Global IPv6 Summit, 29-31.1.2001, Madrid

China IPv6 Initiatives

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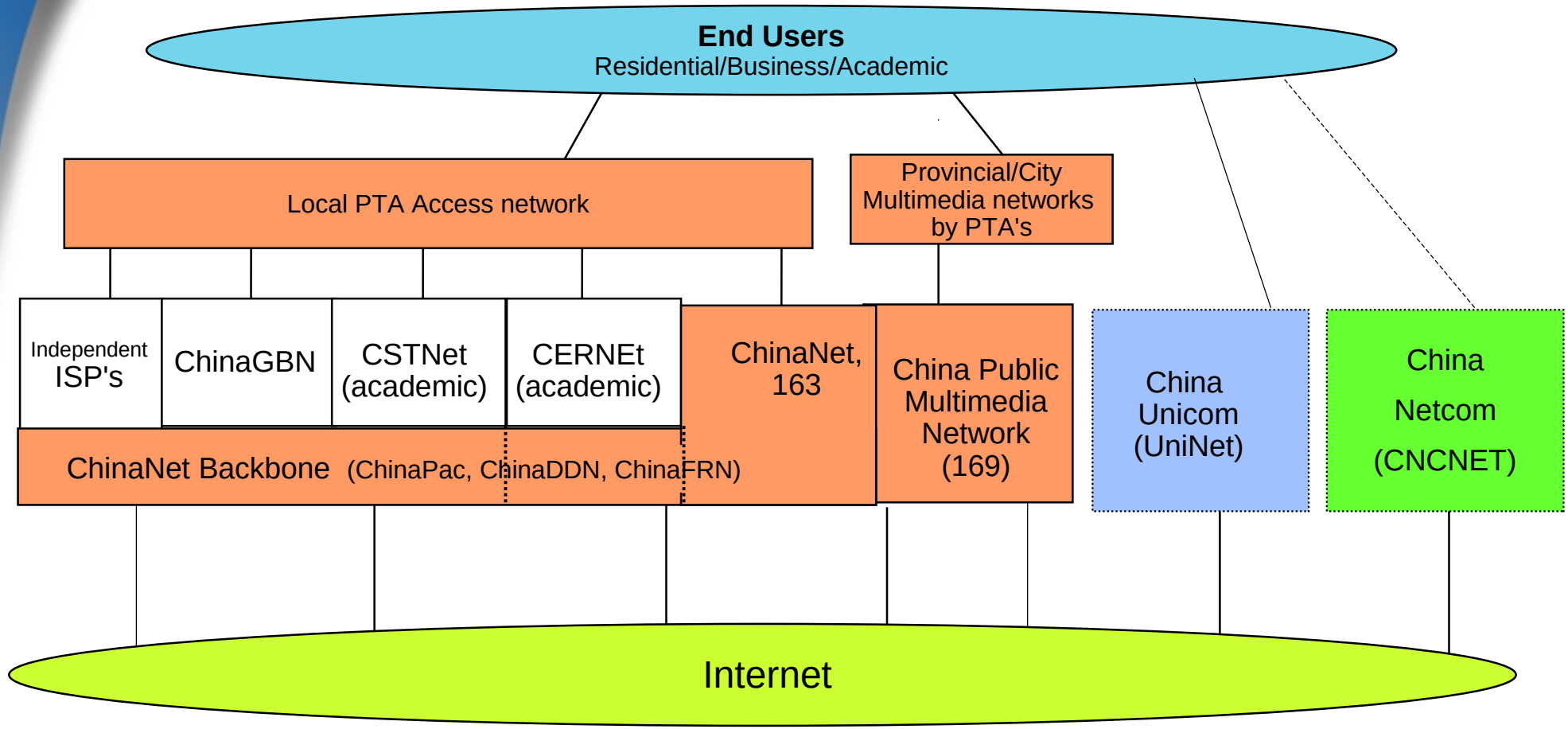
Internet networks architecture in Chin



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Internet Status in China (by end of 2000)

By end of 2000		by end of 99, increase	
• Internet users: 22.5 millions		8.9 m	253%
• leased line connections: 3.64 m,	1.1 m		330%
• Dial-up connections: 15.43 m,		6.6 m	233%
• Both dial-up and leased line users: 3.43 m, and	1.15 m		298%
• Info electrical appliance Mobile devices: 0.93 m		0.2 m	465%
• Computer Hosts : 8.92 millions	3.5 m		255%
• through leased line connections : 1.41 millions		0.41 m	344%
• through Dial-up connections: 7.51 millions		3.1 m	242%

