NORDUnet
Nordic Infrastructure for Research & Education

NORDUnet Update

GLORIAD meeting

Queenstown, NZ, 29 Sep 2014

Lars Fischer

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The Nordic Region

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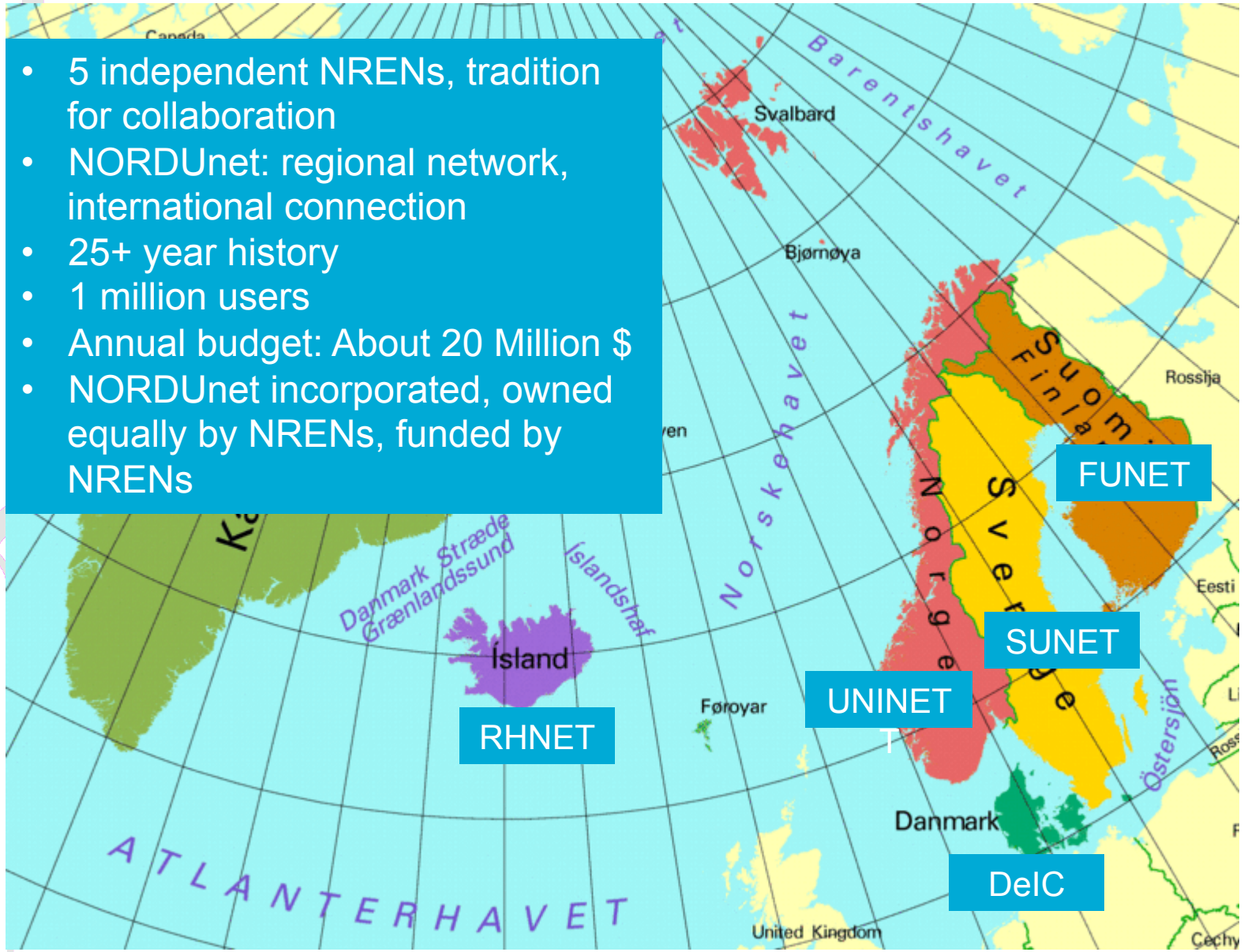
Nordic NREN collaboration

- 5 independent NRENs, tradition for collaboration
- NORDUnet: regional network, international connection
- 25+ year history
- 1 million users
- Annual budget: About 20 Million $
- NORDUnet incorporated, owned equally by NRENs, funded by NRENs



