

The latest on GÉANT 100G+ ...

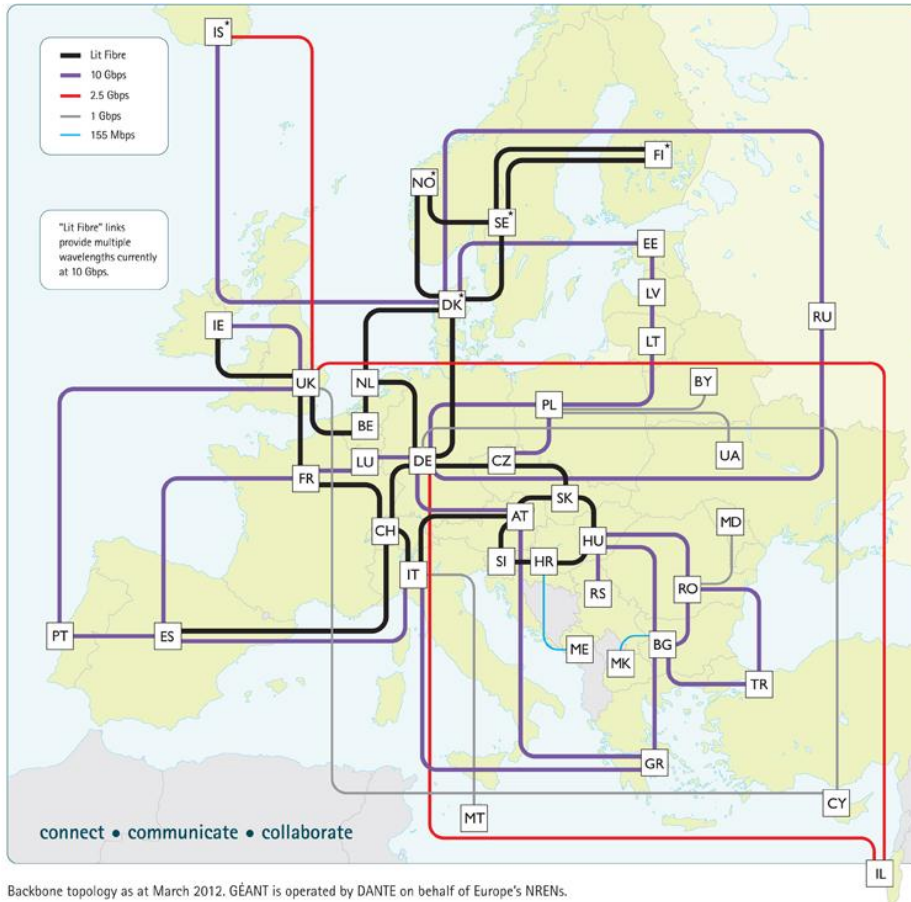
(Terabit capacity)

Richard Hughes-Jones

DANTE Delivery of Advanced Network Technology to Europe

LHCONE Meeting Stockholm, 3-4 May 2012

GÉANT & NREN Connectivity & Network Services



- 40 European Countries
- Dark Fibre + DWDM
- Hybrid network:
 - **IP Packet routed**
IPv6, multicast, VPN
 - **Point-to-point**
Circuits
typically 1Gbit/s
 - **Dedicated Lambdas**
Full 10Gbit/s
- **BoD**
- Network monitoring
- Security
- Mobility

To download this map:
http://www.geant.net/Media_Centre

- Started at the beginning of 2010 with an RFI exercise (6 months)
- Launched a formal procurement process (Competitive Dialogue) at the end of 2010 in **3 lots**
- Dialogue ran throughout 2011
- Examined different approaches to:
 - “100G-optimised” transmission...
 - ...that didn’t hinder continued **flexible** deployment of 10G services [**lot 1**]
 - “Packet transport” solutions for switching layer [**lot 2**]
 - Converged (“POTS”) solutions [**lot 3**]
- Refined requirements during dialogue
- Solicited another round of solutions (without lot 3)
- Shortlisted
- Hands-on (lab testing) & more dialogue
- ITT issued at end of 2011

Approach to technology choices

- **Technology agnostic approach to transmission**
 - e.g. did not specify DCM-based or DCM-free, ROADM specifics, etc
 - BUT service & operational feature prescriptions were made, e.g.
 - *“optimisation” for delivery of 100G;*
 - *in final ITT, suppliers **mandated to include flexible, zero-touch provisioning of 10G “lambdas”** (even if solution not supporting native 10G lambdas)*
 - *effectively meant include OTN switching*
- **“Classical MPLS” approach to switching (lot 2) was mandated**
 - Alternatives (MPLS-TP, PBB-TE) did not look sufficiently convincing during dialogue
- **Lot 3 dropped**
 - Converged/integrated (“POTS”) solutions did not appear sufficiently convincing during dialogue

And the winner(s) are...



