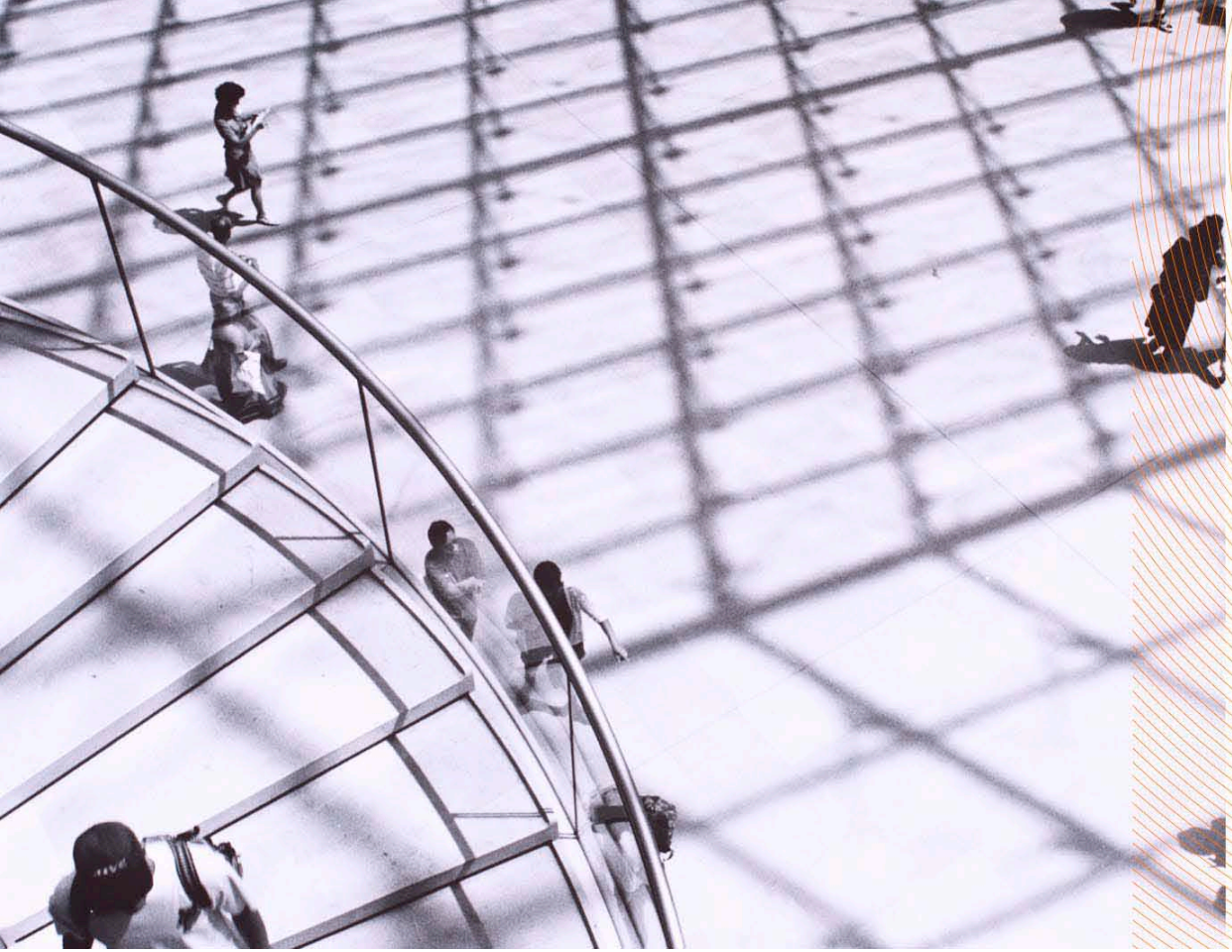


SURFnet Innovation Update

Gerben van Malenstein

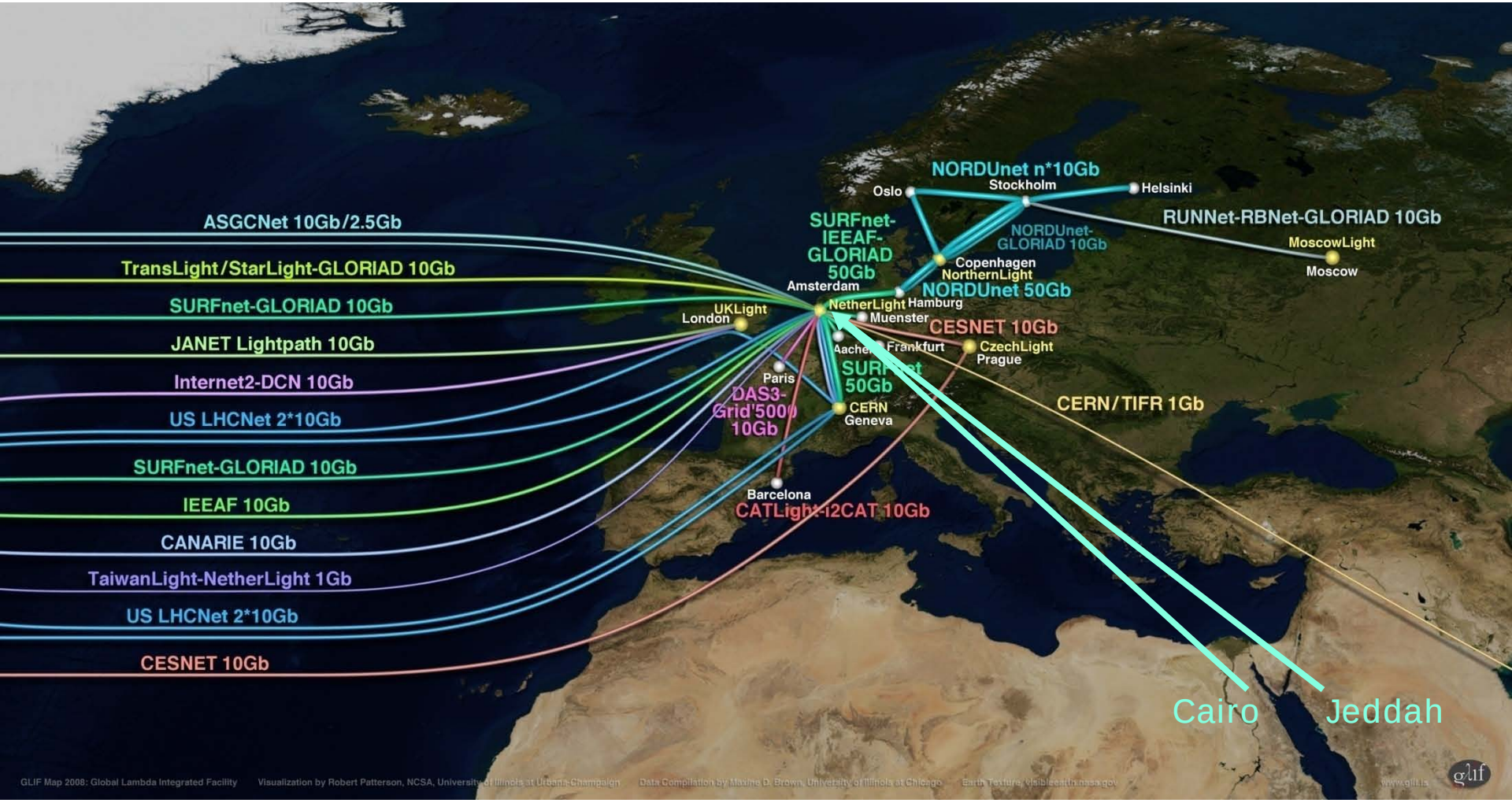
CERN – June 10, 2010

Workshop on Transatlantic Networking for the LHC Experiments

