

# *Challenges to address in the next future*

Apr 3, 2006

HEPiX Spring Meeting 2006

Enzo Valente, GARR and INFN



# Agenda

## ► Challenges:

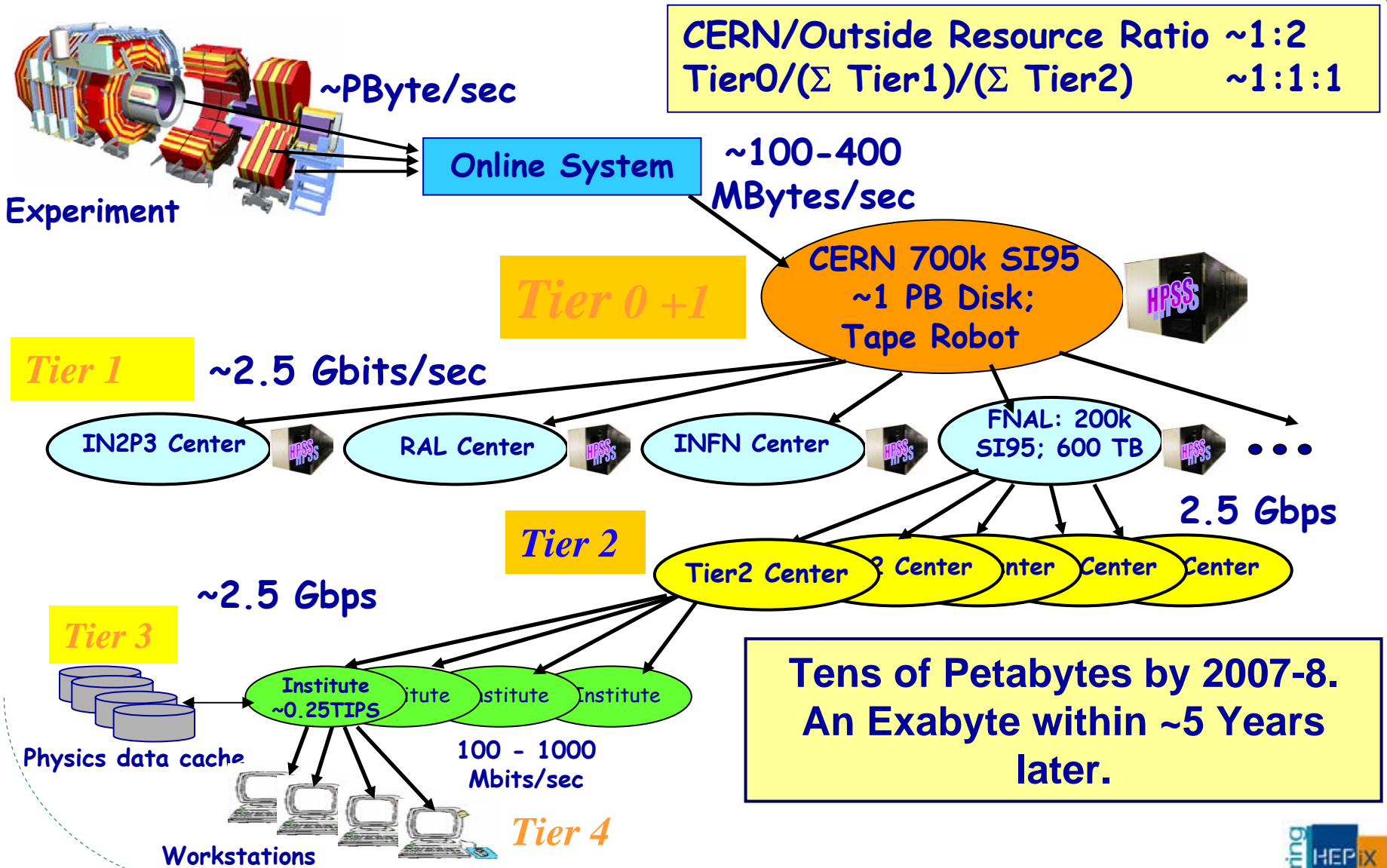
1. E2e with other networks
2. Connecting more regions

