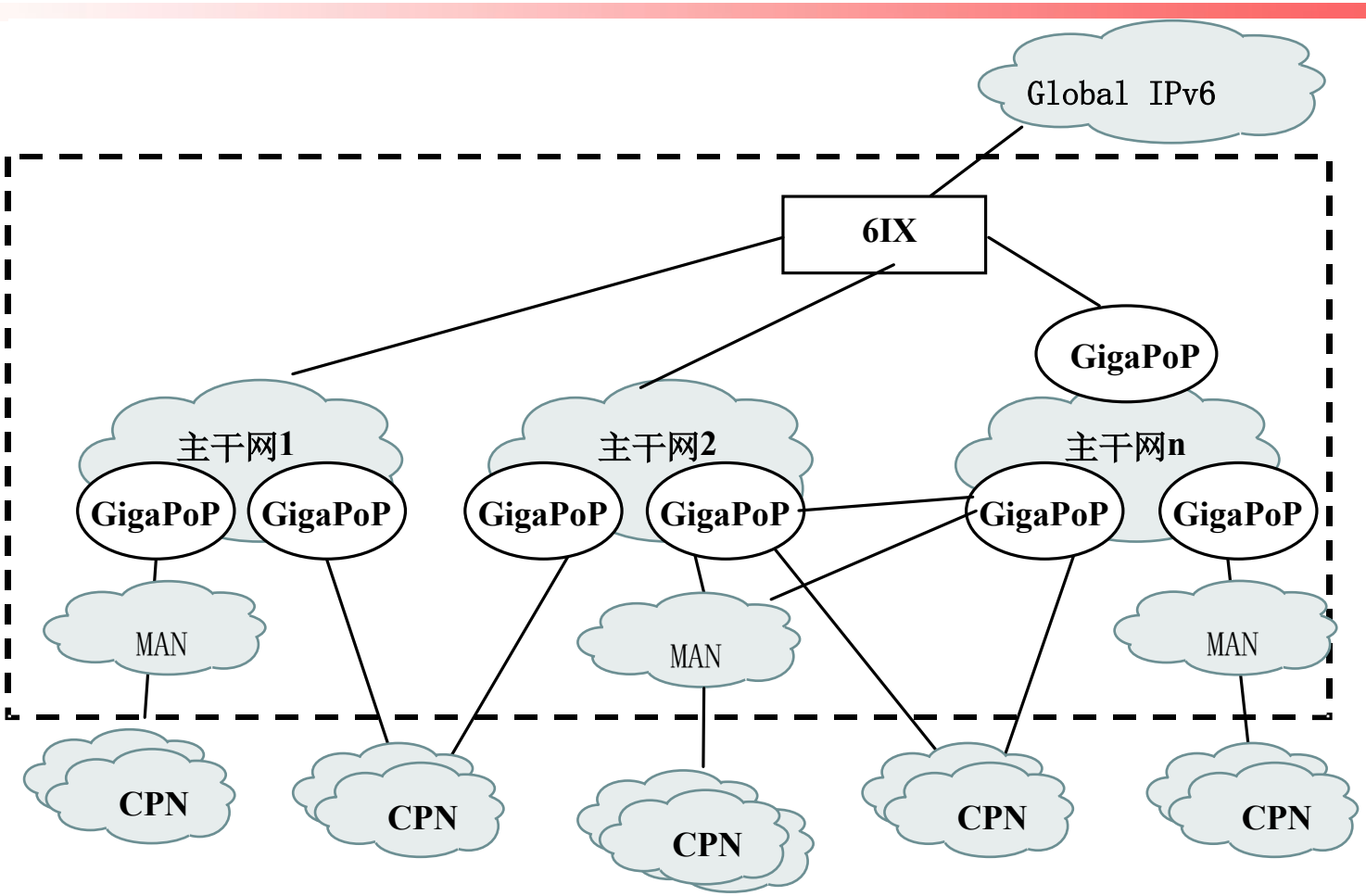
CNGI Backbone



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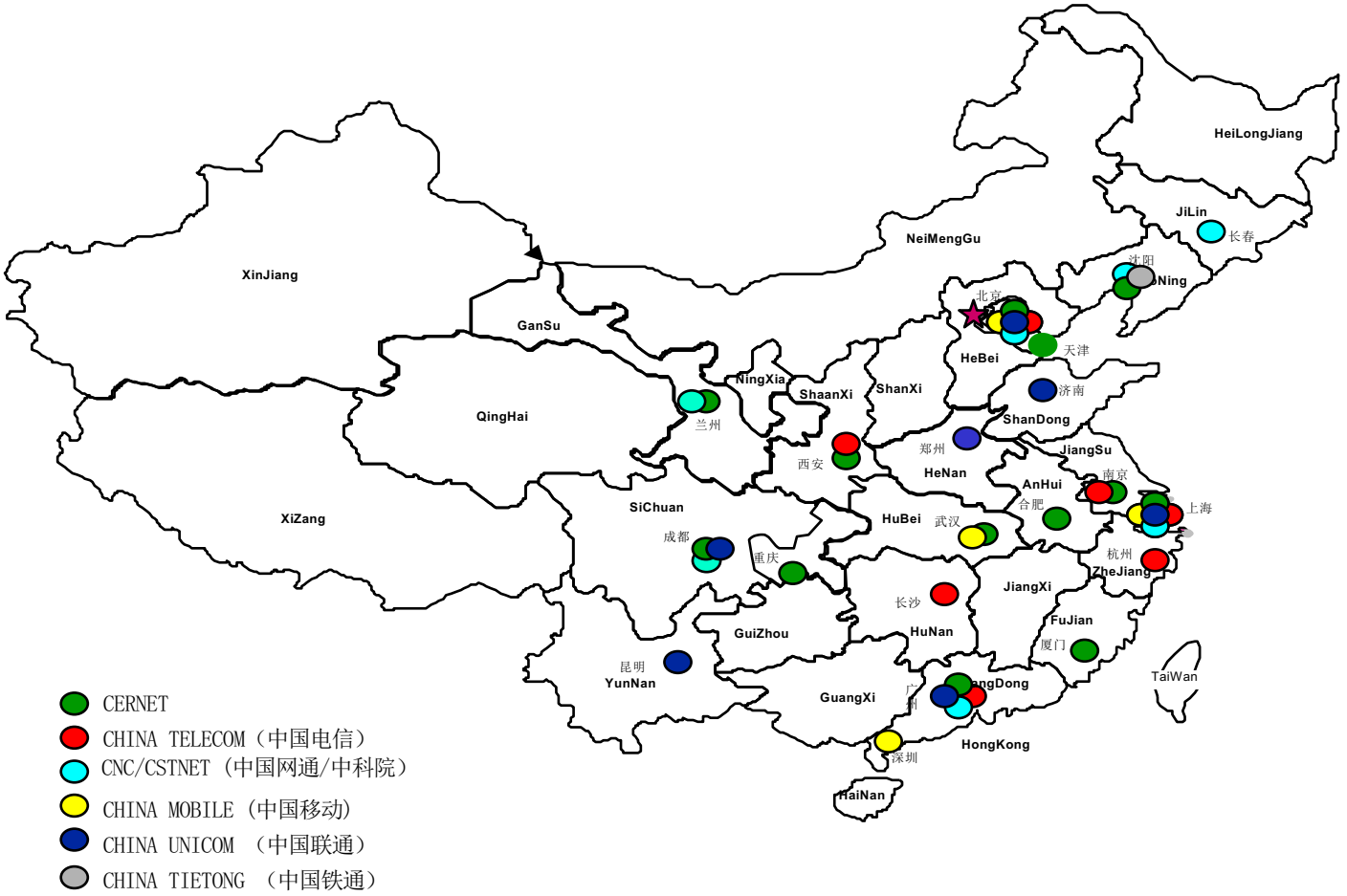