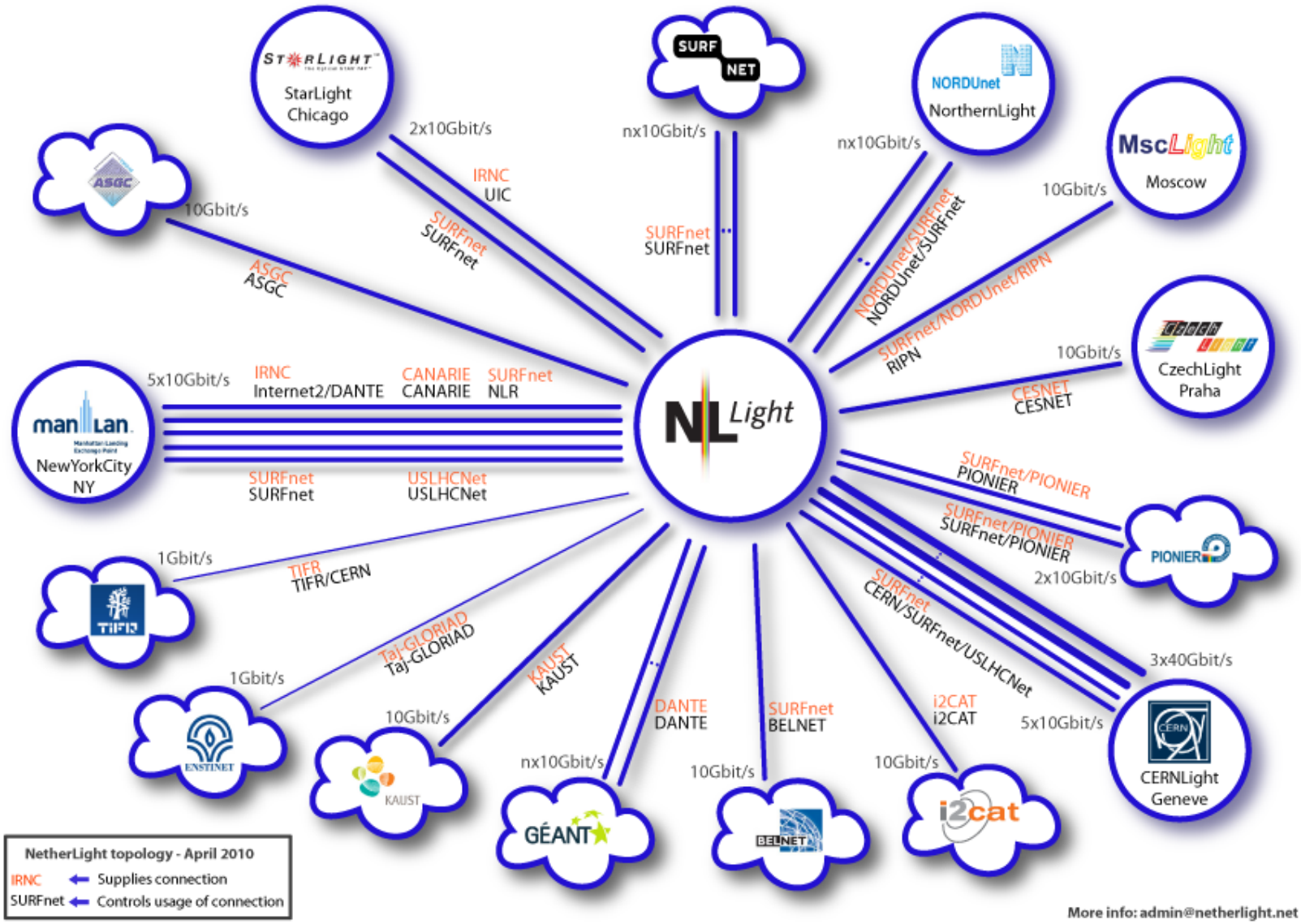
Outline

- NetherLight and GLIF update
- Amsterdam–Geneva Cross Border Fiber System
- From SURFnet6 to SURFnet7
- Open DRAC