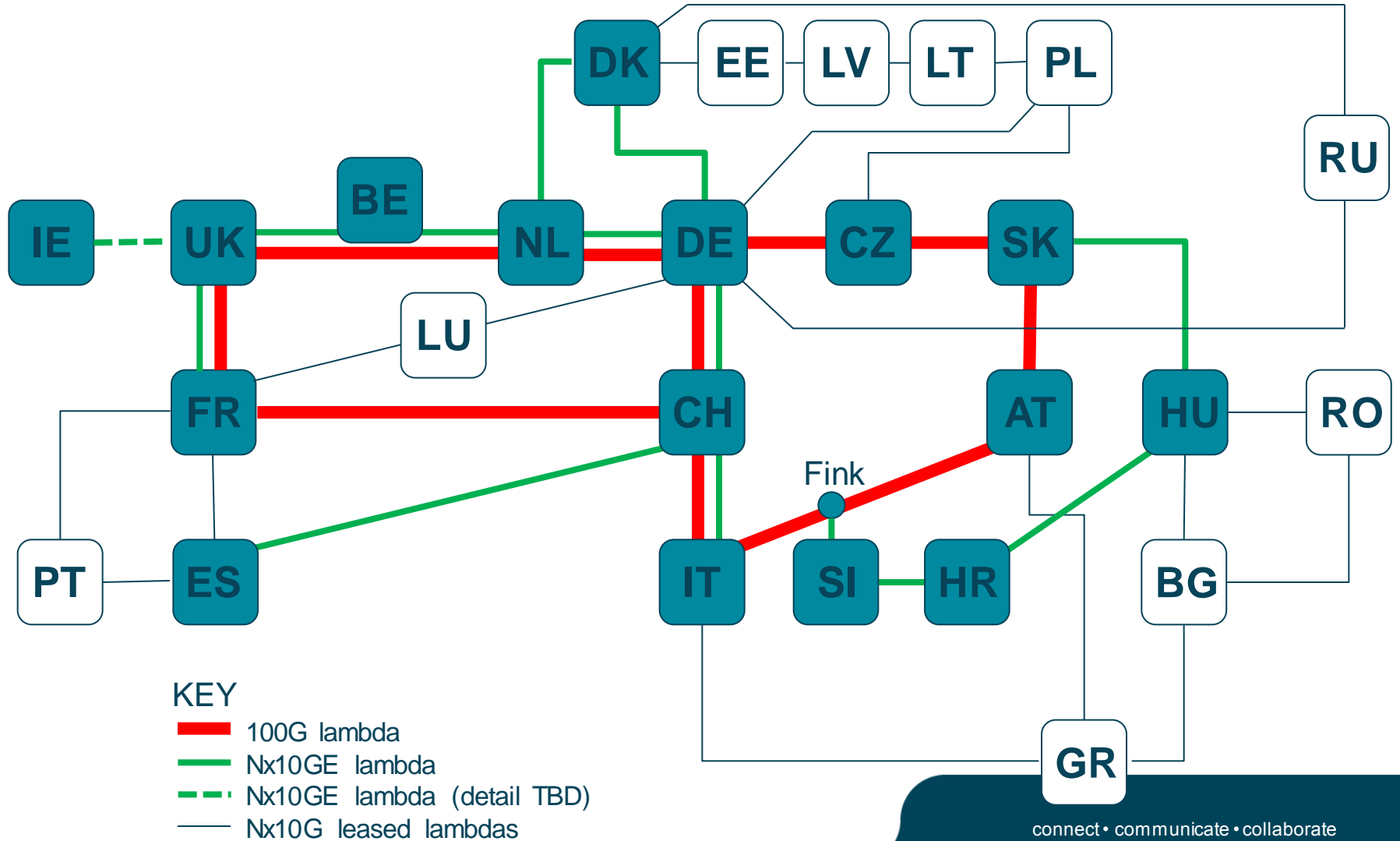
- ... sorry can't say right now
- WATCH THIS SPACE...

But ...