Internet Status in China (by end of 2000)

- The international bandwidth: 2,799 M
  - Network Total Beijing Shanghai Guangzhou 1999 total
  - **CHINANET** **1,953 M** 721M 661M 571M 291 M
  - **CNCNET** **377 M** 4M 365M 8M na
  - **CHINAGBN** **148 M** 53M 59M 36M 22 M
  - **CERNET** **117 M** 8 M
  - **CSTNET** **55 M** 10 M
  - **UNINET** **55 M** 47M 8 M 20 M
  - **CMNET** **90M** 45M 45M
  - **CIETNET** **4M**
  - **CGWNET** **under construction**

Motivation of IPv6 development in China

- Inefficiencies IP addresses for China
  - China will never get enough IPv4 address to meet it's needs for 1.3 billion people.
  - Alternative solutions such as NAT will not scale.
- Biggest Internet growth potential
  - Doubles every half-year in China
- Fastest pace to the Mobile Internet
  - Mobile phone doubles/triples every year from 20 m (99) to 70 m (00)
  - Mobile Internet users will exceed fixed Internet users in 2-3 years.
- China Internet development much behind the US
  - Internet infrastructure well developed in US vs. developing in China.

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China IPv6 Initiatives in 2000

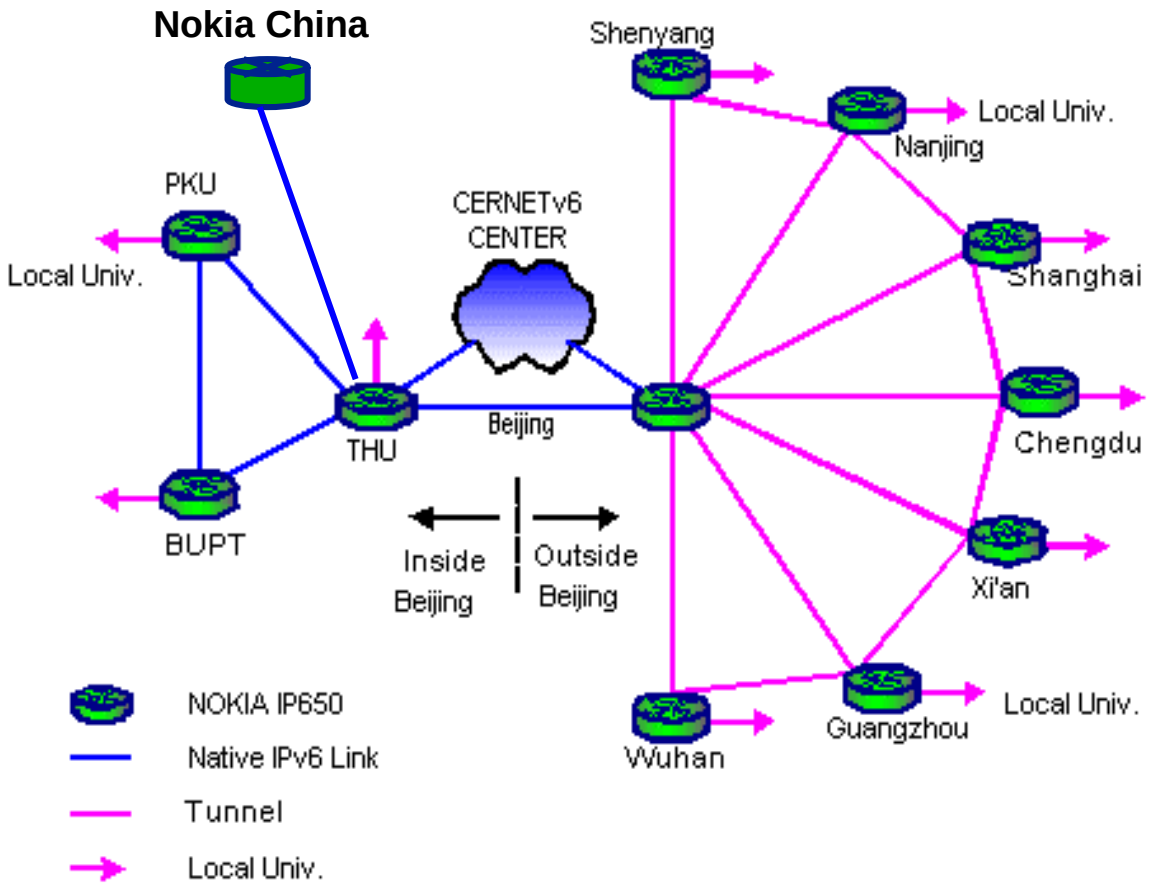
- China National Project (863 plan)
  - CERNET (Tsinghua, SCUT, SEU, and NEU) & China University of Science & Technology
  - IPv6 Demo System
  - Testbed design and deployment
  - Address allocation policy
  - Demo network running IPv6-enabled applications
  - Transition demo -- an IPv6/v4 web proxy
- Small activities
  - China Academy of Science
- INERNET-6 program (China Next Generation Internet Cooperation)
  - Nokia & CERNET

