



DEVELOPMENTS IN GÉANT2: END-TO-END SERVICES

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12 fall meeting
4 December 2006

Agenda



Connect. Communicate. Collaborate

- GÉANT2 briefing and developments
- End to end services and the hybrid infrastructure
- GÉANT2 activity JRA3 (BoD) introduction
- Monitoring

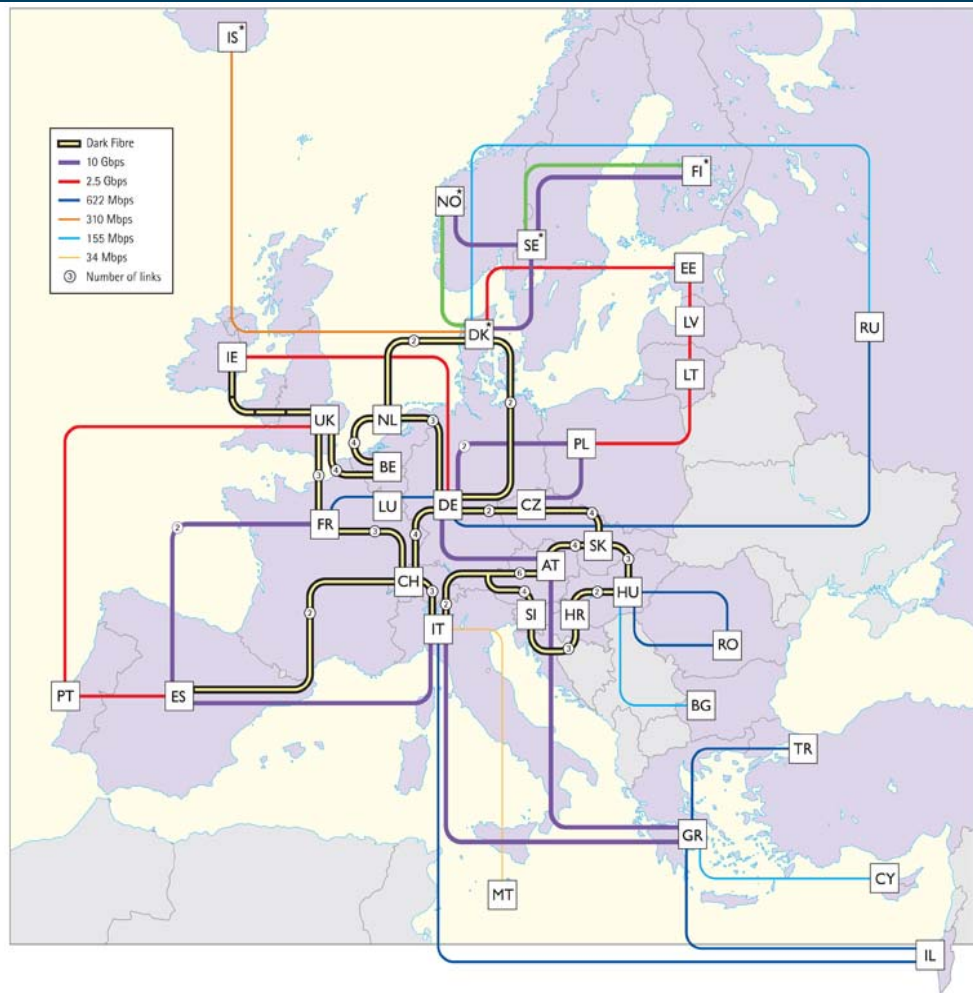
GÉANT2



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Some New Facts & Figures...

