



Rollout Update

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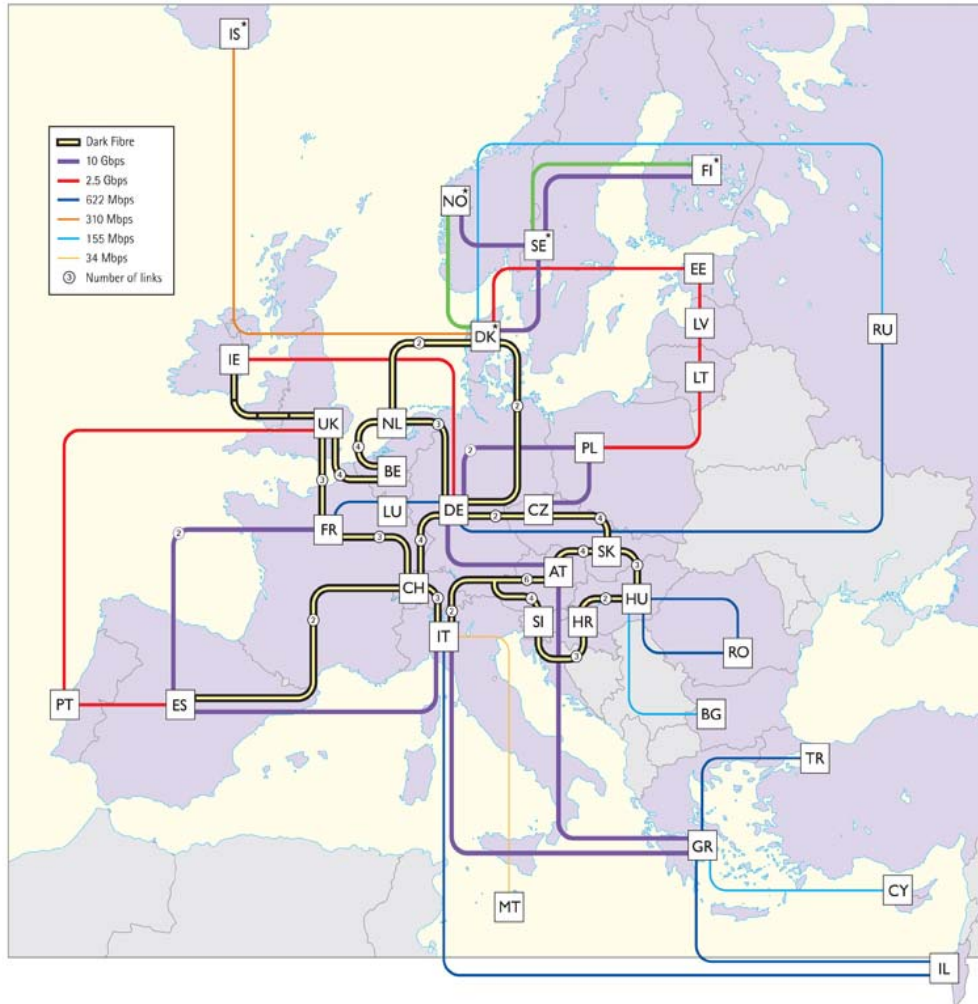
Network Engineering & Planning Manager

Athens 3-4 November 2005

GÉANT(1) → GÉANT2



Connect. Communicate. Collaborate



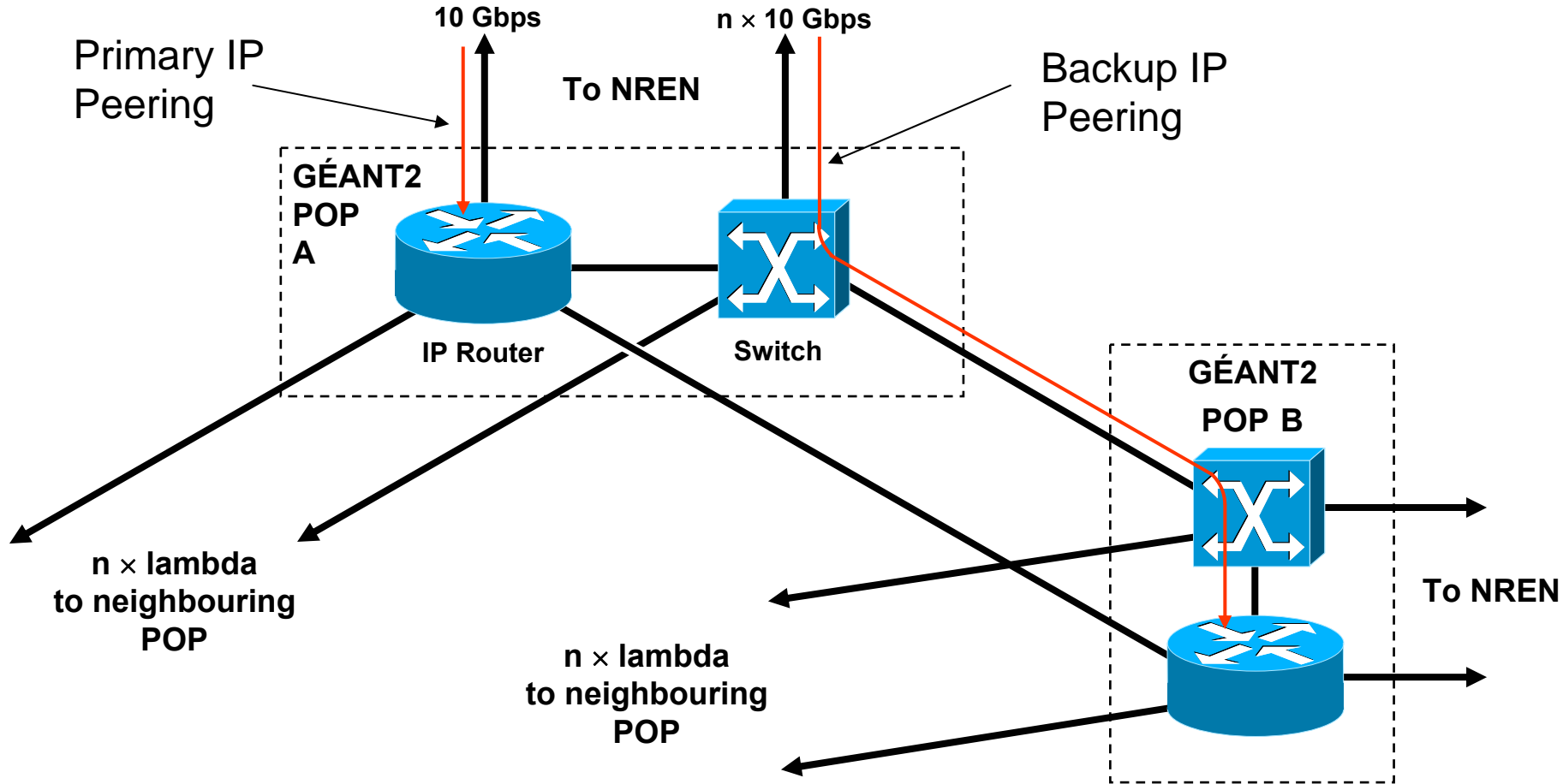
Some New Facts & Figures...