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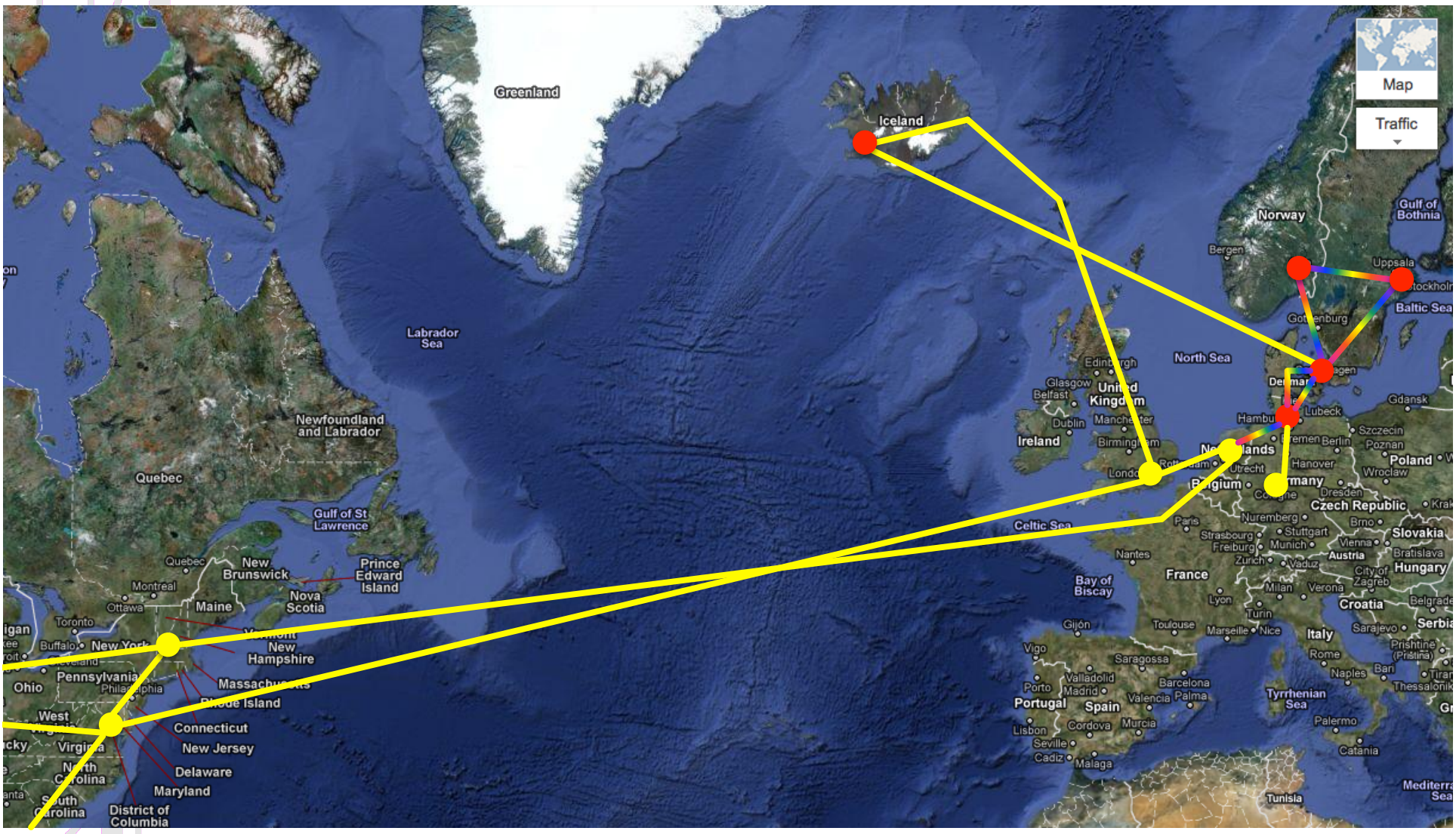
NORDUnet Network



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NDN2017: Network Renewal

- Objective
  - Create a next generation network infrastructure supporting the Nordic NRENs
  - Support a continued peering expansion
  - Support 100Gbps and beyond
  - Support service switching / protection
- Also
  - Expand NDN footprint where it makes financial & political sense
  - Support inter-NREN optical network collaboration
  - Allow network resource sharing

Status

- Peering
  - Frankfurt: √ completed 2012
  - US expansion: √ completed 2012
- Fibre tenders
  - CPH-HMB x2: √ completed 2013 (L3 / GC)
  - HMB-LDN: √ completed 2013 (Interoute)
  - LDN-AMS: √ completed 2013 (Interoute)
- Equipment tenders
  - Transmission Equipment: √ completed 2013 (Ciena) framework agreement for NRENs
  - IP Equipment: √ completed 2014 (Juniper)

Technical Requirements

- Optical
  - Deliver 100G service on current NORDUnet fibre infrastructure to all POPs
  - Maximum control of the optical spectrum
  - Alien wave / spectrum sharing
  - Trans-Nordic reach on single transponder set
- 10G services
  - Restorable
  - Fast install and provisioning
  - Available on all core POPs

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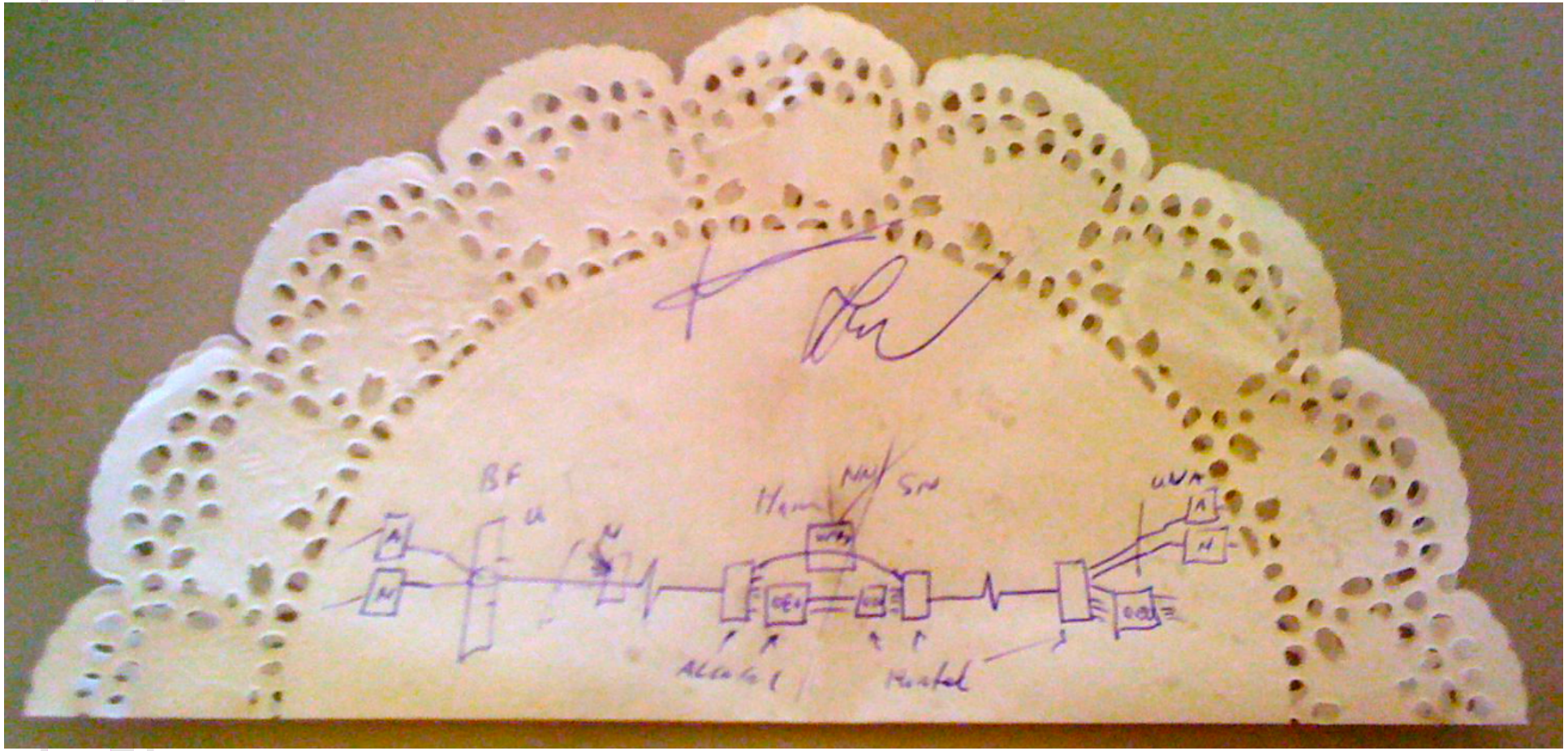
Sharing Fibres