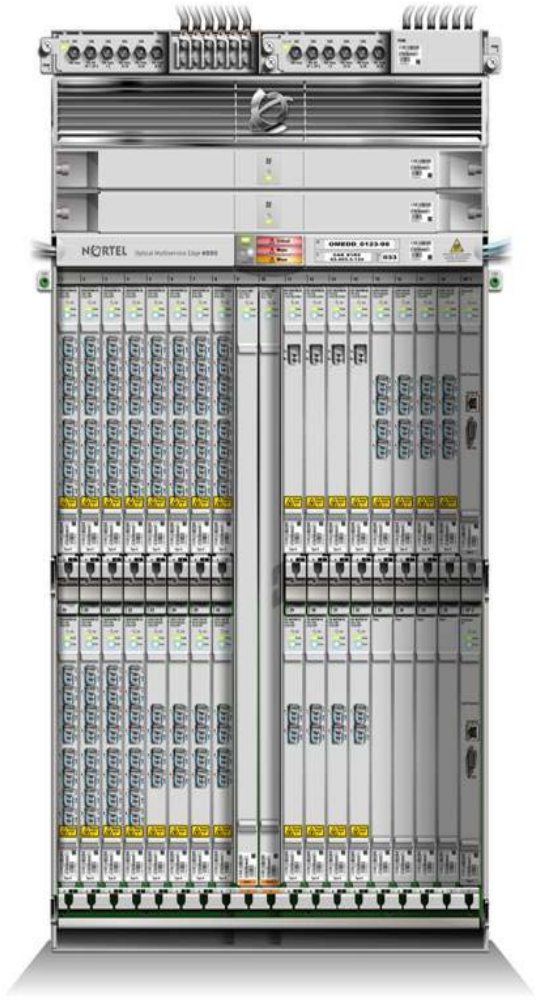
NetherLight lambda connectivity



NetherLight



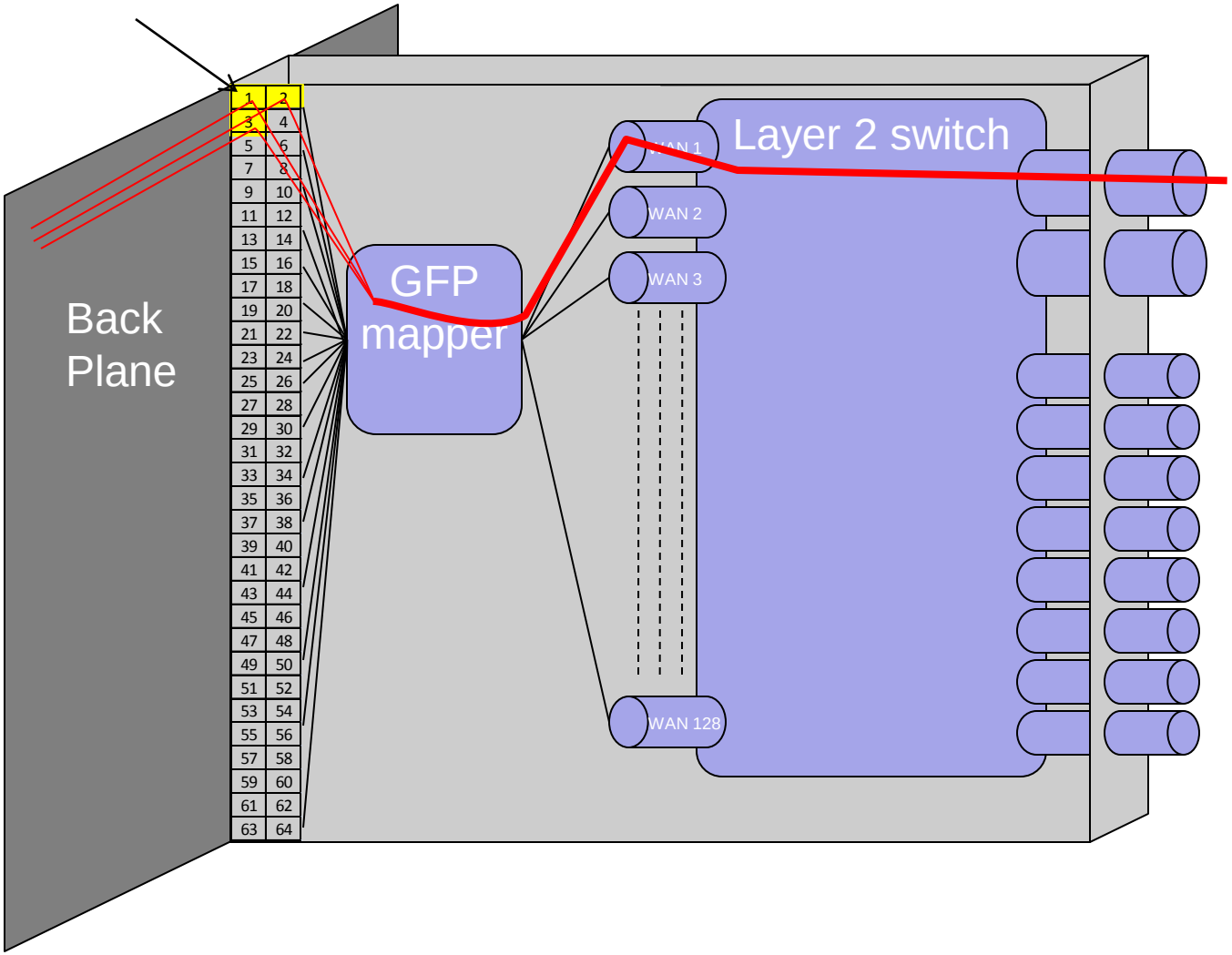
Nortel HDXc replacement



Ciena OME6500 Double Decker

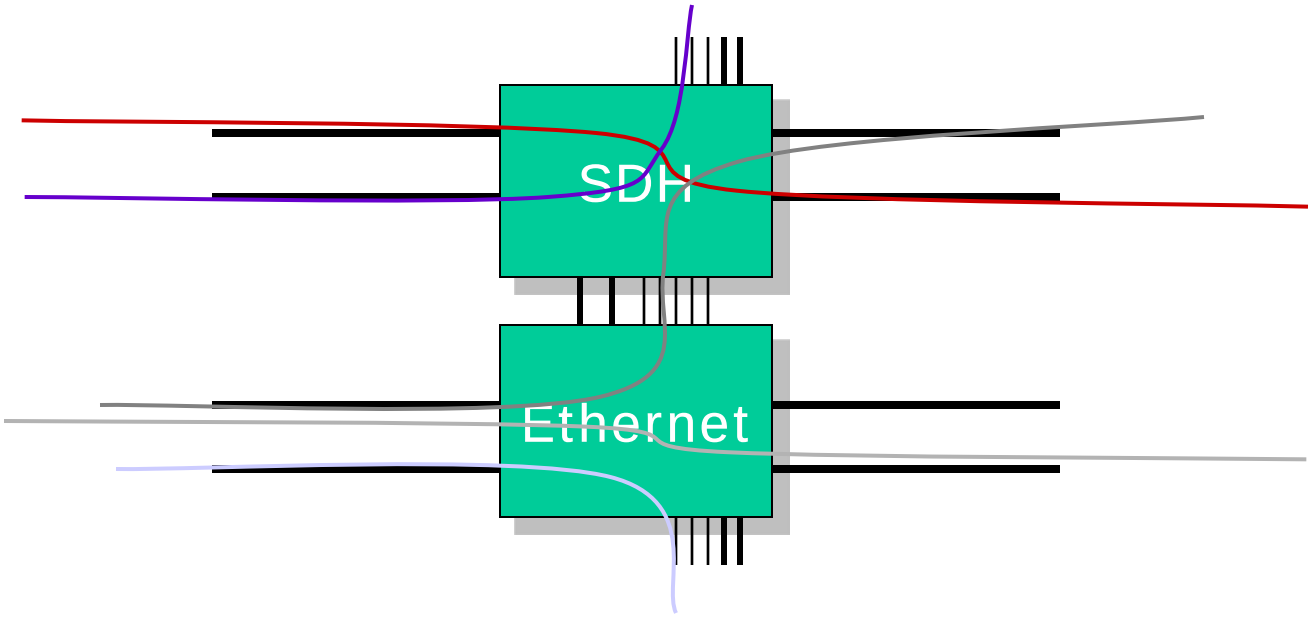
- 40G support and 100G in future
- Layer 2 service cards