- 25 POPs (+4)
- to serve 30 NRENs (+1)
- 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 in POPs with
- 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, EUMEDCONNECT, RedCLARA, TEIN2 (coming)

GÉANT2: A hybrid infrastructure



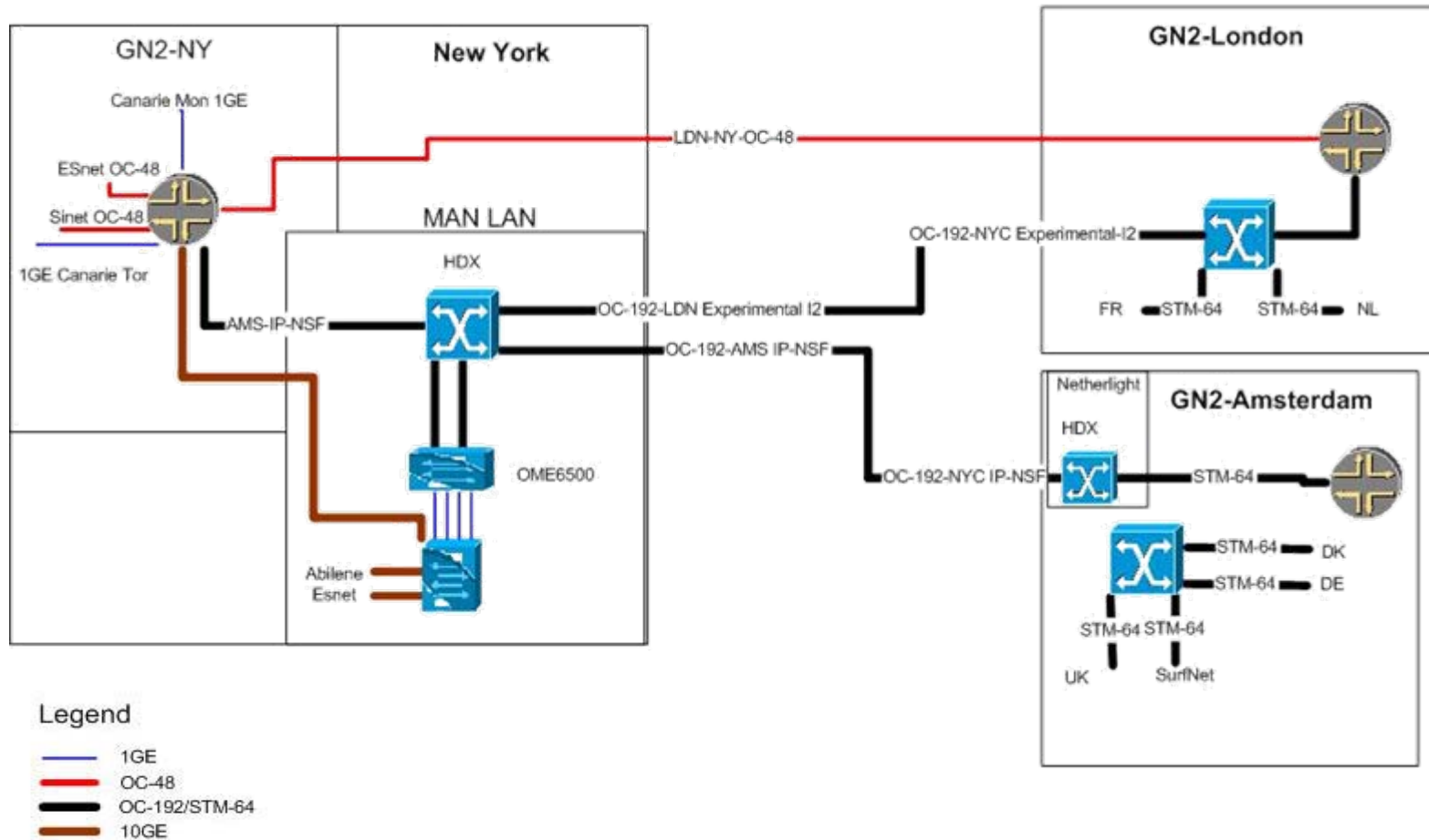
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Transatlantic (Phase 1)



