



GEANT2 status and update, IPv6

Network Infrastructure & Services

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HEPiX Spring meeting 2006

3rd April 2006, Rome



Connect. Communicate. Collaborate

Agenda

- GÉANT2 Highlights
- GÉANT2 Infrastructure and Topology
- GÉANT2 Service overview
- GÉANT2 Supported projects
- GÉANT2 Global connectivity
- IPv6



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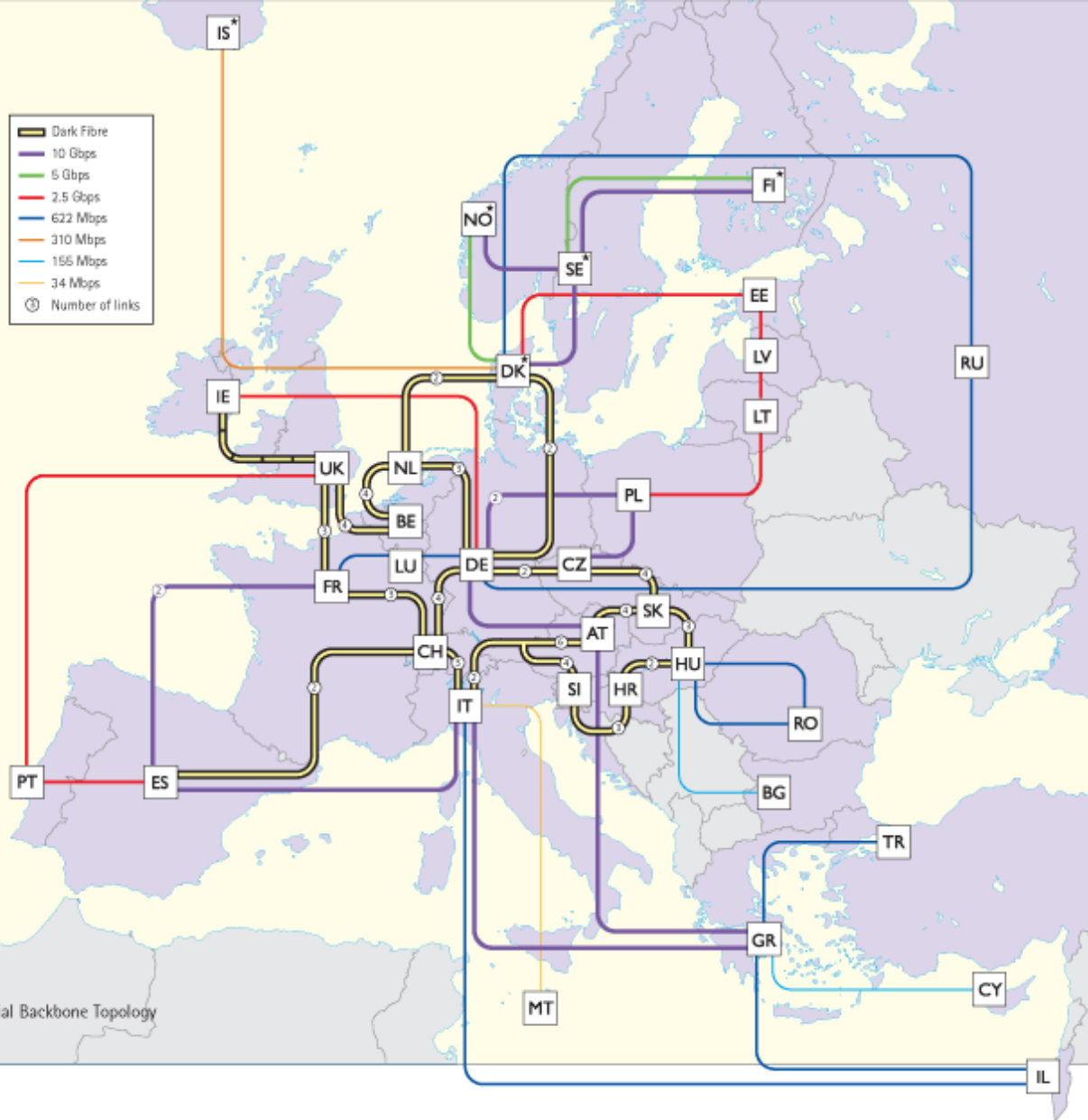
GÉANT2 highlights

- Upgrade GÉANT (1)
 - Not just leased circuits
 - Possibility for greater infrastructure ownership (fibre)
- Provide support for new services
 - Not just a bigger IP network
 - Include support for high-capacity P2P services...
- Explicit joint NREN R&D efforts
 - End-to-end QoS
 - Performance monitoring
 - Security
 - Bandwidth on demand
 - Testbed
 - Roaming
- Extend geographical coverage



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- Dark Fibre
- 10 Gbps
- 6 Gbps
- 2.5 Gbps
- 622 Mbps
- 310 Mbps
- 155 Mbps
- 34 Mbps
- Number of links