CNGI GigaPoPs



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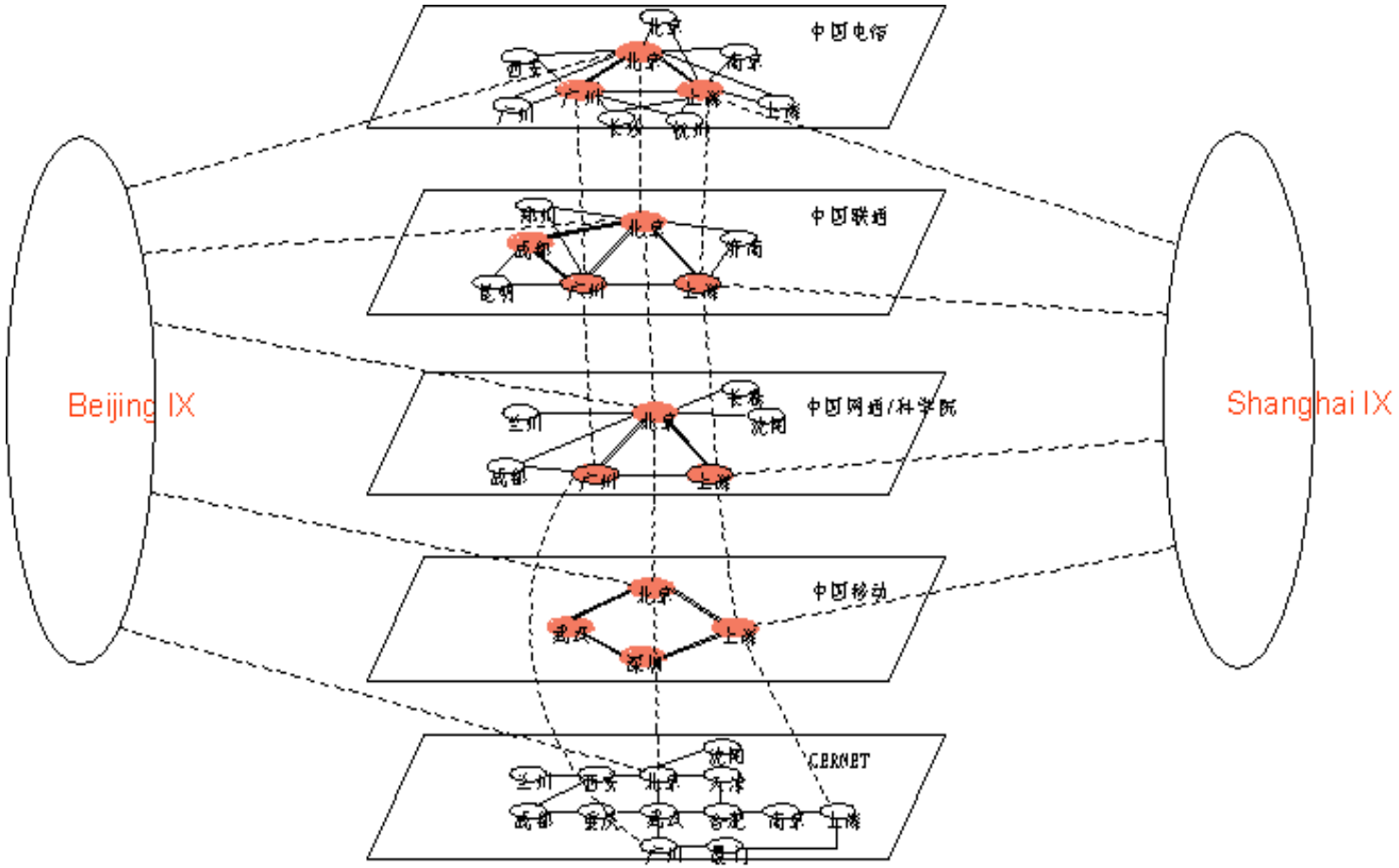
CNGI Interconnect among ISPs