INTERNET-6
Co-operation btw NOKIA and CERNET

- Objectives:
  - Develop, test and validate advanced IPv6 networking in real environment
  - Enable IPv6 application development at Chinese universities
- Agreement signed in 1999, covers 3 years
- Nokia provides IPv6 routers to CERNET backbone testbed
- Joint laboratories with key universities
  - Tsinghua University and South China Univ.. of Tech.
- China IPv6 Workshops
  - Regular exchange of information and experiences
  - Participants from universities, research organizations, operators and regulators/government

CERNET IPv6 testbed 2001 in INTERNET-6

- A native network in Beijing
- A tunneled backbone nation-wide
- Tunnel broker services for students

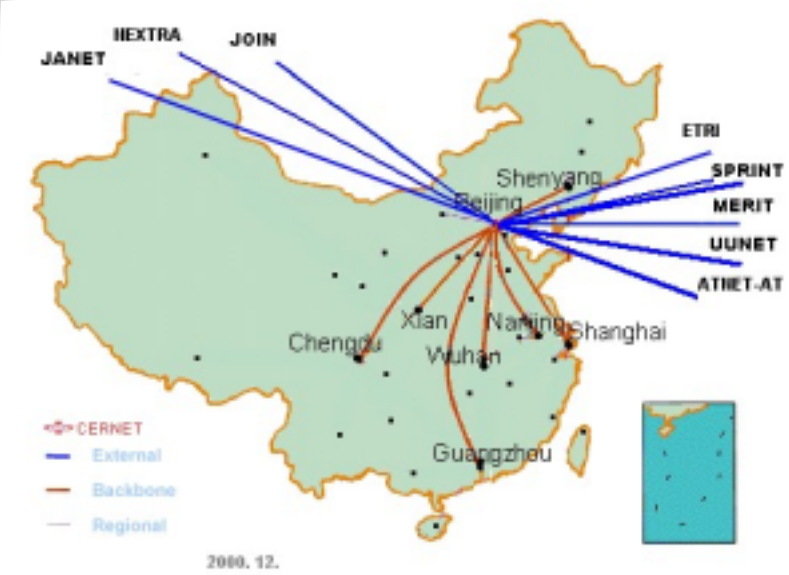


The networking & routers are supported by Nokia

Current research activities in INTERNET-6

- IPv4/v6 transition mechanism study
  - Tunnel Broker implementation and improvement (Tsinghua)
- Network and service management
  - IPv6 DiffServ service management (SCUT)
  - IPv6 network management (SNMP v3) (BUPT)
- IPv6 application development
  - IPv6 Research Engine (Tsinghua)
- IPv6 conformance test tool (CAS /ICT)

CERNET IPv6 Testbed



- Since April 1998
- First tunnel to Merit
- First BGP peer to Sprint
- p-TLA 3ffe:3200::/24 since November 1998
- Connecting CERNET all backbone site and about 20 universities
- CERNET IPv6 Backbone -- 2001:250::/35, the IPv6 SubTLA in China, assigned by APNIC in April 2000

CERNET

•155Mbps+ backbone

•Connecting 3 million users

•700+ education and research organizations over 125 cities in the Mainland of China

China IPv6 developments in 2001

- National project
  - One university will be selected to carry the project.
- INTERNET-6 (China Next Generation Internet R&D Cooperation)
  - CERNET IPv6 backbone testbed and native IPv6 network in Beijing with wireless access and mobility support: Mobile IPv6 + WLAN
  - IPv6 application development
  - Transition machine deployment: Tunnel Broker and NAT-PT
  - China IPv6 Workshop 2001 in April 2001
  - Partnerships
- Other commercial operators follow-up

More information about China IPv6 activities

- http://www.ipv6.com.cn China IPv6 web site
- http://www.internet6.com.cn Nokia-China IPv6 coop
- http://www.ipv6.net.edu.cn CERNET IPv6 web site

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