GEANT2 Topology

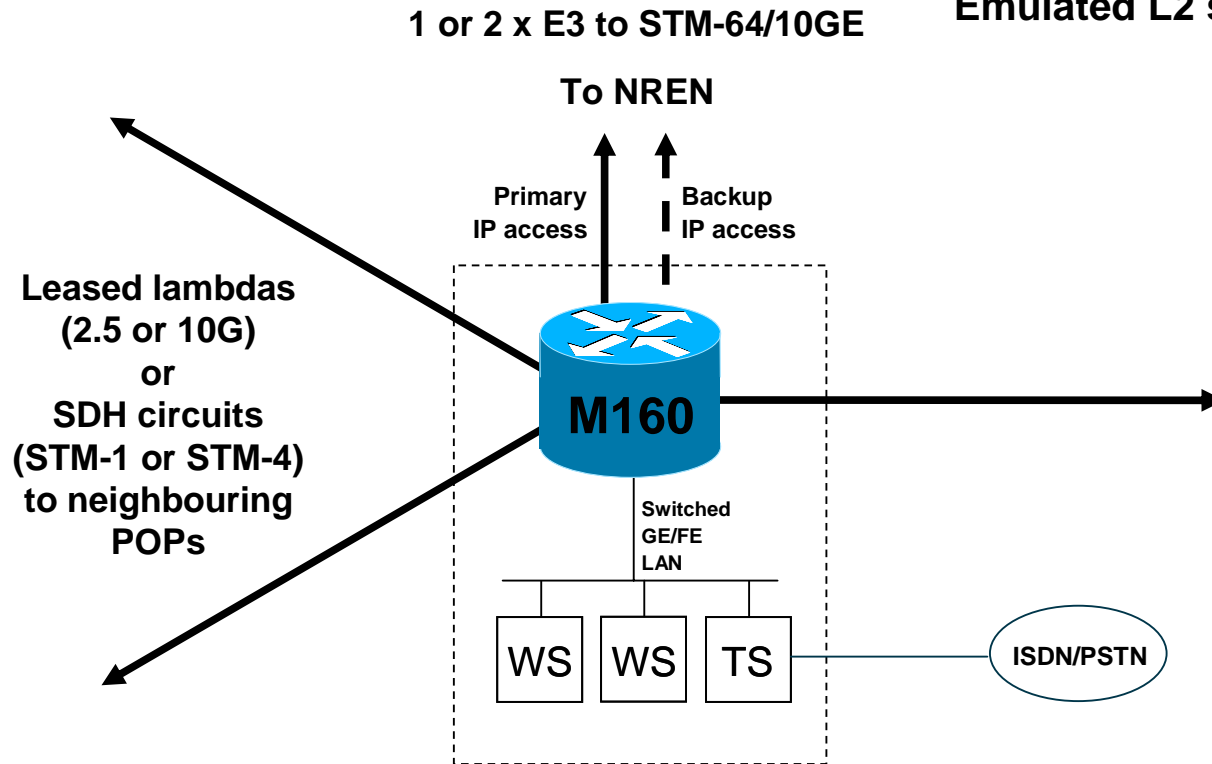


A former GÉANT PoP

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Typical GÉANT POP

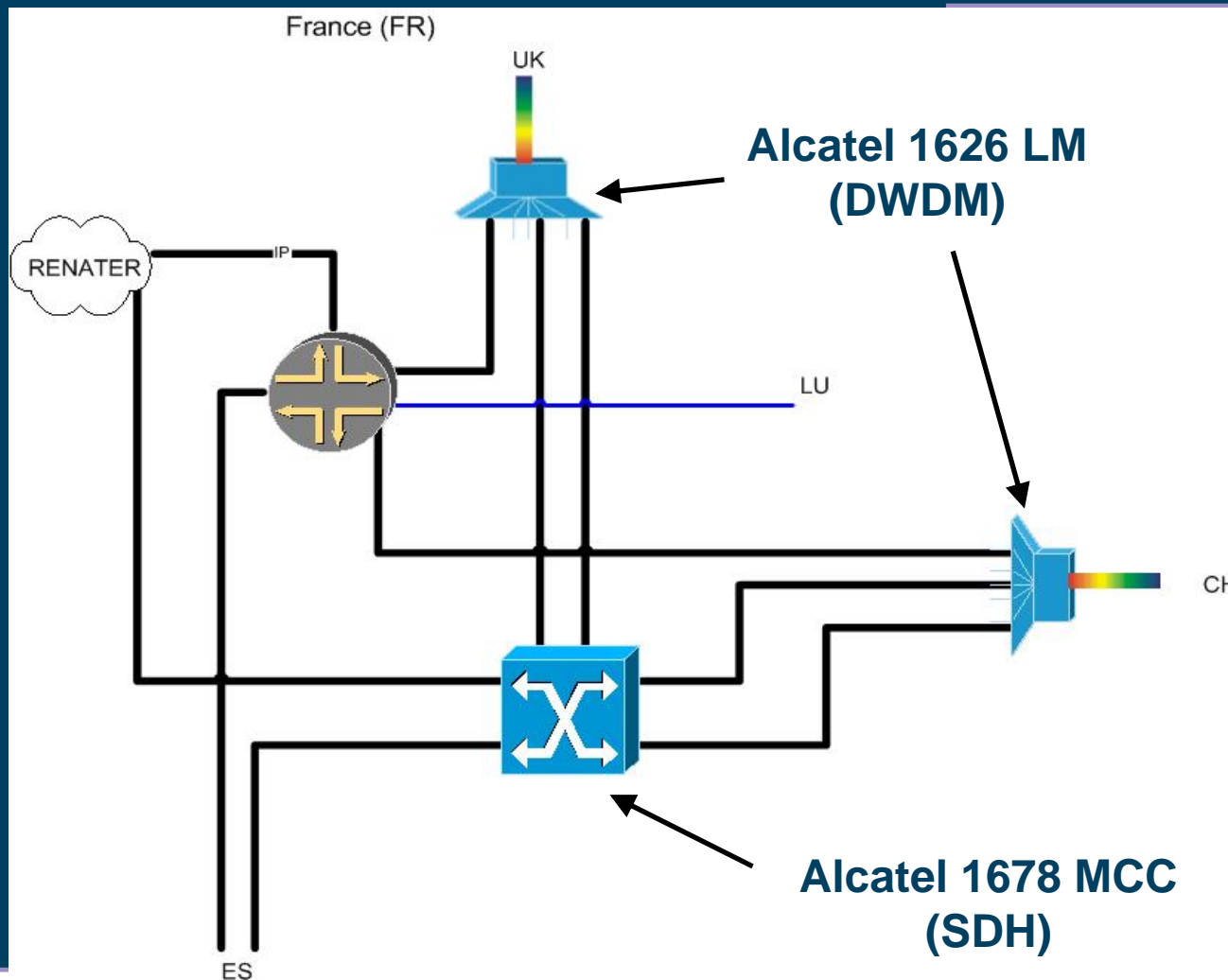
Offers:
Many IP services
Emulated L2 services



Typical GÉANT2 POP



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GÉANT2 Services - I

- Continue to support usual IP services
 - Best Effort, Less than Best Effort, PremiumIP, native mcast (v4), native (dual-stack) v6, native mcast (v6)
- Enhance these with GN2 R&D project results:
 - improved performance monitoring (JRA1 & SA3)
 - more automated QoS provisioning (SA3)
 - network security best practice (JRA2)
- PERT - Performance Enhancement Response Team
 - Support for network performance troubleshooting
 - Knowledge Base for systems and network performance tuning



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GÉANT2 Services – II

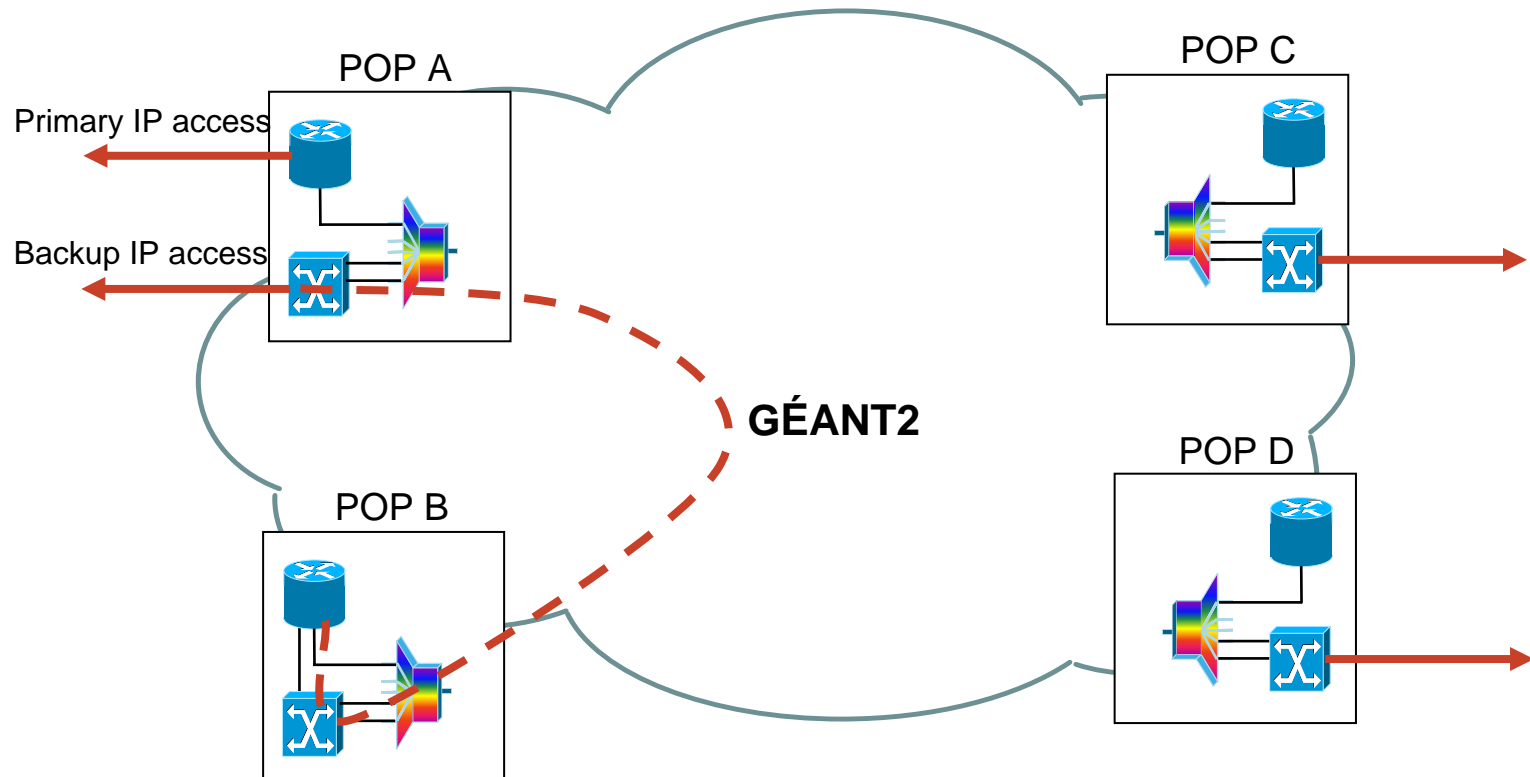
- Continue to support emulated L2 P2P services
 - L2VPNs for lower capacity (sub-1G) P2P service support
- Add portfolio of new L1 and L2 P2P services
 - cost-effective support for high-capacity P2P [“lightpath”] services
 - up to 10G (for now)
 - support for Ethernet framing (10GE links available)
 - translational P2P services
 - e.g. native gigE to SDH using GFP

