RUSSIAN RESEARCH CENTRE
«KURCHATOV INSTITUTE»

Network coordination for Russian science and education

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RRC “Kurchatov Institute”

RUSSIAN RESEARCH CENTRE
«KURCHATOV INSTITUTE»

The basis

- Consolidation (ME&S, RAS, Rosatom, RRC «KI», MSU, JINR)
- Joint network (RBnet/RUNnet+…)
- Projects
  - FASTnet/GLORIAD
  - GEANT
  - EGEE
  - ….

RUSSIAN RESEARCH CENTRE
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- Domestic infrastructure
  - 2001 - 4Mbps
  - 2002 - 34 Mbps
  - 2003 - 90 Mbps
  - 2004 - 155 Mbps

RUSSIAN RESEARCH CENTRE
«KURCHATOV INSTITUTE»

- International connectivity
  - 2001 - 45-90 Mbps
  - 2002 - 155*2 Mbps
  - 2003 - 622*2 Mbps
  - 2004 - 2.4 Gbps

Russian Institute for Public Network

Russian Institute for Public Networks (RIPN) has been founded in 1992 by the Higher School Committee of Russia, Russian Research Centre "Kurchatov Institute" and Computer Centre of Kurchatov Institute. The aims declared were the following:

- to develop computer communications in the interests of Research & Education (R&E);
- to coordinate IP networking in Russia;
- to promote research studies in the field of computer communications;
- to support R&E organizations in getting access to the Internet information resources via public networks.

Russian Institute for Public Network

IX - (Internet eXchange) Russian computer networks traffic exchange points

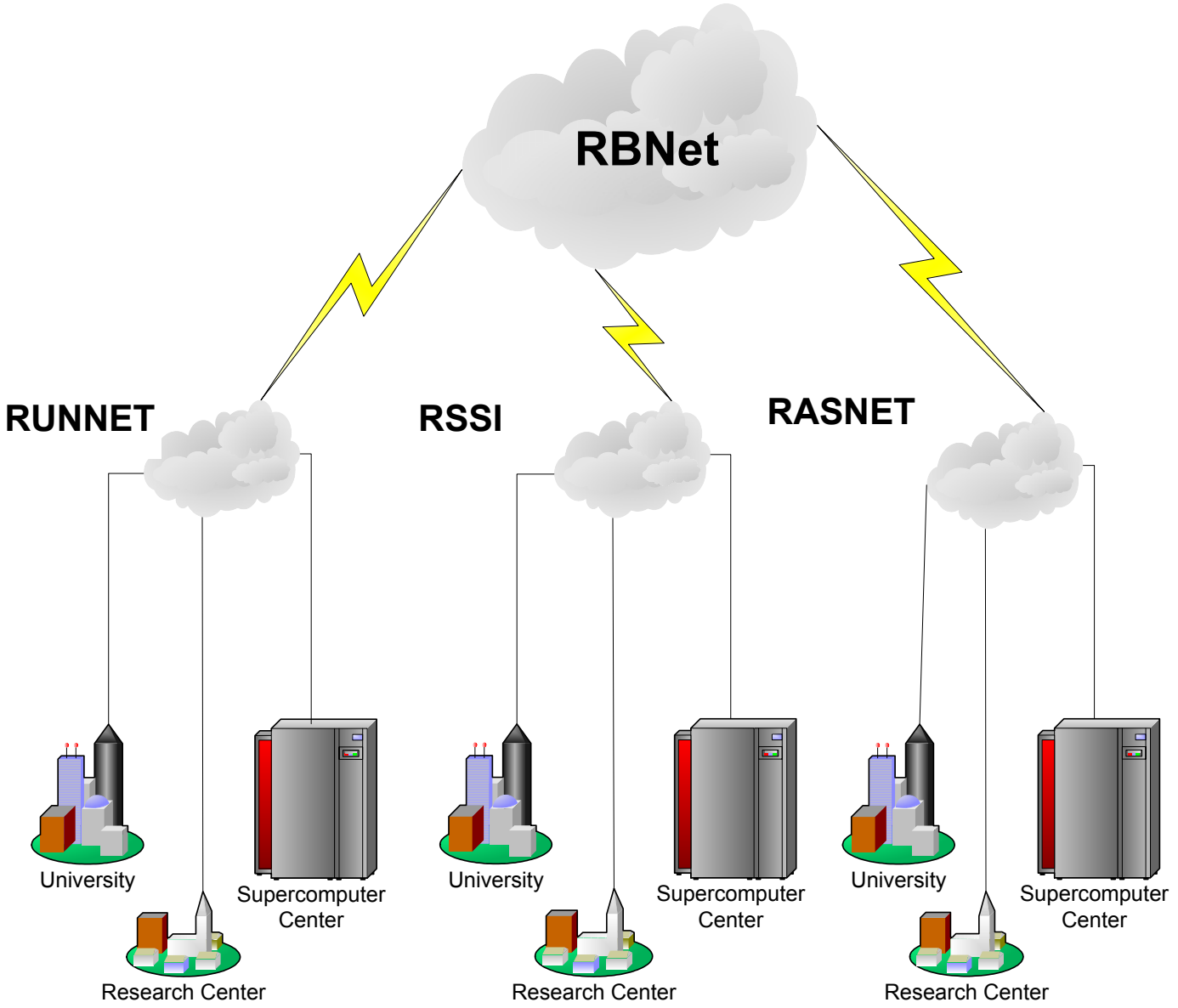
RBNet - (Russian Backbone Network) for regional Research & Education computer networks of Russia integration

NMBB - (North Moscow BackBone)

RELARN-IP - non-commercial computer network for Research & Education

INFOMAG- distribution of bibliographical and other scientific information, primarily scientific technical journals tables of contents

RBNet 2-level structure



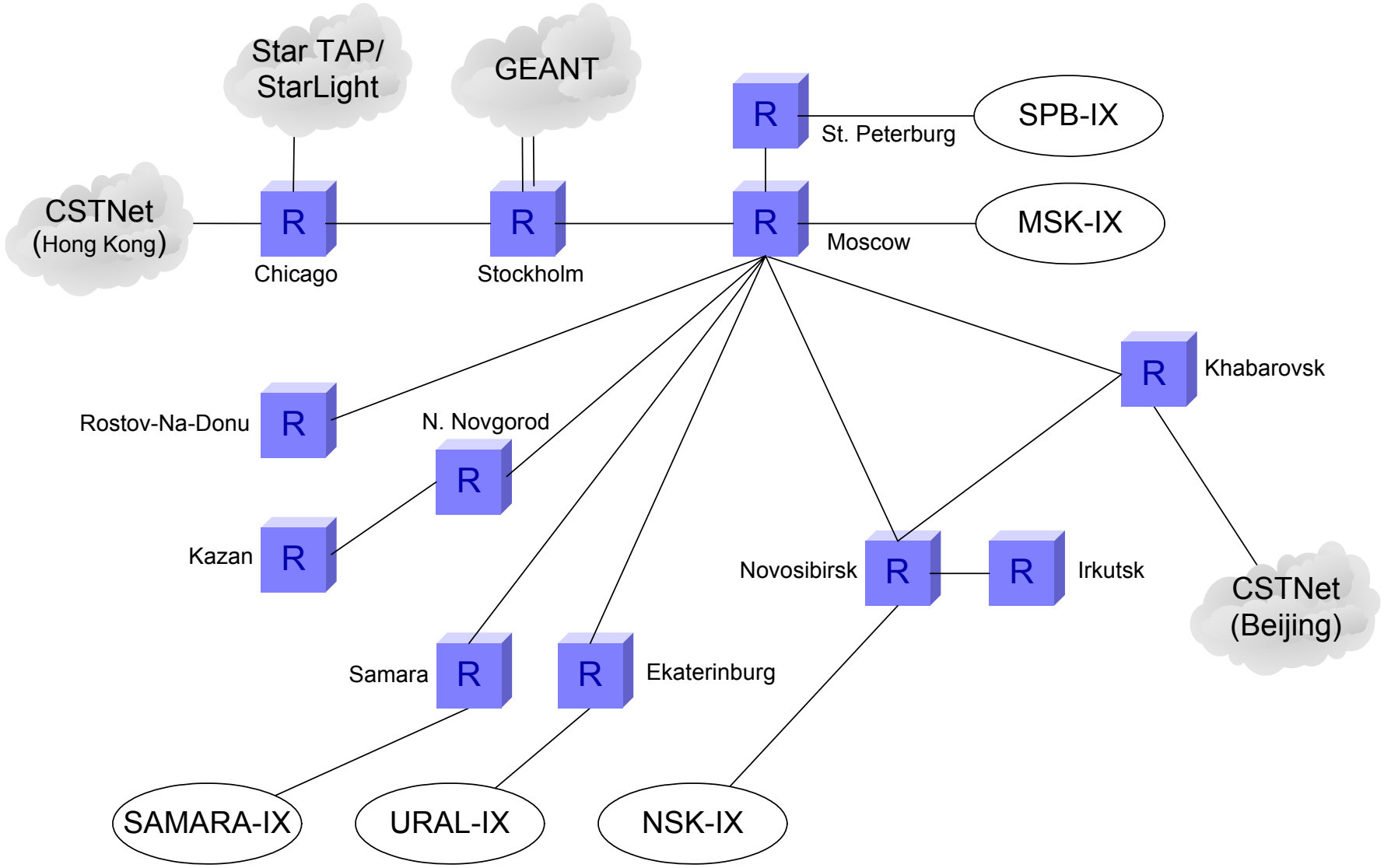
R&D Networks:

- -Regional
- -Corporative
- -Specialized
- ...

End Users:

- -Universities
- -Research Centers
- -Supercomputer Centers
- ...

RBNet POPs


Star TAP/
StarLight
GEANT
CSTNet
(Hong Kong)
R
Chicago
R
Stockholm
R
St. Peterburg
SPB-IX
R
Moscow
MSK-IX
R
Khabarovsk
Rostov-Na-Donu
R
N. Novgorod
R
Kazan
R
Novosibirsk
R
R
Irkutsk
CSTNet
(Beijing)
Samara
R
R
Ekaterinburg
SAMARA-IX
URAL-IX
NSK-IX

Moscow RBNet PoP

- Distributed architecture (3 PoPs)
- Transport system: Gigabit Ethernet and ATM (155/622Mbps)
- Fiber optic network (about 200 km)
- 24*7 support by RIPN
- NOC location: Kurchatov Institute

RBNet access system (Moscow)

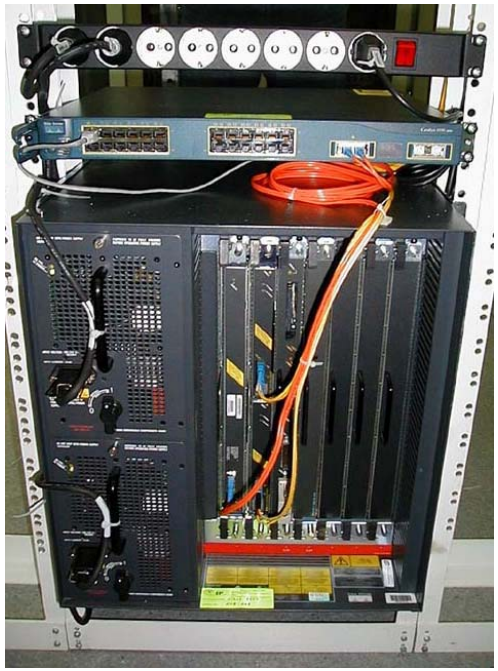
•RBNet Network Operation Center is placed at Kurchatov Institute.

•Datacenter "KIAEhouse" is designed professionally as telecommunication equipment housing location:

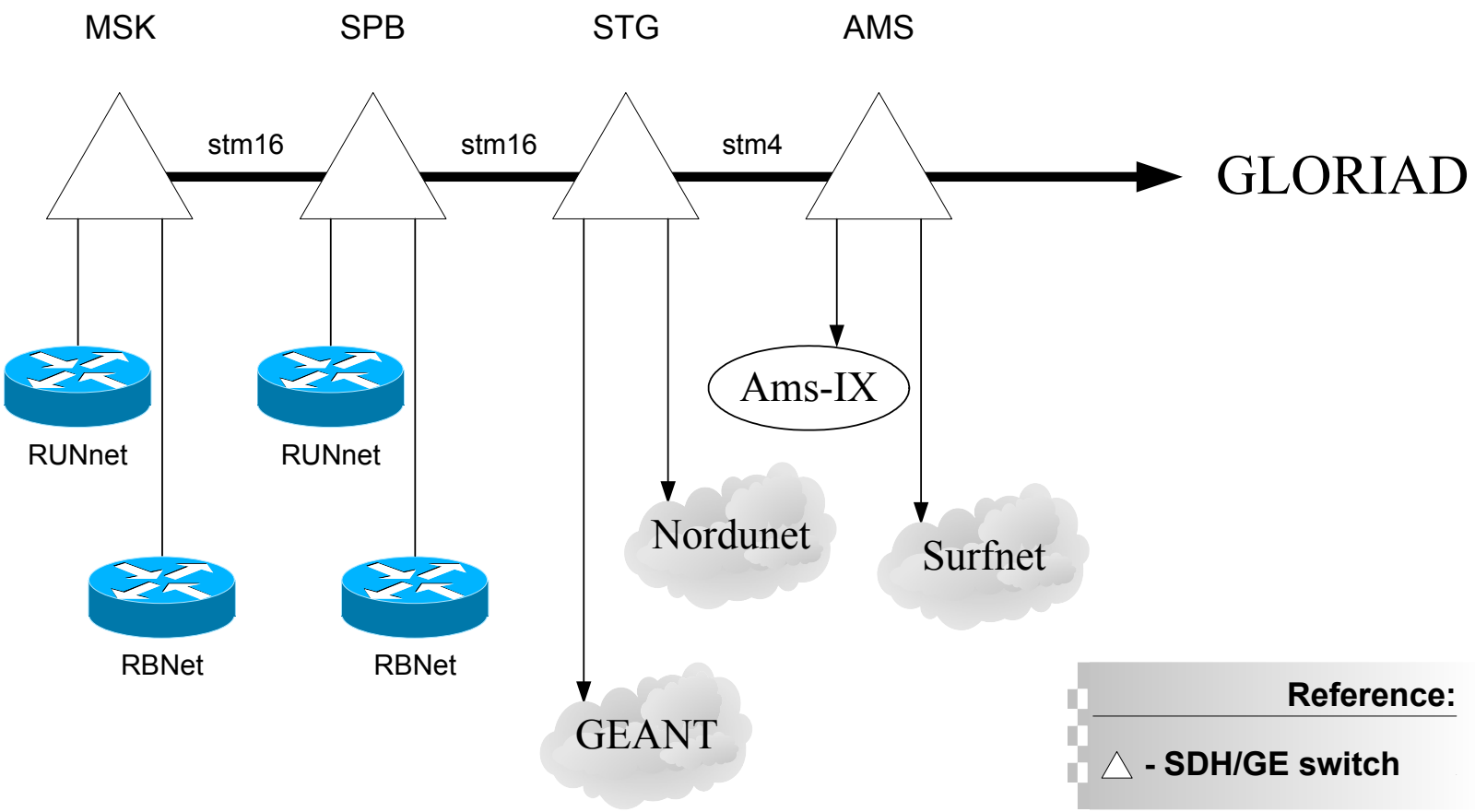
- **Rack space in a 19" rack for router and auxiliary equipment;**
- **Backup power system;**
- **Air-conditioning;**
- **Fire protection;**
- **Closed circuit television system;**
- **Out-of-band management;**
- **24*7 security on site ;**
- **Intelligent hands 24*7.**

RBNet access system (Moscow)

RBNet access system (Khabarovsk)