- 10G EPL interface
- Scalable to 640G
- Open DRAC compliant

Transparent translation service



NetherLight Services

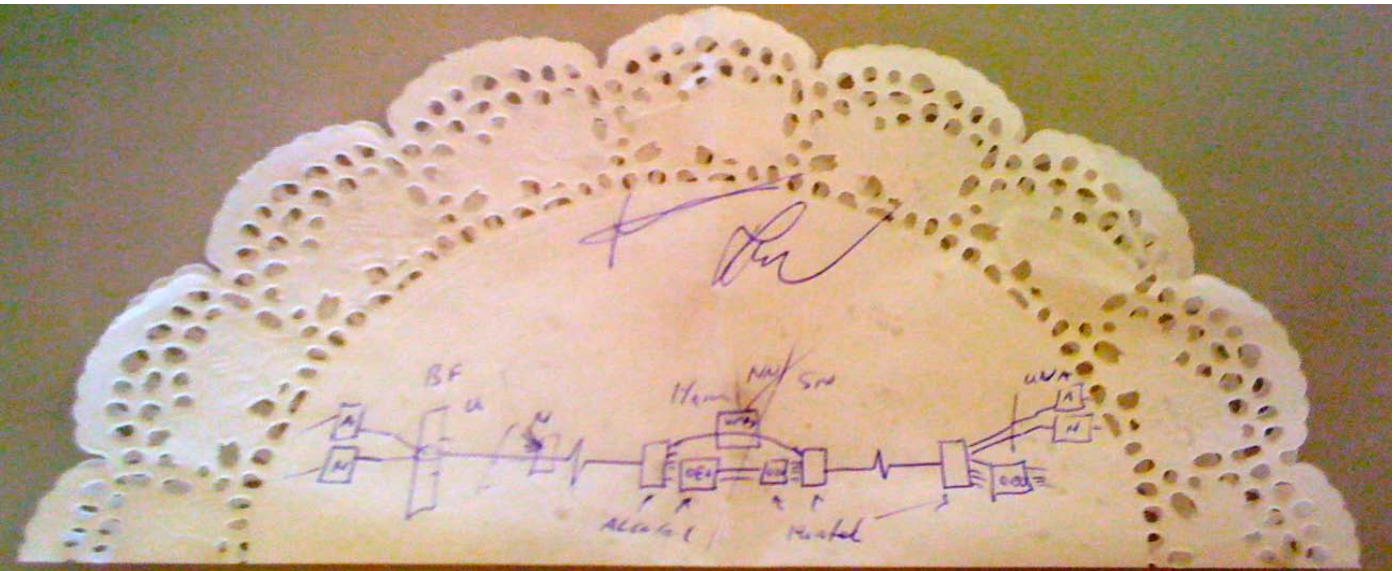
- Lightpath using SONET/SDH transport layer
- VLAN based connections using Ethernet layer 2
- Or combined service