Circuit Services over GÉANT2



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More resilient IP service

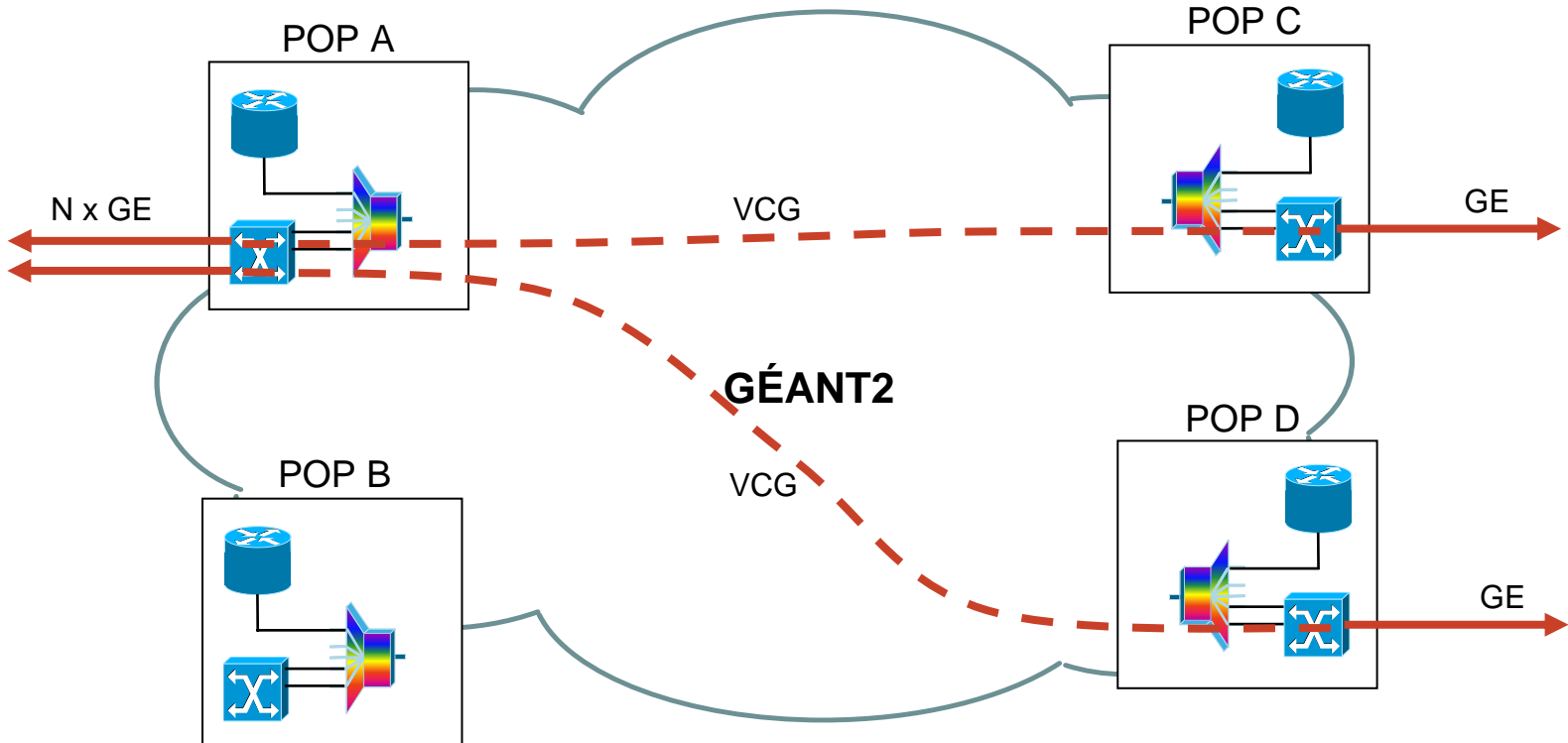


Circuit Services over GÉANT2



Connect. Communicate. Collaborate.

Point-to-point GE (GE access)



Features:

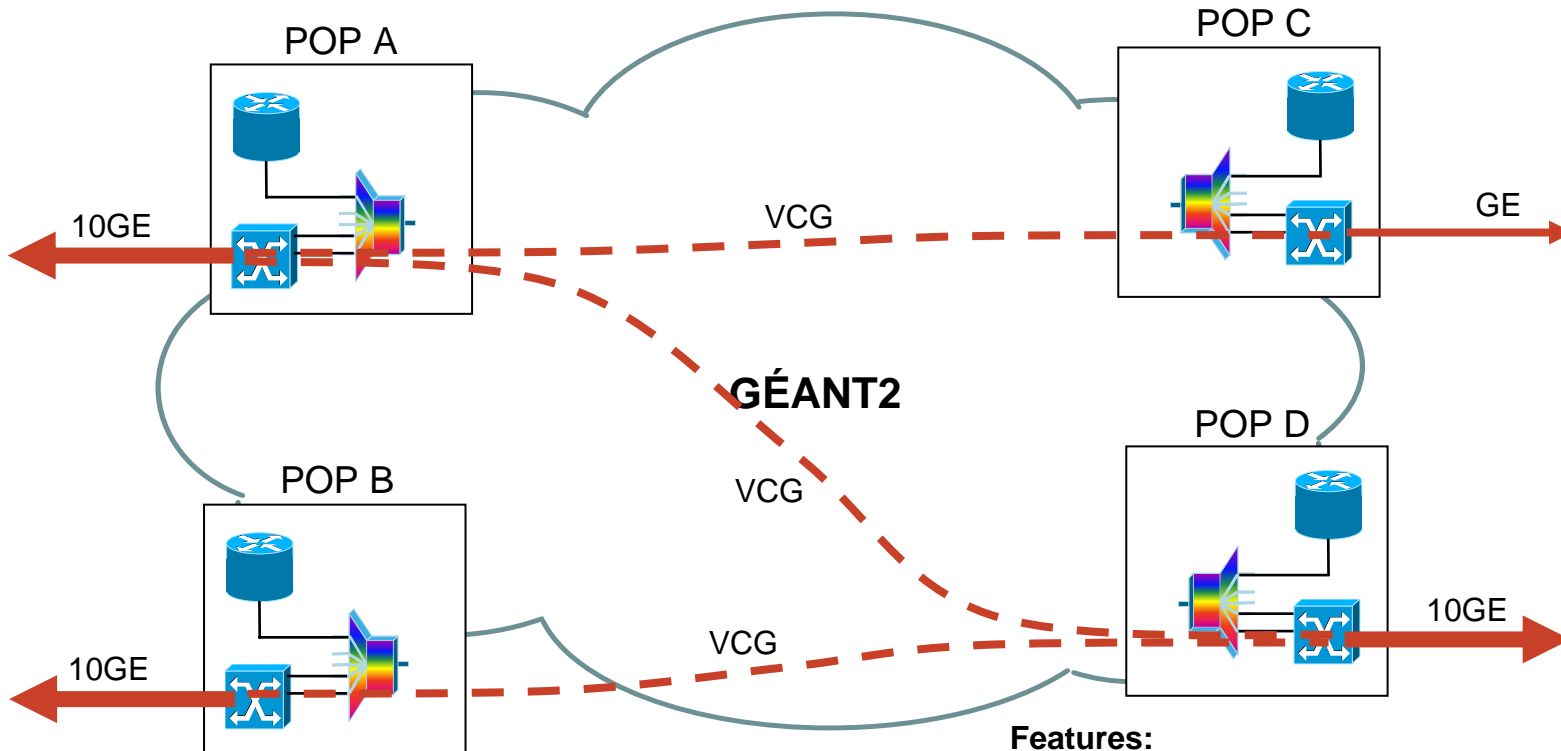
- uses GFP/VCAT
- GE port per instance
- more dynamic
- sub 1G possible

