

International NREN capabilities

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Overview

- Global NREN community
 - Services
 - Innovation
 - Community
- Are we falling behind ?

The Australian National University

- Your National University
- Research focused
 - Global projects
- Internal research



ANU Network

- Fibre
- 10Gb core
- 1Gb to the desktop
- Converged network
- Experimenting with 10Gb to the desktop
- Some legacy infrastructure
- IPV4 and IPV6
- ~400Mbps multicast video
 - 80 TV channels
 - 30 Radio channels

Global NRENs

- NREN - National Research and Education Network
 - Internet2 (US)
 - Geant (EU)
 - CESNET (CZ)
 - CERNET (CN)

Comparison of service offerings

- AARNet
- Internet2
- Geant
- CESNET
- CERNET

Drivers at ANU

- Data focused research and science
 - Skymapper
 - Hawaii Observatories
 - Synchrotron
 - CERN LHC
 - Remote sensors

Internet2

Member focused. Member led.

Internet2 Network

ciena

INDIANA UNIVERSITY

infinera

Juniper NETWORKS

Level(3)



CONNECTORS

- 3ROX
- CENIC
- CIC OmniPoP
- Drexel University
- GPN
- Indiana GigaPoP
- KyRON
- LEARN
- LONI
- MAGPI
- MAX
- MCNC
- Merit Network
- MREN
- NOX
- NYSERNet
- Oregon Gigapop
- Pacific Northwest GigaPoP
- SoX
- University of Memphis
- University of New Mexico
- University of South Florida
- University of Utah/UEN

Internet2

Member focused. Member led.

- FibreCo
 - Holding company for acquiring, holding and distributing dark fibre network assets
 - 13,000 route miles
 - Metro dark fibre assets
 - Access to over 6,000 on-net facilities via Level 3

Internet2

Member focused. Member led.

- Network Services
 - Advanced IP network
 - 10Gb member connections
 - Dynamic circuits
 - Static circuits

Internet2 Community Working Groups

- Bulk Transport
- Grouper
- HEPKI-TAG (PKI)
- IPV6
- MACE-Dir (Directories)
- MACE-Shibboleth
- Multicast
- Orthopaedic Surgery
- perfSONAR
- Presence and Integrated communications
- Salsa
- SIP