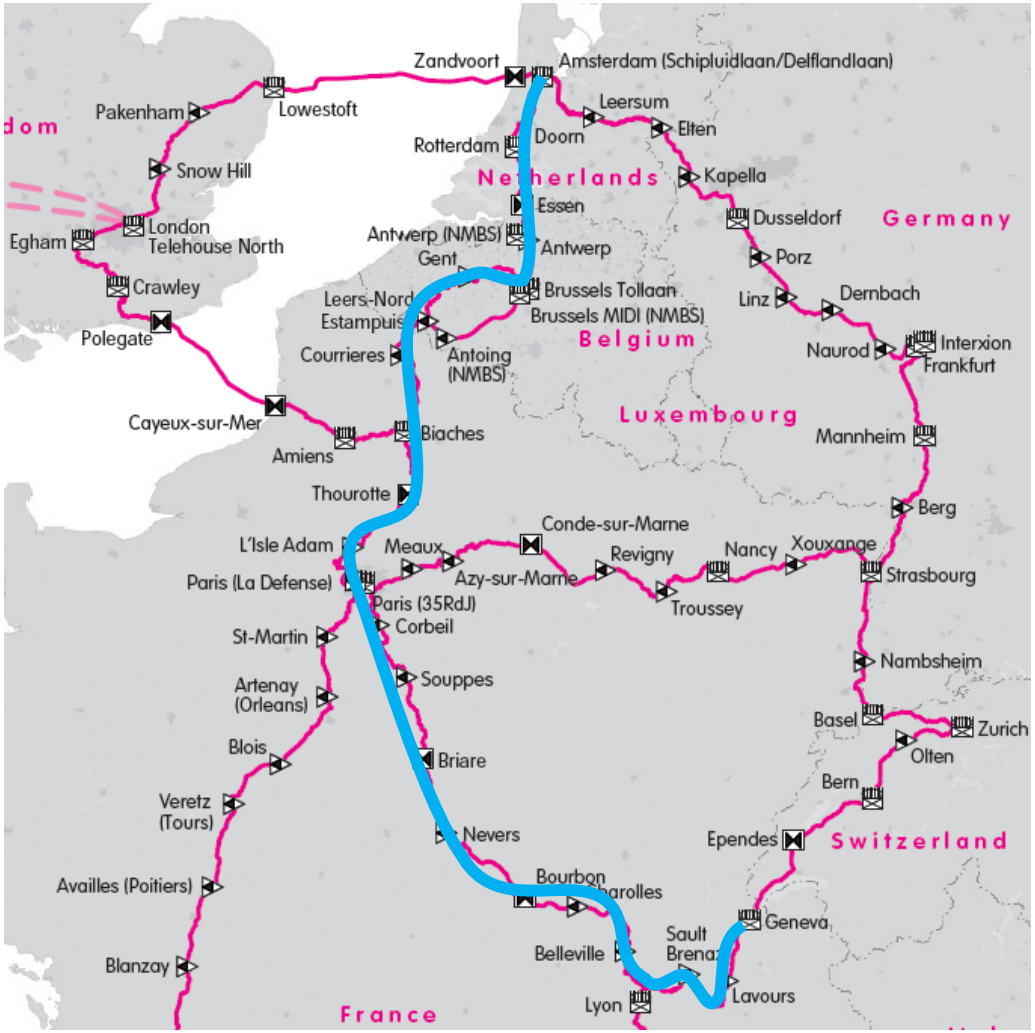
SURFnet testing on CBF

- 100 Gbit/s field testing, on a 1244 km live production system between Amsterdam and Hamburg, and back

- 40 Gbit/s Alien Wave testing with NORDUnet, on a 1056 km live production system between Amsterdam and Copenhagen



Amsterdam - Geneva DWDM system

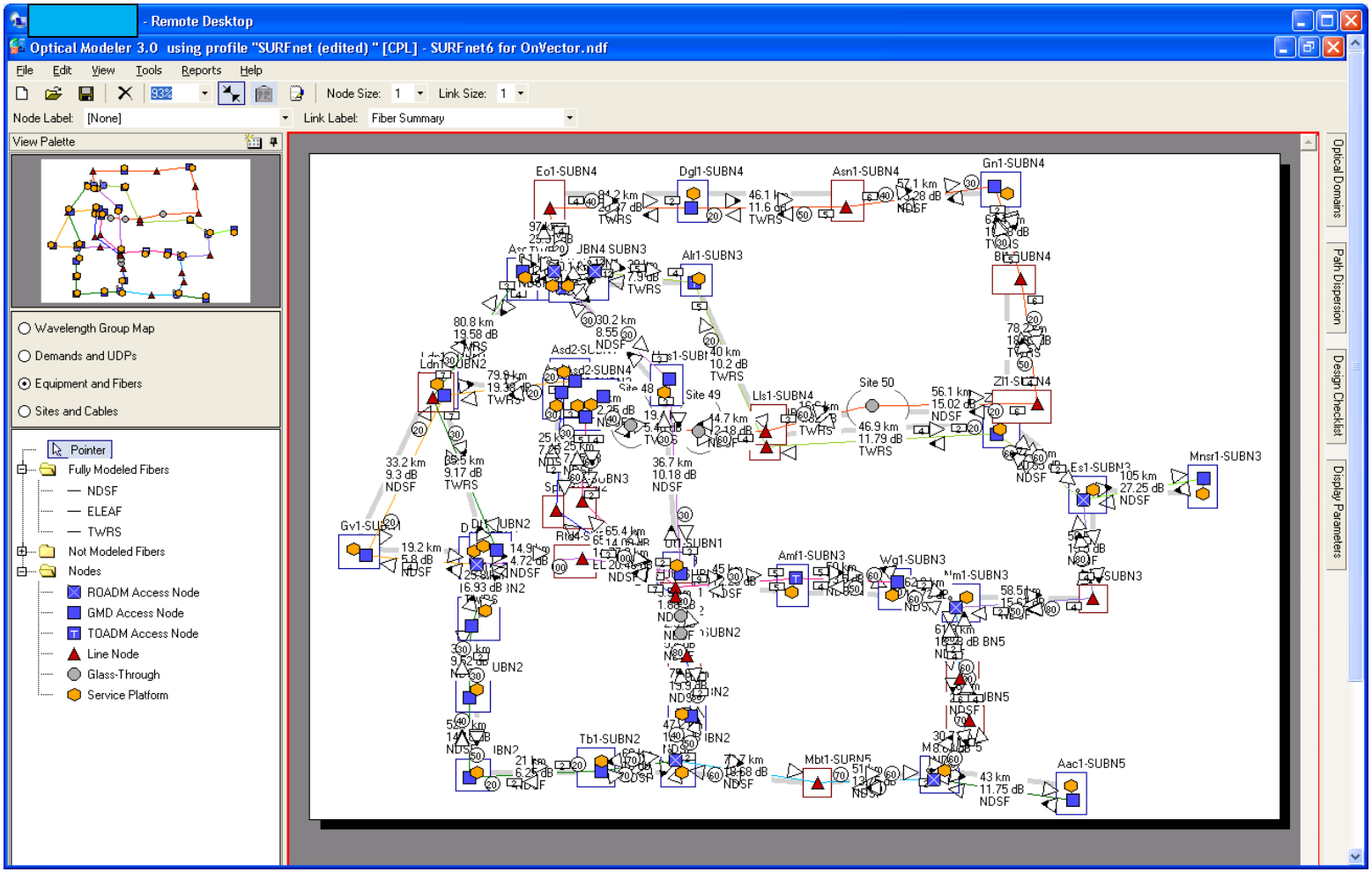


- 1650km DWDM system
  - 22 spans
- Via Bruxelles (Belnet) and Paris
- Currently three 40Gb/s PM-QPSK channels installed
  - In production!
- 100G ready
  - OSNR margin was measured and is sufficient to guarantee 100Gb/s single carrier PM-QPSK transmission between Amsterdam and Geneva

SURFnet6: Hybrid end-to-end network

- 11.000+ km dark fiber, into connected organisations
- Own photonic network
- Network Services:
  - IPv4 and IPv6
  - Fixed and dynamic Lightpaths
- Collapsed IP backbone with routers at only 2 locations