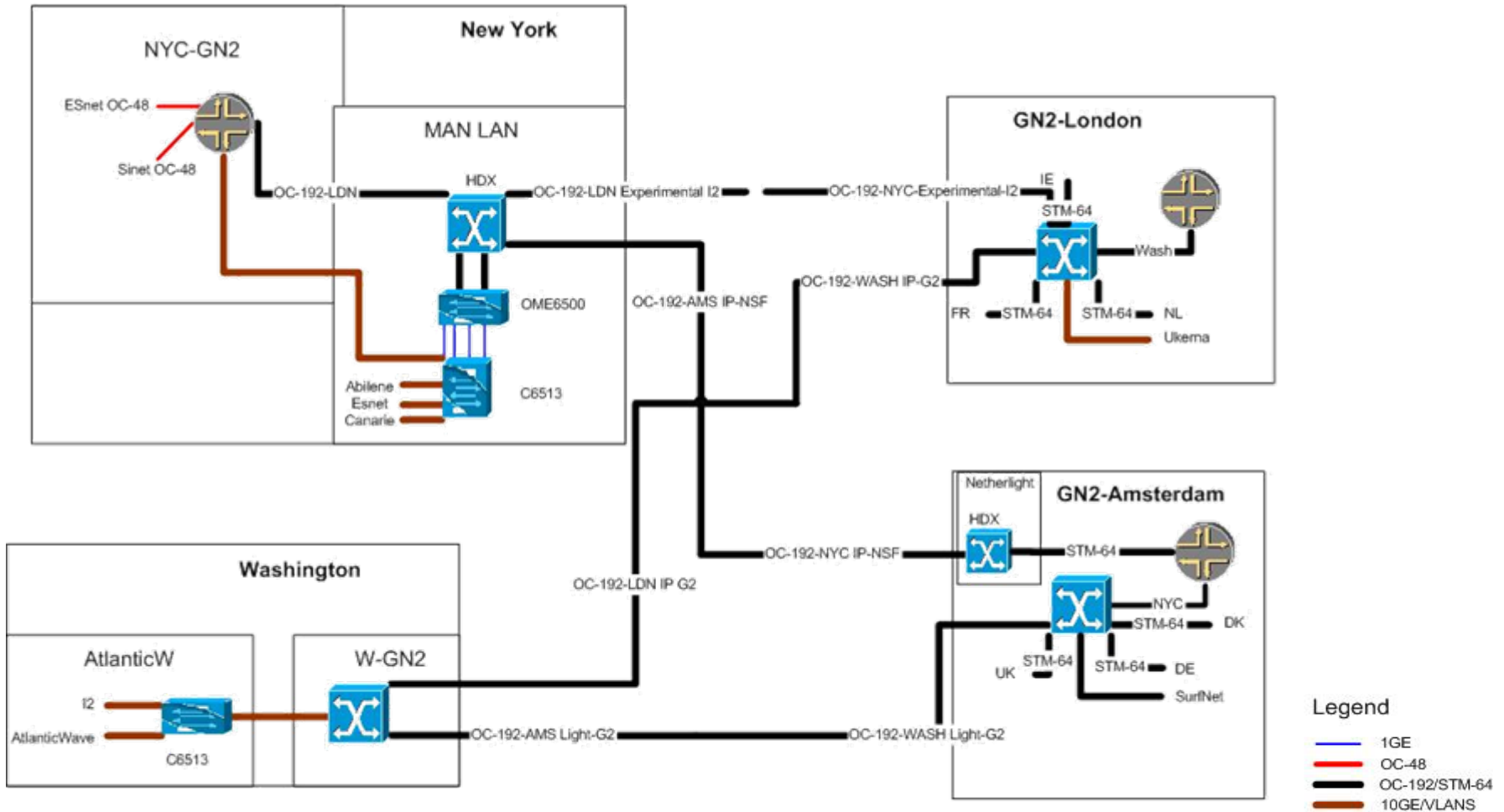
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Transatlantic (Phase 2)



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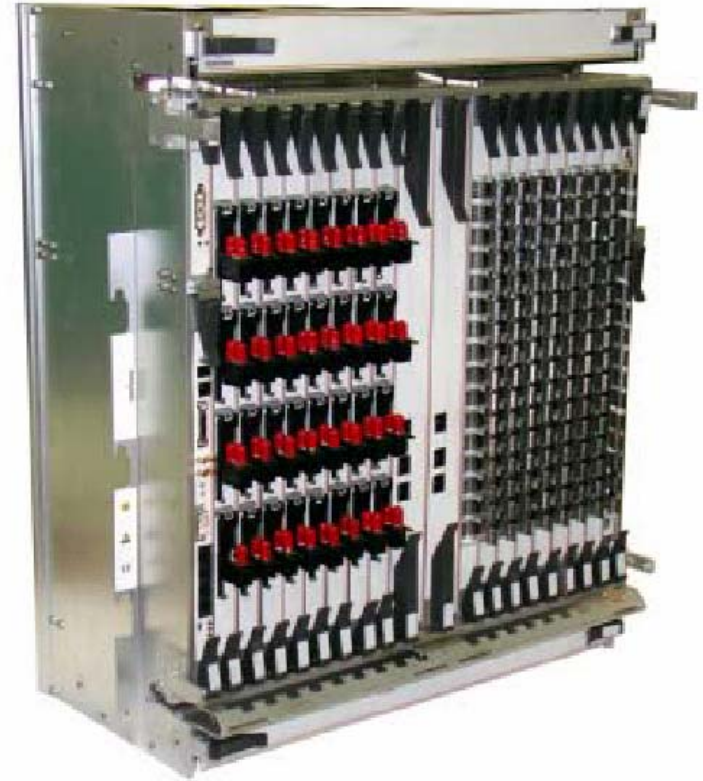
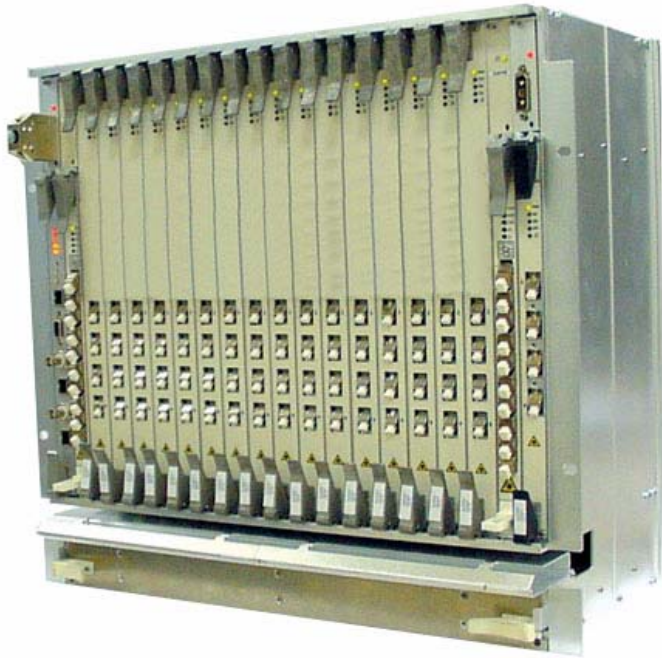


Transport Equipment



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Alcatel 1626 LM (Light Manager)



Alcatel 1678 MCC (Metro Core Connect)