Internet2 Community SIGs

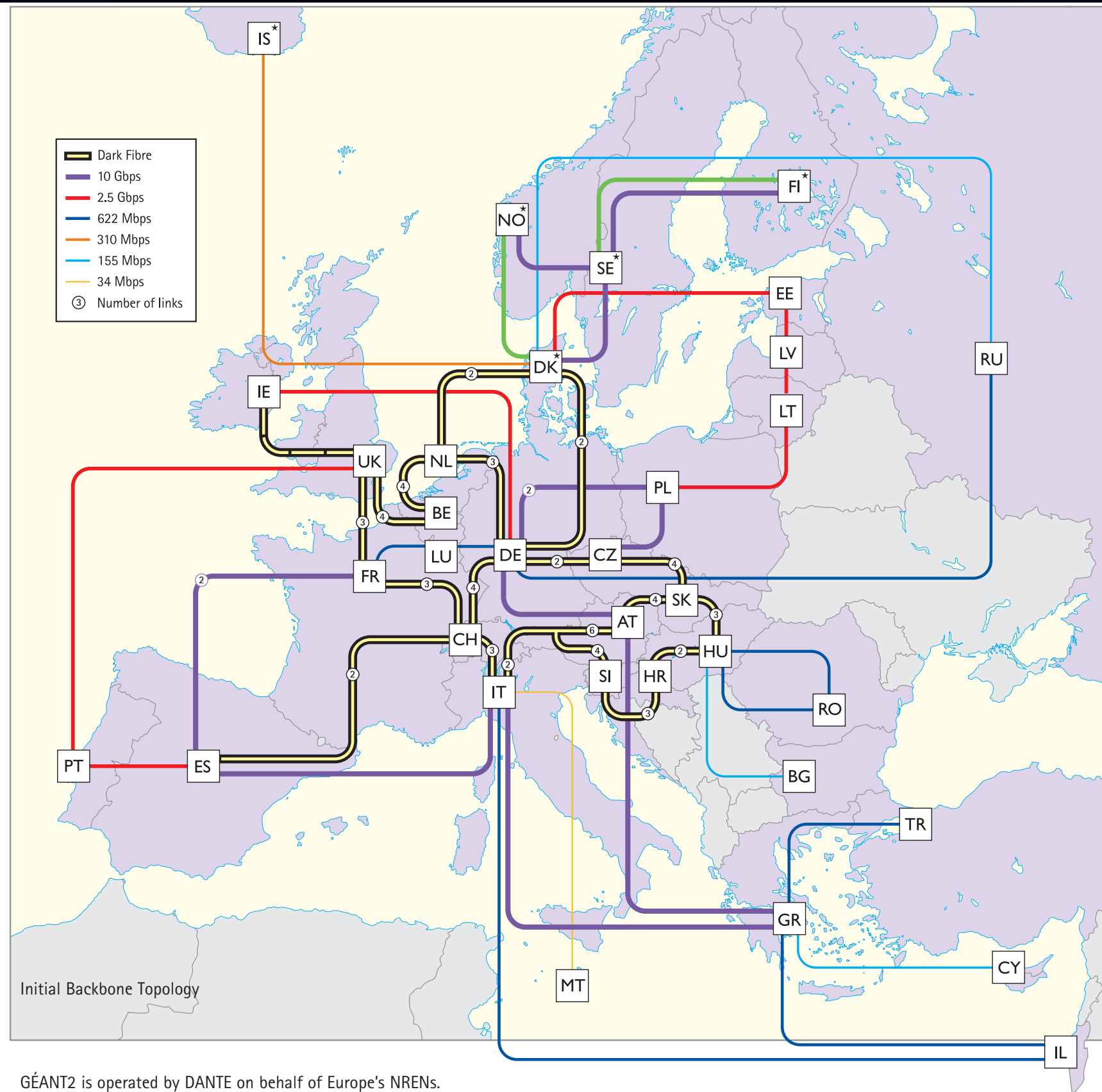
- Advances of Relevance to Clinical Activities
- Archaeology
- Campus Bandwidth Management
- Collaboration
- Digital Video
- Emerging Research and Education Networks
- Health
- High Energy Physics
- Performance
- Teaching and Learning
- Voice over IP

GÉANT

- Pan-European multigigabit data communications network
 - Grid computing
 - Collaborate in real time
 - Perform previously unimaginable cutting edge research

GÉANT

- 34 countries
- 30 national R & E networks
- Multiple 10Gb wavelengths



GÉANT2 is operated by DANTE on behalf of Europe's NRENs.