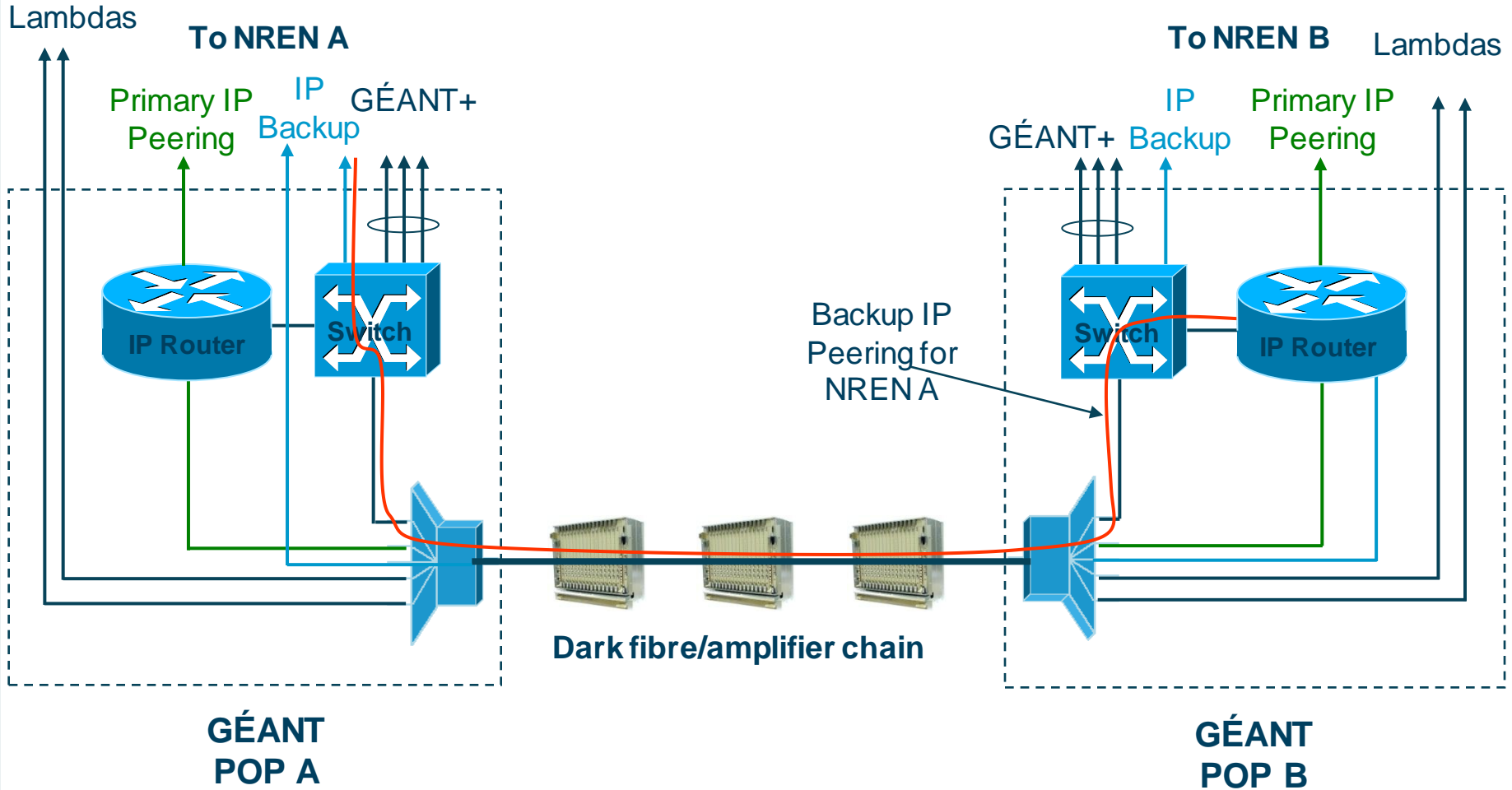
- Starting Q2 2012
- GEANT will roll-out its newest network providing 100s of Terabits of switching capacity across Europe...
- ...by creating a Hybrid infrastructure that is:
 - ...Multi Domain with a dense Pan European footprint
 - ...with aggregated Peta Bit Class switching and...
 - ...with Multi Tera Bit nodes and...
 - ...with hundreds of Giga Bit transmission and...
 - ...with a Global reach to all regions in the World.