# Agenda

▶ Challenges:

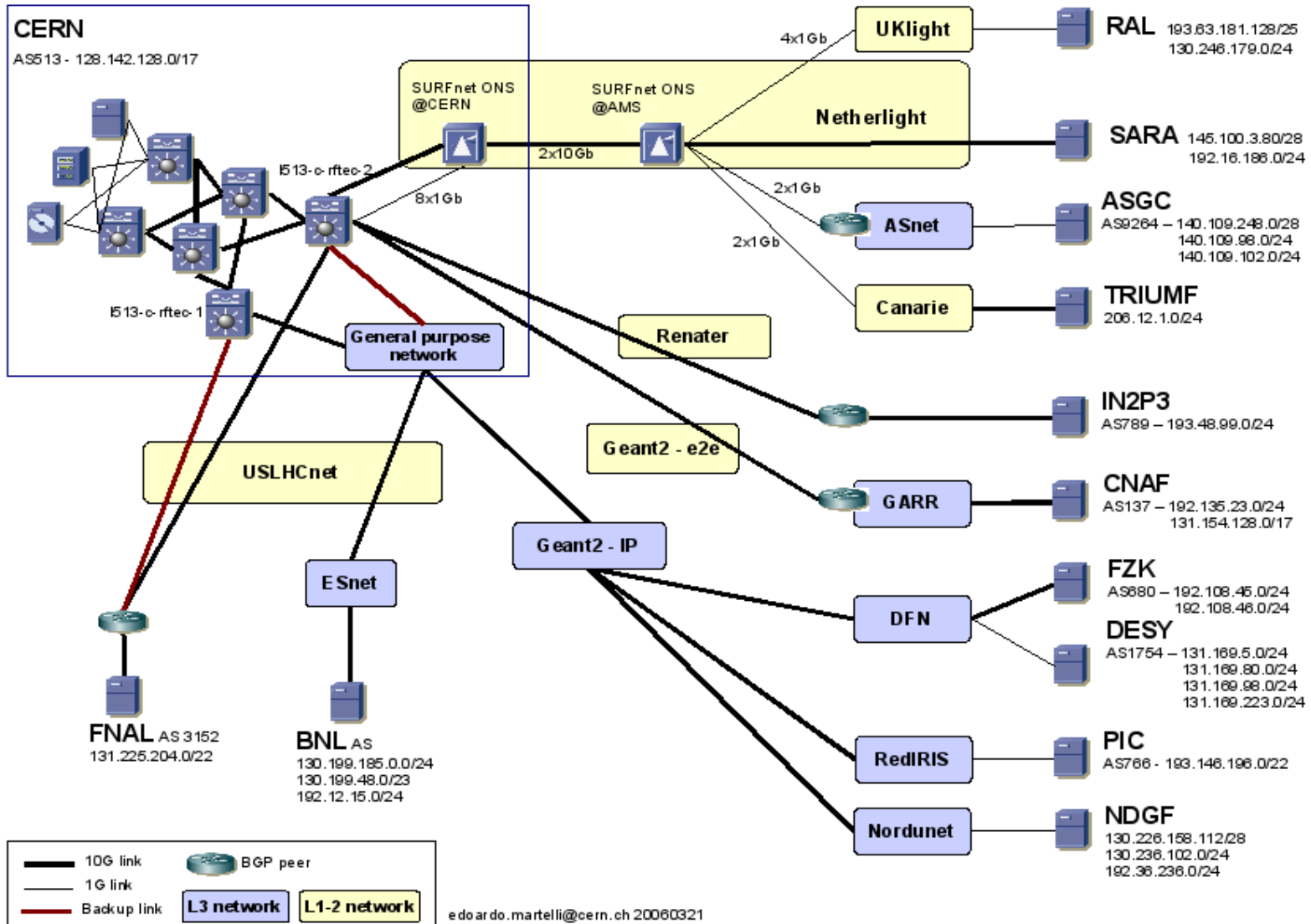
1. E2e with other networks
2. Connecting more regions