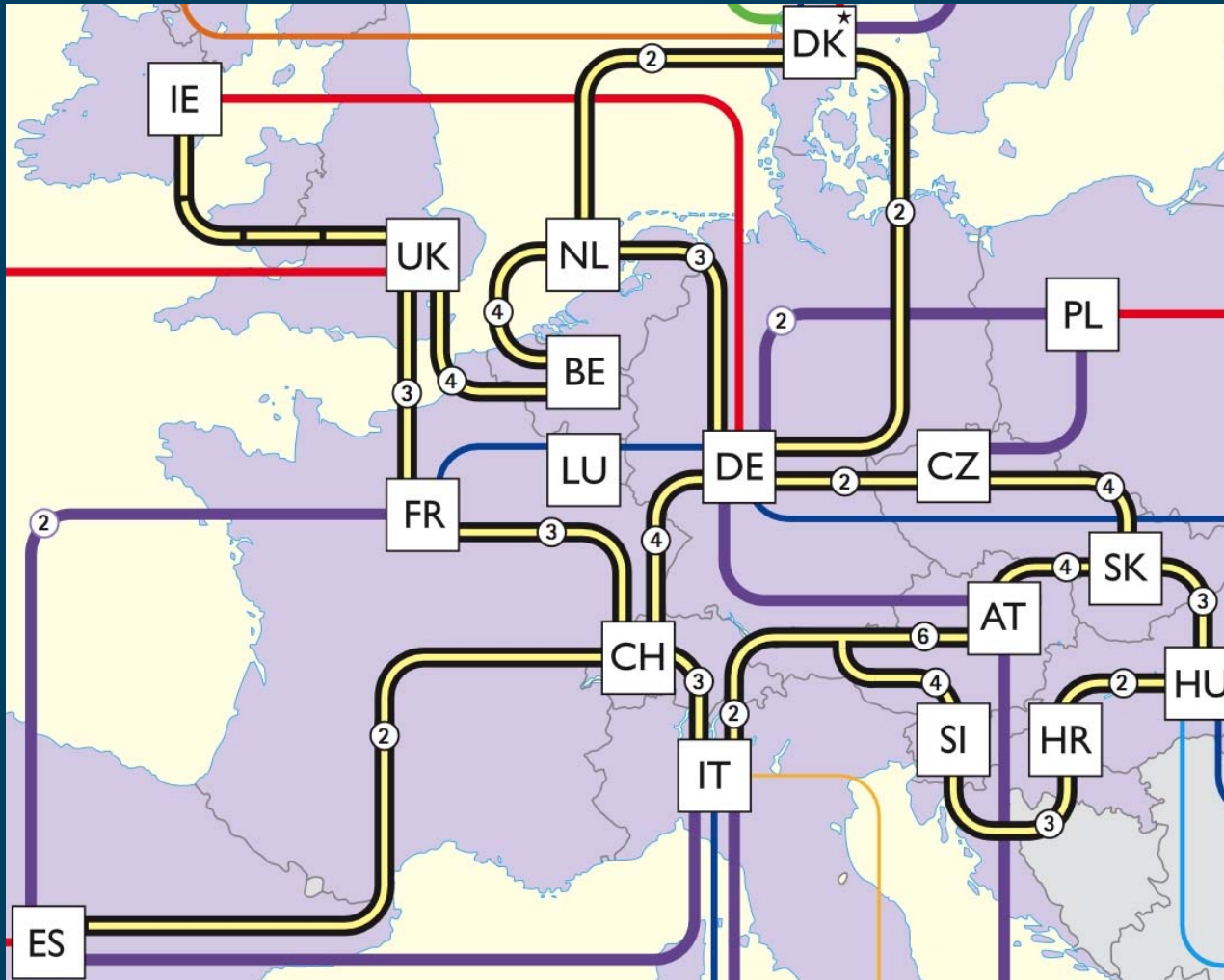
- 25 POPs (+4) serve >30 NRENs
- 11600 km of fibre + 140 ILA sites
- 50+ x (own) 10G lambdas
- 9 x (leased) 10G lambda
- 8 x 2.5G (leased) “lambda” + some lower speed links
- Juniper T640, M160, M40 routers
- NREN accesses at up to 10Gbps (+ backup) + P2P
- 4 x 10G to North America
- POP in NY
- connections to other R&E networks as before : Abilene, ESnet, CA*net4, SINET, TENET, RedCLARA, EUMEDCONNECT, TEIN2



The GÉANT2 fibre topology



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Core fibre topology (initial)

Figures in circles represents the number of lambdas

Valid at July 2006



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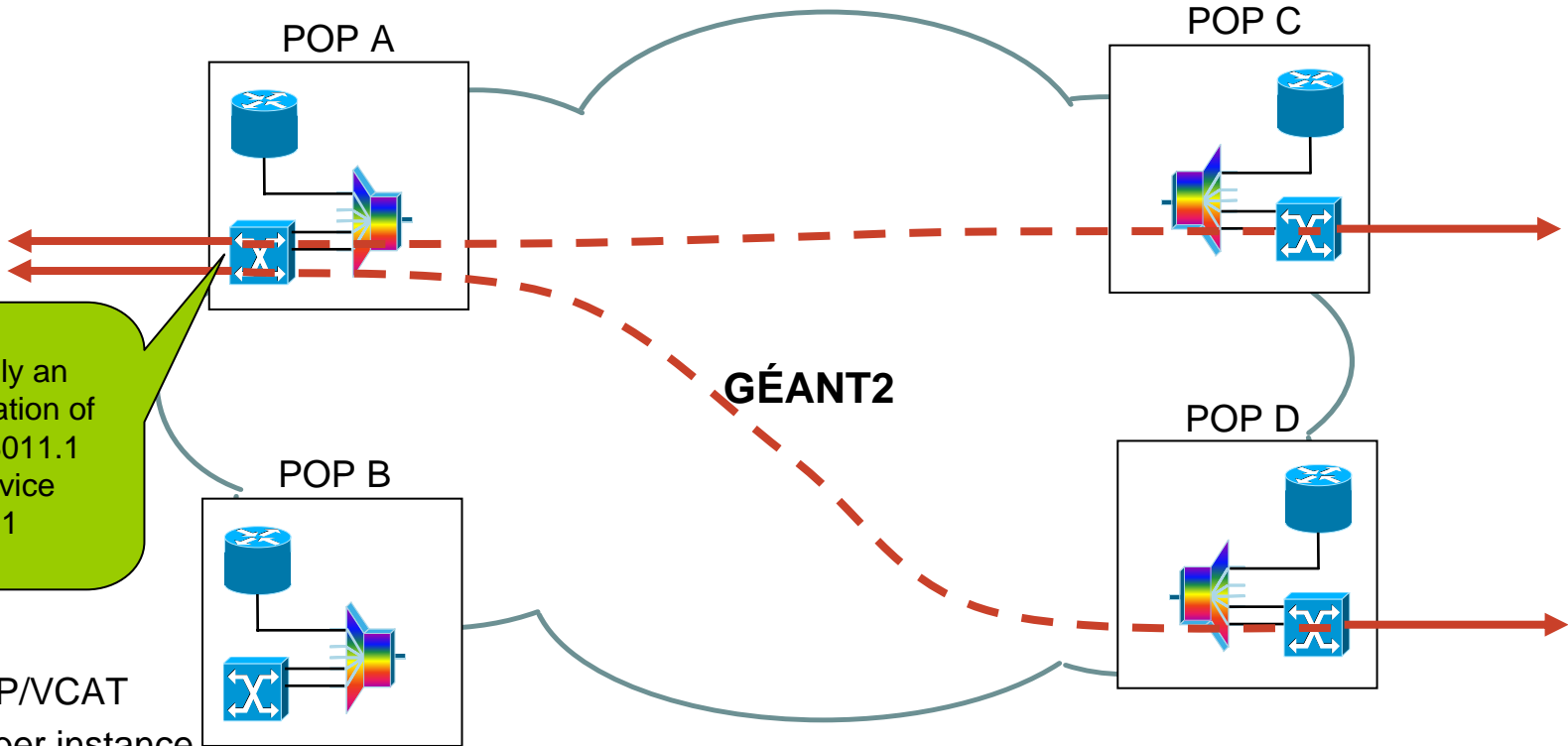
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Services over GÉANT2