- Alien Wave design, NORDUnet / SURFnet, May 2008
- (photo: Cees de Laat)

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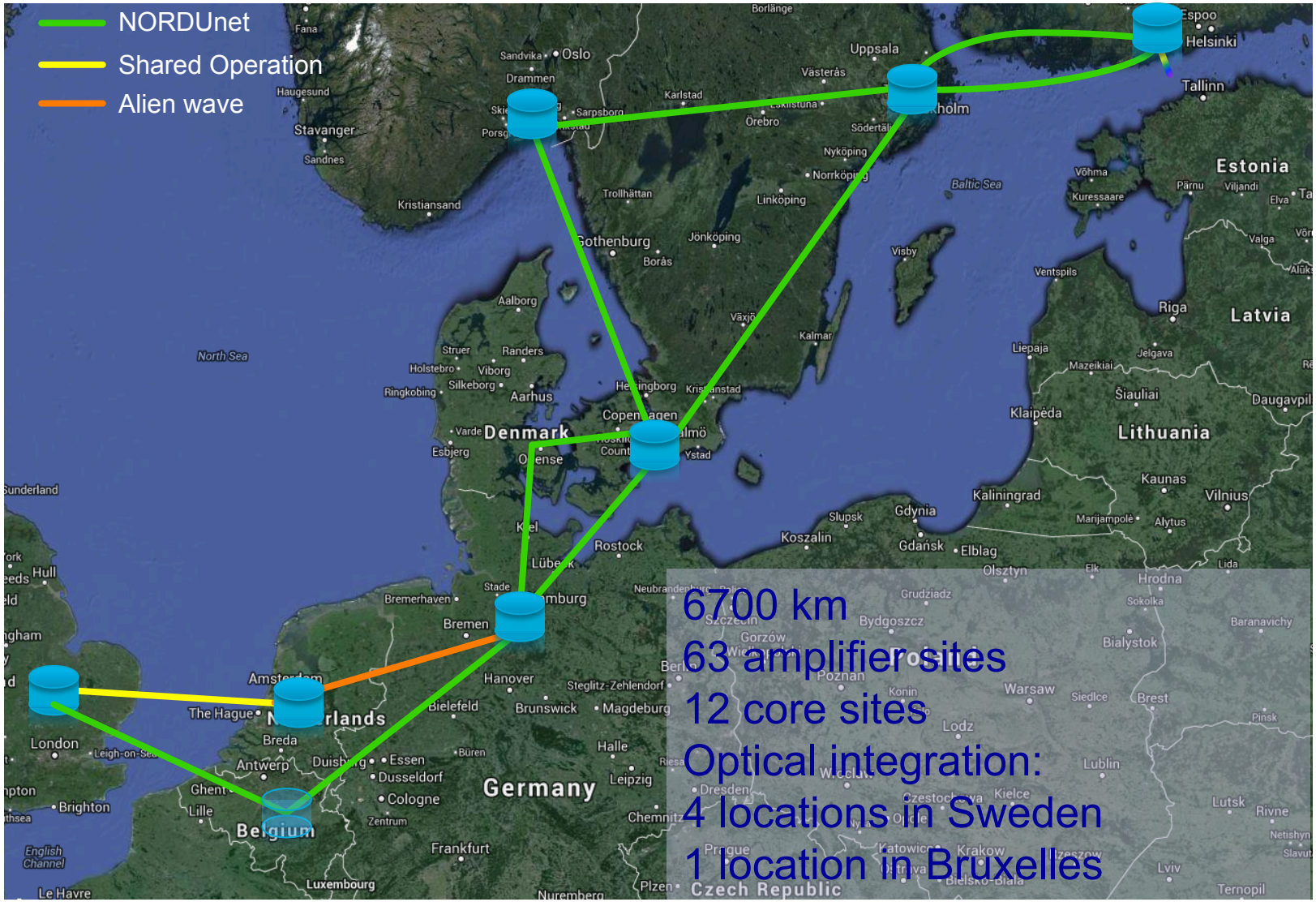
NORDUnet Optical Network



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New Services

- 100G Wavelengths
  - 3 flavours; metro, regional and longhaul
  - Deployed between core routers and OTN core
- Restorable 10G services
  - Available on all core POPs
  - Can be turned up within seconds
  - Can survive multiple fibre cuts.
- New cost structure