Circuit Services over GÉANT2



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Point-to-point GE (10GE access at one or both ends)



Features:

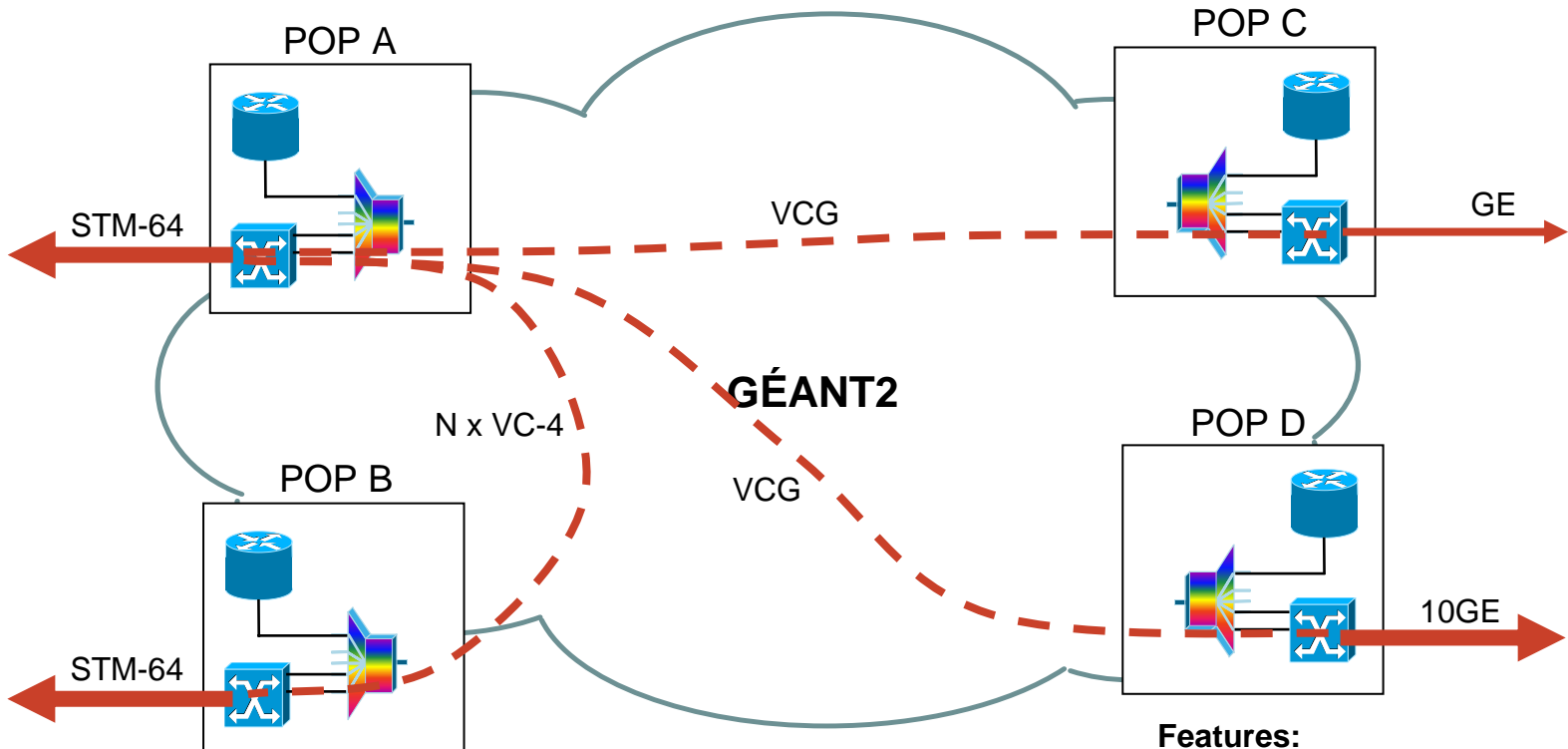
- uses GFP/VCAT
- 10GE LAN-PHY port (multiple instances)
- use 802.1Q VLAN tags as IDs
- more dynamic
- sub 1G possible

Circuit Services over GÉANT2



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Point-to-point GE (10G SDH access at one or both ends)



Features:

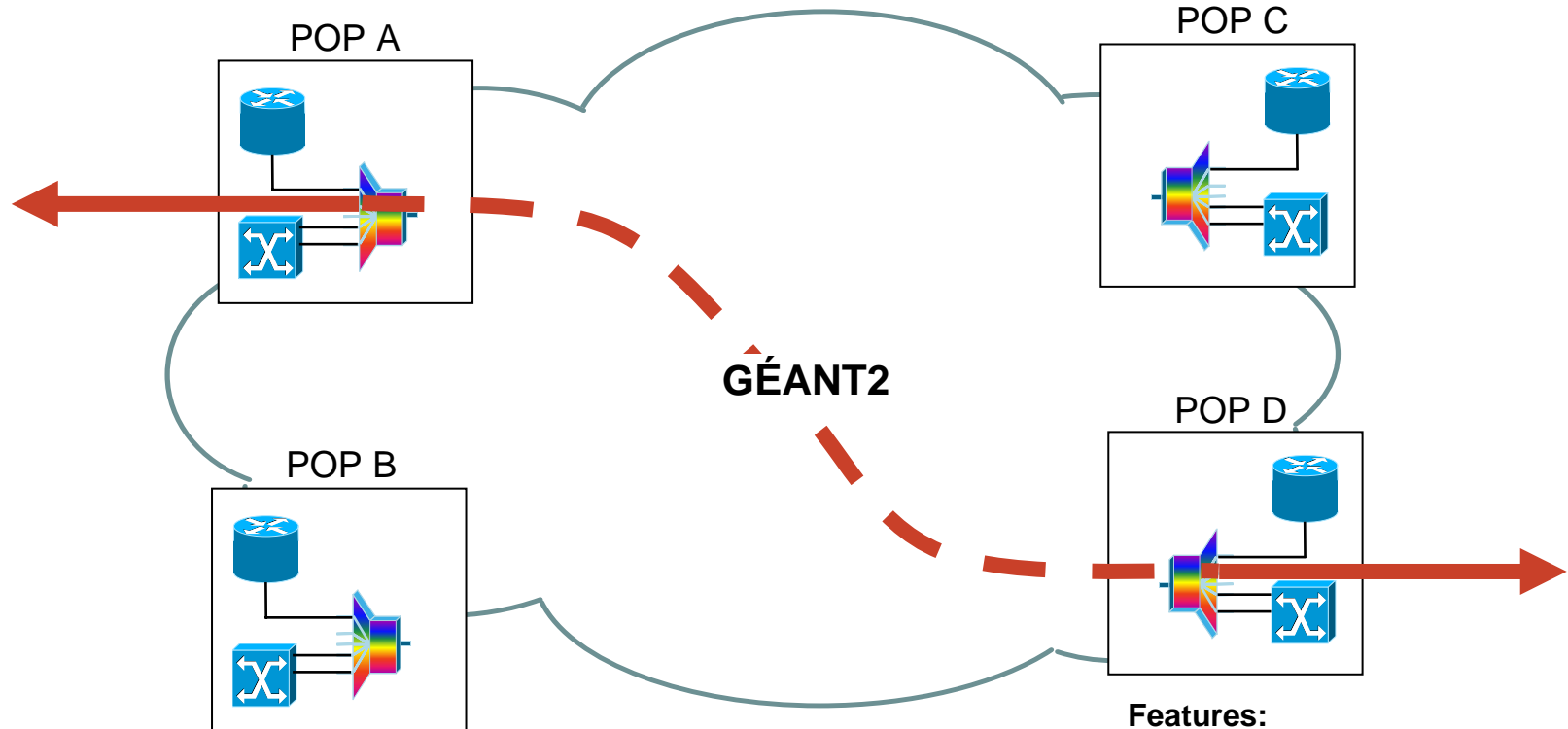
- uses GFP/VCAT
- 10G SDH port
- GFP done in NREN
- more dynamic
- sub 1G possible