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Point-to-point GE (GE access)



Essentially an implementation of ITU-T G.8011.1 EPL service Type 1

Features:

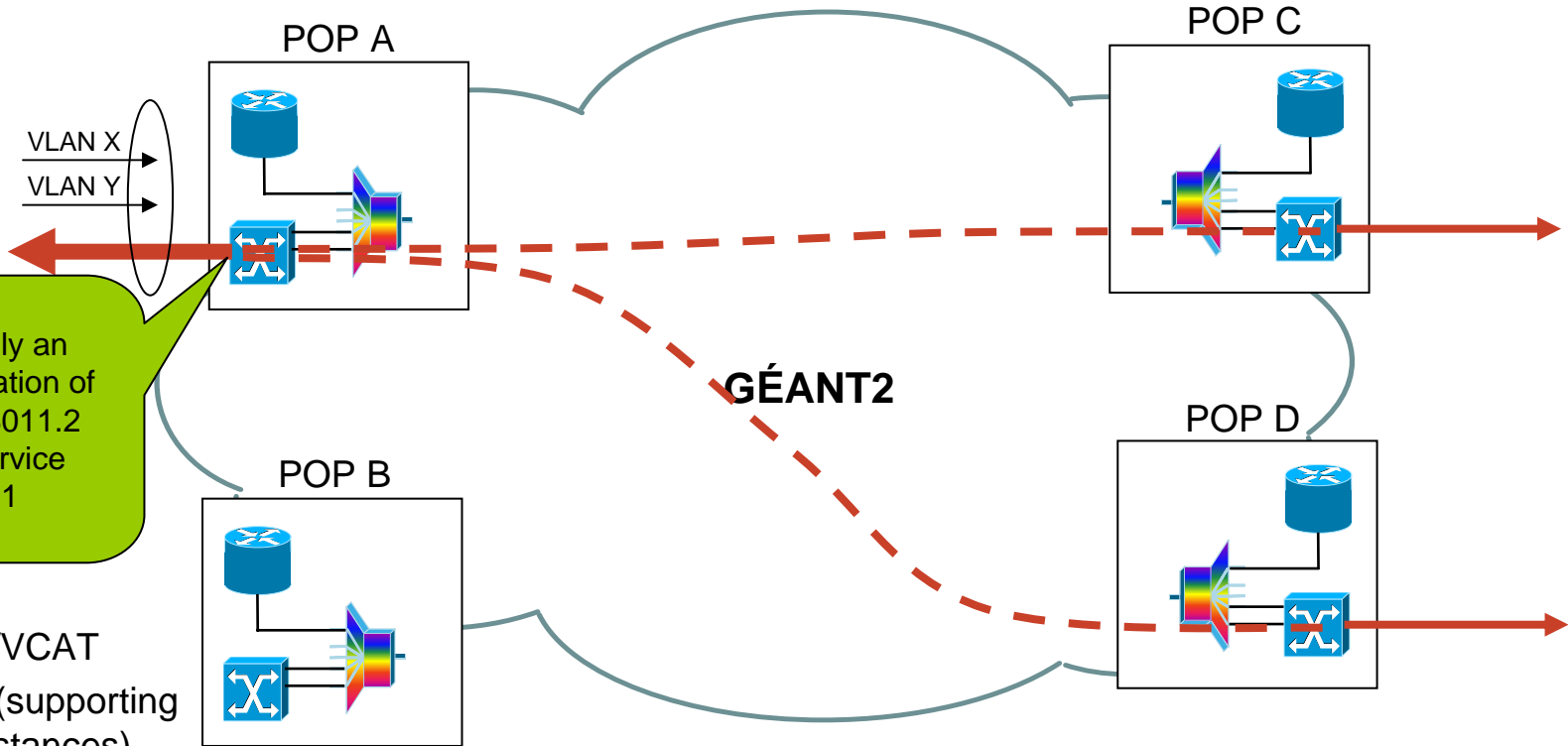
- uses GFP/VCAT
- GE port per instance
- more dynamic
- sub 1G possible



Services over GÉANT2

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Point-to-point GE (10GE access)



Essentially an implementation of ITU-T G.8011.2 EVPL service Type 1

Features:

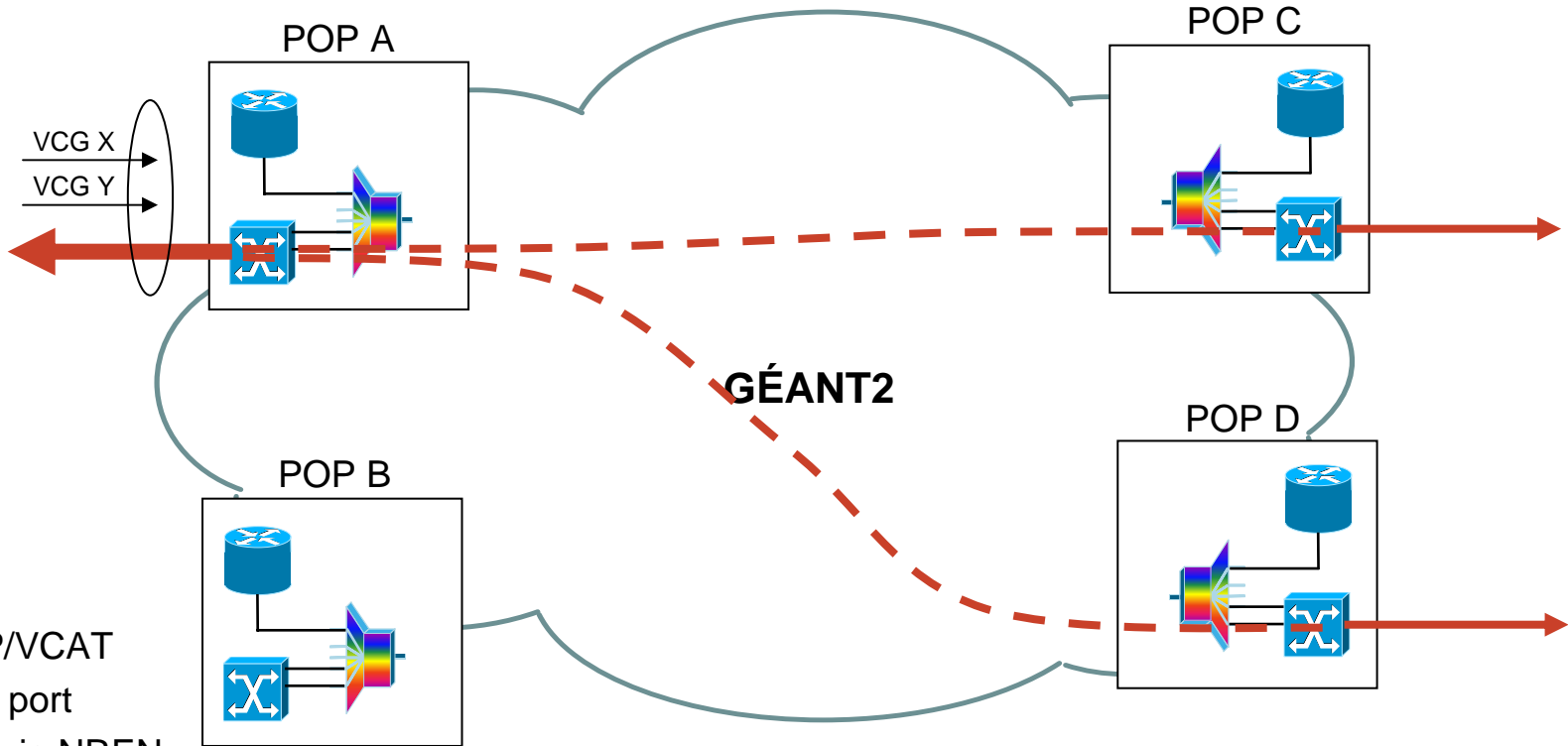
- uses GFP/VCAT
- 10GE port (supporting multiple instances)
- use 802.1Q VLAN tags as IDs
- sub (or >) 1G possible



Services over GÉANT2

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Point-to-point GE (10G SDH access)



Features:

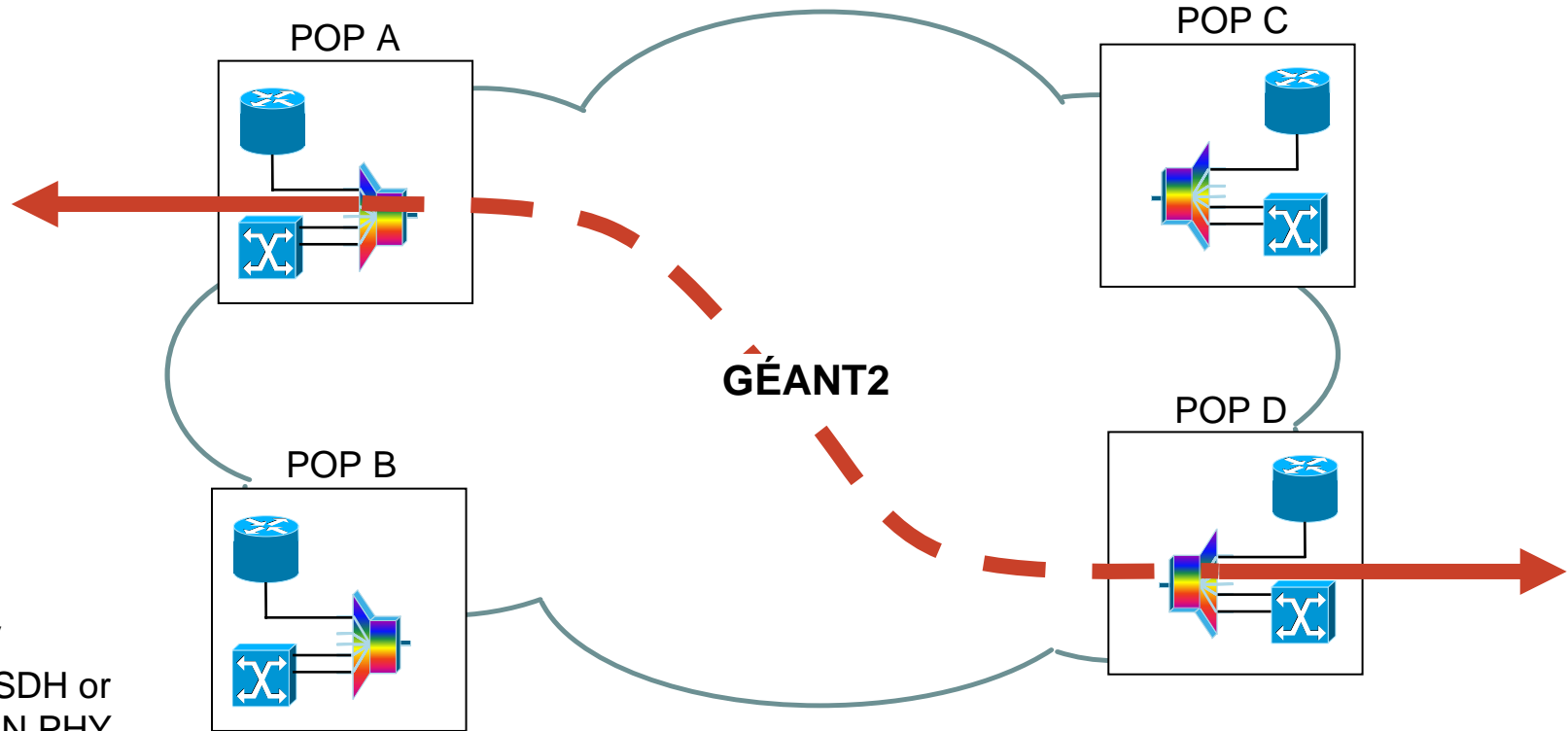
- uses GFP/VCAT
- 10G SDH port
- GFP done in NREN
- sub 1G possible



Services over GÉANT2

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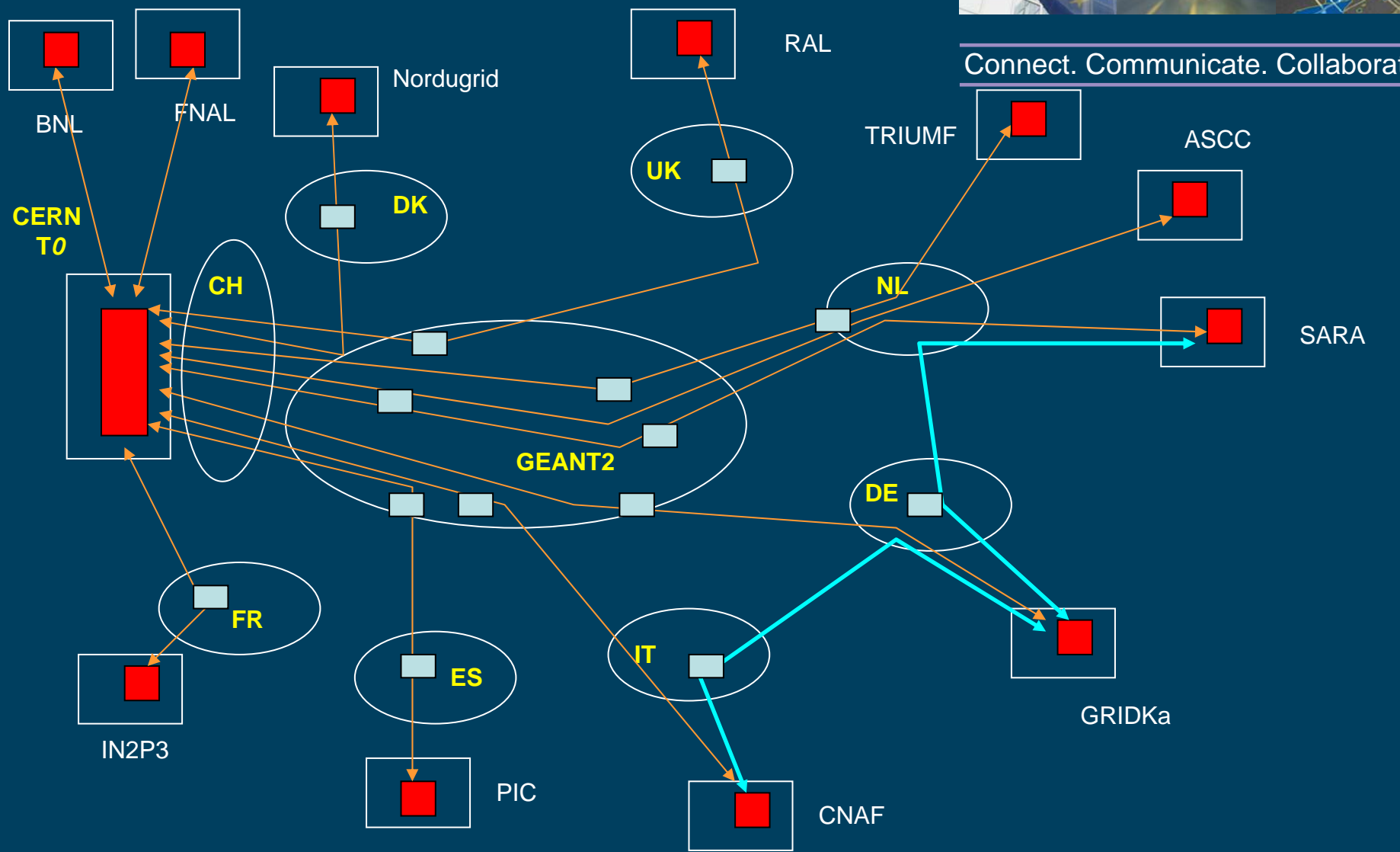
Managed wavelength service