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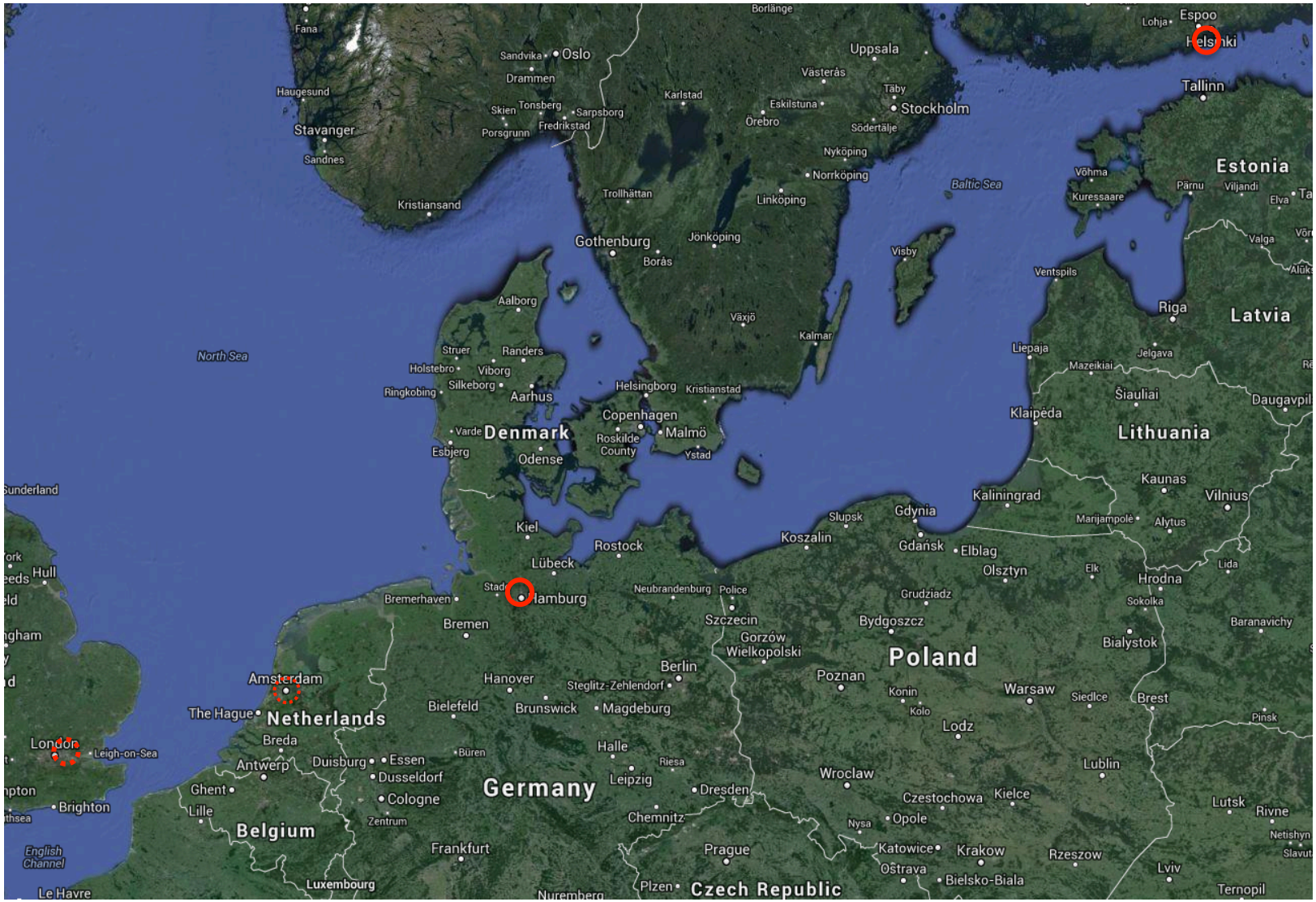
NORDUnet Open Exchange (NOX)



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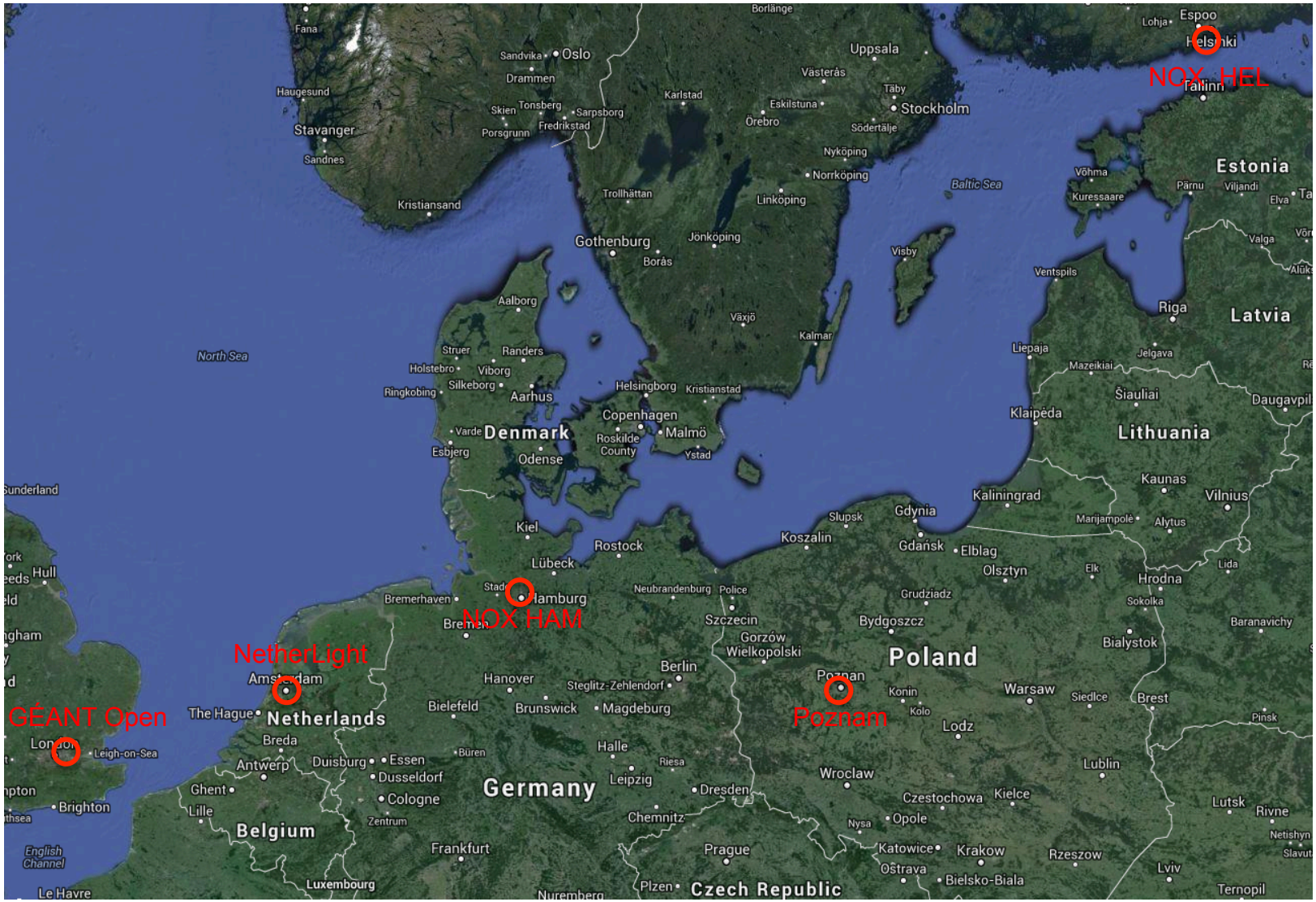
OLE's, North-West Europe