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Services

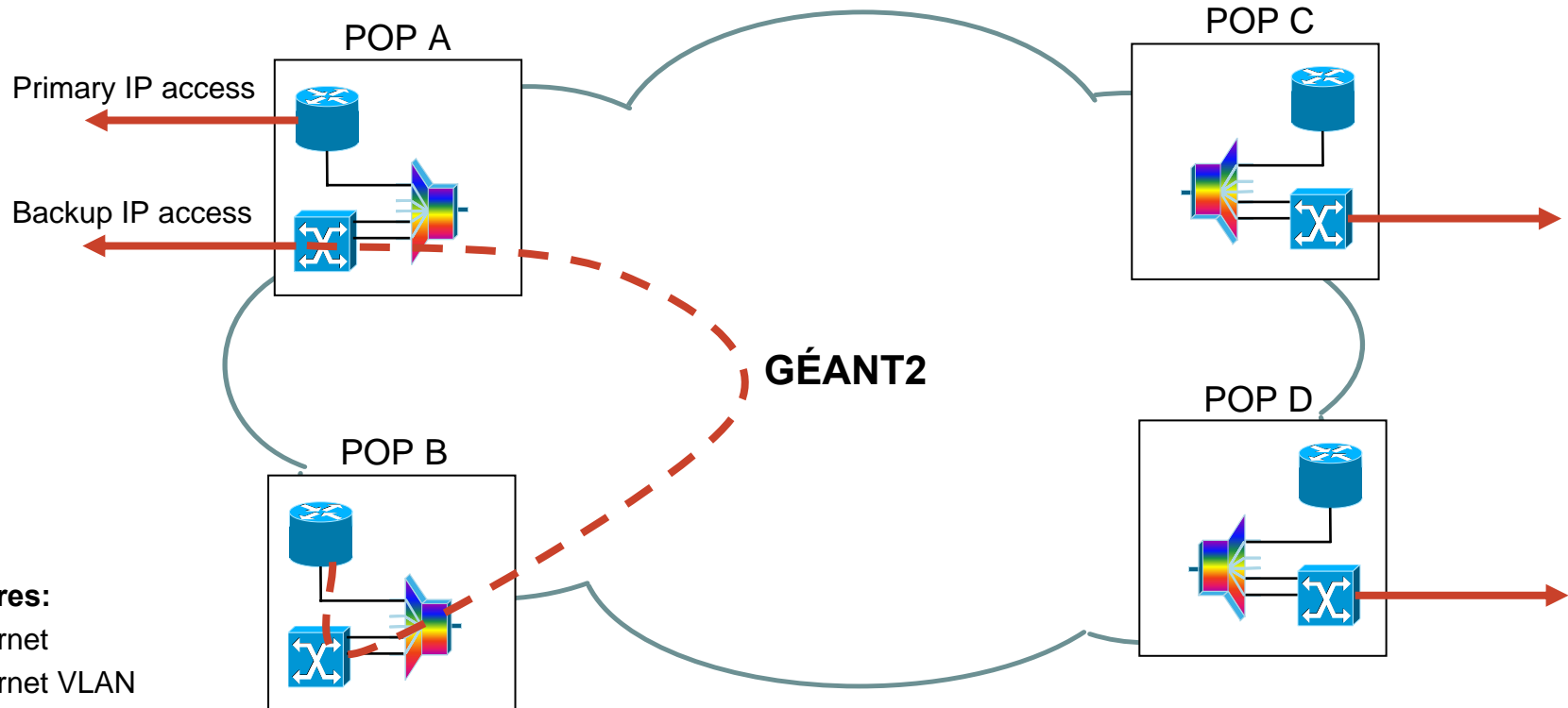
- Continue to support usual IP services
 - BE, LBE, PIP, mcast (v4), v6, mcast (v6)
- Enhance these with:
 - implementation of new features as required and available
 - e.g. embedded RP for IPv6mcast
 - improved performance monitoring (JRA1 & SA3)
 - more automated PIP provisioning (SA3)
 - network security best practice (JRA2)
- Continue to support emulated L2 P2P services
 - L2VPNs for lower capacity [“lightpath”] support
- Add portfolio of new L1 and L2 P2P services
 - cost-effective support for high-capacity [“lightpath”] services
 - up to 10G (for now)
 - emphasis placed on support for Ethernet framing
 - experiment with translational P2P service support
 - e.g. native gigE to GFP VC-4-7v over SDH
 - experiment with support for various protection modes

Circuit Services over GÉANT2



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More resilient IP service



Features:

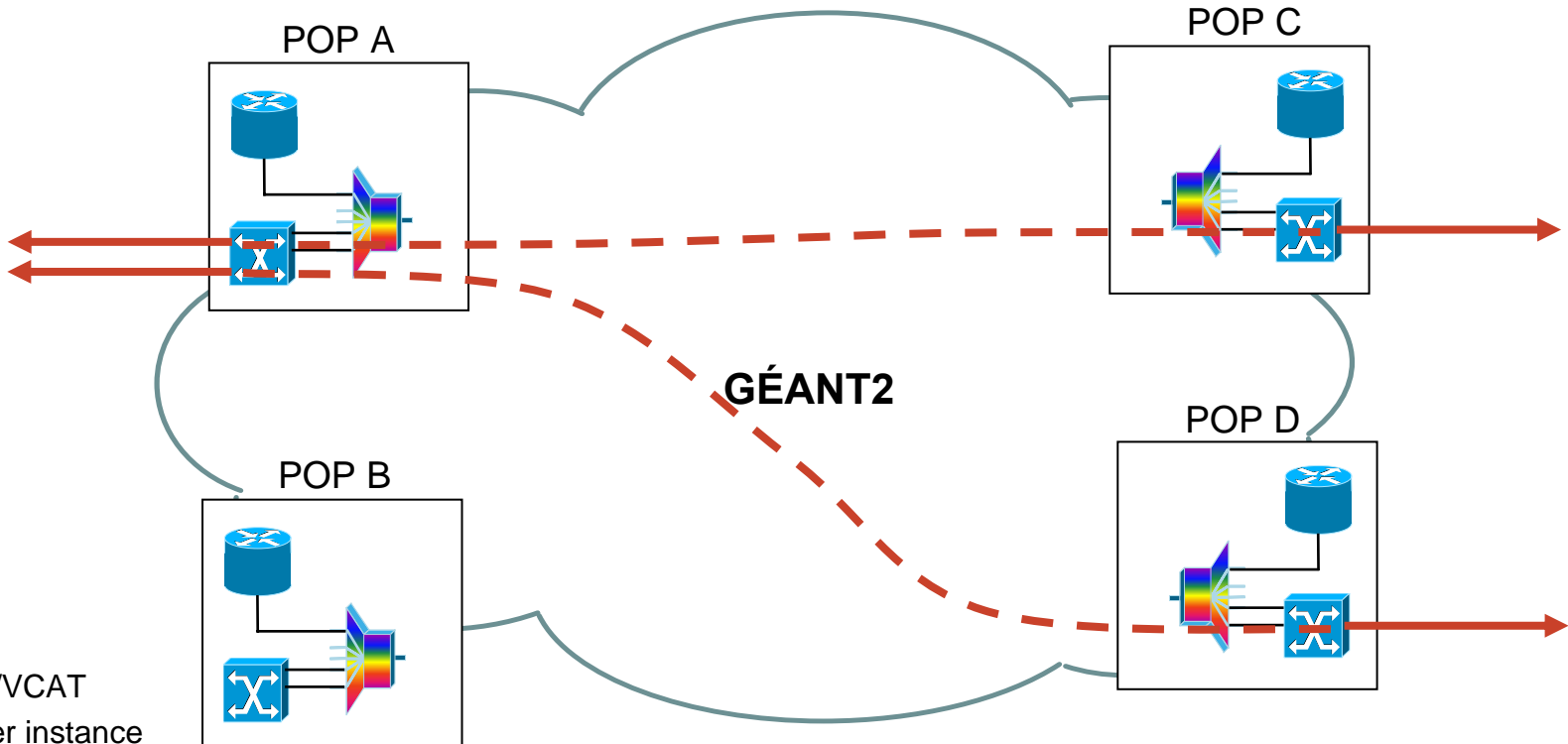
- Ethernet
- Ethernet VLAN
- SDH

Circuit Services over GÉANT2



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Point-to-point GE (GE access)



Features:

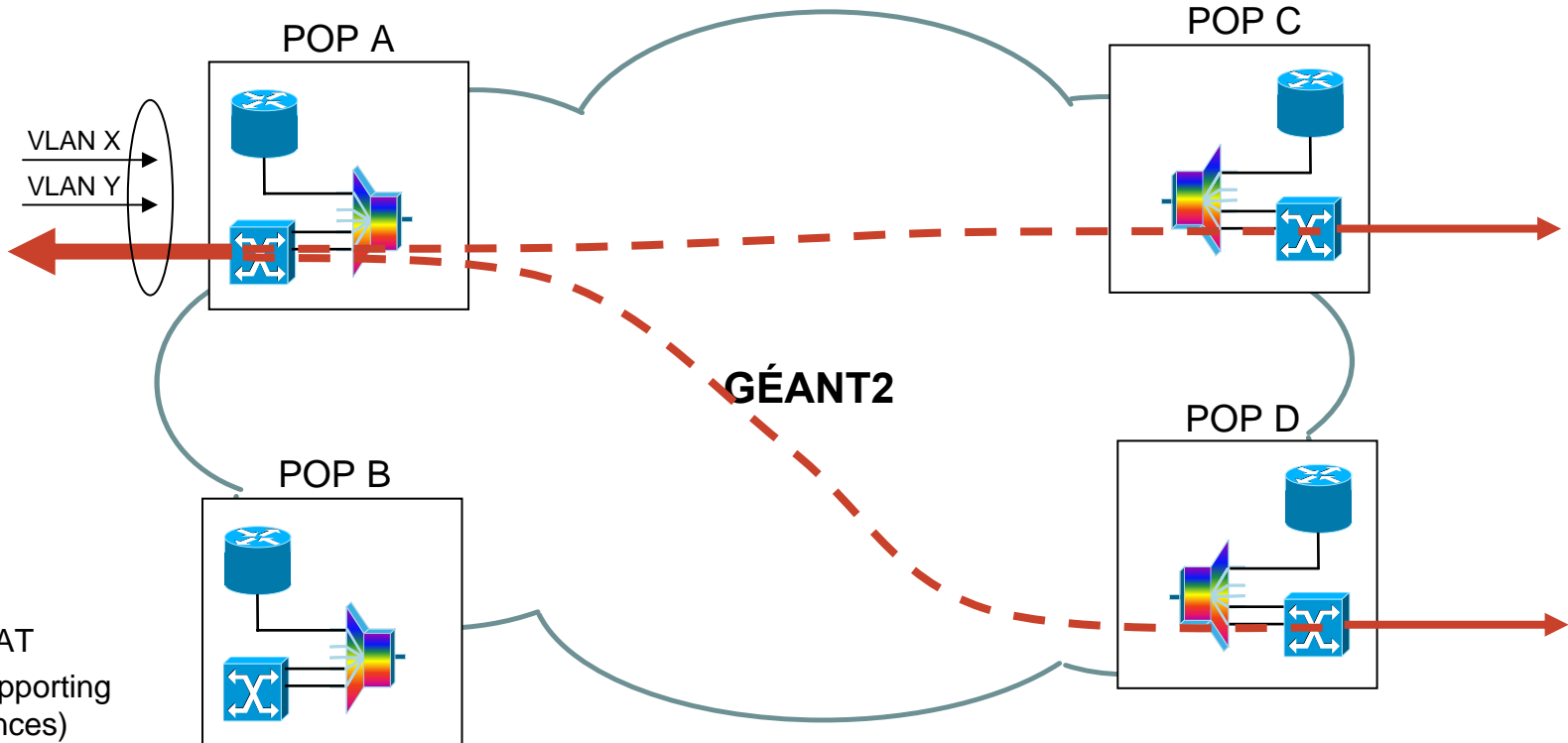
- uses GFP/VCAT
- GE port per instance
- more dynamic
- sub 1G possible

Circuit Services over GÉANT2

Point-to-point GE (10GE access)



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Features:

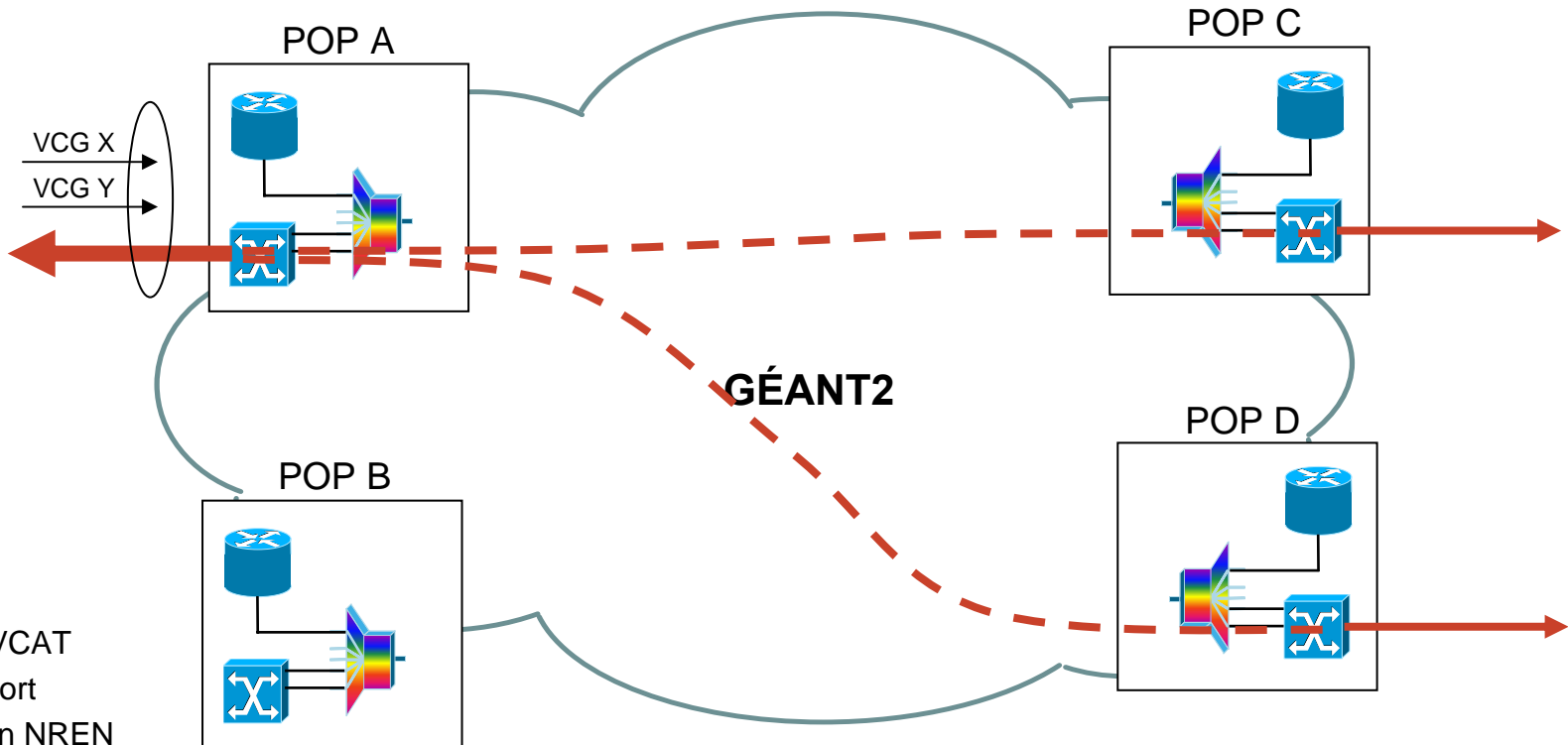
- uses GFP/VCAT
- 10GE port (supporting multiple instances)
- use 802.1Q VLAN tags as IDs
- sub (or >) 1G possible

Circuit Services over GÉANT2

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



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Features:

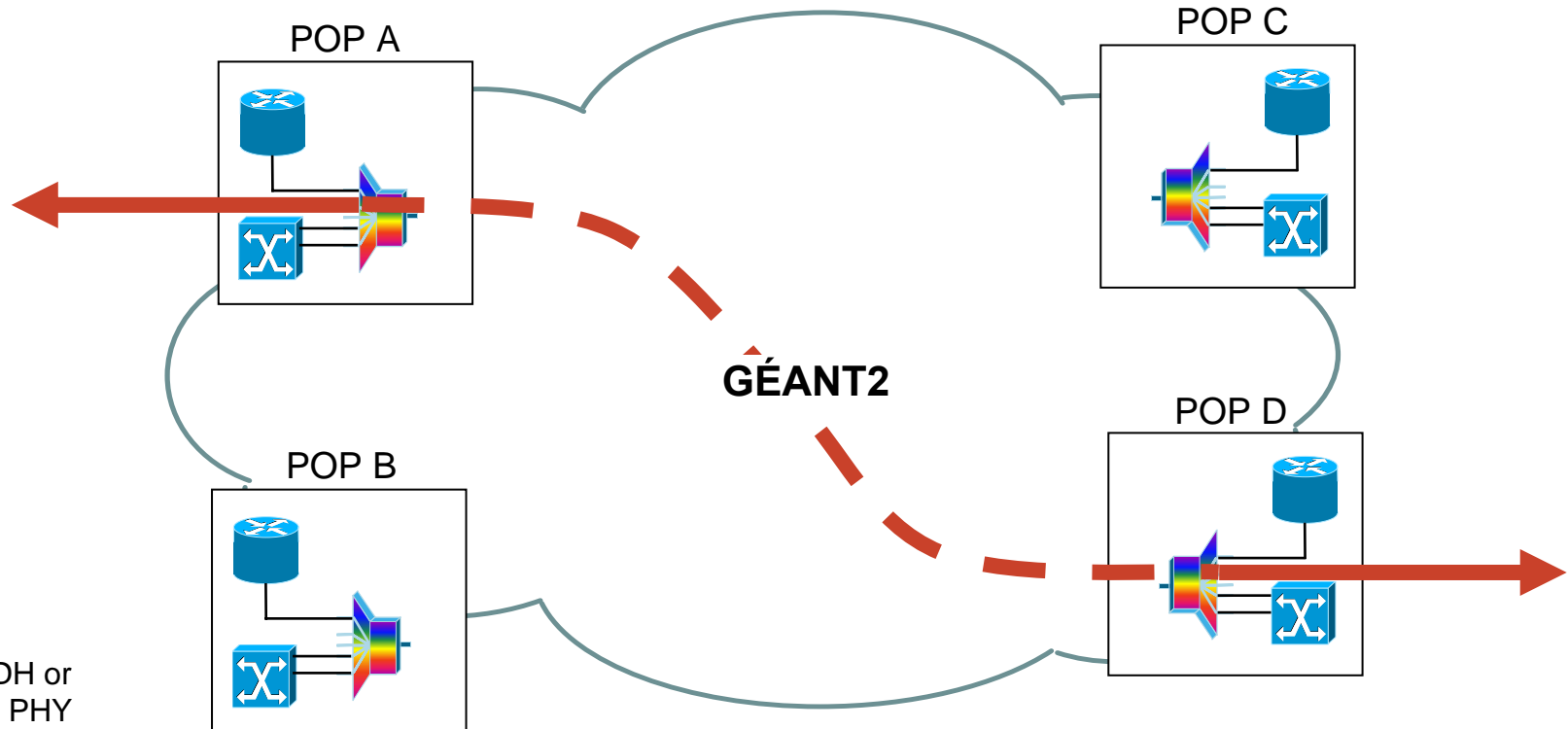
- uses GFP/VCAT
- 10G SDH port
- GFP done in NREN
- sub 1G possible