Circuit Services over GÉANT2

Managed wavelength service



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Features:

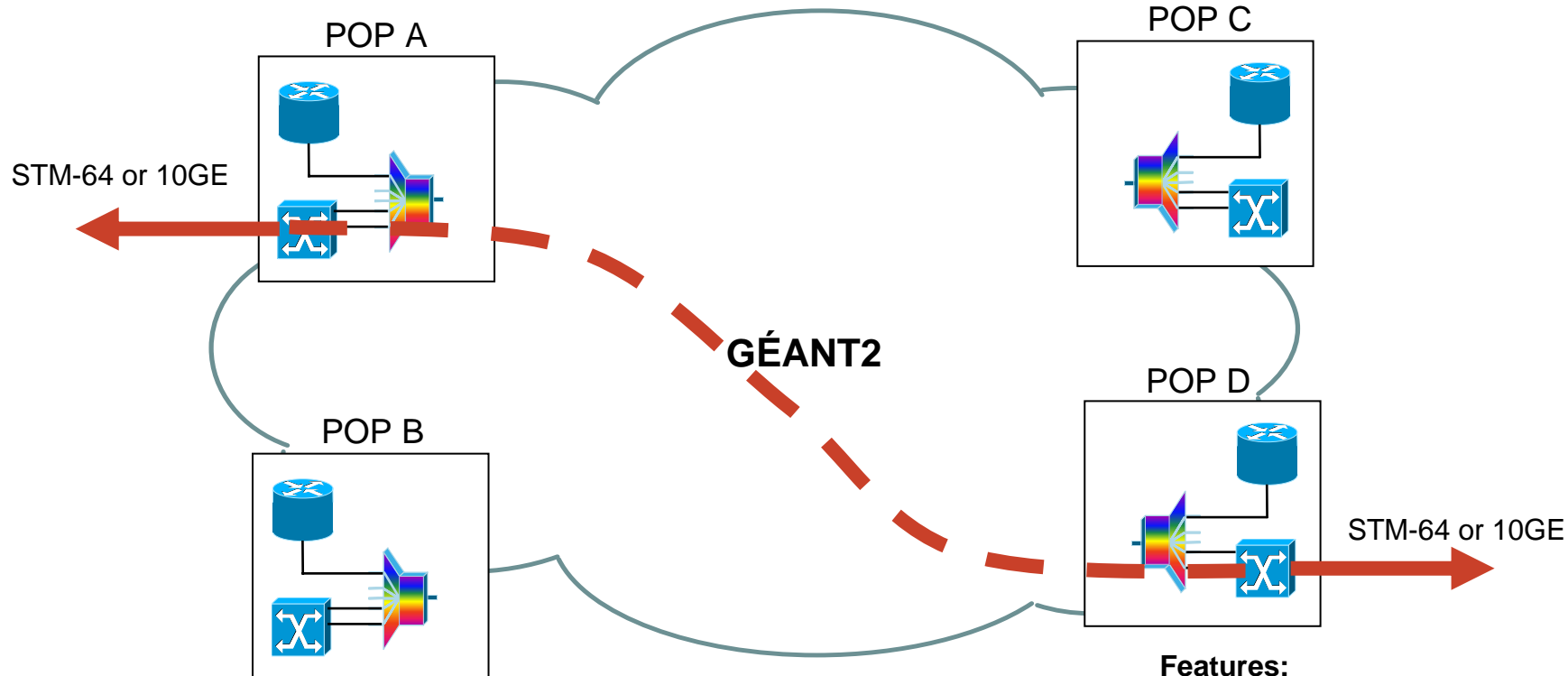
- direct access to DWDM layer
- 10G only
- SONET/SDH or 10GE LAN PHY
- static
- 10GE is full-rate

Circuit Services over GÉANT2

Point-to-point 10GE (and SDH too)



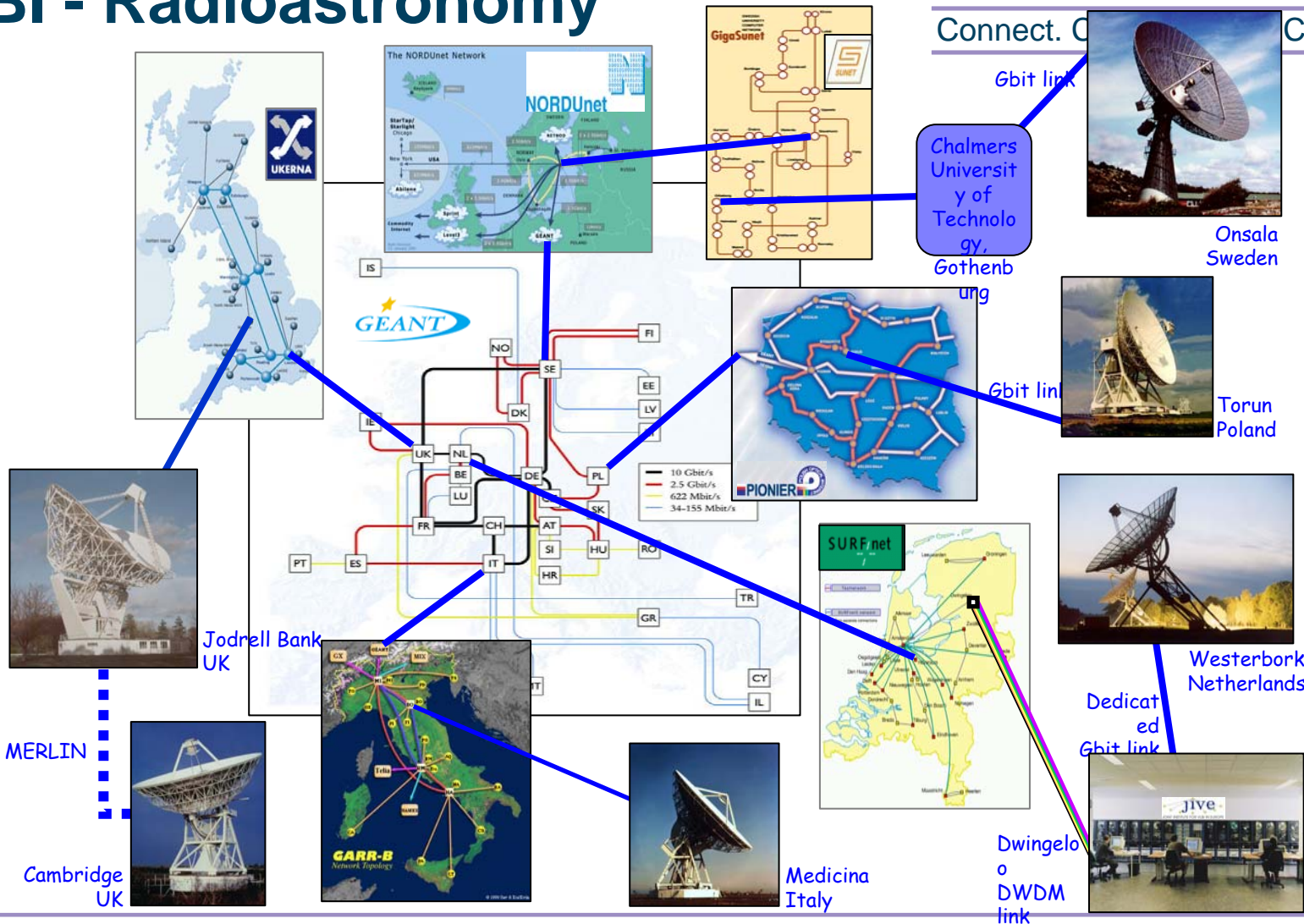
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Features:

- via MCCs
- uses GFP/VCAT (for 10GE)
- NOT full line rate! (for 10GE)
- more dynamic
- sub 10G possible

GÉANT2 Supported projects: eVLBI - Radioastronomy



Connect. C

Collaborate

Gbit link

Chalmers University of Technology, Gothenburg

Onsala Sweden

Gbit link

Torun Poland

Westerbork Netherlands

Dedicated Gbit link

Jodrell Bank UK

MERLIN

Cambridge UK

Medicina Italy

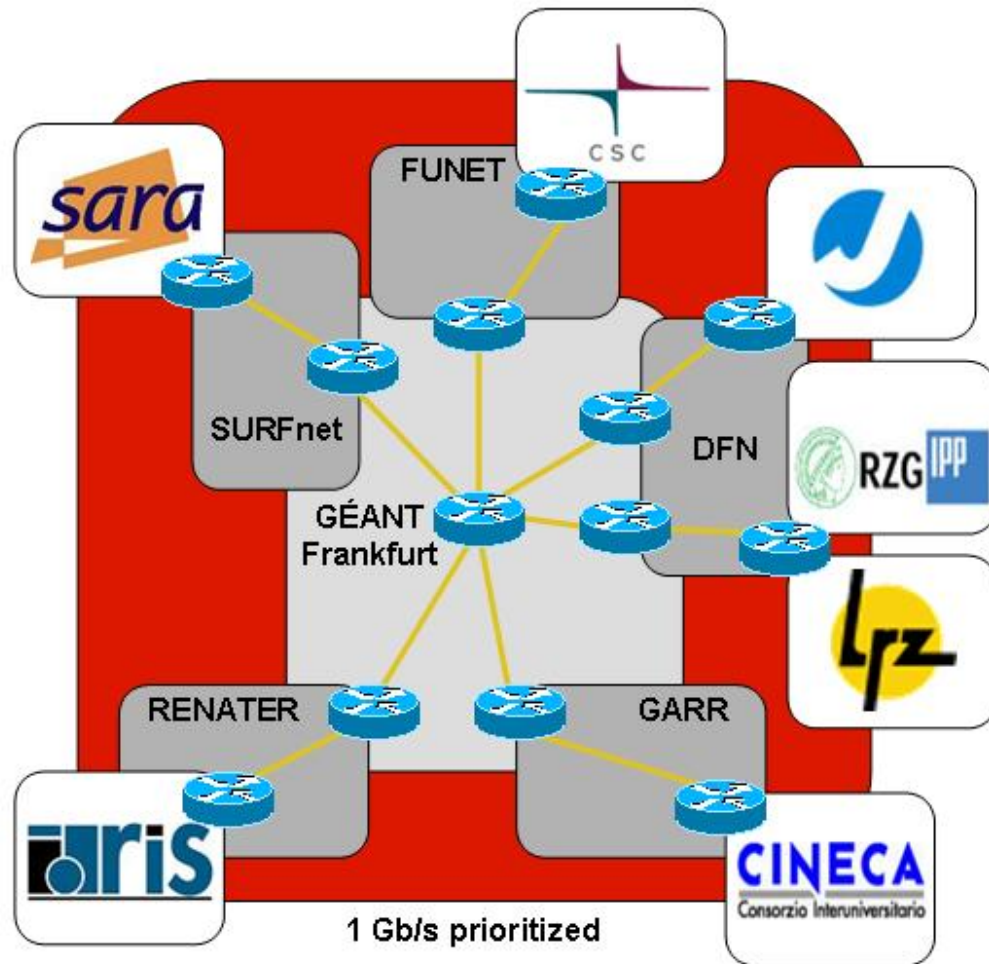
Dwingelo DWDM link

GÉANT2 Supported projects: DEISA Supercomputer network



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Distributed
European
Infrastructure for
Supercomputing
Application