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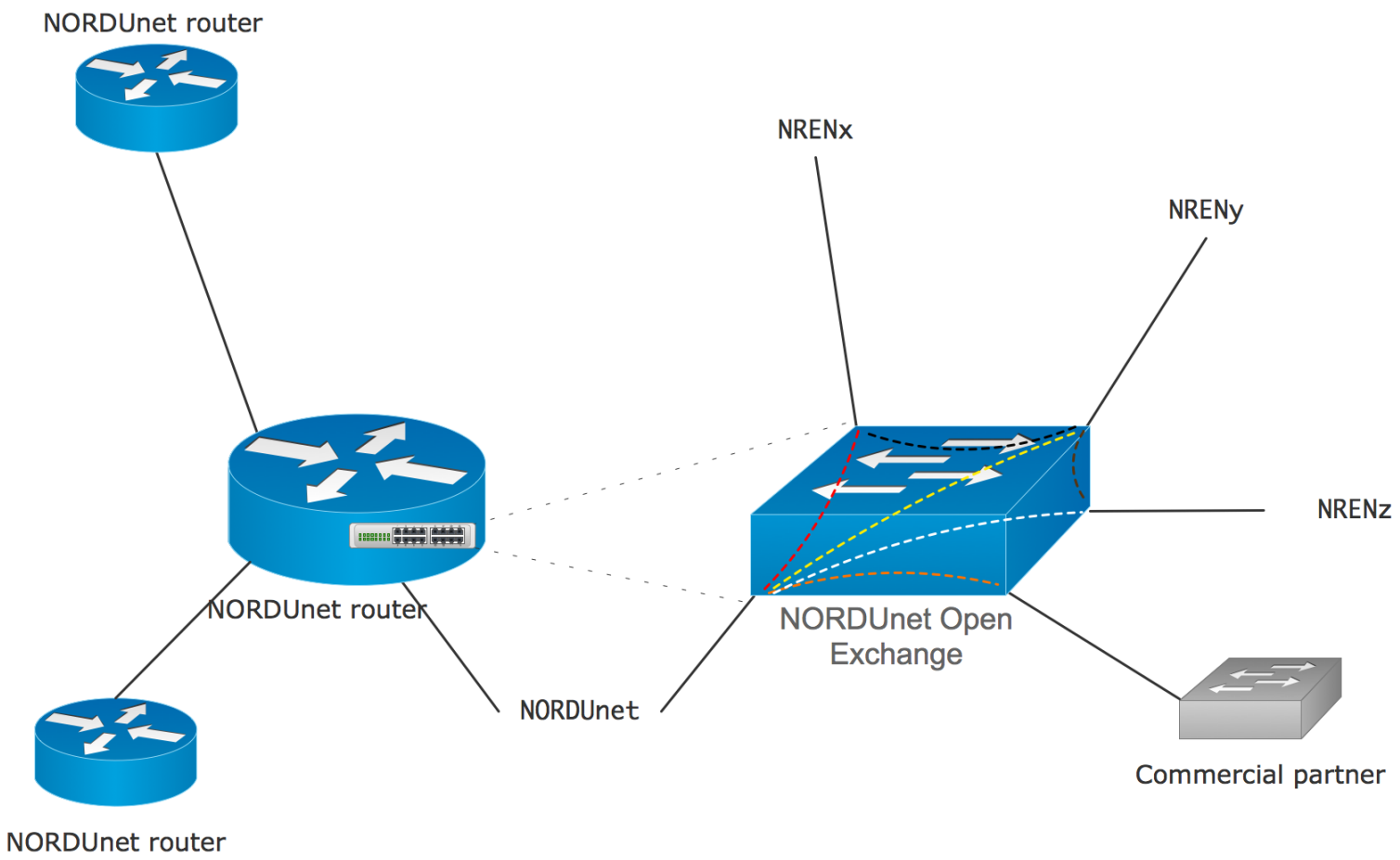
NOX Generic