Day-1 architecture (high level)

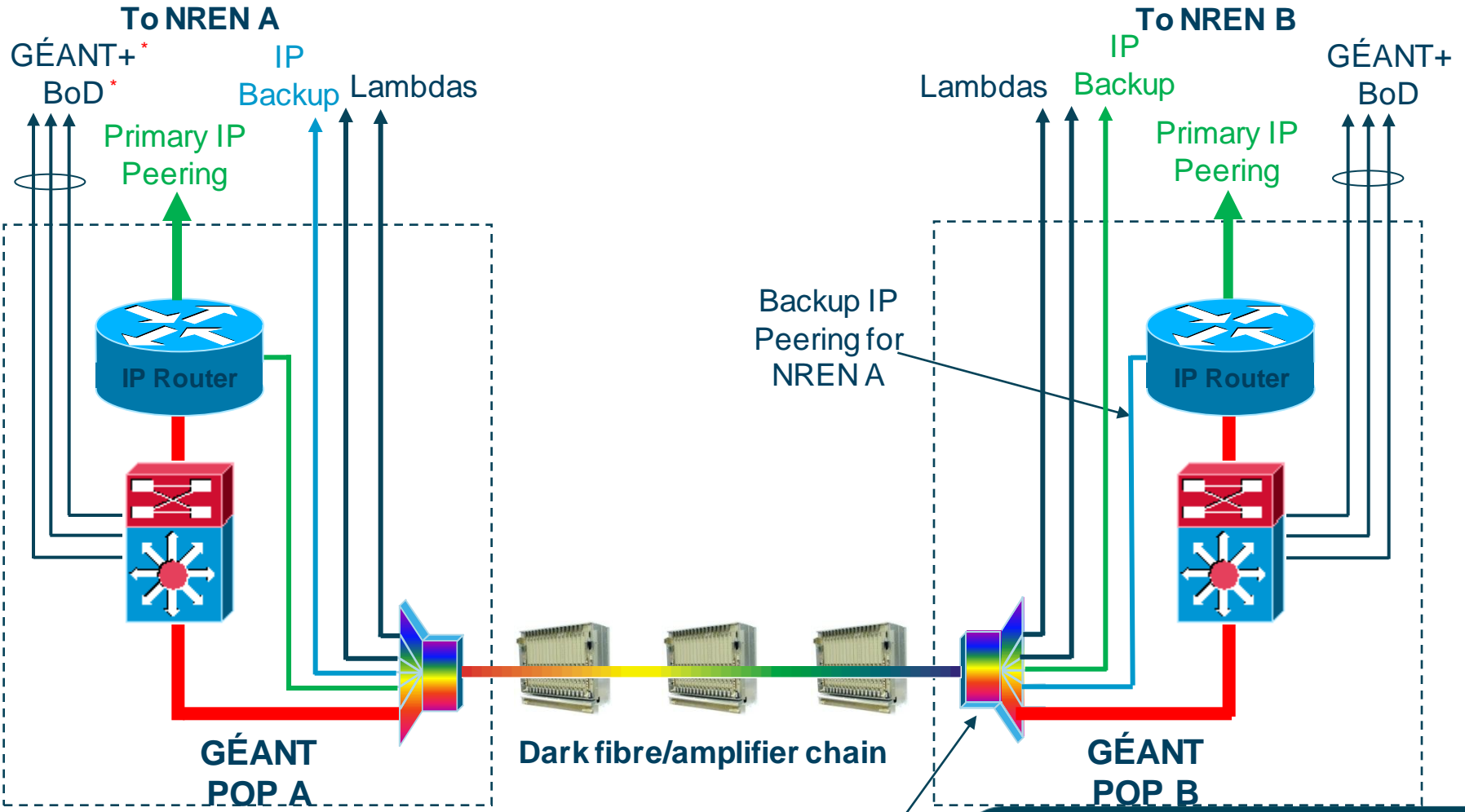


Inside the GÉANT PoP

The Hybrid GÉANT+ services



Inside the GÉANT New PoP



* Includes 10G and greater

Optical Switch

connect • communicate • collaborate

- Clear drivers to upgrade GÉANT infrastructure now to move it **Towards Terabits**
- Lengthy procurement process is now *almost* complete
- This means 1x100G this year (plus another ~100G's worth of 10Gs) *in production* on many of the main trunks
- Growth thereafter... expect to keep up the ~50% pa
- Terabit ETA around 2016
- Also expect to be field trialing 400G and TB transmission within similar time frames (*research network* remit)...
- And endeavour to support the more niche applications... e.g. “photonic services”
- Time scales: Start very soon – Rollout: June – May 2013