Features:

- 10G only
- SONET/SDH or 10GE LAN PHY
- static
- 10GE is “full-rate”

LCG TIER0 – TIER1 Optical Private Network - OPN,



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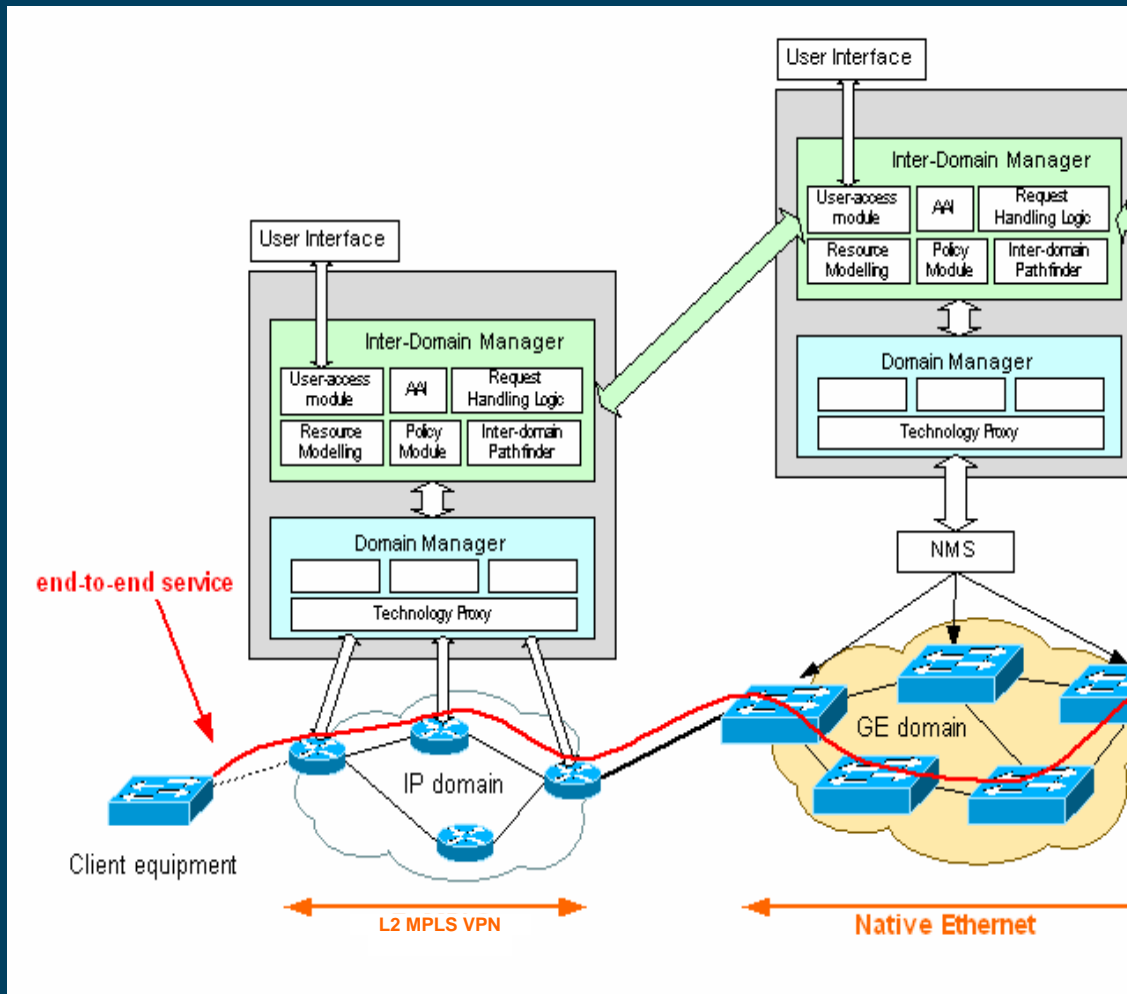
The JRA3 Activity of GN2

- JRA3 is investigating the provision of 'Bandwidth on Demand' services to the NREN community
- The goal implies an environment that is:
 - Multi-domain
 - Using multiple transmission technologies
 - SDH, GFP over SDH, L2 MPLS VPN, Ethernet
- Requirements for:
 - end-to-end delivery of a non-contended capacity
 - a standardized interface for service requests at end-points
 - service level indication to end-users
 - advance reservation (scheduled)
 - modular and technology independent implementation

JRA3 architecture



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Key elements:

- Inter-Domain manager (IDM)
- Domain manager (DM)
- Resource modeling (aka Abstract representation)
- Path finder
- Technology proxies
- Standardized interfaces

Each domain participating in the BoD service provisioning needs to operate an IDM and honor the IDM-DM and IDM-IDM interfaces.