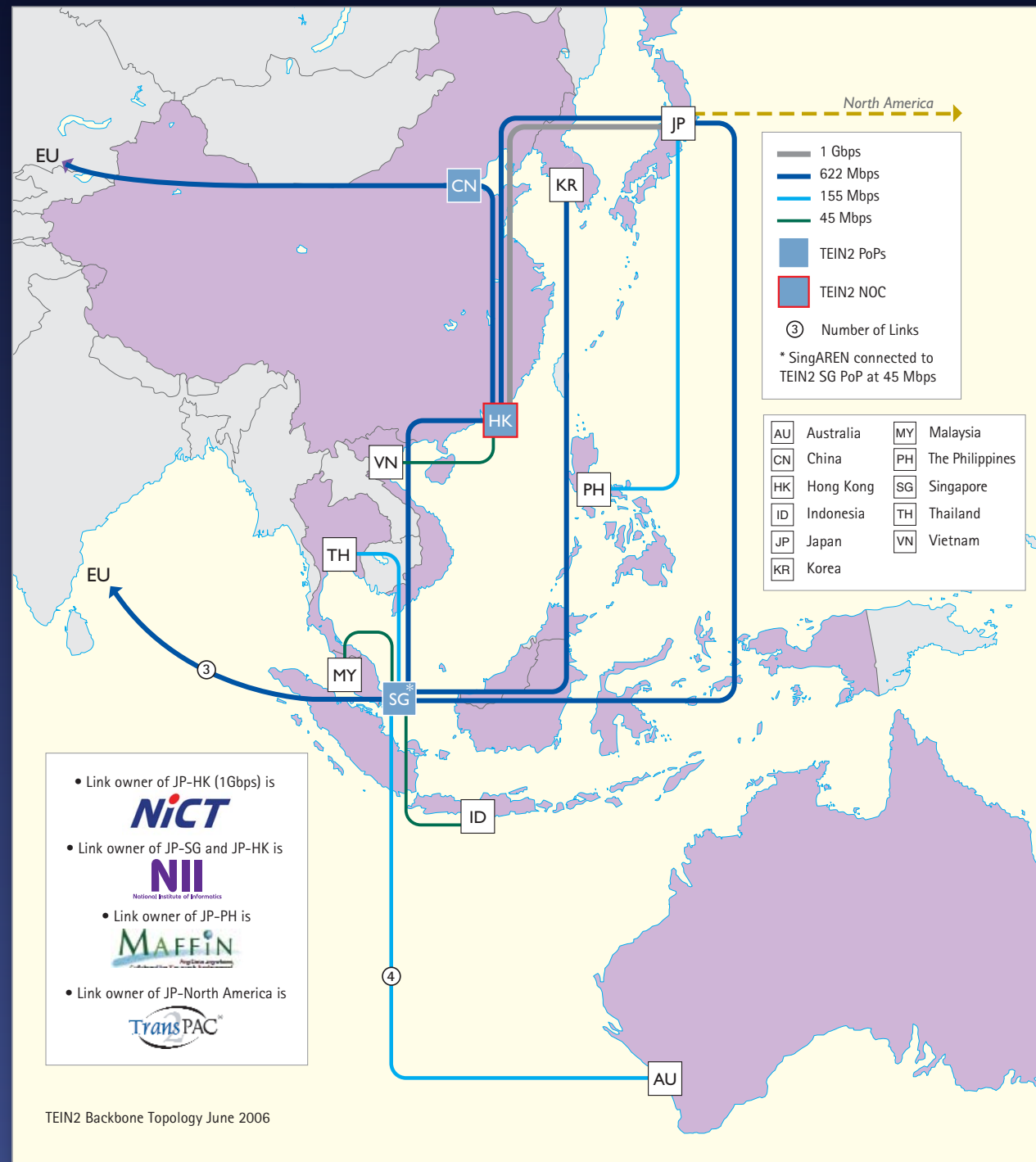
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BE Belgium	DE Germany	FI Finland*	HU Hungary	IT Italy	MT Malta	PT Portugal	SI Slovenia
BG Bulgaria	DK Denmark*	FR France	IE Ireland	LT Lithuania	NL Netherlands	RO Romania	SK Slovakia
CH Switzerland	EE Estonia	GR Greece	IL Israel	LU Luxembourg	NO Norway*	RU Russia	TR Turkey
CY Cyprus						UK United Kingdom	

*Connections between these countries are part of NORDUnet (the Nordic regional network)