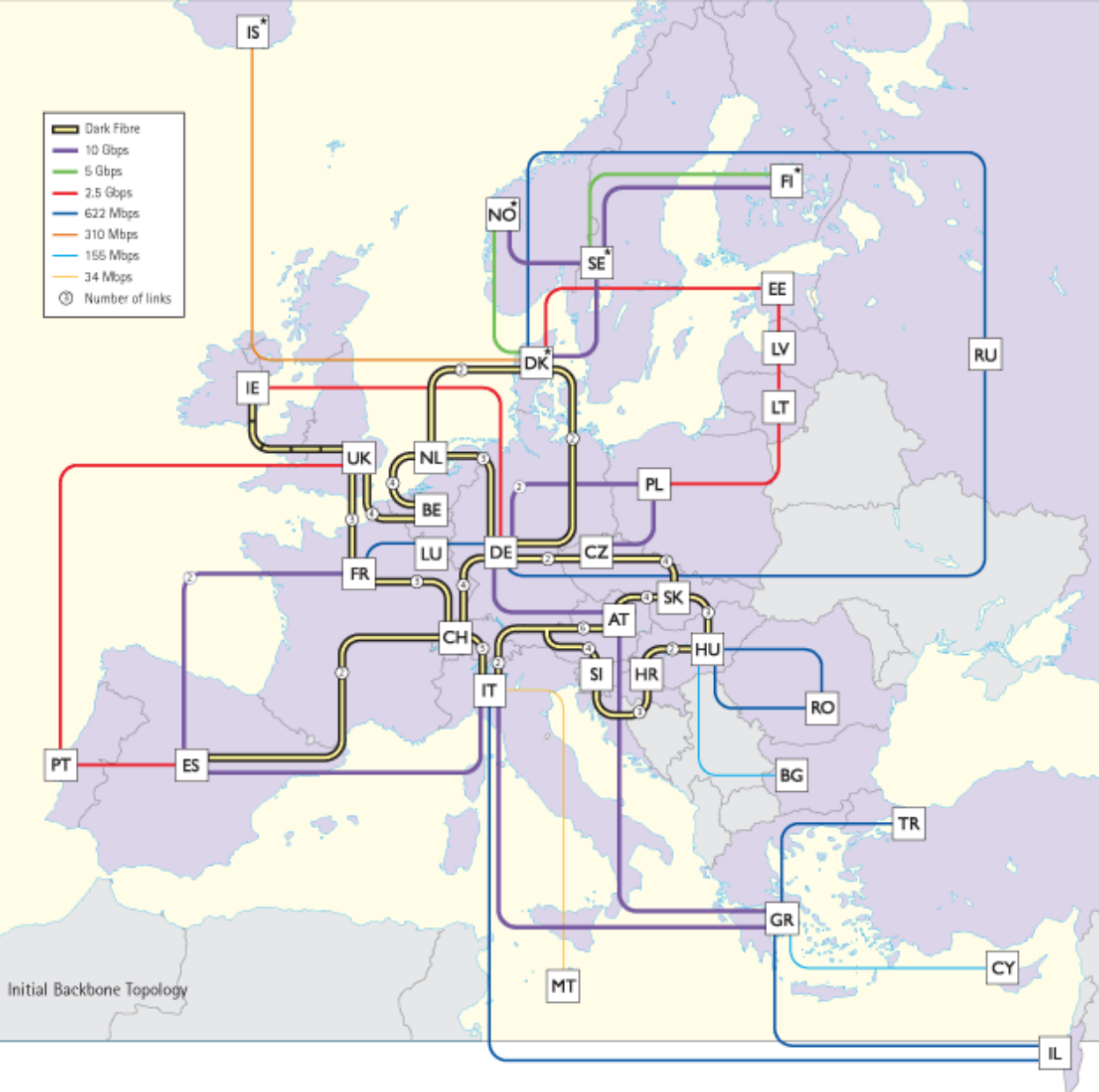
# LHC Data Grid Hierarchy



# Current LHCOPN topology

## LHCOPN – current status

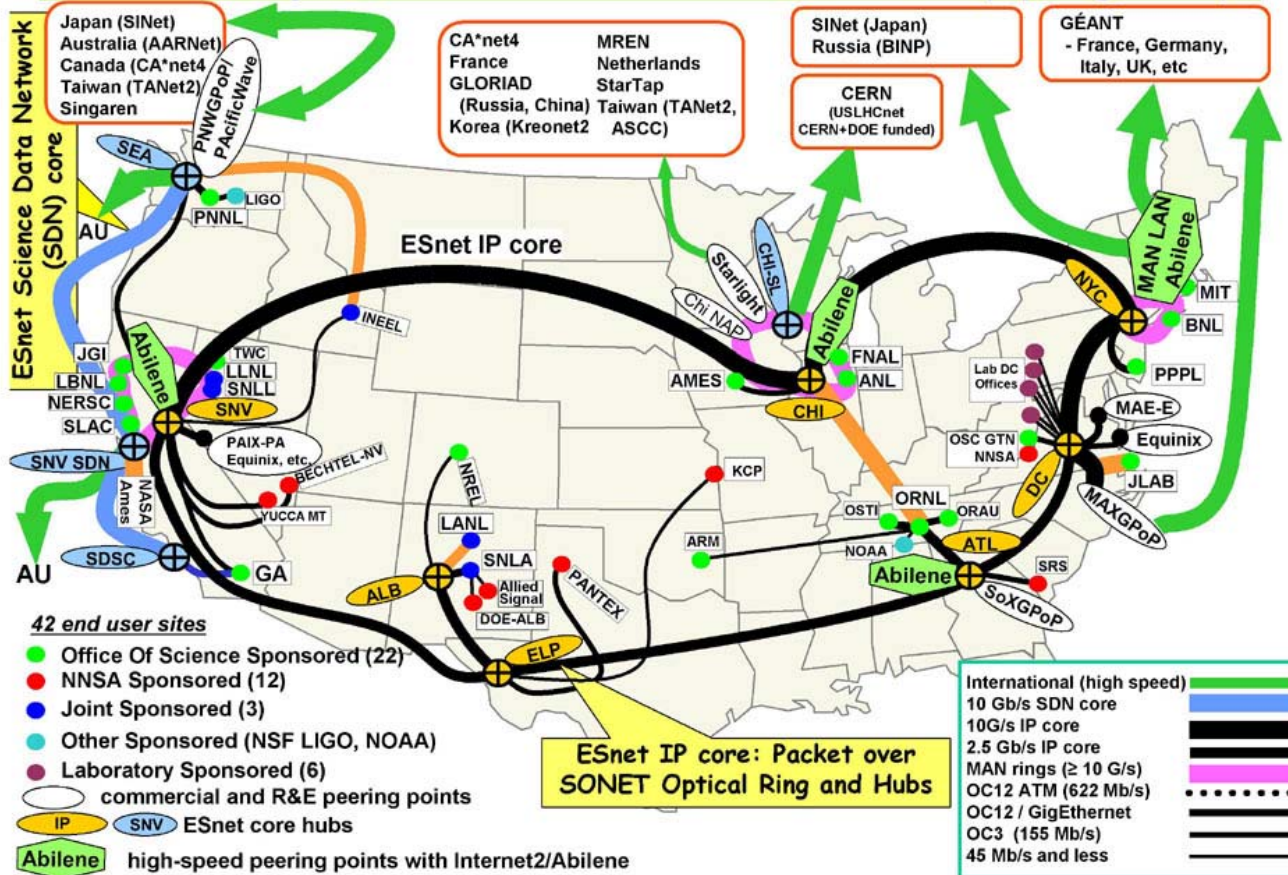




# GÉANT2 Topology

# Esnet Topology Spring 2006

**ESnet Layer 2 Architecture Provides Global High-Speed Internet Connectivity for DOE Facilities and Collaborators (Spring, 2006)**