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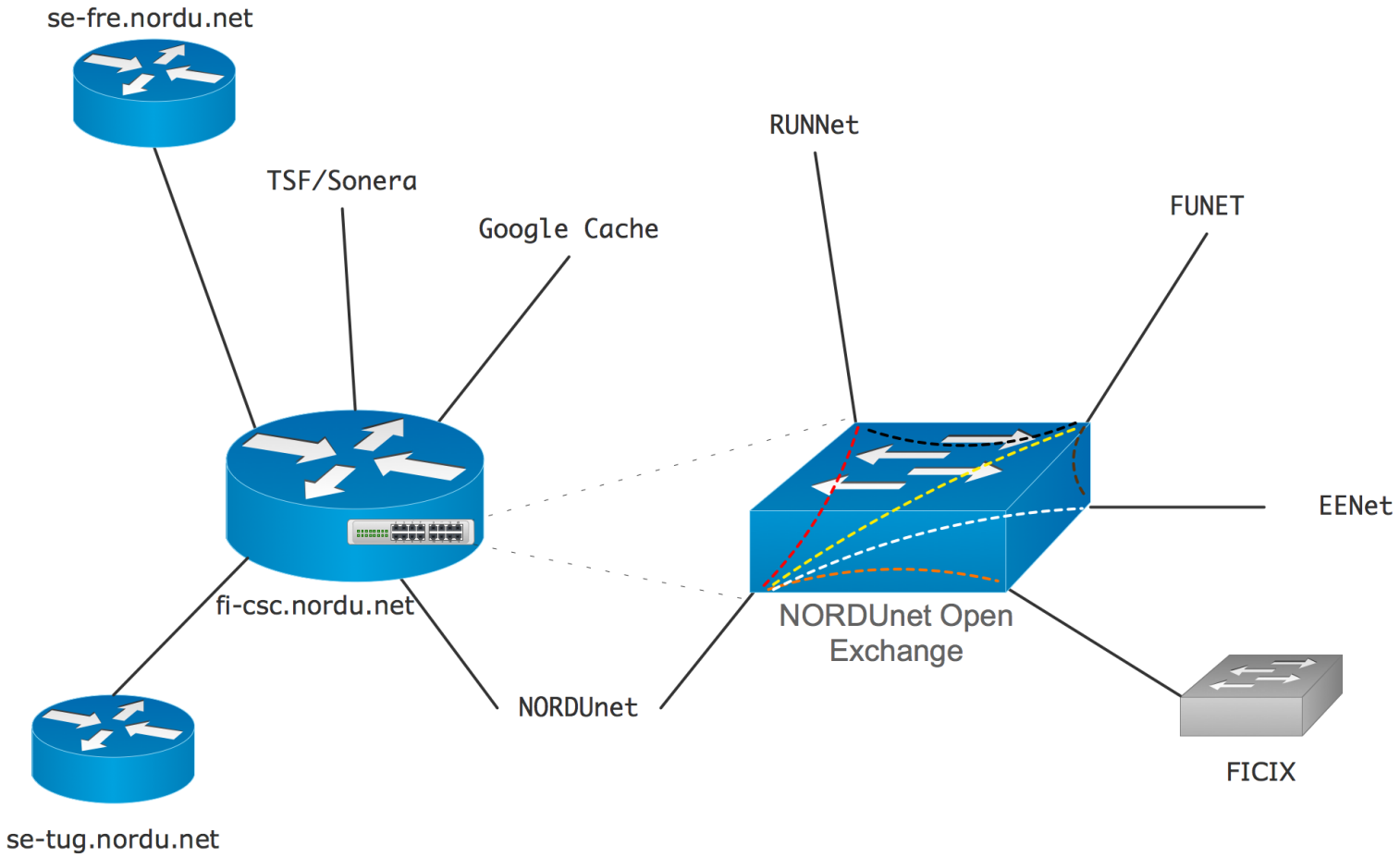
NOX Helsinki



- Moving towards meeting all NREN partners at Open Exchanges
- Examples
  - SURFnet, GÉANT, ESnet (x3)
  - Internet2 (x2)
  - PIONEER, EEnet, RUNNET (x1)
- OLE connectivity
  - Own optical infrastructure
  - Cross-Border Fibres
  - Fibre / Spectrum sharing

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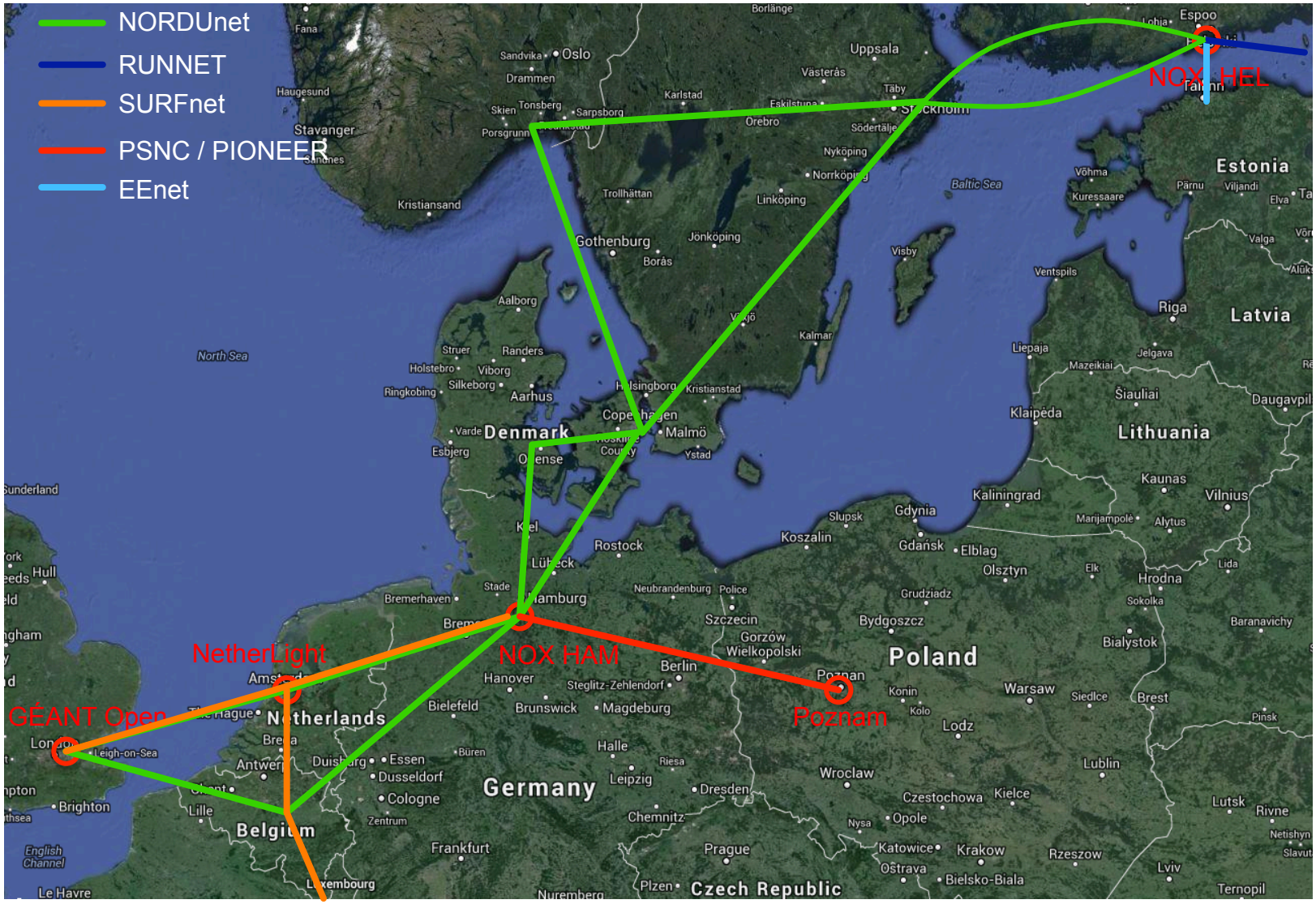
North-West Europe CBF



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ANA-200G Overview

ANA-200G: 100G Production Ring across North Atlantic for R&E

Open Exchange Points & Links

- MAN LAN
- WIX
- NetherLight
- GEANT Open London
- Internet2
- TGN-Atlantic South
- NORDUnet/SURFnet
- Hibernia Atlantic

ANA-100G Production Network: A 100 Gbit/s production quality ring across the North Atlantic for Research and Education. Collaborators: Internet2, NORDUnet, CANARIE and SURFnet.