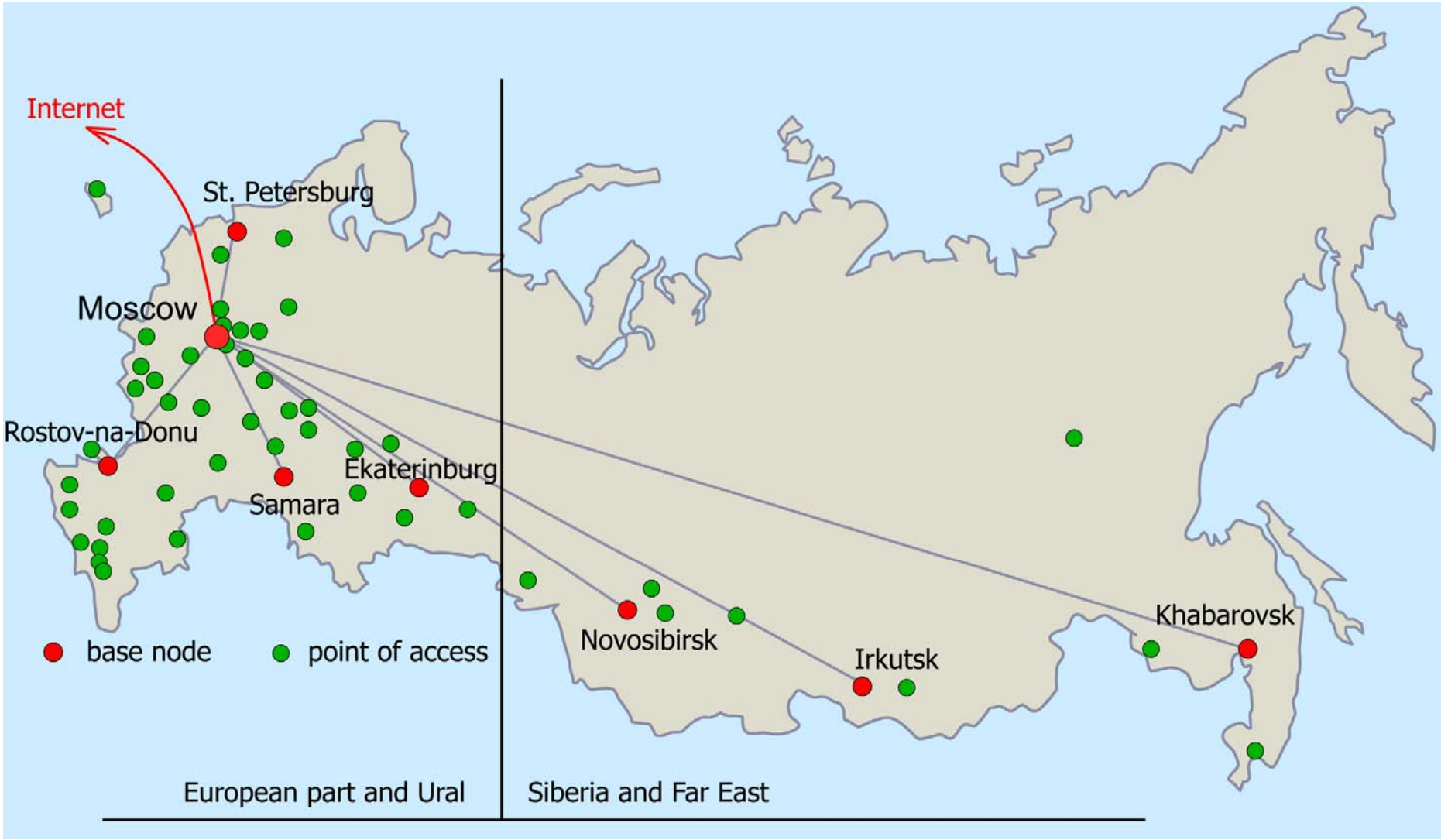


RBNet/RUNnet integrated International link



RBNet links

(General scheme)