SURFnet6 - Optical Modeler simulation tool

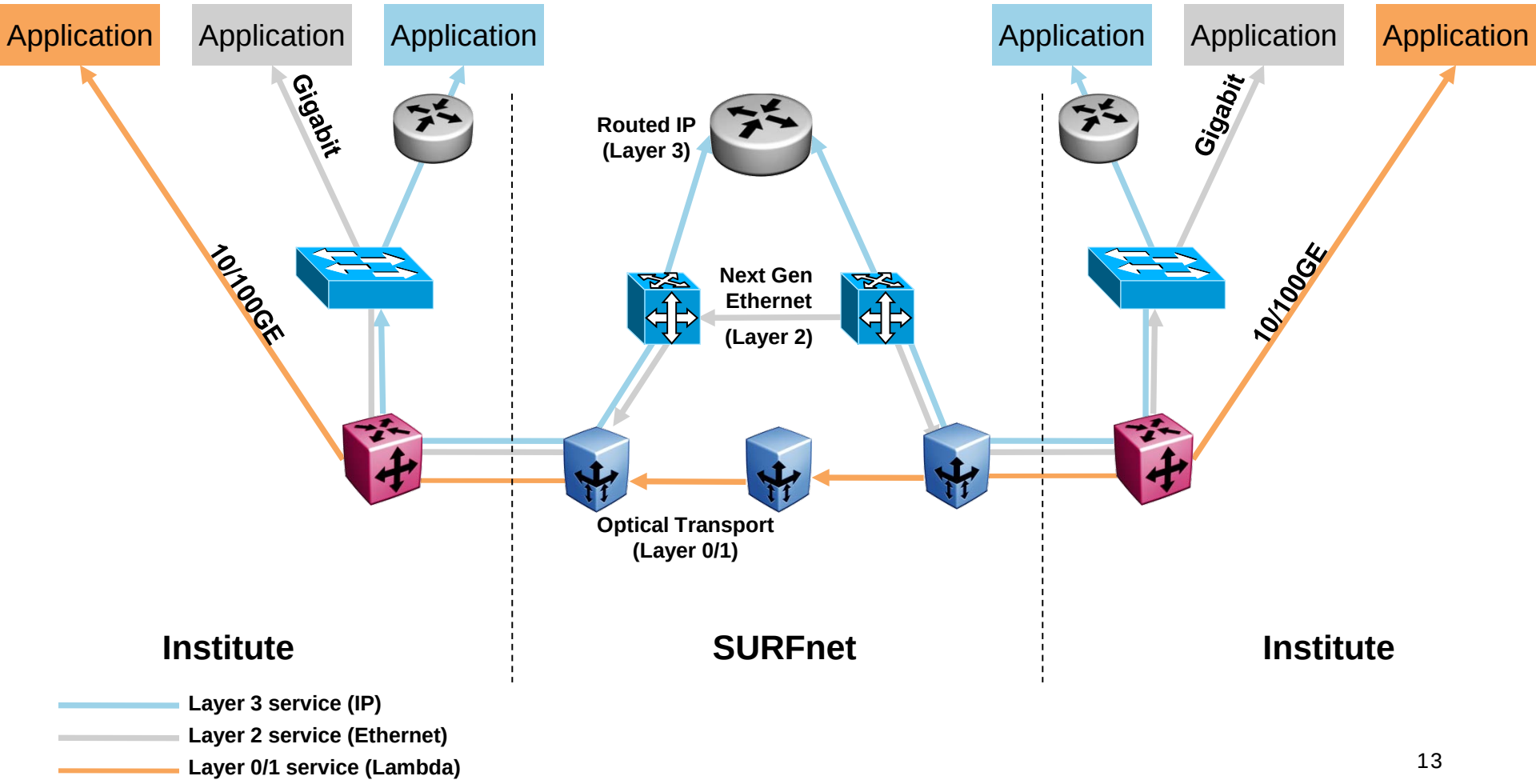


GigaPort3 (2009-2013) Ambition

- SURFnet7: A next step in bandwidth and flexibility
- Lichtpaths: scalable and under control of users and their applications
- New architecture: Next Generation Ethernet
- Enabling Dynamic Services: middleware for safe and user-friendly integration of ICT infrastructure components en instruments
- Research into improvements in mobility solutions and the integration with next gen wireless communications such as 802.11ac and LTE (and beyond)
- Stimulating the use of novel and advanced services and knowledge dissimination

- Research on Networks is essential to realize this high ambition

SURFnet7
The scalable hybrid network



DRAC

Dynamic Resource Allocation Controller

- Abstracts network for the user and/or application
- Provides generic interface to network resources
- Delivers Bandwidth on Demand
  - Future reservations, recurring schedules
- Manages resources:
  Access control, group management, bandwidth policies
- Users in control
- Multi-layer provisioning
- Multi-vendor provisioning
- Multi-domain provisioning