Circuit Services over GÉANT2



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Managed wavelength service



Features:

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



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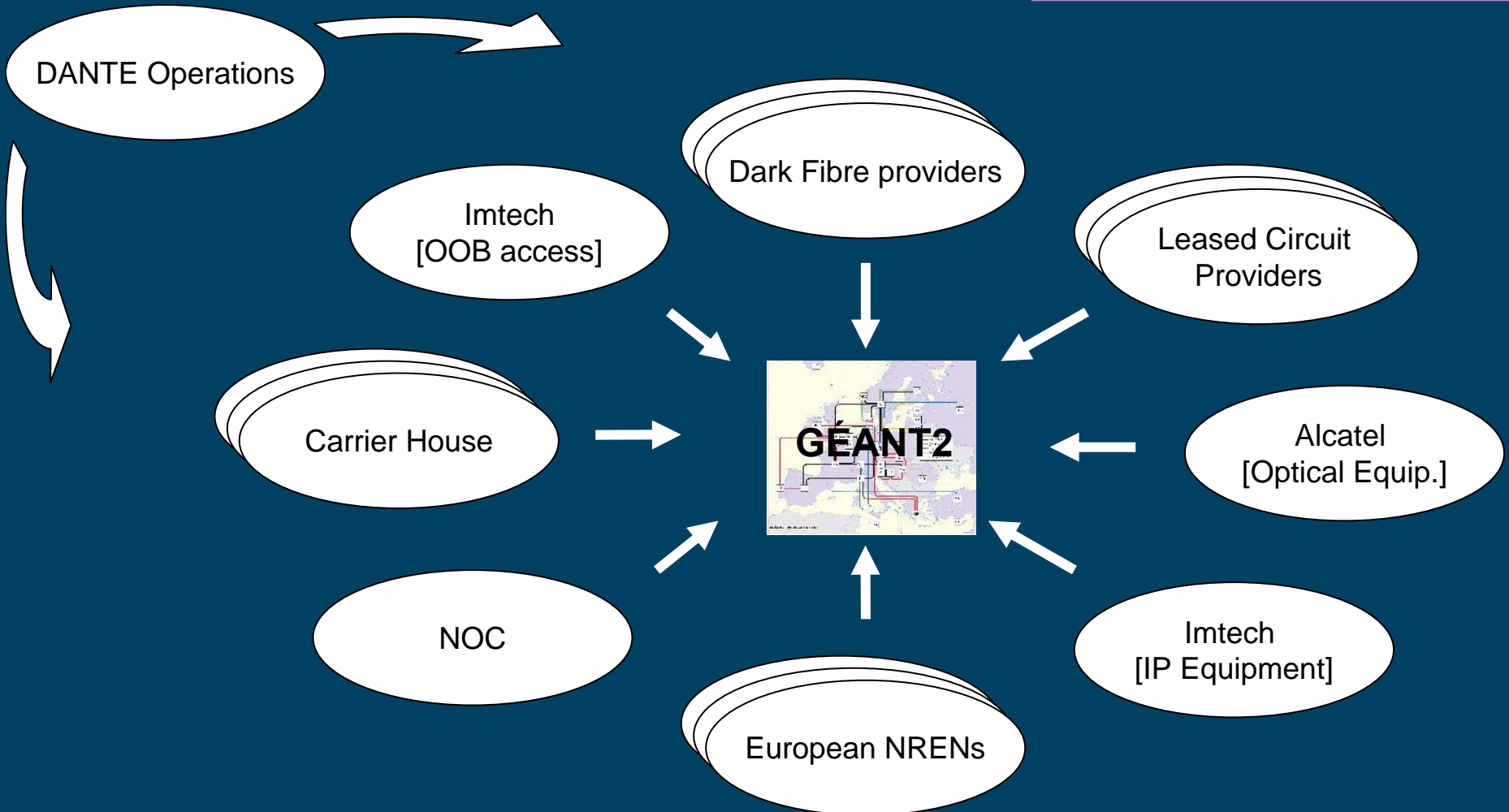
Operational insight...



DANTE Co-ordination



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Steps During Migration



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- Planning of phases / dates
- Implementing new connectivity: fiber routes between countries
- Implementing services [IP&e2e] using this connectivity
- Connecting NRNS
- Decommissioning unused GÉANT systems or moving the ones to re-use in other locations



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Implementing new routes

- Prepare GÉANT2 sites
 - 11 out of 18 main sites currently containing IP equipment need to be moved to a different location
 - ~200 sites need to be setup
 - Need to provide equipment suite
 - Includes power, out of band access, etc.
- Install optical equipment
- Connect dark fibre
- Verify dark fibre and optical equipment functionalities

Decommissioning and moving GÉANT equipment



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- Decommissioning
 - 30 leased circuits
 - 11 Points Of Presence
- Moving
 - ~60 chassis and ~60 individual PICs to be moved between PoPs.



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Phase 1 Migration...





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PoP set up

- IT, DE, CH, AT
 - AC/DC Power and CMS in place
 - LAN equipment (OOB access and workstations) up and running
 - New T640 in DE, CH and AT powered up
- PL
 - AC/DC Power and CMS in place
 - Router and LAN equipment moved from old location
 - Temporary extension of (old) trunks to PSNC router
 - New trunks (2 x 10G λ) under test now

Connectivity to date



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- Leased circuits:
 - DE – AT (10G λ)
 - accepted on 30th of September
 - PL – CZ, PL – DE (10G λ s)
 - handed over, under test now
- IL – IT, IL – GR (STM-4c upgrades)
 - IL – IT handed over on 4th Oct.
 - IL PoP to be moved in a few months
- Dark fibre links (so including 1626 LM installations):
 - DE – CH, CH – IT (supplier COLT)
 - fibre test results received 3rd Oct. => to be accepted 14th Nov
 - IT – AT (via Finkenstein) (supplier Interoute)
 - fibre test results received 29th Sep => to be accepted 10th Nov

Delayed!