TEIN2

Regional Connectivity for Asia-Pacific Research and Education

Linking Asia-Pacific to Europe and beyond



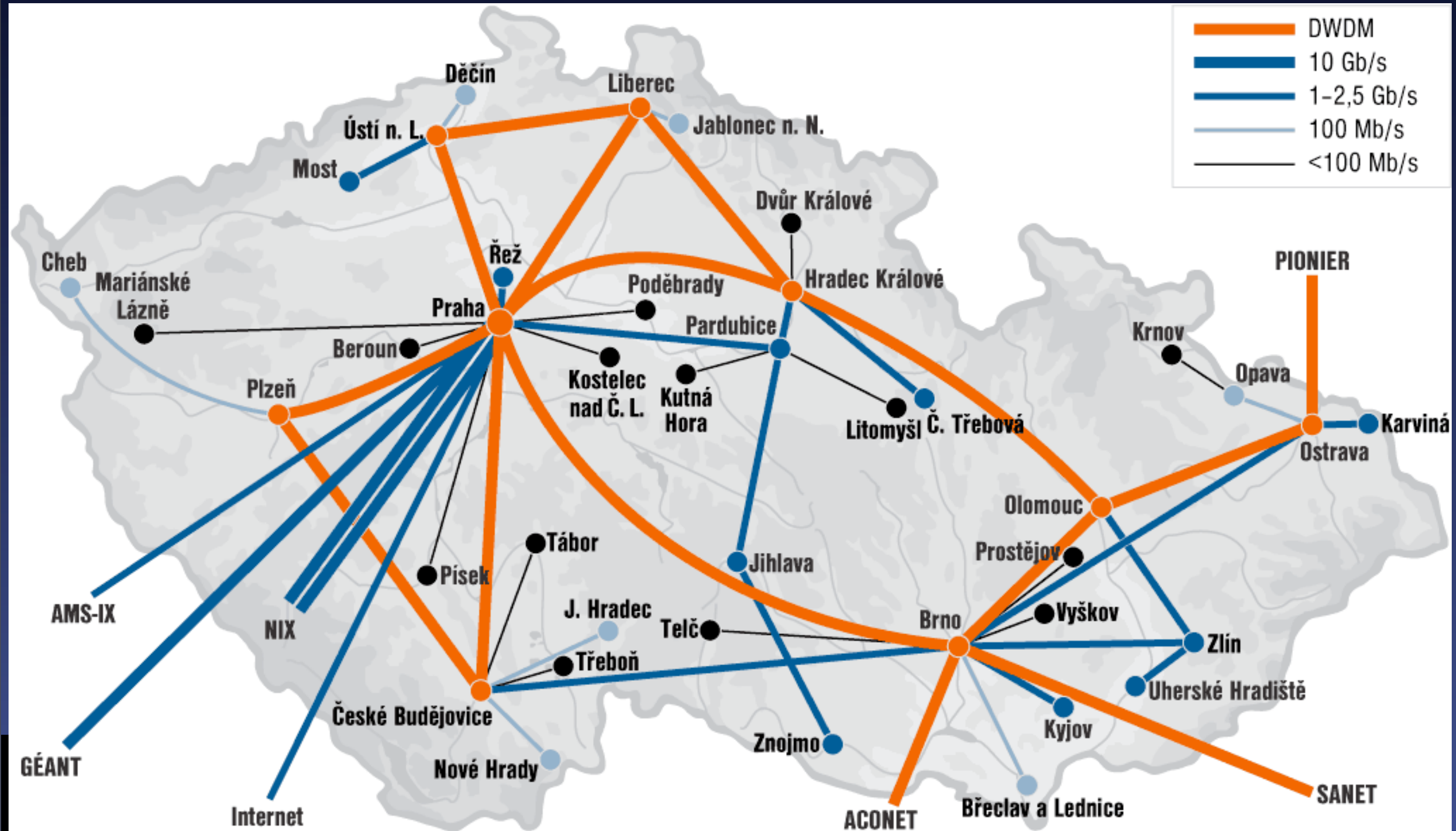
GÉANT

- Pan-European working groups
 - IPV6
 - Multicast
 - MPLS
 - perfSONAR
 - PERT
- QoS
- Security
- Namespace
- Training
- eduroam

CESNET

- 16 Member institutions
- DWDM core
- 1Gb, 10Gb, POS
- Multiple 10Gb interconnects to other NRENS