- Currently 3 User Groups within SURFnet
  - Enlighten Your Research 2 contest

Open DRAC

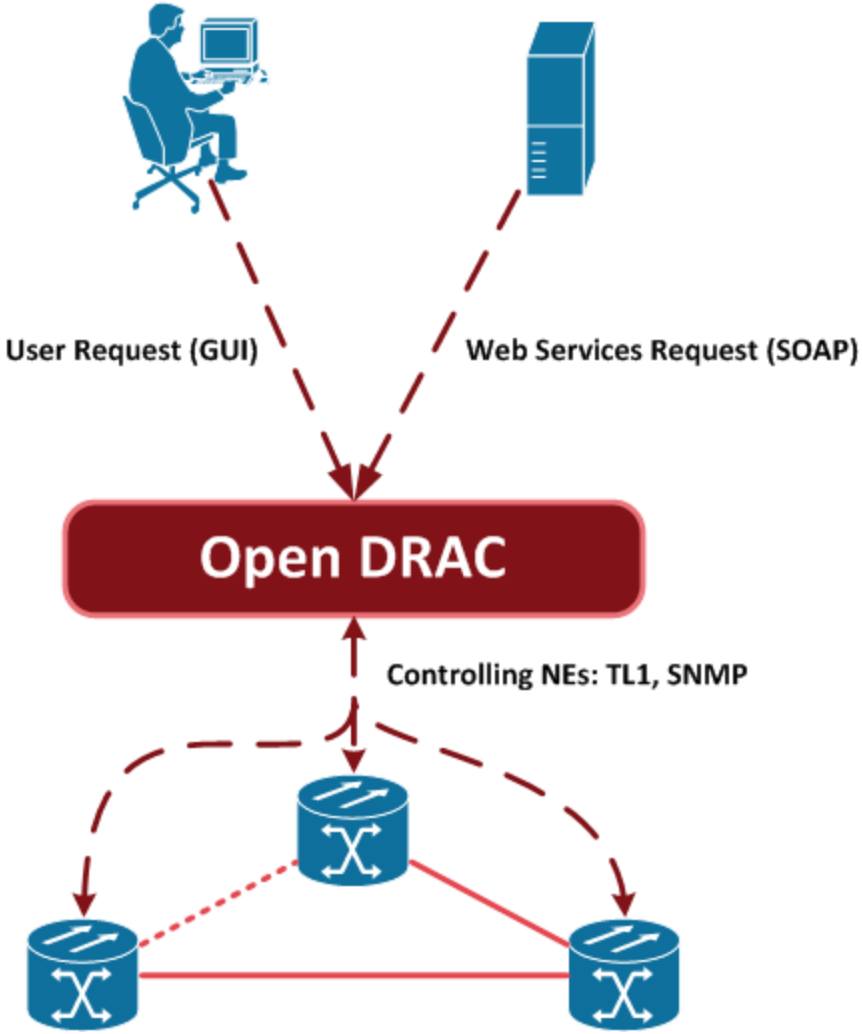
- http://www.opendrac.org

- **DRAC open sourced** by Nortel/Ciena in April 2010
  - Preceded by independent Security Audit
  - Multiple source code drops until end of 2010
  - Under GPLv3 License