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ANA-200G European side

ANA-200G: 100G Production Ring across North Atlantic for R&E

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ANA-200G North American side

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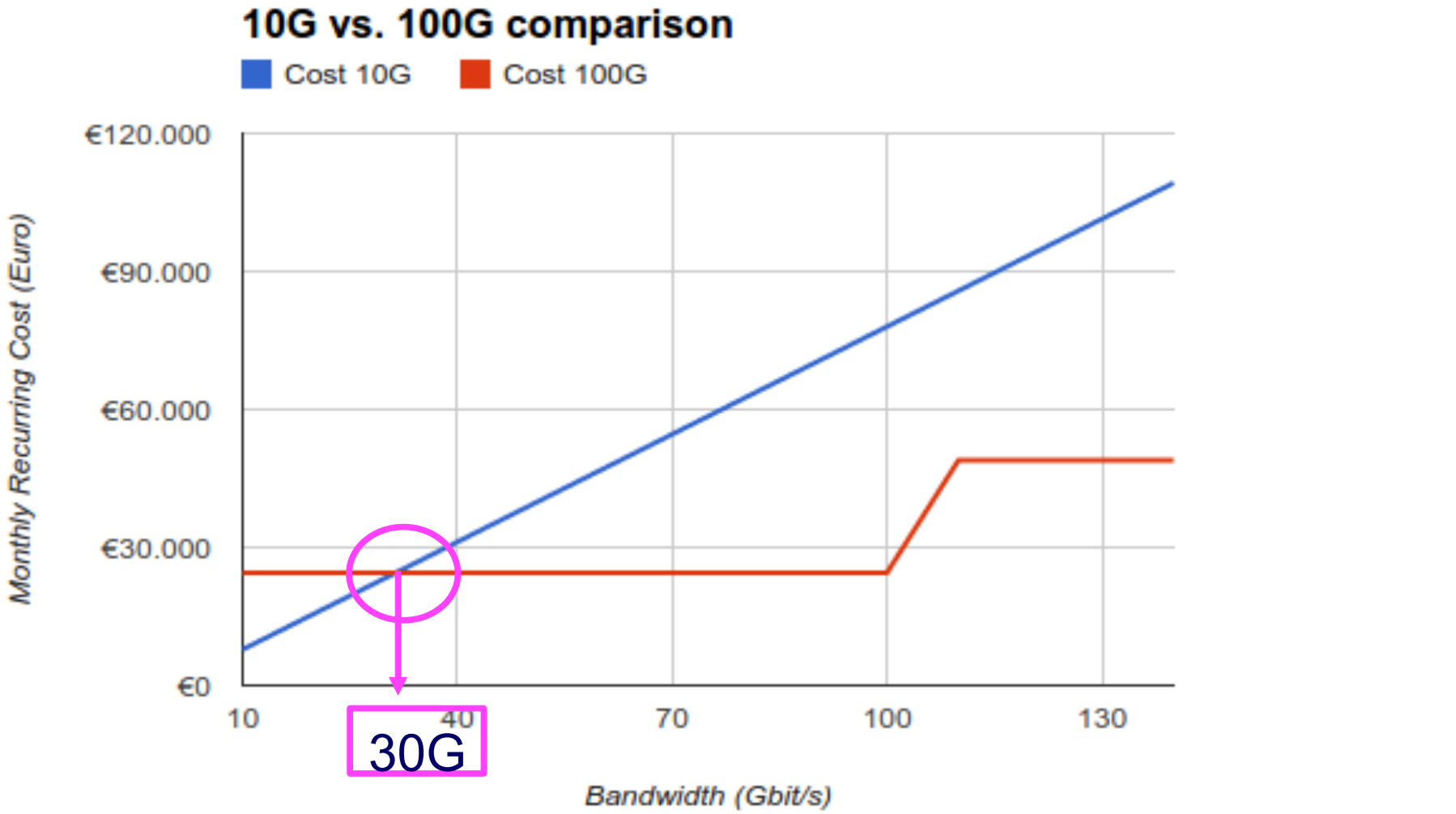
Comparison 10G vs. 100G