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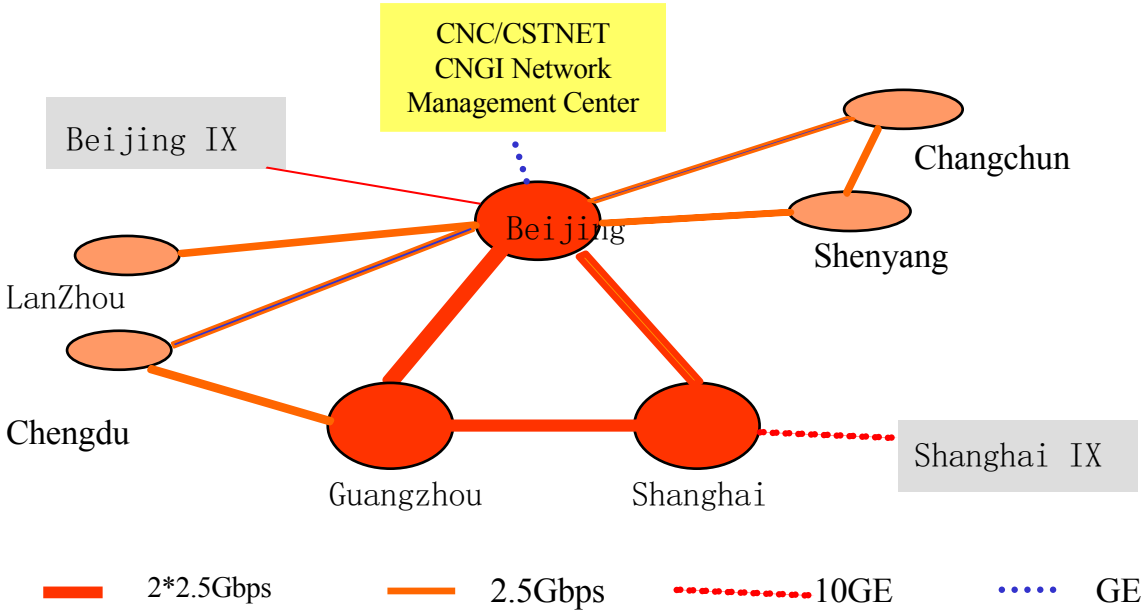
Our Work In CNGI

- CHINA/CSTNET in change of establish the GigaPoPs in Beijing, Shanghai, Guangzhou, Shenyang, Changchun, Chengdu, Lianzhou and the network management center.



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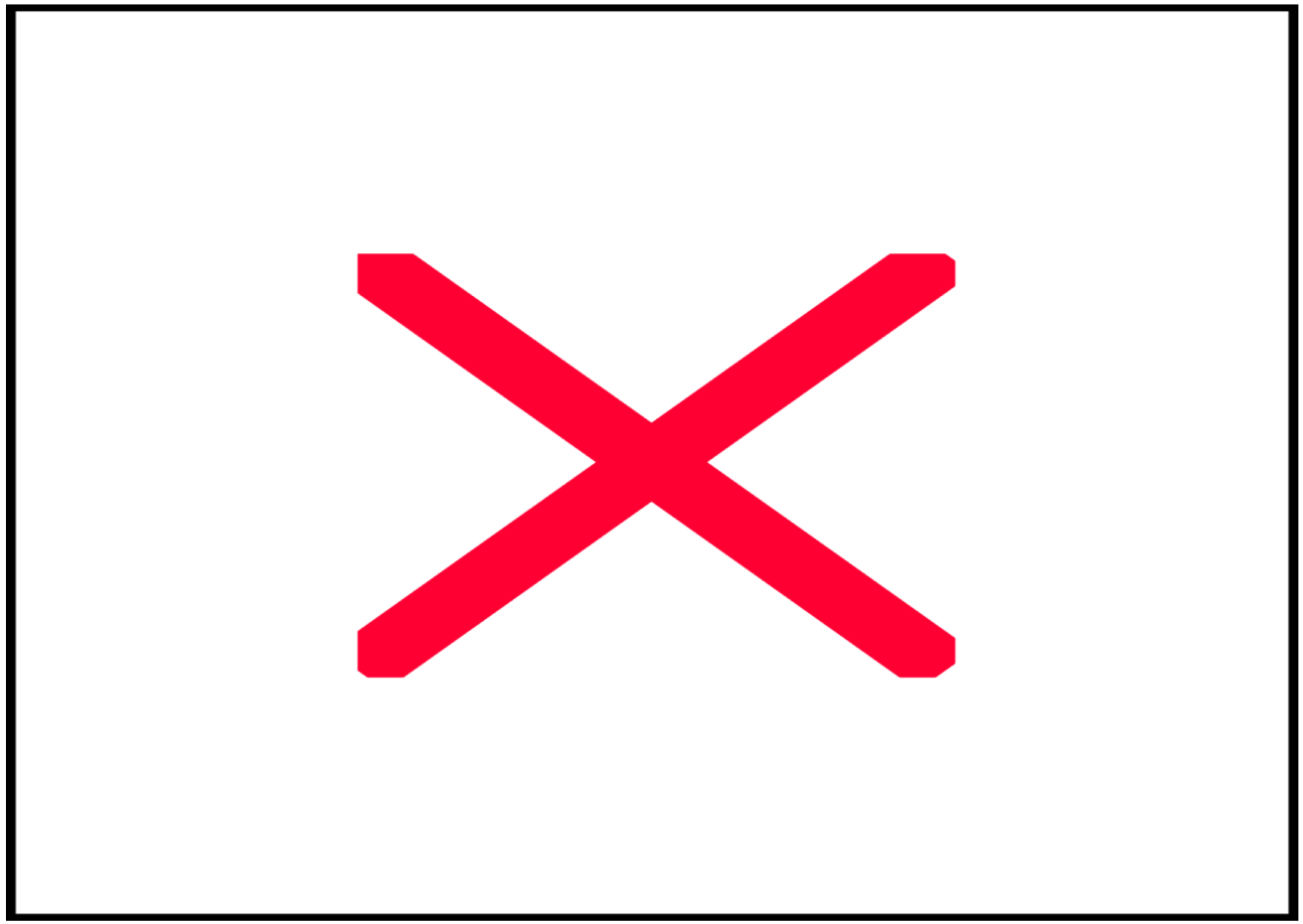
Our Network Management Center