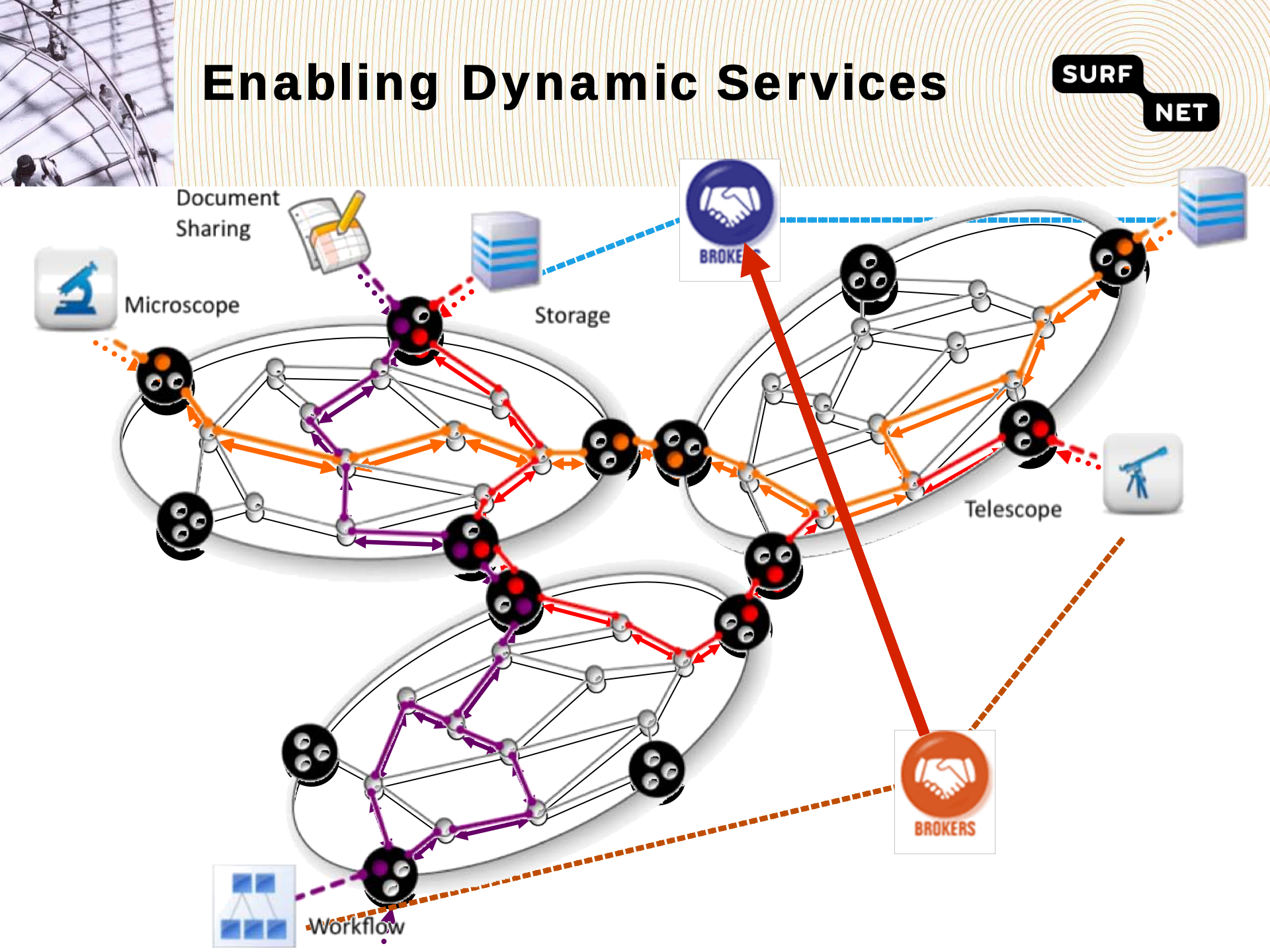
- http://ur1.ca/0580u

Open DRAC

Provisioning Bandwidth on Demand

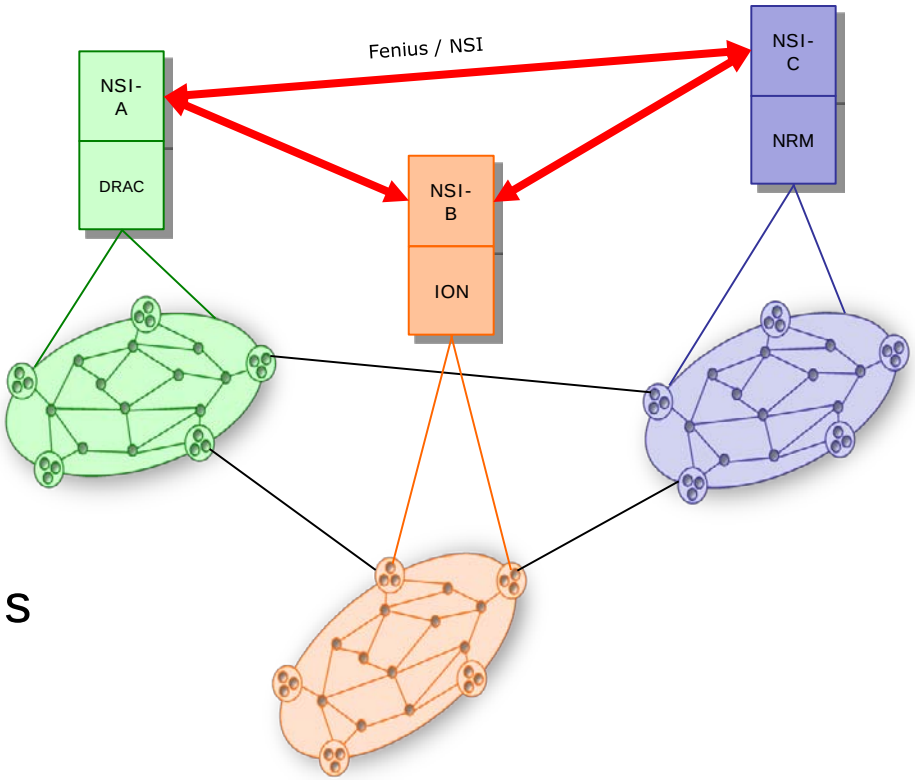


Enabling Dynamic Services



Automated GOLE Pilot

- MANLAN, StarLight, NORDUnet, CERNLight, CzechLight, NetherLight
- Inter-domain connections
  - Open DRAC
  - ION
  - Fenius
- Real-world users/applications



Open DRAC development

Layer 2 support (hybrid network)

- Force10, VLAN based
- Next Generation Ethernet

Interdomain support

- Fenius (GLIF)
- Network Service Interface (OGF)

Generic Resource Brokering

Federated Resources

GLIF Automated GOLE Pilot

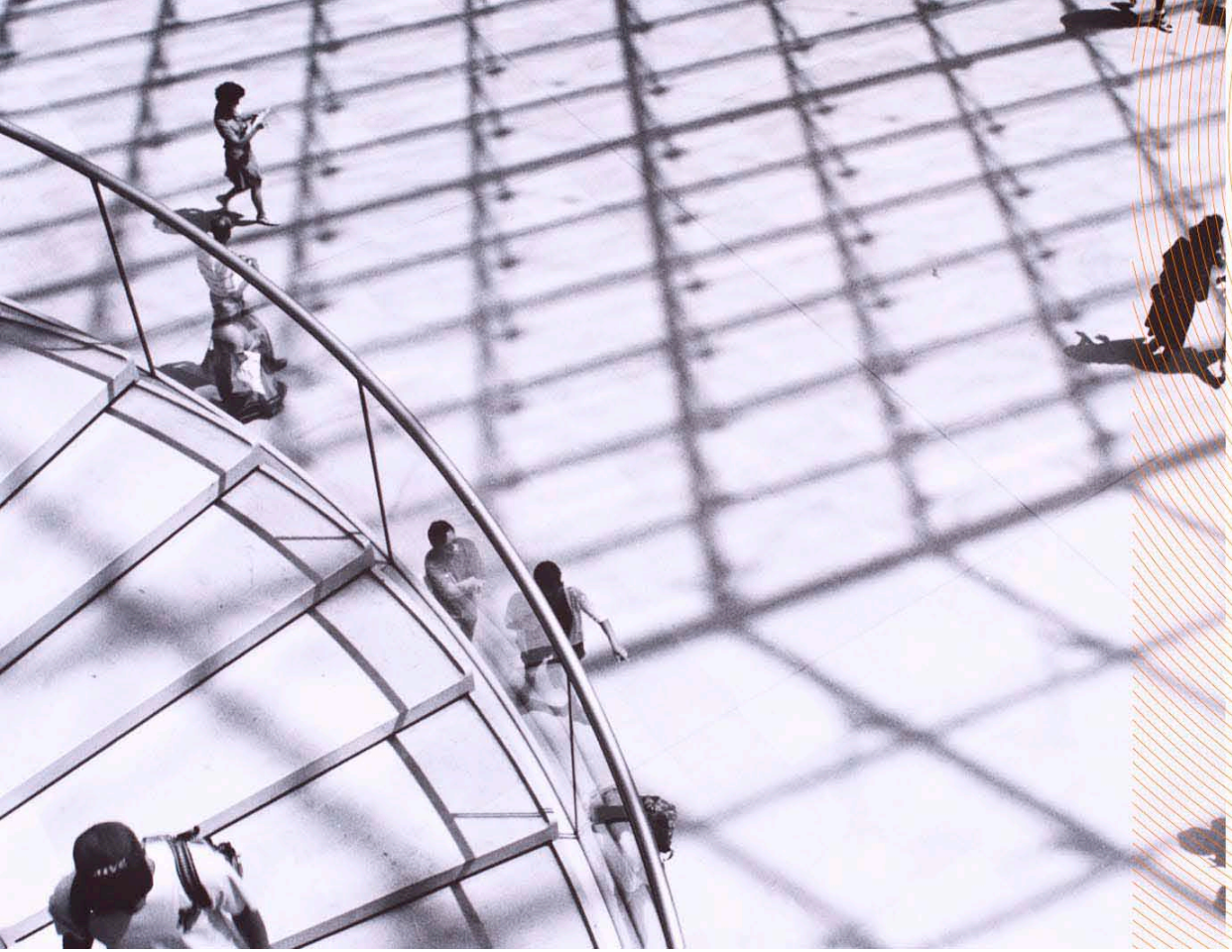
- DRAC at NetherLight
- Ciena OME6500 Double Decker with L2SS card

Principle: "No limitation on vendor or equipment"

Future cooperation

Everyone can join!

New open foundation to ensure open participation and contribution to be defined



Thank you!

Gerben van Malenstein

gerben.vanmalenstein@surfnet.nl