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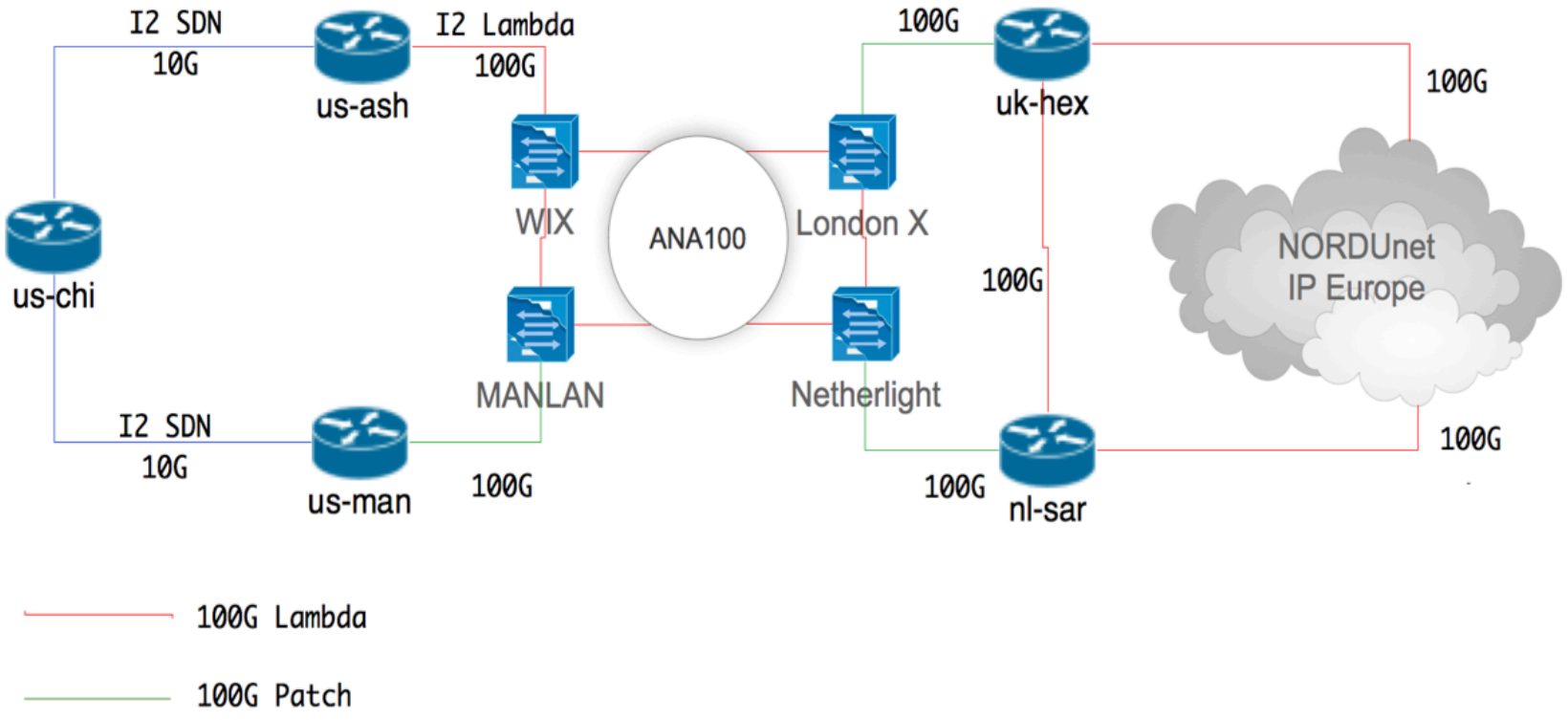
NDN & ANA-100G



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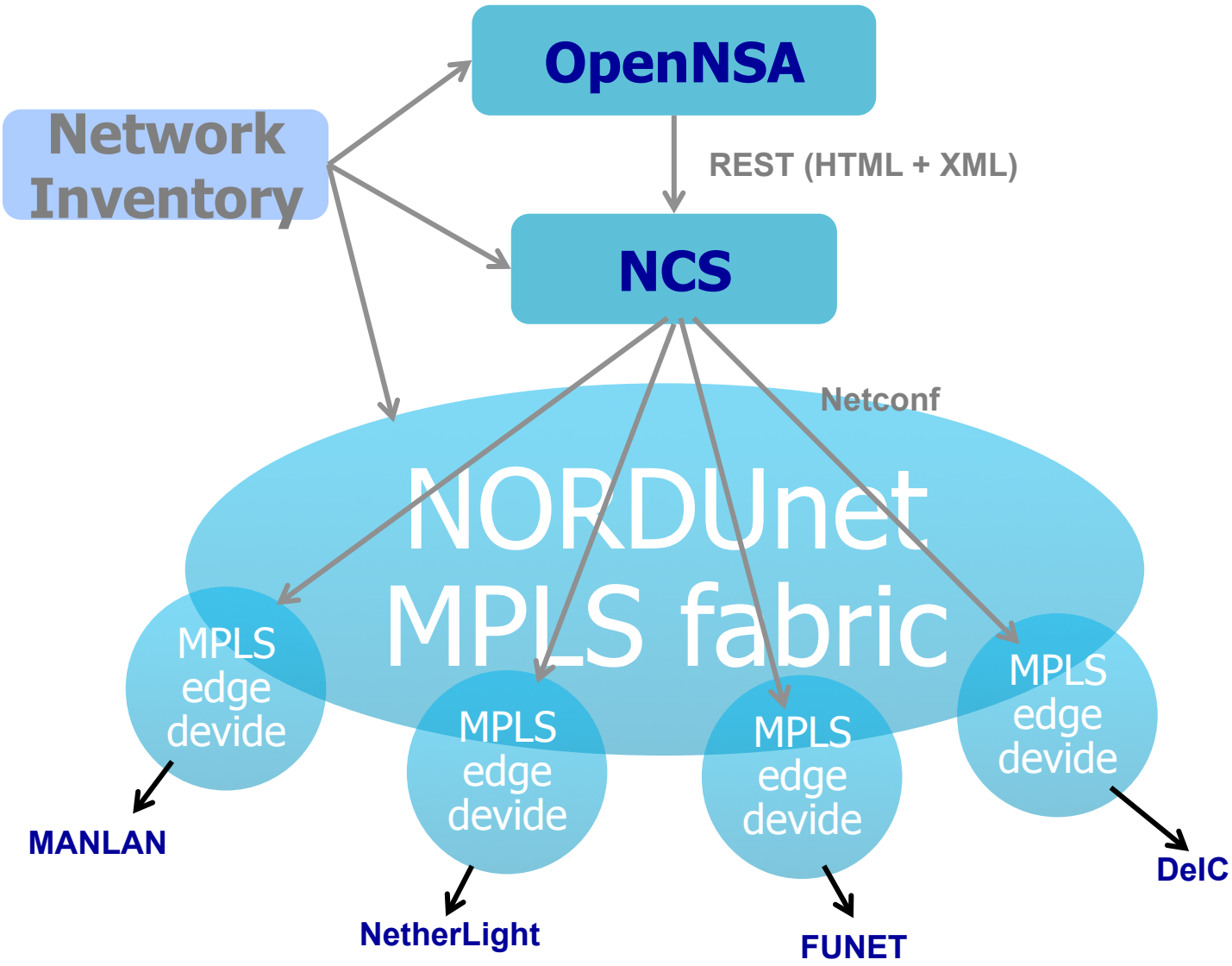
NSI Network Capability