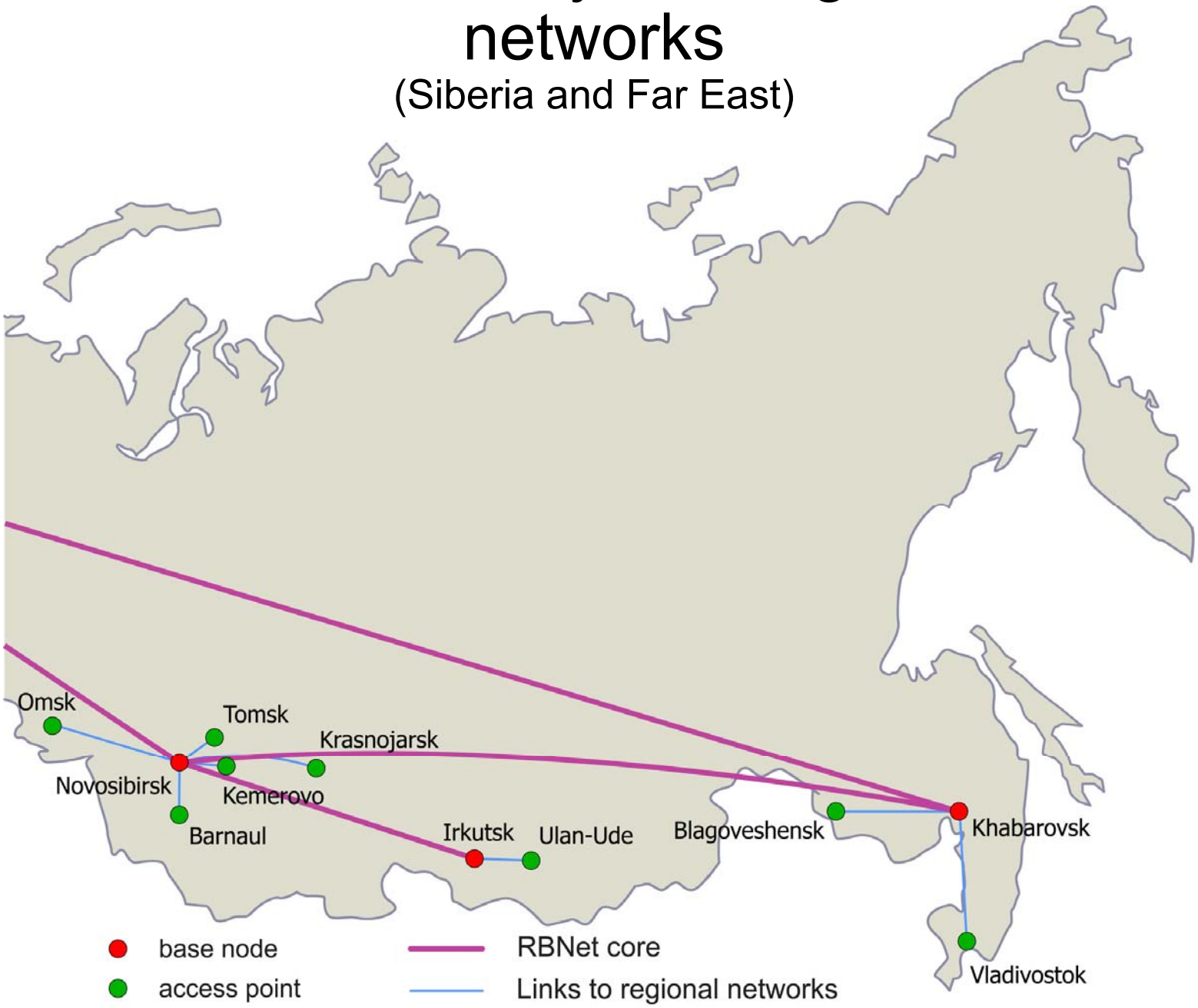


RBNet connectivity with regional R&E networks

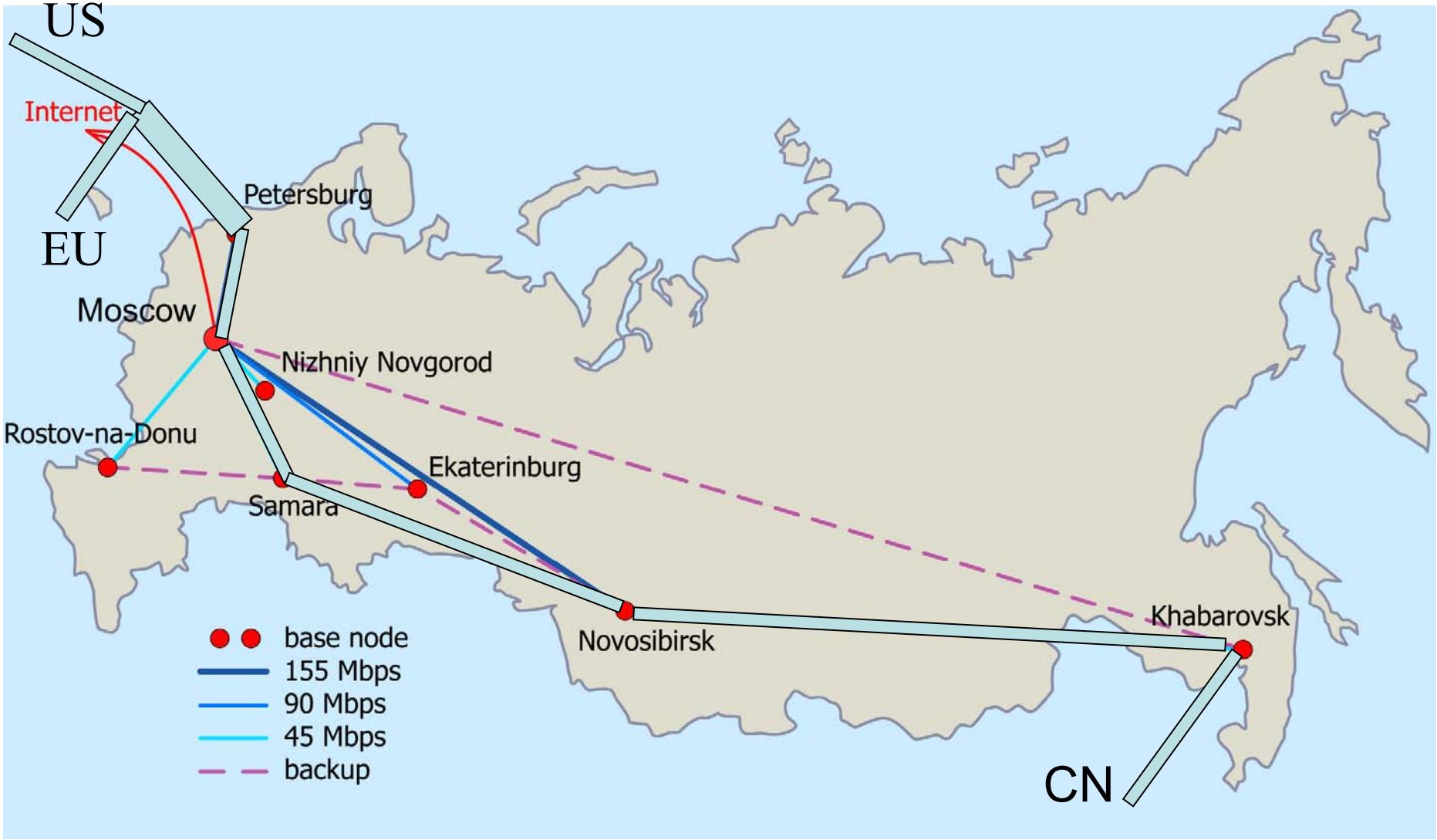
(European part and Ural)

RBNet connectivity with regional R&E networks

(Siberia and Far East)