## LHCOPN – LHC Optical Private Network

- ▶ Every Tier1 will be connected to the Tier0 with a direct 10Gbps "*lightpath*".
- ▶ Those lightpaths will be of different kinds:
  - single or concatenated layer 1 links (STM64, LANPHY, WANPHY)
  - layer 2 VLANs
- ▶ Tier1s should also provide a dedicated backup link to Tier0,
  - during the startup phase (Service challenges) backup will be provided via routed paths (GN2, Esnet, Abilene, NRENs..).



# Challenges

- ▶ **Multidomain L2VPN**: something router manufacturers did not consider enough
- ▶ Interoperability between platforms
- ▶ An L2 path can be a security backdoor into someone's LAN
  - An **alternative using L3VPN** was studied
  - A trusted relationship is needed
- ▶ **Complex setup**
  - **VPLS** could be the solution to scale to T2 numbers

# LHCOPN challenges

## ▶ Security

- The LHCOPN will bypass the security system (firewall, IDS...) already in place at every Tier; current technologies cannot deal with the requested bandwidth

## ▶ Operations

The **ENOC** is Network Co-ordination Service. It is required to:

- look after network issues for EGEE and LCG
- receive network TTS from NRENs, analyse them and provide relevant information to the GGUS who will then interact with the users
- monitor the e2e status of the lightpaths and trigger the appropriate corrective actions

## ▶ Monitoring

- Several metrics, several different devices, and several OSI stack levels to monitor

# Agenda

- ▶ Challenges:
  1. E2e with other networks
  2. Connecting more regions

# Networks, Grids and HEP

- ▶ Next generation 10 Gbps network backbones are almost here: in the US, Europe and Japan
  - First stages arriving, starting now
- ▶ Major transoceanic links at 2.5 - 10 Gbps since 2002-3
- ▶ Getting high (reliable; Grid) application performance across networks means:
  - End-to-end monitoring; a coherent approach
  - Getting high performance (TCP) toolkits in users' hands
  - Working in concert with Internet2, Terena; the Grid projects and the Global Grid Forum
  
- ▶ *Network improvements are especially needed in SE Europe, Latin America; SE Asia, and Africa.*
  
- ▶ Removing regional, Last mile bottlenecks and compromises in network quality are now (in all world regions)  
*On the critical path*