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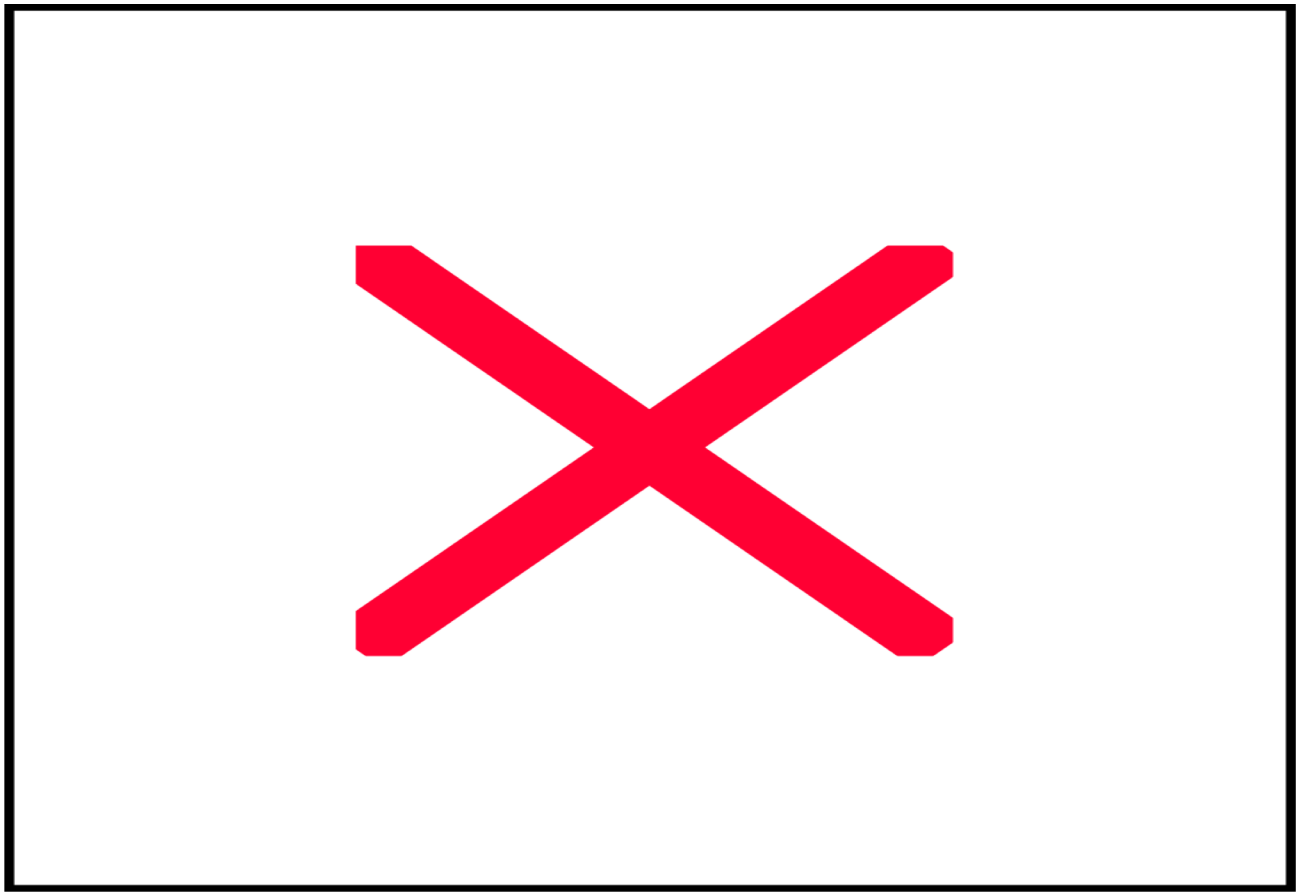
Beijing GigaPoP