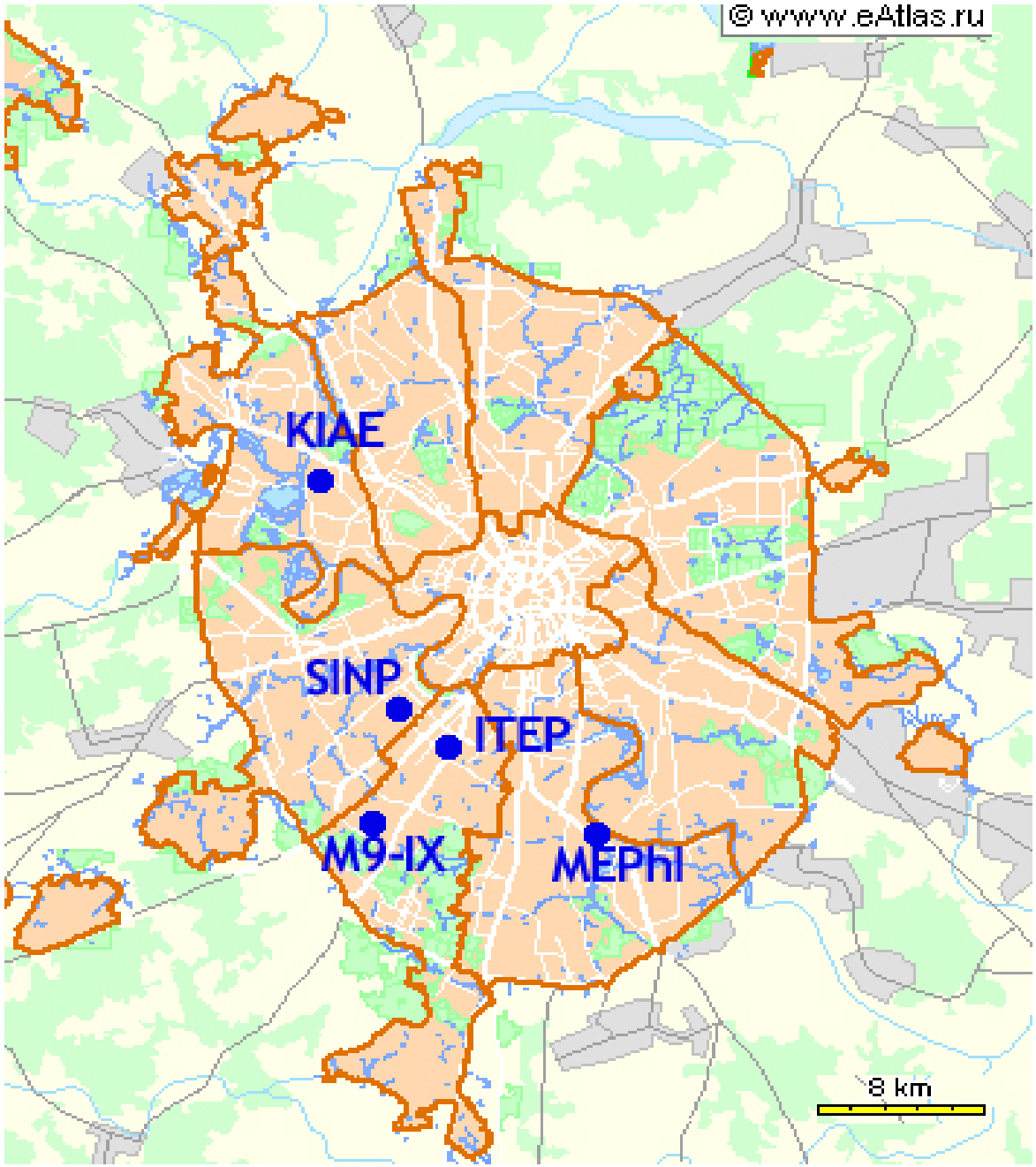
RBNet-2 links



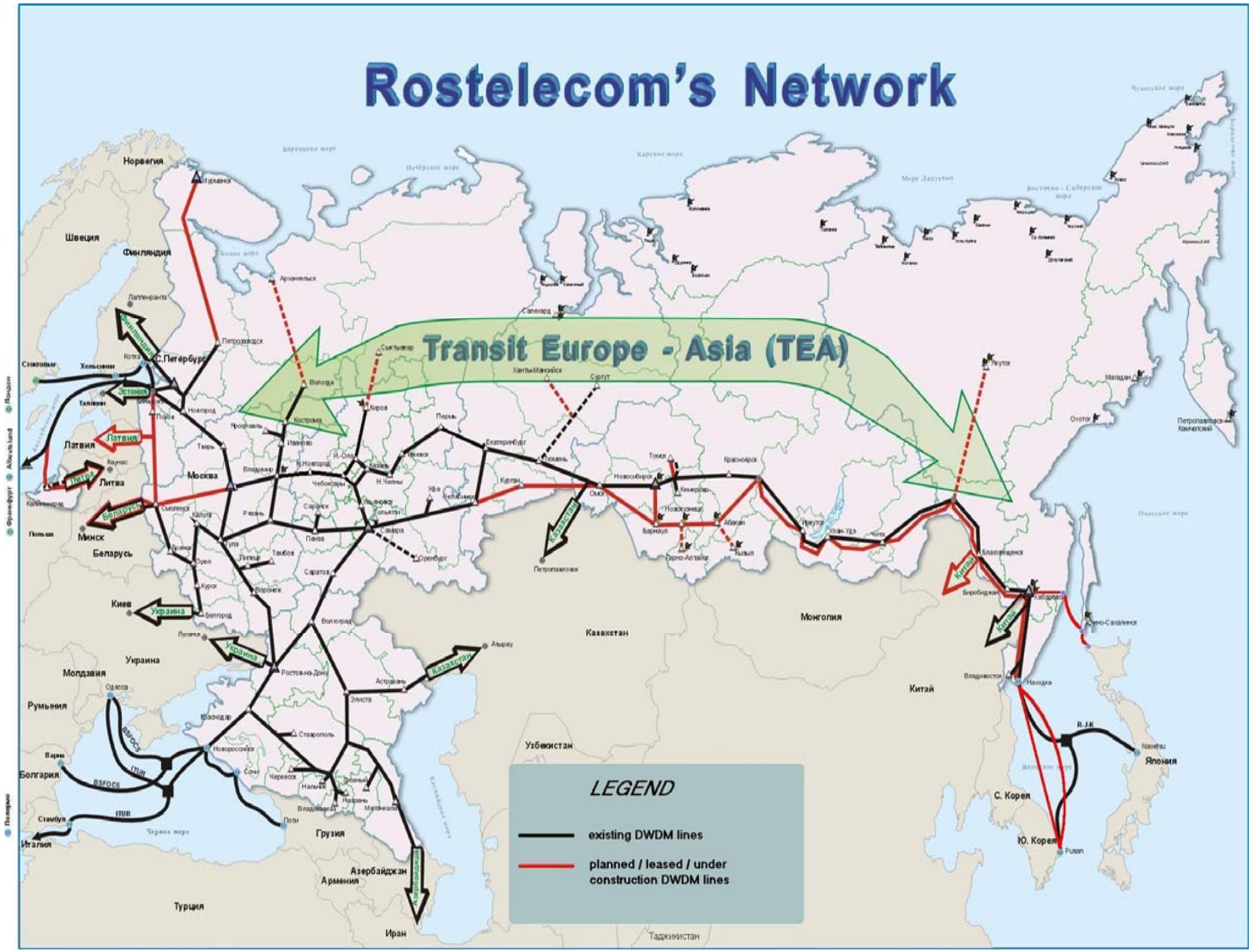
RUNNET


NORDUnet
RADUGA
Petrozavodsk
St.Petersburg
Vologda
Moscow
Pereslavl-
Zalessky
N.Novgorod
Izhevsk
Perm
Tambov
Ulyanovsk
Ekaterinburg
Rostov-
na-Donu
Saratov
Stavropol
Nalchik
Vladikavkaz
Makhachkala
Orenburg
Tomsk
Krasnoyarsk
Novosibirsk
Barnaul
Irkutsk
Khabarovsk
Vladivostok

Moscow city map. Location of HEP centers are indicated, as well location of M9-Internet-Exchange Point M9-IX



ROSTELECOM

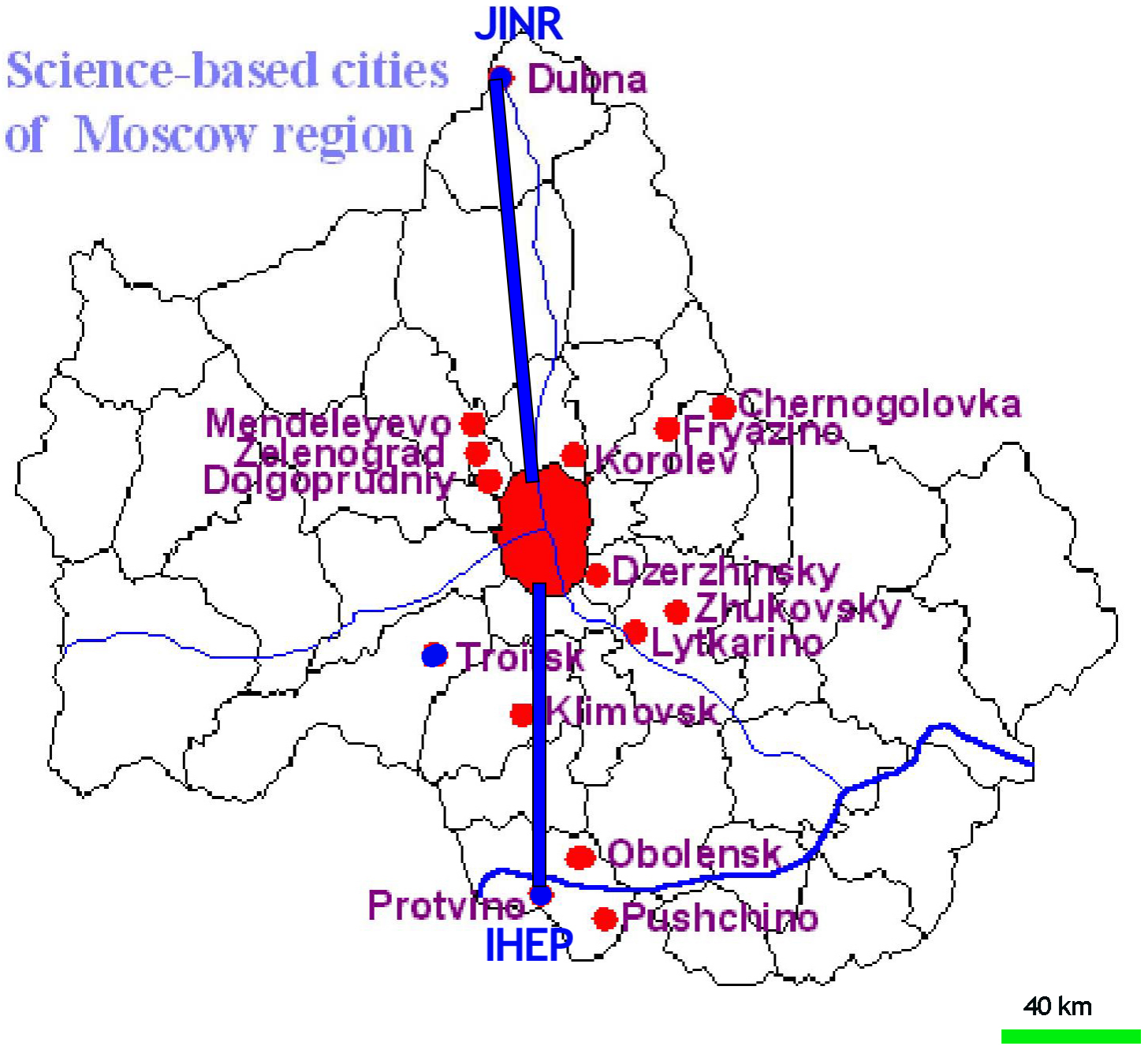

Rostelecom's Network
Transit Europe - Asia (TEA)
LEGEND
existing DWDM lines
planned / leased / under construction DWDM lines
Норвегия
Швеция
Финляндия
Эстония
Латвия
Литва
Беларусь
Минск
Москва
Украина
Киев
Молдавия
Румыния
Болгария
Италия
Грузия
Азербайджан
Армения
Турция
Иран
Казахстан
Монголия
Китай
Узбекистан
Таджикистан
С. Корея
Ю. Корея
Япония

National operator ISP

company TransTeleCom™

Connecting Europe, CIS and Asia

TransTeleCom was founded by Russian Railways in 1997 to build nationwide fibre optic network along extensive railroad easements in Russia. Our network stretches across Russia and internationally extends into Western Europe, China and the CIS. Network reliability is ensured by series of SDH network rings providing geographically diverse routes and selection of leading edge technology solutions from internationally recognized suppliers.