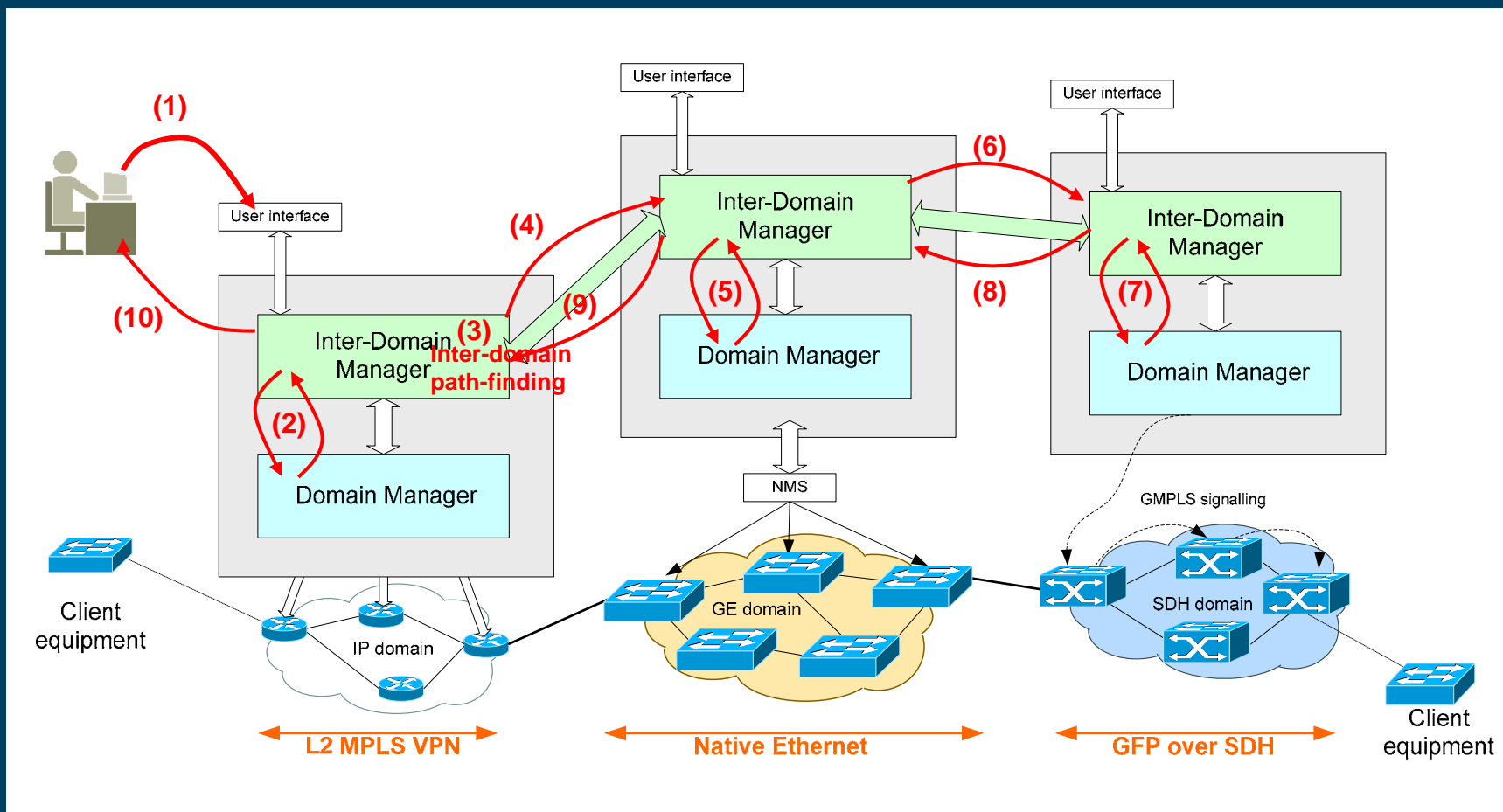
The local DM can be any technology, just a proxy is needed towards the IDM

JRA3

Distributed approach



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JRA3: Current status



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- Framework and Architecture defined
- IDM functional specification released
- IDM phase 0 (simplified in some modules) implementation and testing done
- Draft abstract notation available
- Working on Pathfinding module , IDM phase 1 and abstract representation



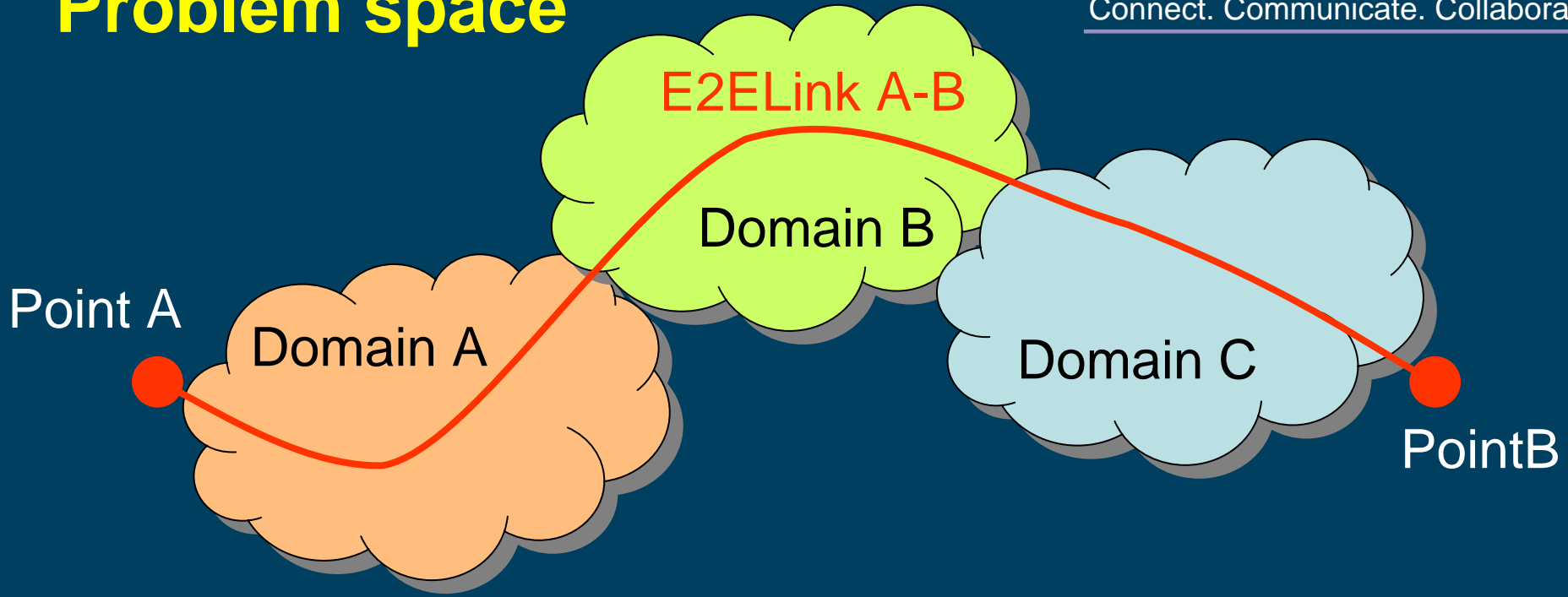
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Problem space