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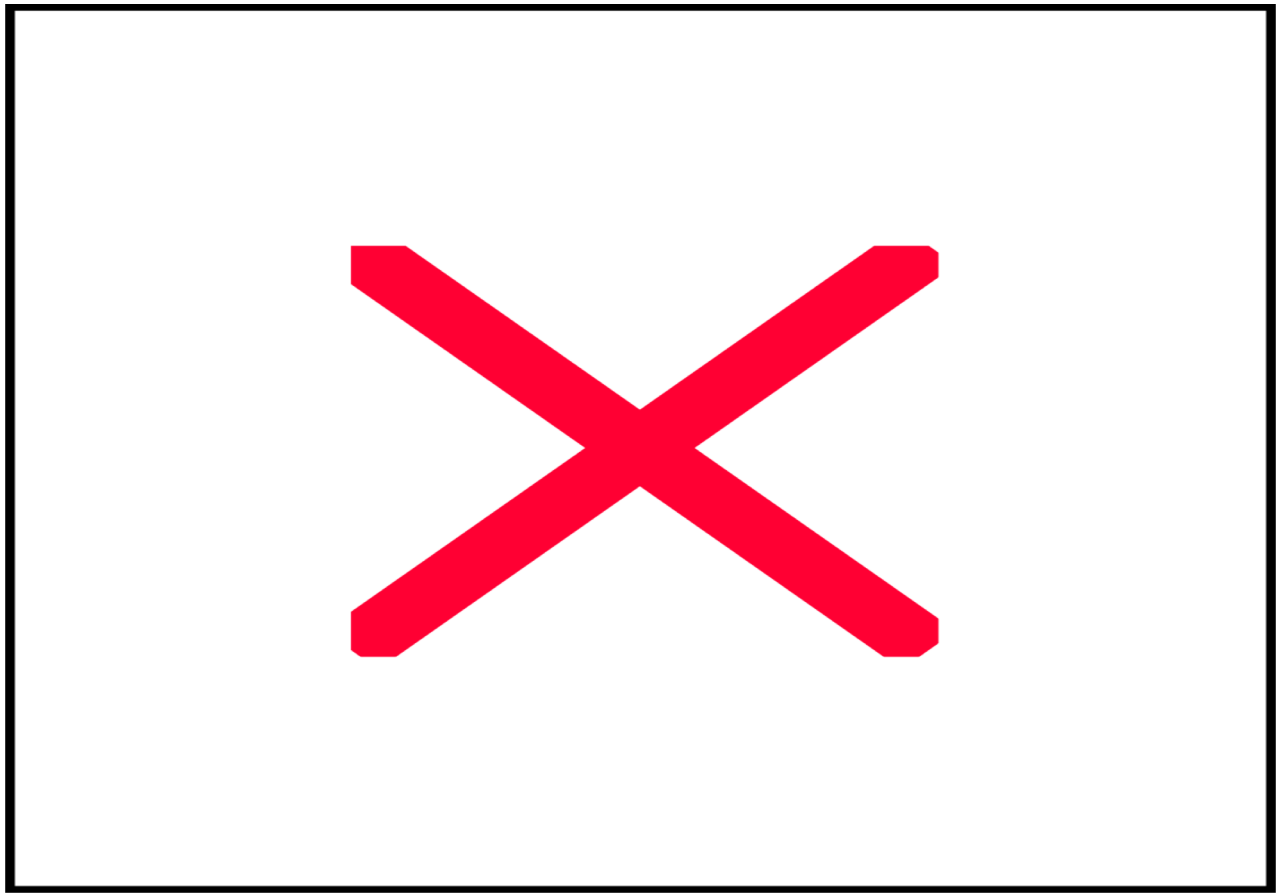
Shenyang GigaPoP



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GLORIAD

- GLORIAD is the first global high-speed network around the north hemisphere.
- GLORIAD is driven directly by the requirements from scientists and science applications in China, US and Russia.
- GLORIAD will not only serve for scientists of the three countries, but also become a platform for scientists across the world.

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Introduction to GLORIAD

- Co-developed (and to-be-co-funded) by U.S., Russia, China
- Expanded capacity for science and education collaboration (10 Gbps)
- New "Global Ring" topology for reliability and new applications
- Essential for supporting advanced S&E applications (particularly HEP, Astronomy, Atmospheric Sciences, Bioinformatics, optical network research, network security research)

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GLORIAD Background

- 1998, US-Russia NaukaNet
  - Supported by Russian MinSci and U.S NSF
  - Bandwidth 6 M→ 45M→155M (2003)
  - NaukaNet finished in Fall 2003
- *Motive*
  - *Russia intends to extend S&E network to far east*
  - *Highest level interest in US for improving US-China S&E cooperation*
  - *Highest level interest in Russia for improving Russia-China cooperation*
  - *Good opportunity to develop general framework for tri-lateral cooperation around most advanced S&E network built to-date*
  - *Extend NaukaNet*

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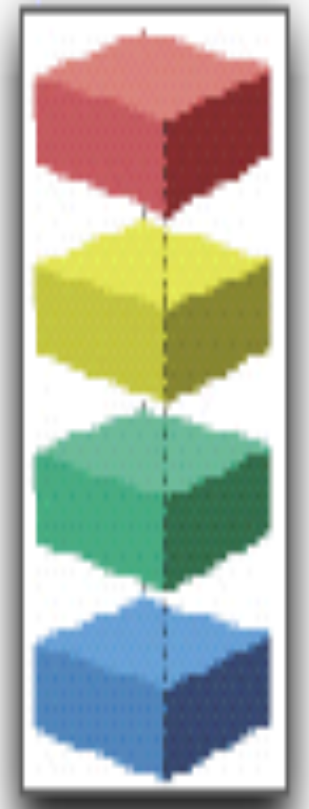
The 4 Layer GLORIAD Model



- Application Communities

  Scientists, educators, public organizations, students

- Collaboration Framework

  Middleware/grid tools, technologies tying together networks, computers and communities

- Sculpted Network Platform\

  Ethernet (layer 2) switching, IPv6 migration, Network monitoring and management (scheduling, allocation) tools

- Lightwave/Lambda Network

  Lambda-based network; optical switching

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GLORIAD Science Applications

- Focus
  - Sharing of Scientific Data
  - Sharing of Scientific Equipment
  - Cooperation on research projects
  - Improve research methods with digitalization, Informatization
- Most interesting areas
  - High Energy Physics
  - Astronomy
  - Bioscience
  - Geo Science
  - Environment
  - Atmosphere

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Milestones of GLORIAD

- 1993-2002.02: Both US and Russia partners of NaukaNet program, proposed that China, as a new strategic partner, join this program and aim to build a ring network for science and education around the north hemisphere.
- 2002.07: NSF contacted with CAS.
- 2002.10: CAS officially approved that CNIC, representing CAS, initiate this China-US-Russia Network program.
- 2002.12: US & Russia delegates visited CNIC, CAS. MOU was signed by 3 countries' partners.
- 2003.02-12: A couple of video conferences about GLORIAD.
- 2003.11: CNIC delegates visited US. A contract with Tyco Telecommunication was signed.
- 2004.01.12: China-US-Russia Network GLORIAD Grand Opening Ceremony in Beijing.