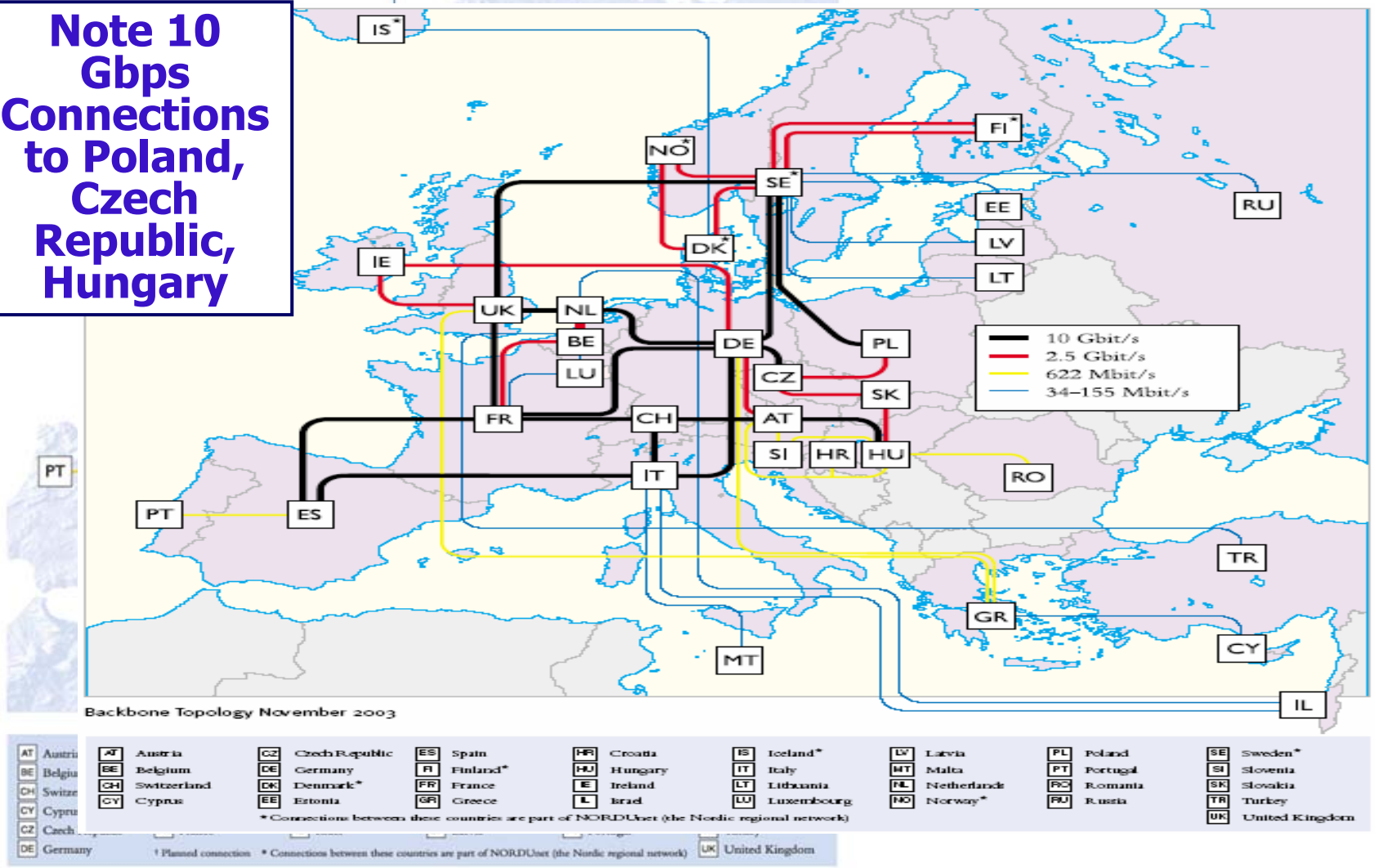

Science-based cities
of Moscow region
JINR
Dubna
Mendeleyevo
Zelenograd
Dolgoprudny
Korolev
Chernogolovka
Fryazino
Dzerzhinsky
Zhukovsky
Lytkarino
Troitsk
Klimovsk
Obolensk
Protvino
IHEP
Pushchino
40 km

Projects

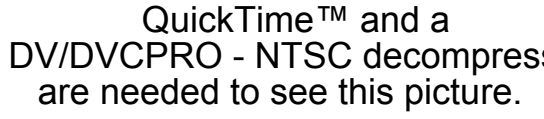
- Trans-Russia
  - 0.6-2.4-10Gbps
- GLORIAD
  - 0.6-2.4-10Gbps
- GEANT
  - POP in Moscow - 2*2.4Gbps