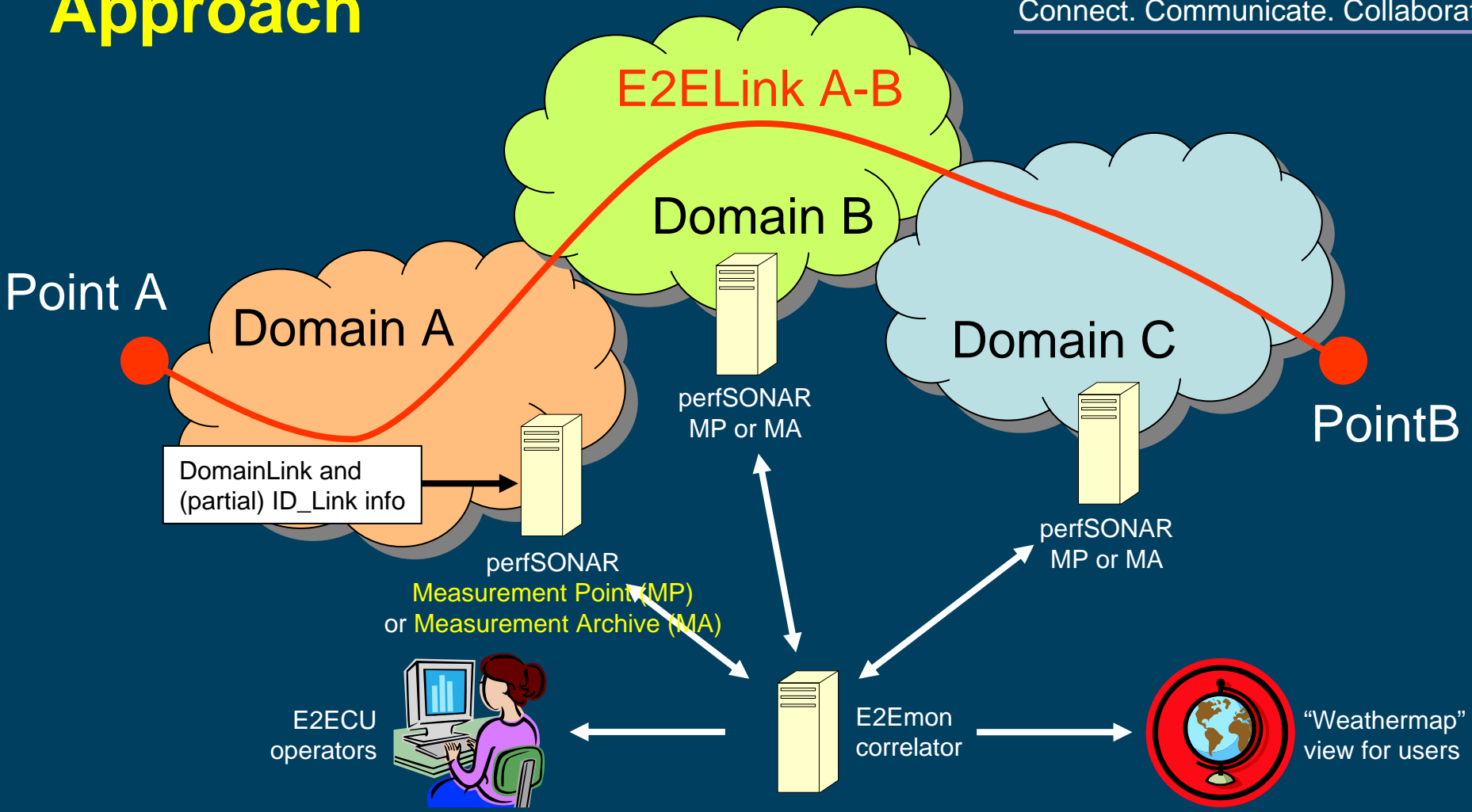


Goal: (near) real-time monitoring (link status) of constituent DomainLinks (and links between domains) and whole end-to-end Link A-B.



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Approach





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Demo



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Thank you