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GLORIAD Grand Opening Ceremony

GLORIAD Grand Opening Ceremony, CAS Headquarter Jan.12, 2004

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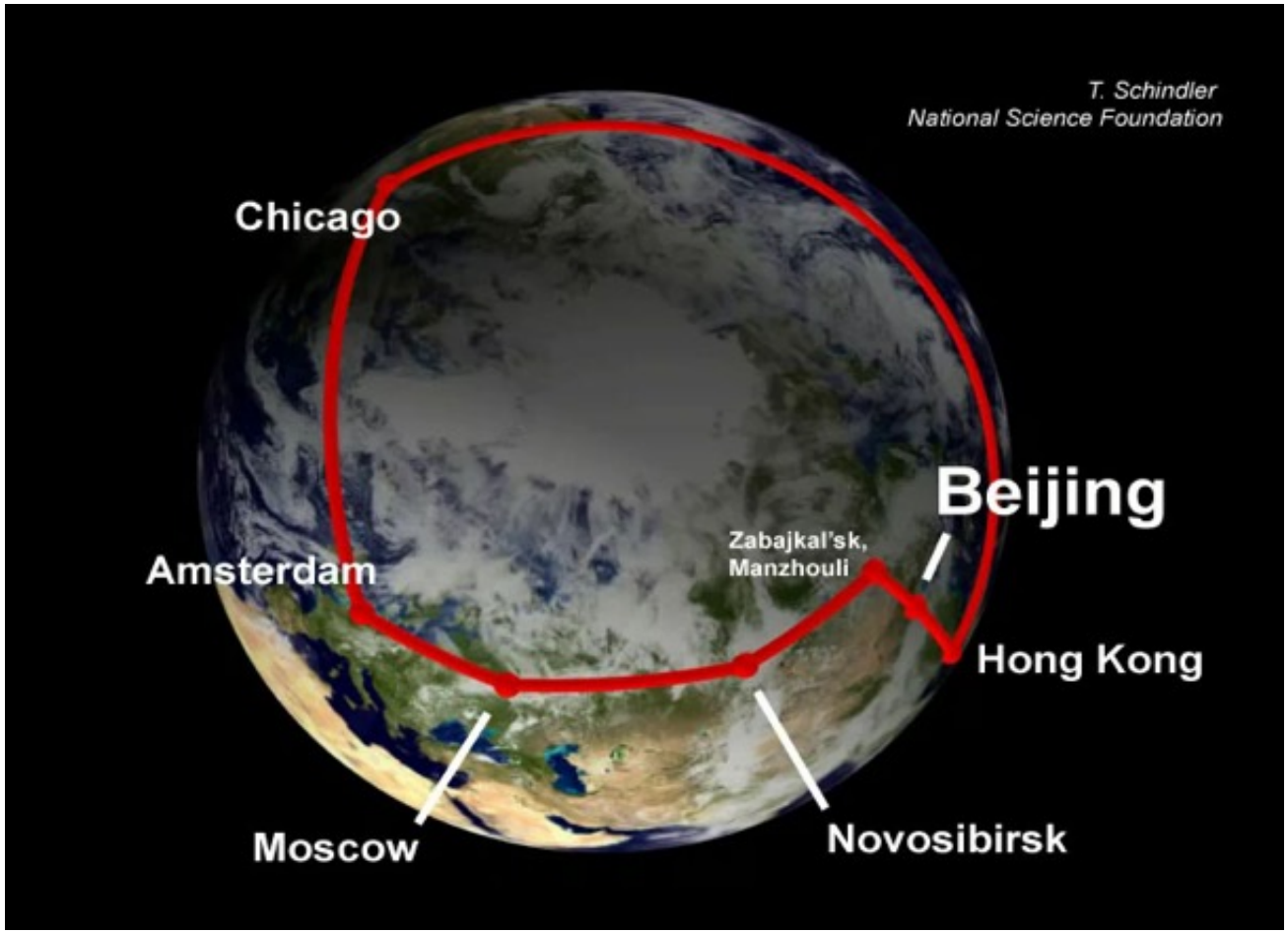
Global Ring Network for Advanced Applications Development



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Hong Kong Internet Open Exchange Point

- Nov 23, 2004, the Beijing-Hong Kong section of the "China-US-Russia Global Ring Network for Advanced Applications Development (GLORIAD)" has been upgraded to 2.5G
- On the same day, the Chinese Academy of Sciences formally announced a plan to establish the next generation light wave "Hong Kong Internet Open Exchange Point-HK Light“
- HK Light is the first Open Exchange Point in Asia
- HK Light will serve as a venue where high-speed broadband Internet networks from Japan, South Korea and Taiwan Province of China will interconnect.