Pan-European Multi-Gigabit Backbone (33 Countries) January 2004

Note 10 Gbps Connections to Poland, Czech Republic, Hungary

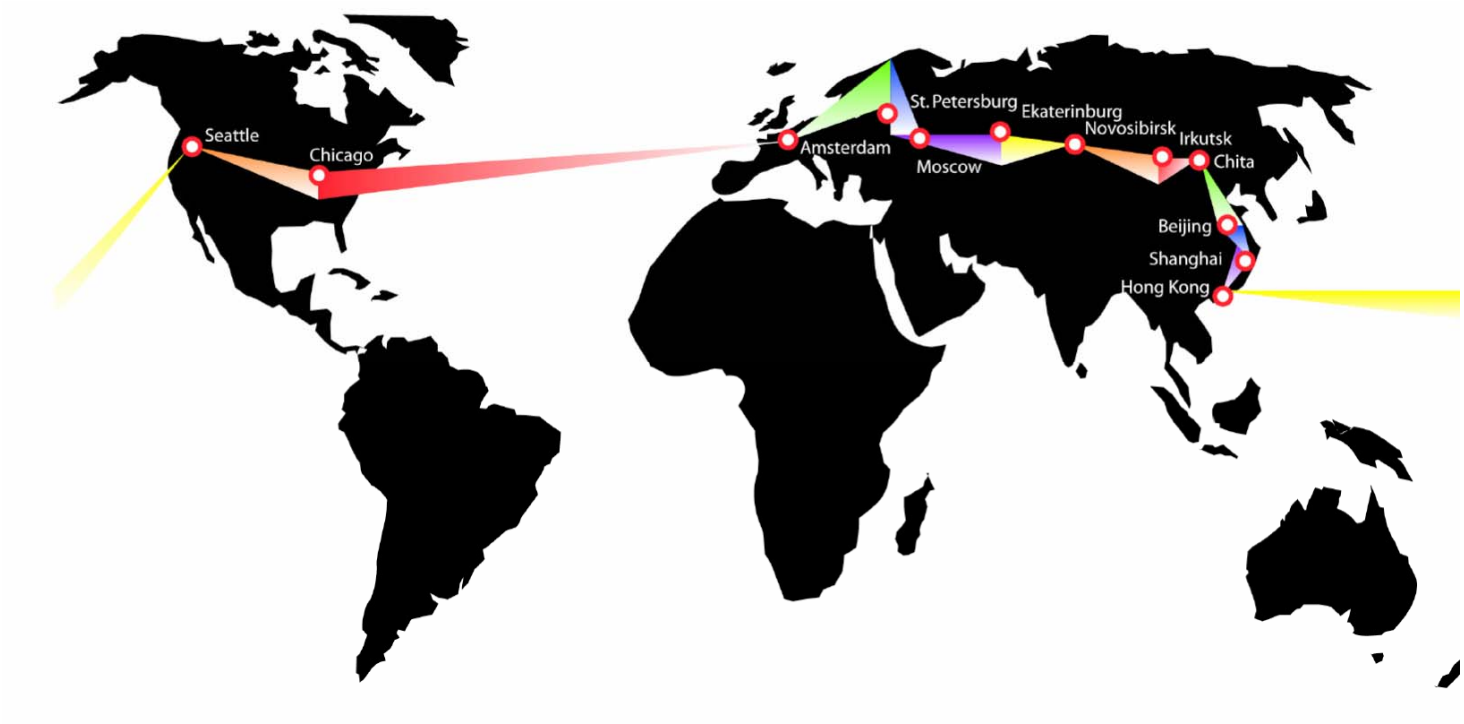


Planning Underway for "GEANT2" (GN2) Multi-Lambda Backbone, to Start In 2005


QuickTime™ and a
DV/DVCPRO - NTSC decompressor
are needed to see this picture.

GLOBAL RING NETWORK FOR ADVANCED APPLICATIONS DEVELOPMENT

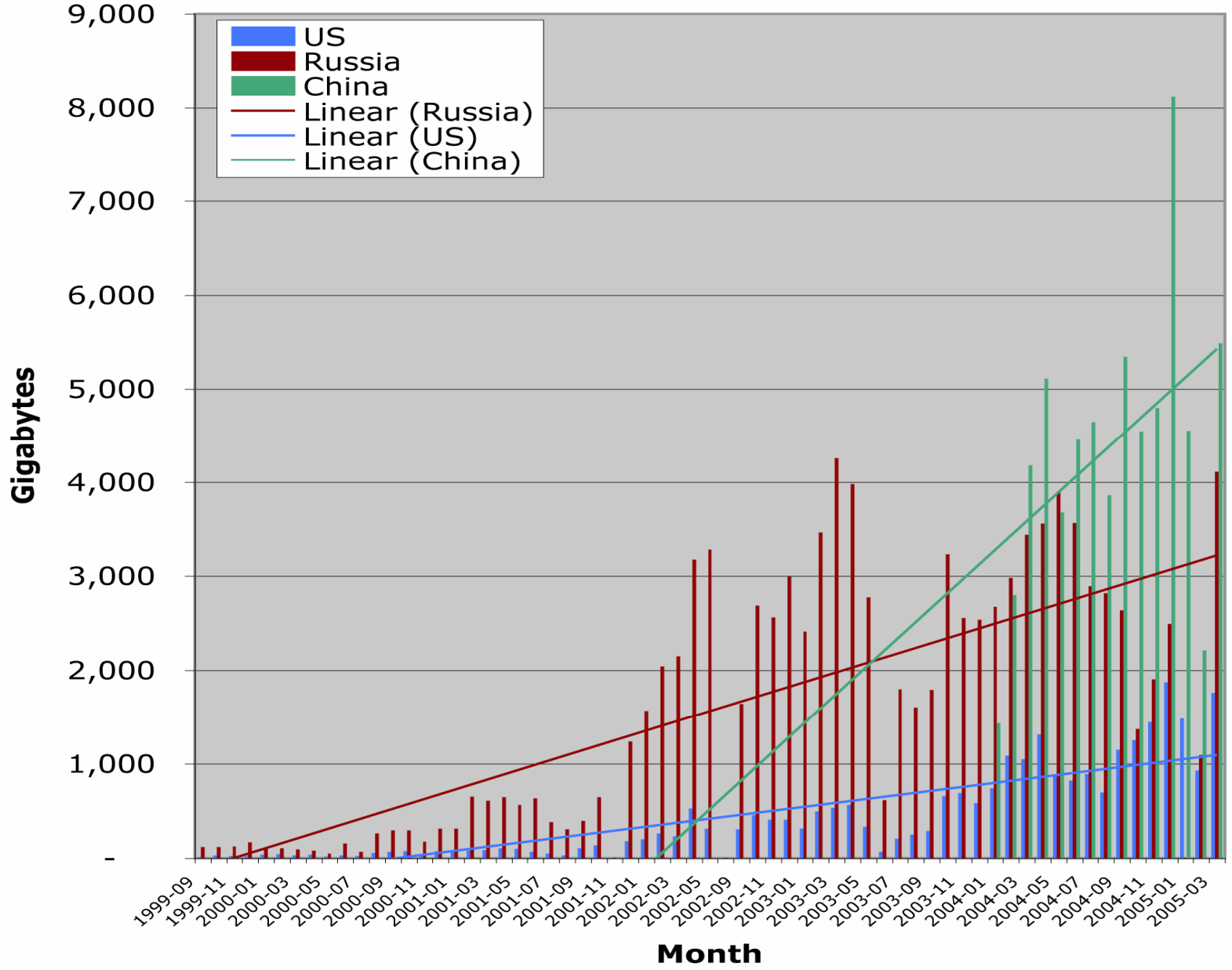
Russia-China-USA Science & Education Network