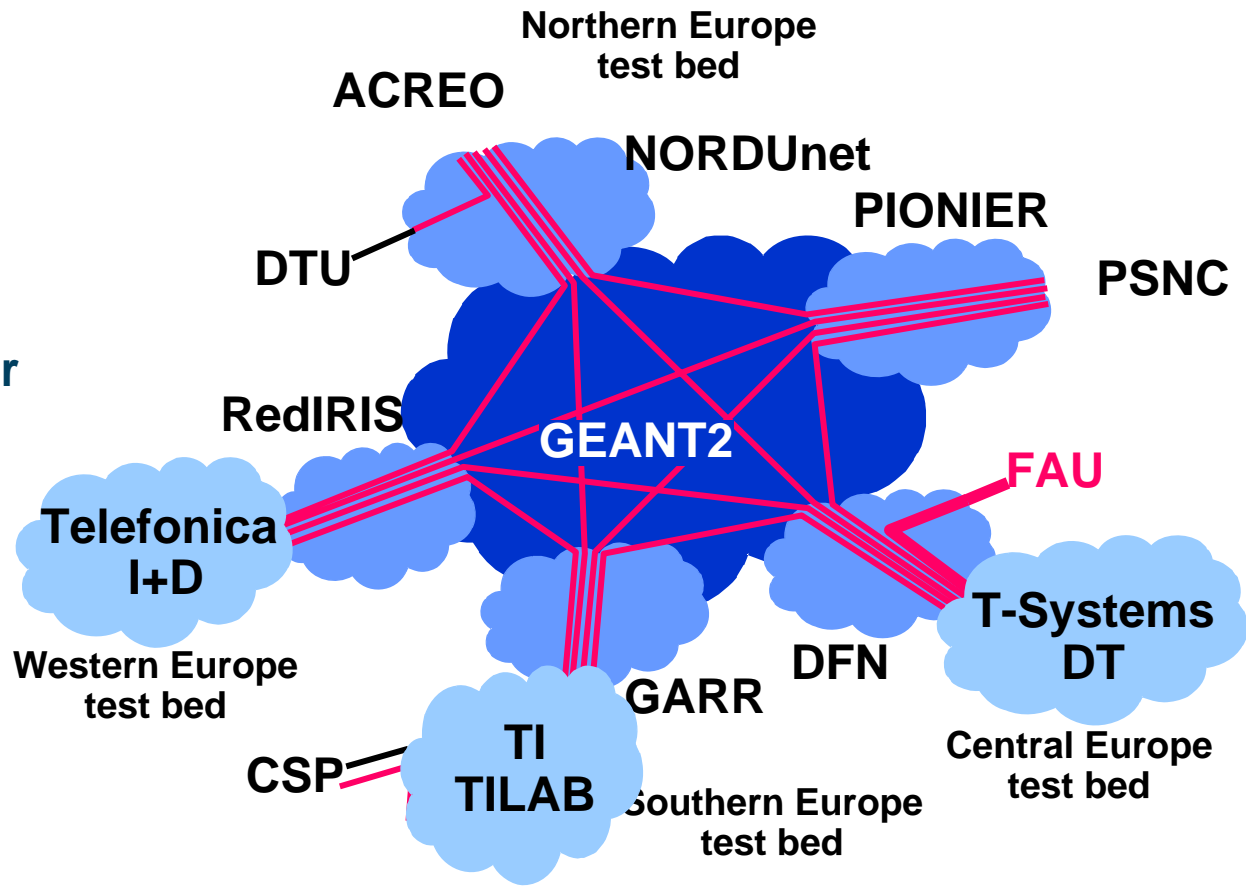


GÉANT2 Supported projects: MUPBED – Network technology testbed



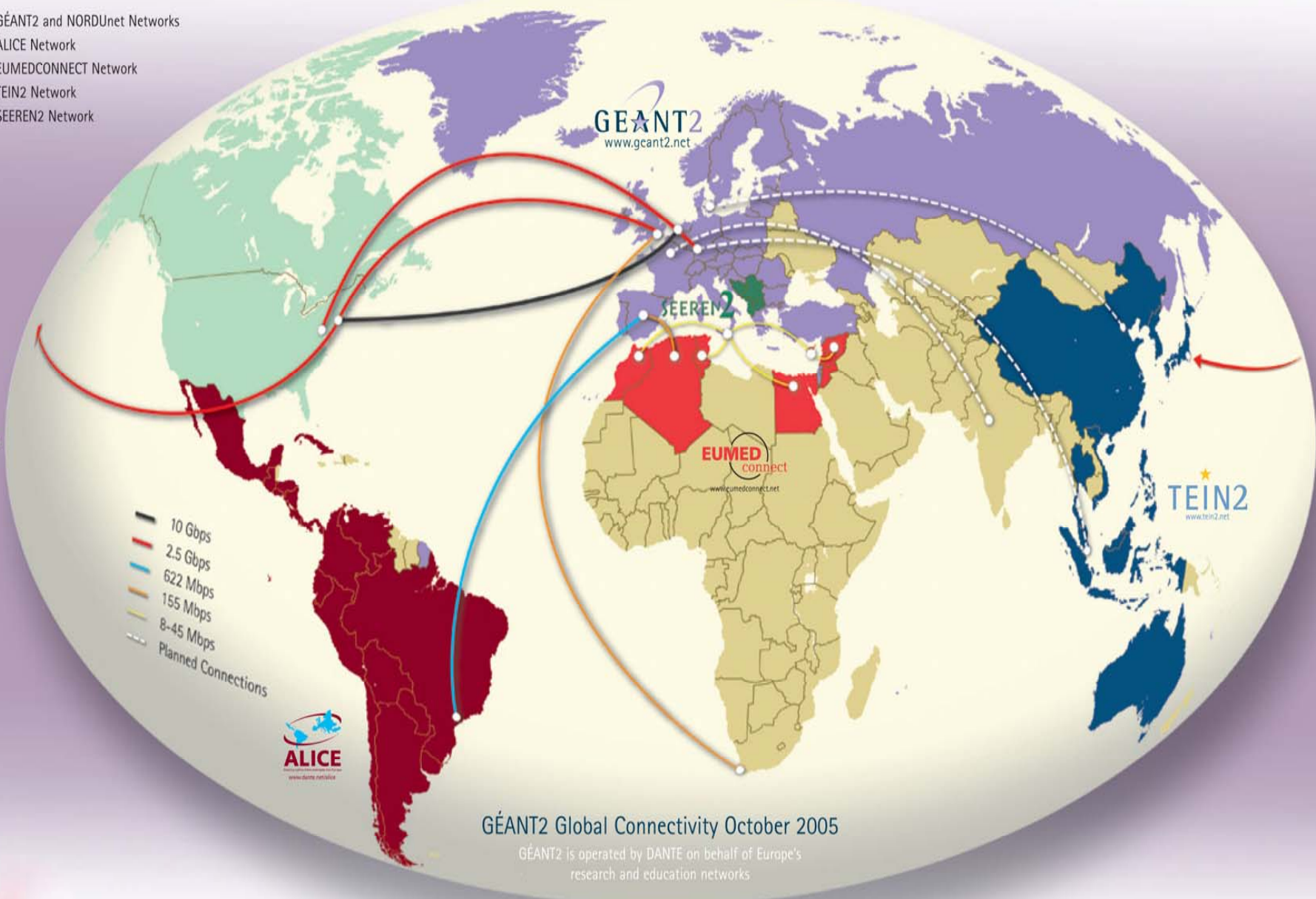
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- integrate and validate ASON/GMPLS technology
- creating a large experimental multi-layer and multi-domain network environment
- uses L2VPN across domain borders



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

www.geant2.net



GÉANT2 Global Connectivity October 2005

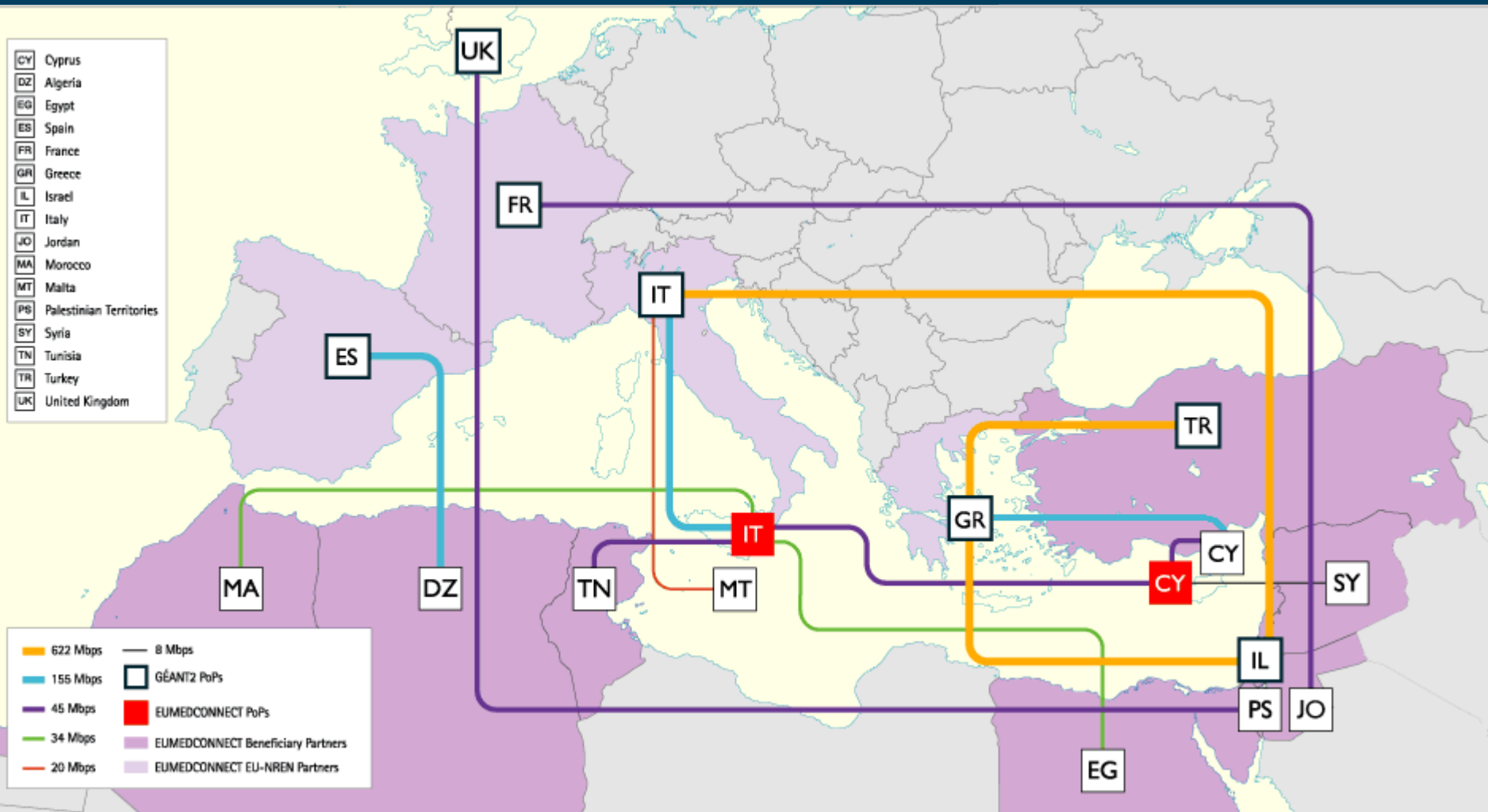
GÉANT2 is operated by DANTE on behalf of Europe's research and education networks