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HK Light Press Conference

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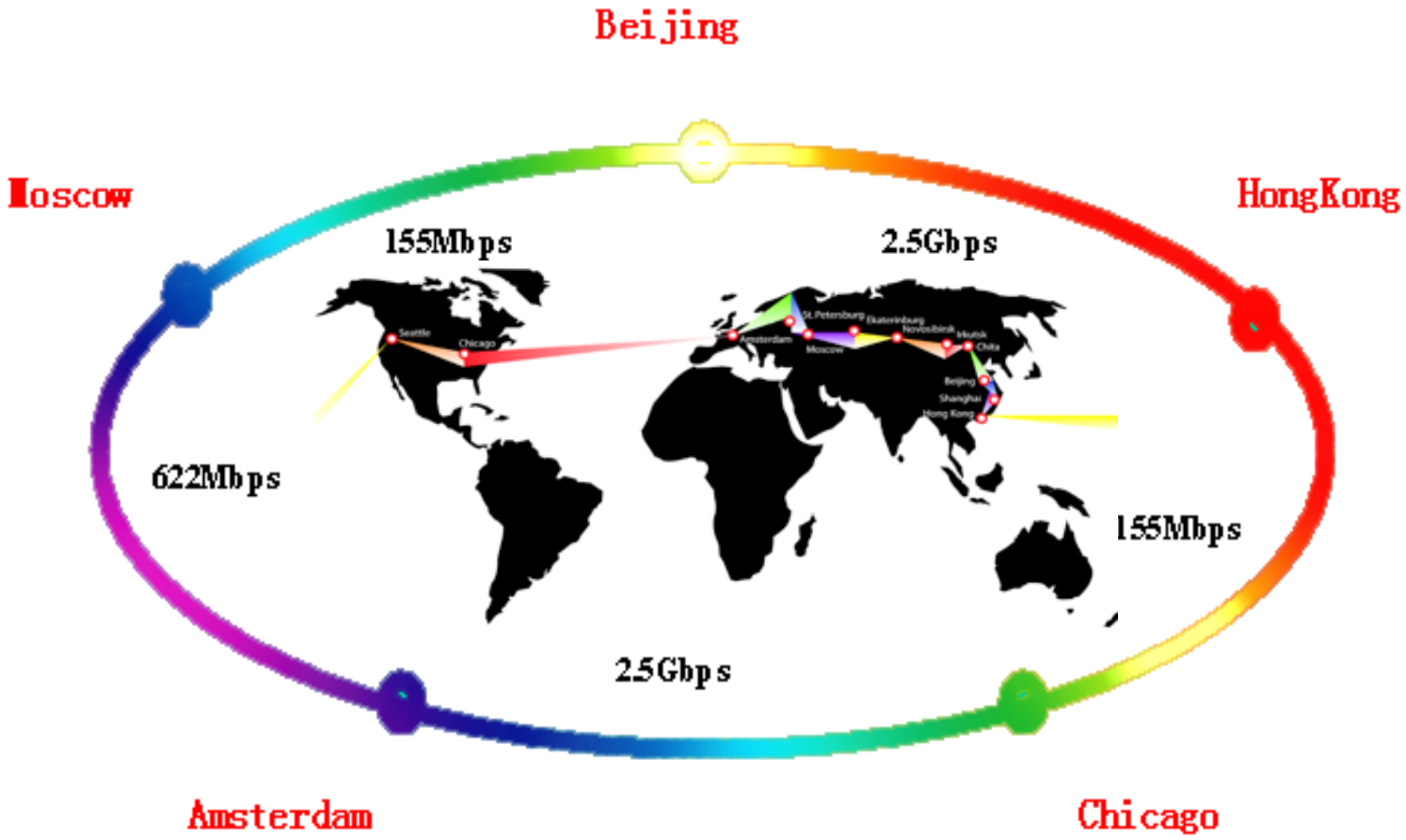
Current GLORIAD network speeds



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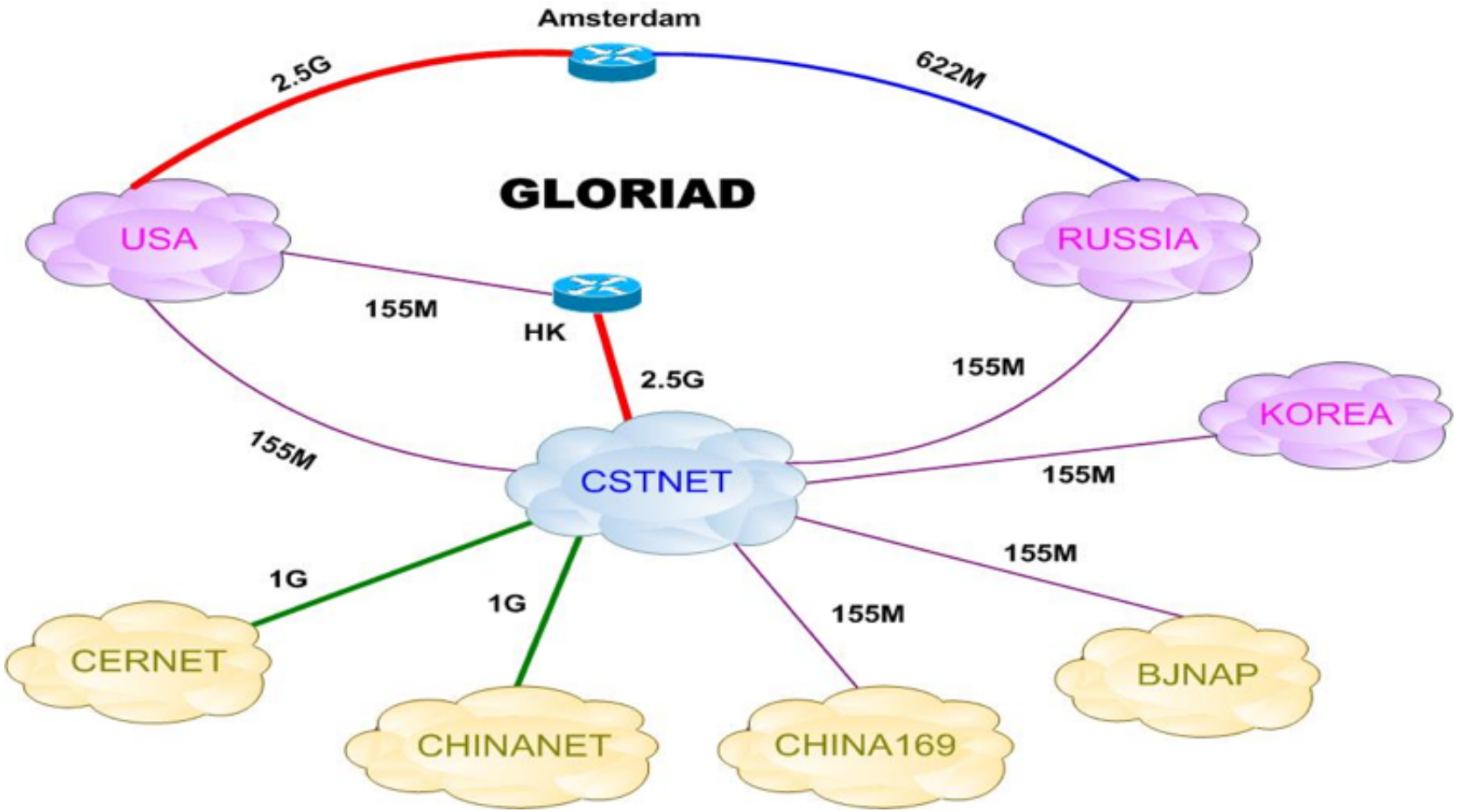
Current Status Of CSTNET Connections