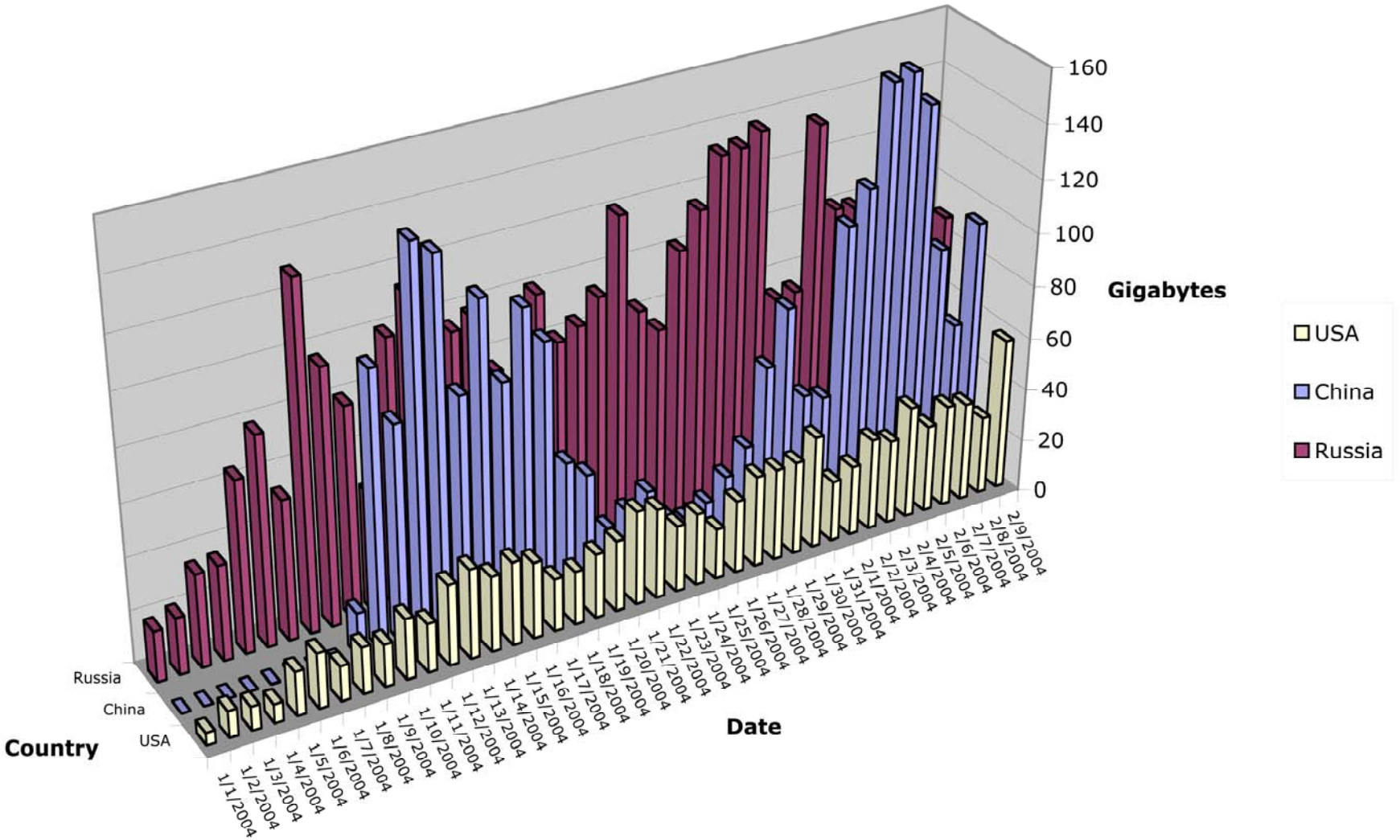

Novosibirsk
美 国
U.S.A.
中 国
China

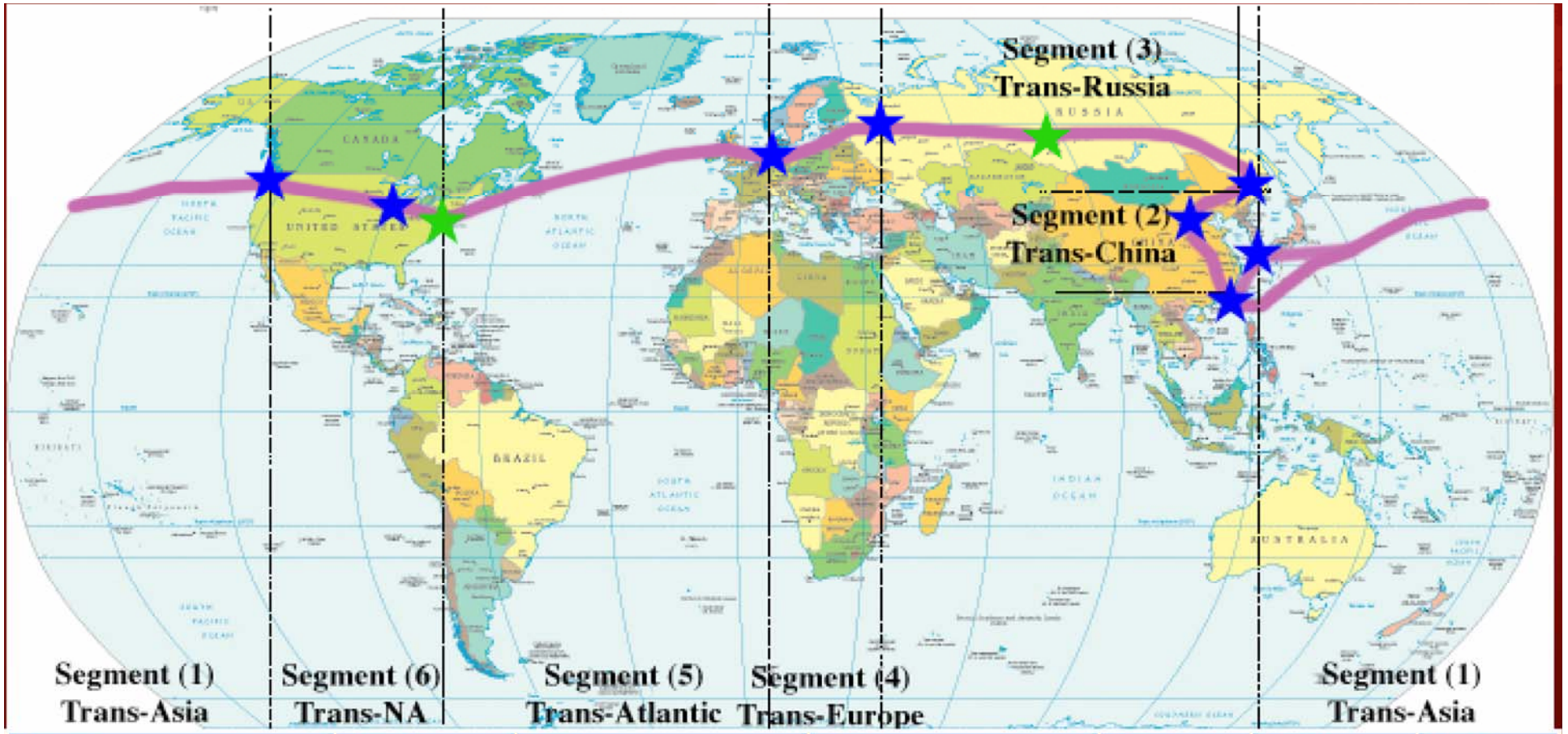

网络开通仪式
work GLORIAD Grand Opening Ceremony
中国
China

GLORIAD Data Flows



Traffic Flows to Russia, China, USA via "*Little GLORIAD* ", 2004





Segment	Current	Year 1	Year 2	Year 3	Year 4	Year 5
1 - Trans-Asia	155 Mbps	2.5 Gbps (US-China), 10 Gbps (US-Korea-China)	2 x 10 Gbps (US-China, US-Korea-China)	2 x 10 Gbps	N x 10 Gbps	N x 10 Gbps
2 - Trans-China	2.5 Gbps (155 Mbps, Beijing-Khabarovsk)	2.5 Gbps	1 x 10 Gbps	2 x 10 Gbps	N x 10 Gbps	N x 10 Gbps
3 - Trans-Russia	155 Mbps	155 Mbps	622 Mbps	1 x 10 Gbps	N x 10 Gbps	N x 10 Gbps
4 - Trans-Europe	622 Mbps	622 Mbps	622 Mbps	2 x 10 Gbps	N x 10 Gbps	N x 10 Gbps
5 - Trans-Atlantic	622 Mbps	1 Gbps	1 x 10 Gbps	2 x 10 Gbps	N x 10 Gbps	N x 10 Gbps
6 - Trans-North America	155 Mbps (Asia-Chicago), GbE NYC-Chicago (via CANARIE)	10 Gbps, Seattle-Chicago-NYC	10 Gbps, Seattle-Chicago-NYC	2 x 10 Gbps	N x 10 Gbps	N x 10 Gbps

Segment	Current	Year 1	Year 2	Year 3	Year 4	Year 5
1 - Trans-Asia	155 Mbps	2.5 Gbps (US-China), 10 Gbps (US-Korea-China)	2 x 10 Gbps (US-China, US-Korea-China)	2 x 10 Gbps	N x 10 Gbps	N x 10 Gbps
2 - Trans-China	2.5 Gbps (155 Mbps, Beijing-Khabarovsk)	2.5 Gbps	1 x 10 Gbps	2 x 10 Gbps	N x 10 Gbps	N x 10 Gbps
3 - Trans-Russia	155 Mbps	622 Mbps	2.5 Gbps	1 x 10 Gbps	N x 10 Gbps	N x 10 Gbps
4 - Trans-Europe	622 Mbps	622 Mbps	622 Mbps	2 x 10 Gbps	N x 10 Gbps	N x 10 Gbps
5 - Trans-Atlantic	622 Mbps	1 Gbps	1 x 10 Gbps	2 x 10 Gbps	N x 10 Gbps	N x 10 Gbps
6 - Trans-North America	155 Mbps (Asia-Chicago), GbE NYC-Chicago (via CANARIE)	10 Gbps, Seattle-Chicago-NYC	10 Gbps, Seattle-Chicago-NYC	2 x 10 Gbps	N x 10 Gbps	N x 10 Gbps

- **S.E. Europe, Russia: Catching Up**
- **Latin Am., Mid East, China: Keeping Up**
- **India, Africa: Falling Behind**