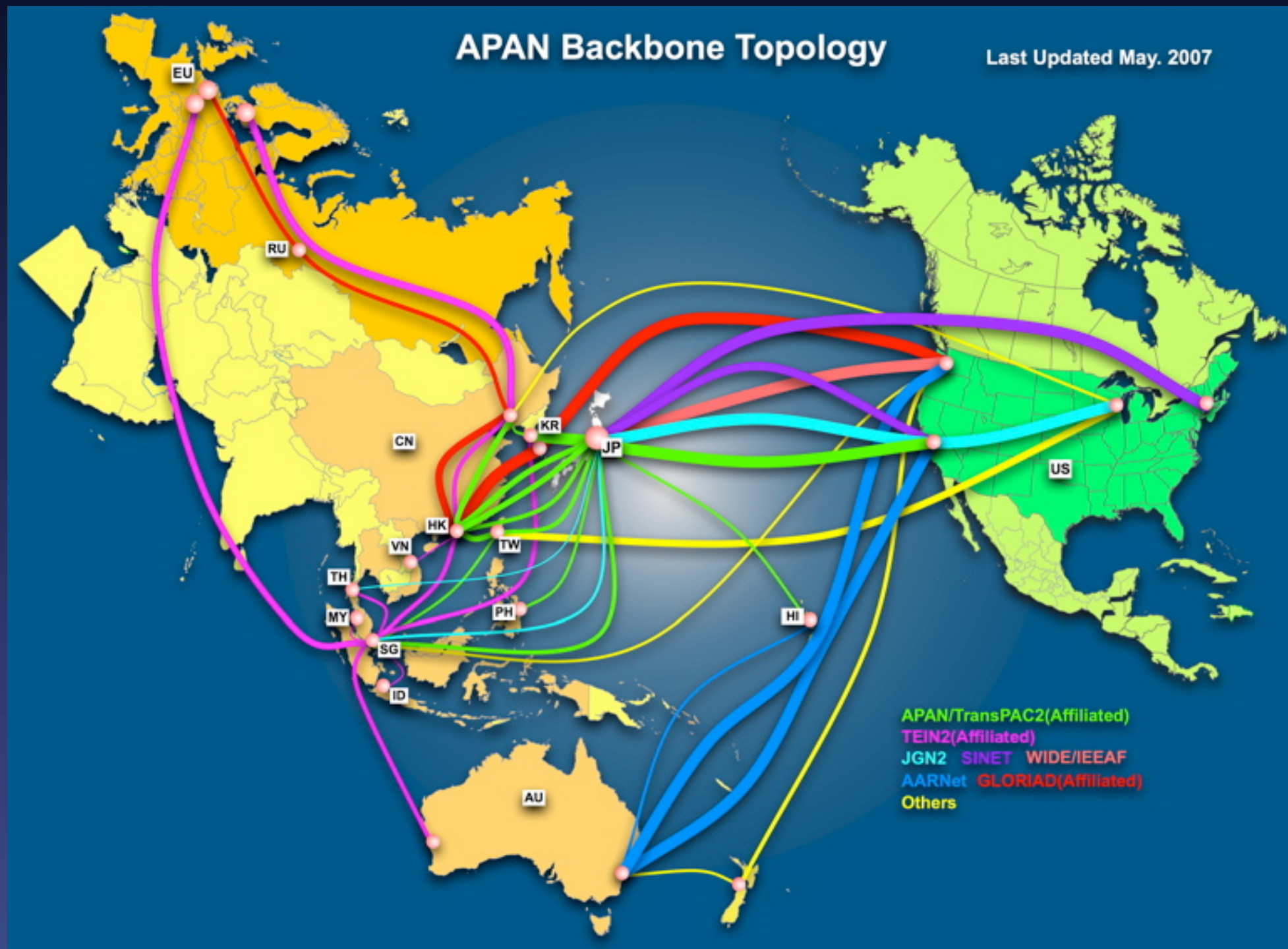
CESNET



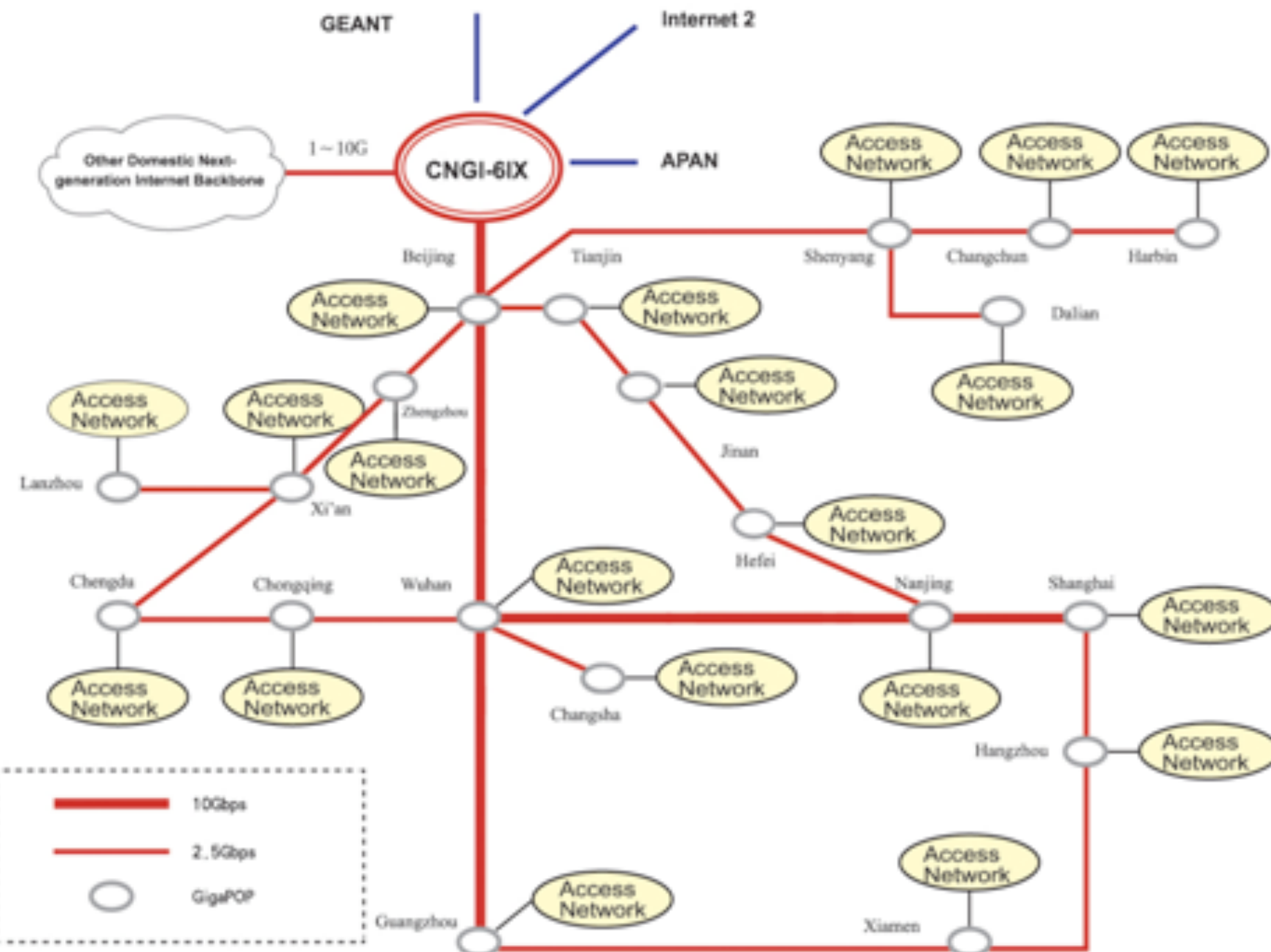
CESNET

- Development of the NREN
- Optical networking
- Programmable hardware
- Network performance
- AAI and mobility
- MetaCentre
- Multimedia transmissions and collaborations
- Application support

Asia



CERNET



2008

- We are now 5 years or 1/3 of the way into the IRU for NextGen fibre
- 10Gb service might be “available soon”
- Tsunami of data sources coming online
 - CERN
 - Skymapper

AARNet

- National 10Gb backbone
- Lightpaths
- 1Gb circuits to members
- 10Gb circuits “real soon now”

Research capability

- Many have argued
 - no evidence of demand
 - current network use does not stress the existing capacity
 - lightpath or bypass networks are needed
- Why ?
 - no direct contact with the research community
 - cost of use
 - traffic engineering

The Tsunami is coming

- Data focused research and science
 - Skymapper
 - Hawaii Observatories
 - Synchrotron
 - CERN LHC
 - Remote sensors
- Collaboration
- Rich media content



Networks, Storage, Access

- Data driven science needs
 - high speed networks
 - massive data storage
 - access

Delivering to our communities

- Education delivery is maturing
- Expectations of facilities
 - Lecture downloads
 - Remote tutorial participation
 - The experience
- Content producers

Innovation

- Innovation depends on world class facilities
- 1 Gb circuits are not enough
- Cost uncertainties and interference with creative research projects stifle innovation
- Press releases, rehashing and reimplementing others achievements is not innovation

Shared video

- Multicast reticulation of Television, Radio and lecture material for educational use
- Complex problem
 - Conflicting legal opinions
 - Sector wide approach required

How does AARNet compare ?

- Services
- Innovation
- Community

Room for improvement

Must focus on the needs of its owners

Being world class

- Attracting the best talent requires world class facilities
- Science is global and data driven
- We need the best to be the best

Conclusions

- A tsunami of data is coming
 - 10Gb On-Net access is essential
 - Lower cost for commodity traffic
 - Clarification on shared video

Thank you