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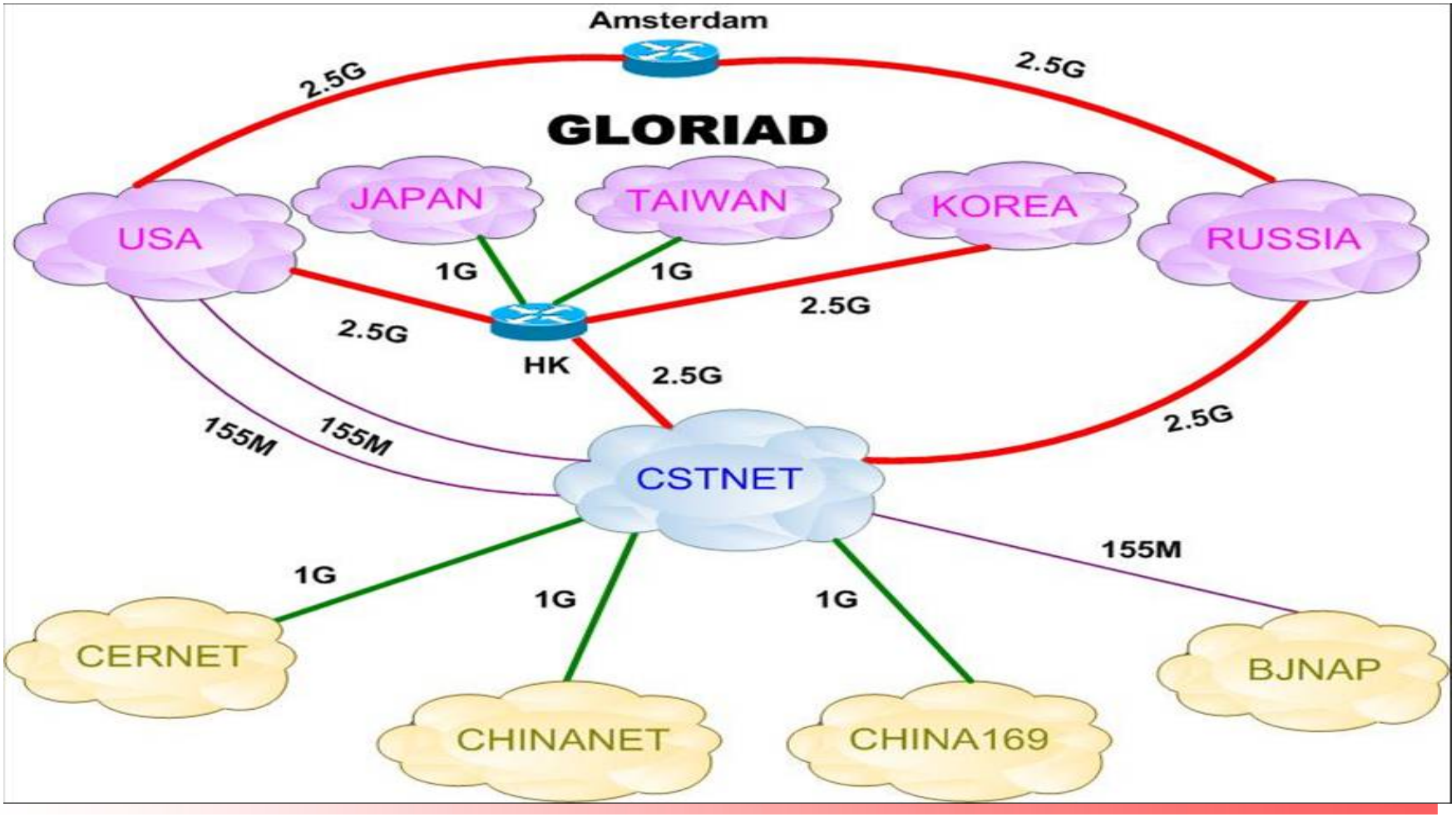
Ongoing Developing Scheme



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The end

Thank you!