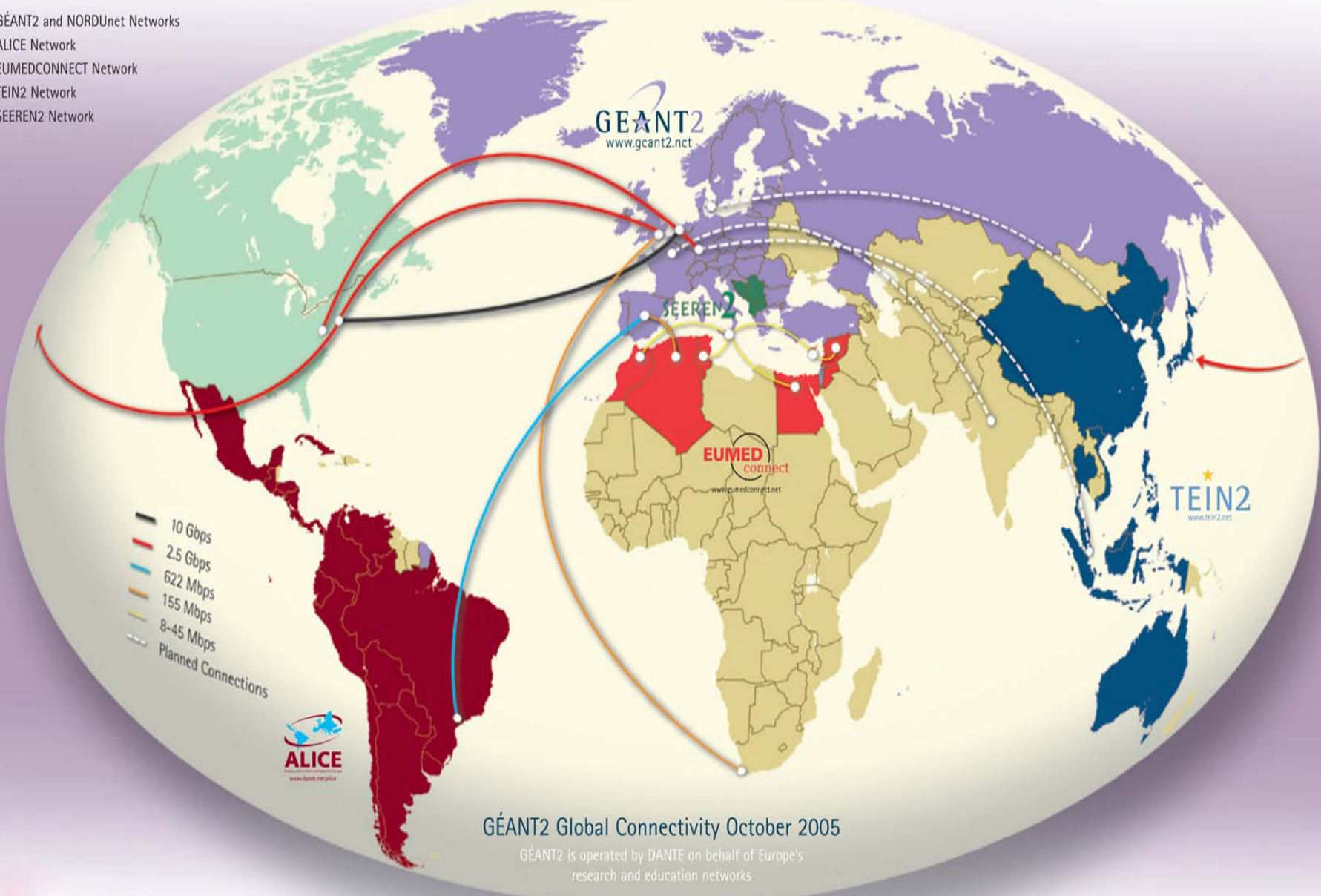
# ICFA-SCIC

## Closing the Digital Divide

- ▶ Spread the message: “ICFA SCIC is there to help”
- ▶ Help identify and highlight specific needs (to Work On)
  - Policy problems; Last Mile problems; etc.
- ▶ Encourage Joint programs
- ▶ Make direct contacts, arrange discussions with gov’t officials
  - ICFA SCIC is prepared to participate
- ▶ Help Start, or Get Support for Workshops on Networks (& Grids)
  - Discuss & Create opportunities
  - Encourage, help from funded programs
- ▶ Help from Regional support & training groups (requires funding)

- GÉANT2 and NORDUnet Networks
- ALICE Network
- EUMEDCONNECT Network
- TEIN2 Network
- SEEREN2 Network

www.geant2.net



- 10 Gbps
- 2.5 Gbps
- 622 Mbps
- 155 Mbps
- 8-45 Mbps
- Planned Connections



GÉANT2 Global Connectivity October 2005

GÉANT2 is operated by DANTE on behalf of Europe's research and education networks

# A global, federated e-Infrastructure