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Alcatel 1678 Installations

- IT / CH / DE
 - installed, tested, handed over
 - only IT under NMS supervision at the moment

- AT
 - installation still ongoing



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NREN IP Migration Planning

- NRNs to receive demarcation points 4 weeks before the first dark fibre CDD in their respective PoPs
- GÉANT IP and GÉANT2 IP connection in parallel
- IP backup to be connected at the same time if possible
- One week is allocated to set up and test IP service. Primary NRN access still in GÉANT
- One week is allocated to set up Primary NRN access in GÉANT2 and disconnection from GÉANT
- First to go through this process will be: DFN and SWITCH/CERN

Decommissioning & Moves



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- GÉANT DE – FR link first to be taken out of service
 - On 5th of October
 - 10 Gbps cards needed to serve links to PL
 - Mainly used for DEISA => LSPs re-routed
- DE (old) PoP equipment
 - Expected first week of November
 - One router to go to NL (SARA)
 - Second router serving part of GÉANT infrastructure
 - Testbed router to GÉANT2 DE PoP

Delayed!

Decommissioning

- CH PoP equipment
 - Expected on first week of November
 - Router to go to FR (new PoP)
 - LAN equipment to ES (new PoP)
- AT PoP equipment
 - In place until the end of the year
- GÉANT links:
 - IL-IT / IL-NL
 - CH-IT / CH-AT
 - PL-CZ / PL-SE



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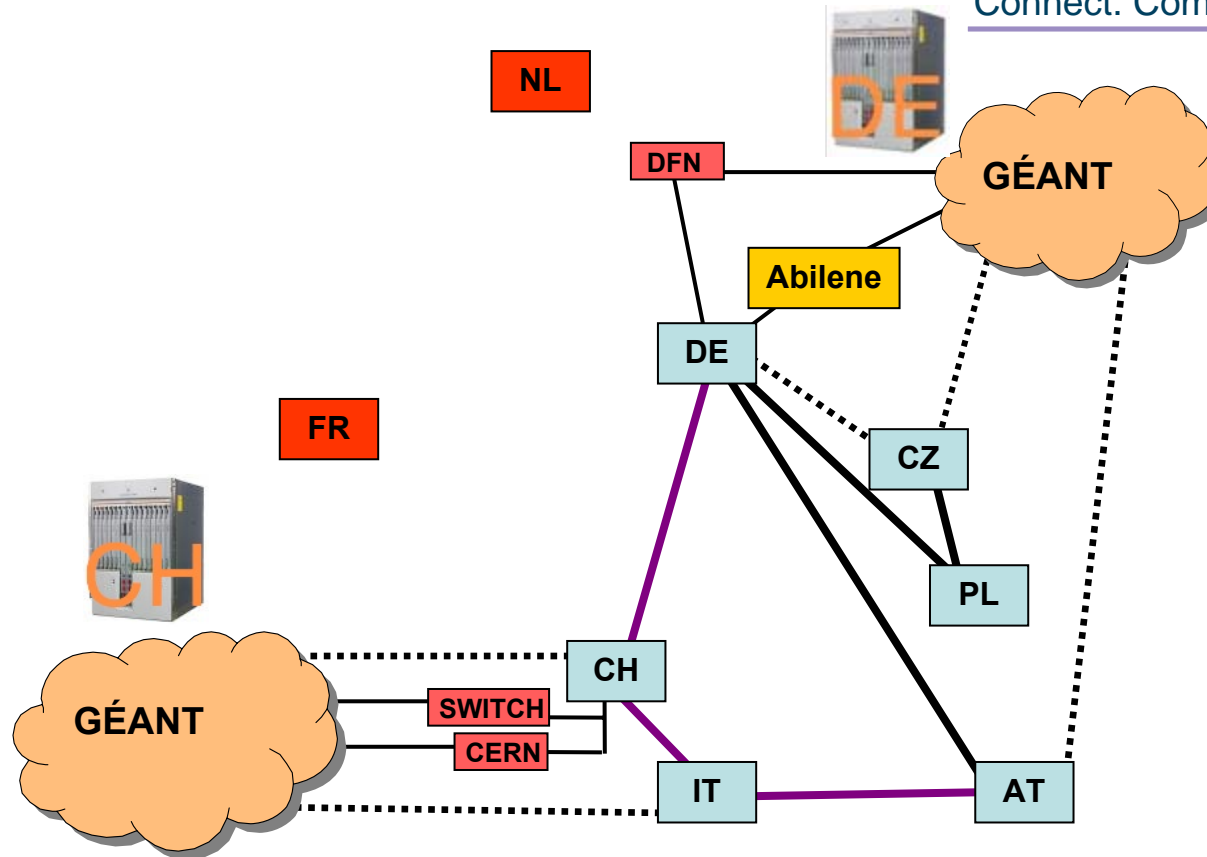
Delayed!

Delayed!

Migration Phase I



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And that was just phase 1!

- Phase 2
 - DE-NL-BE-UK-FR-CH transport build
 - Links to RU and LU
 - SURFnet, BELNET, JANET, RENATER migrations
 - More decommissioning of old PoPs and GÉANT links
- Phase 3
 - DE-CZ-SK-AT & SK-HU transport builds
 - SANET migration (no moves for other PoPs)
- Phase 4
 - ES-CH & DE-DK-NL transport builds
 - ES-FR (2x10G λ) & ES-IT re-home
 - GR-IT & GR-AT (2x10G λ landing on MCC)
 - NORDUnet & RedIRIS migrations (no move for GRNET)
- Phase 5
 - HU-HR-SI-AT (Finkenstein) transport build
 - DK-EE-LV-LT-PL (SDH)



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Completion when?

- Take into account:
 - Took much longer than expected to finalise contract with Alcatel
 - First DF handover delayed (learning experience)
 - Alcatel now assigning more teams during implementation
 - Buffering left in initial planning
 - Been experiencing “access problems” for installation teams to CERN
- Currently 2-4 weeks behind schedule
- Final completion expected end of Q1 2006



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Thank you!