EUMEDCONNECT Topology

October 2005



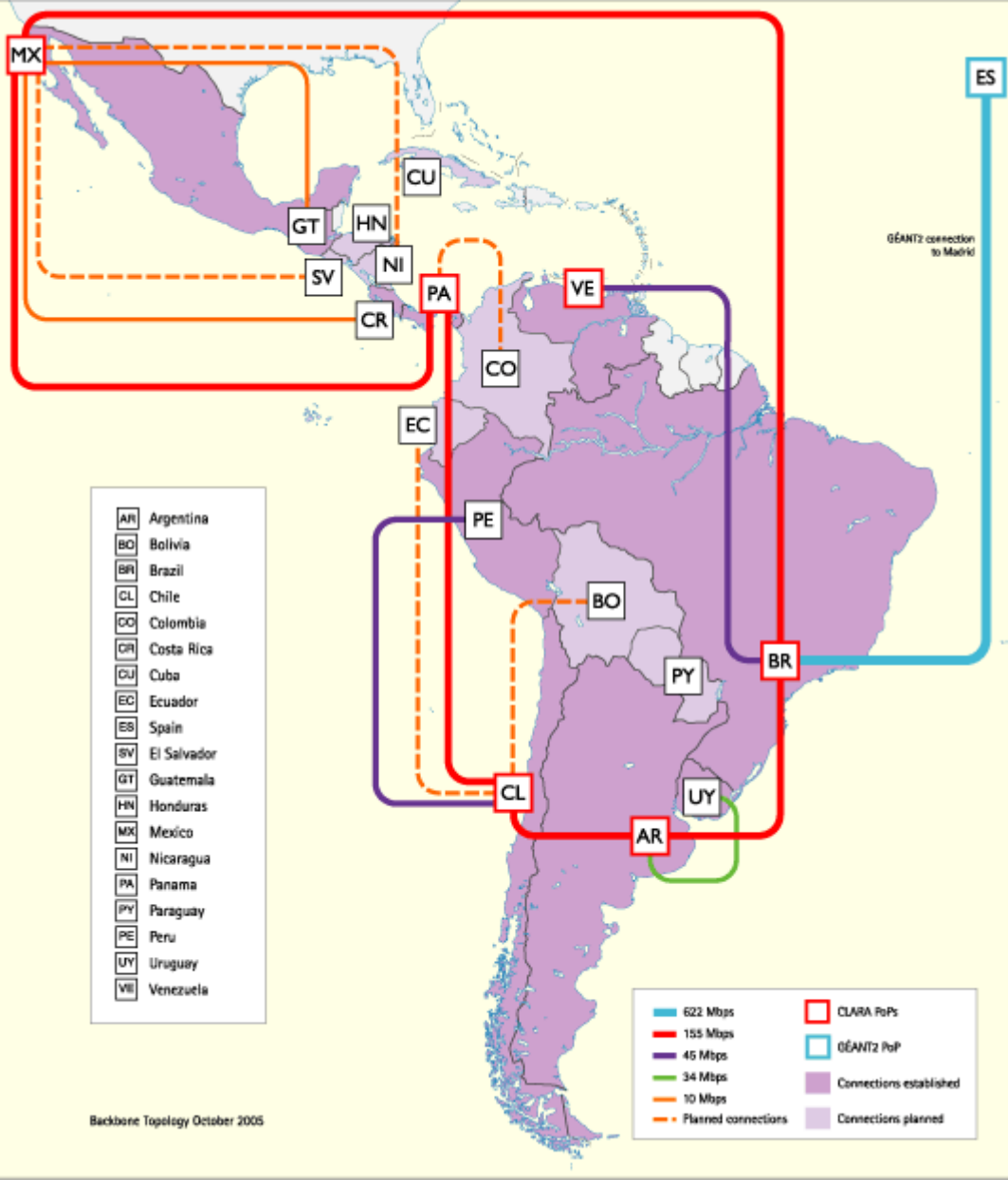
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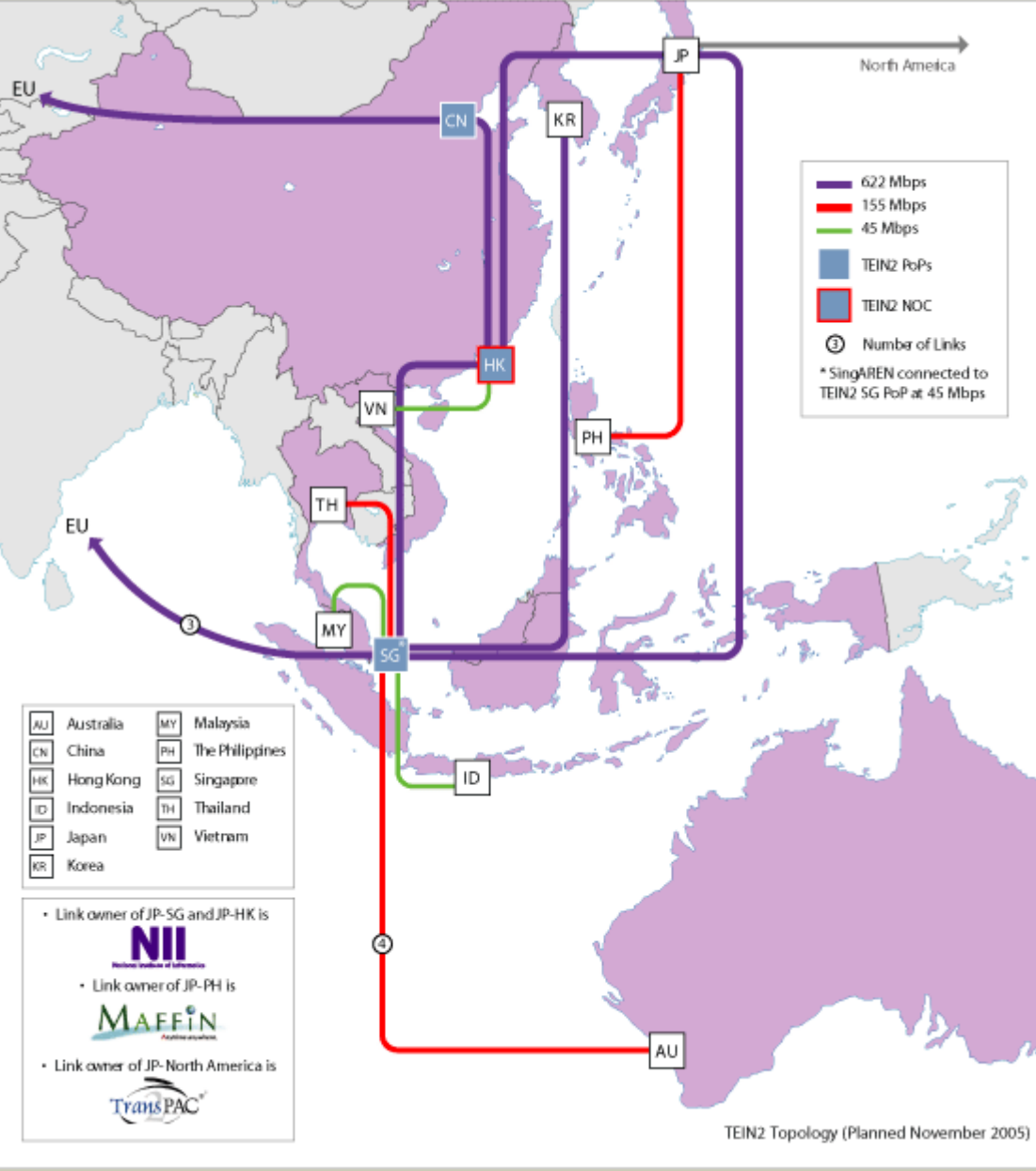
ALICE Topology October 2005





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Planned TEIN2 Topology November 2005





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IPv6

- IPv6 already available – *Standard*
- Research networks are IPv6 compliant
- Grids need an **high performance network**
- IPv6 is the **value-added** component
- IPv6 can do everything you can do with IPv4 **and IPv6 do it better**
- Public end-to-end network based on **High performance** forwarding
- New generation routers support native **IPv6 packet forwarding** through hardware ASICs
- Removing NAT and Private IP address reduces network delays
- Collaboration with ASIA-PACIFIC drives to improve IPv6 in Europe
- **GRID Middleware** needs to be **IPv6 compliant**
- **Applications** should be **transparent**



Questions?

Thanks to Michael Enrico, DANTE