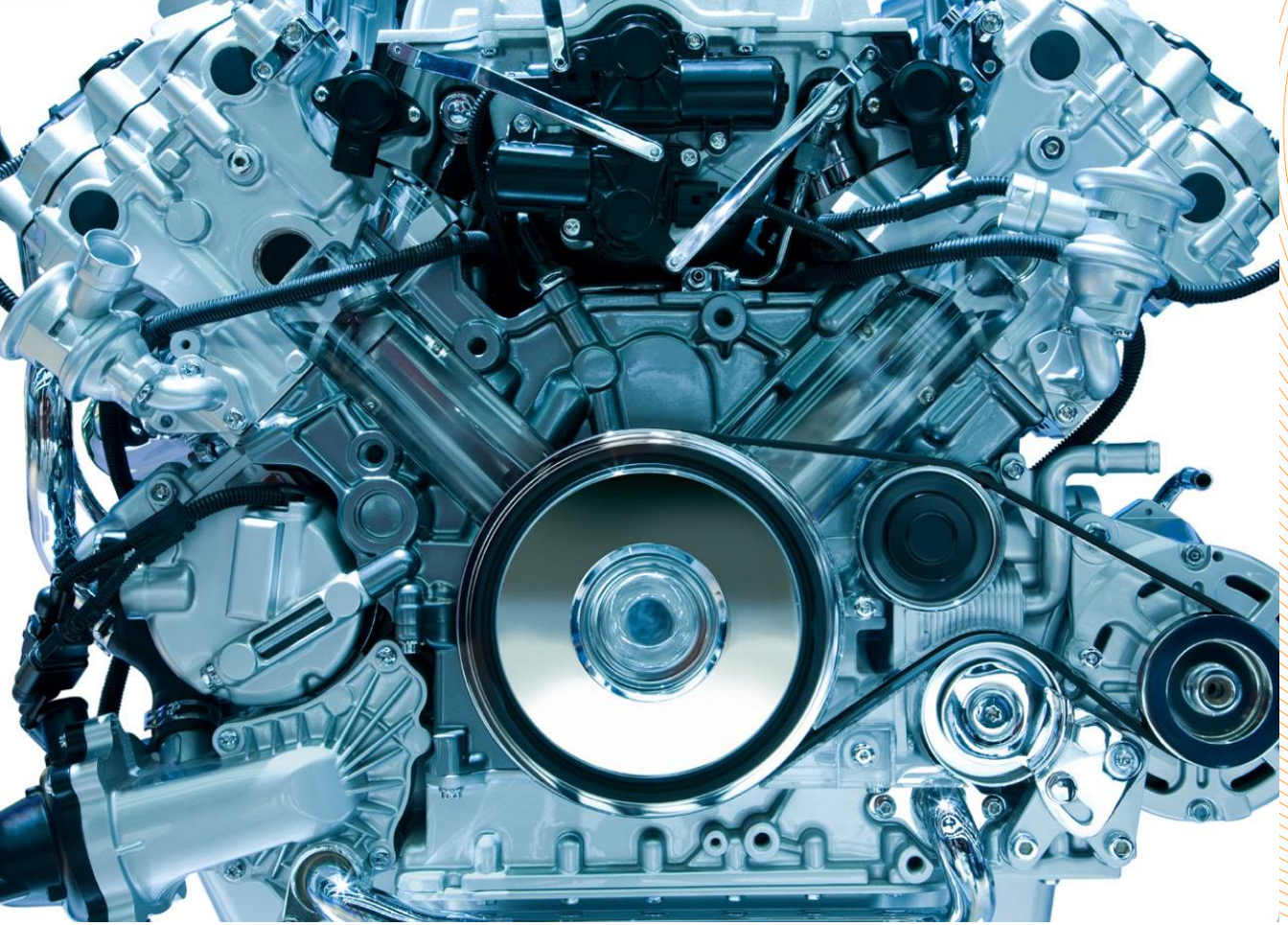
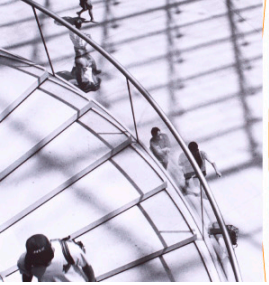


SURFnet network developments

10th E-VLBI workshop– 15 Nov 2011

Wouter Huisman – SURFnet



Engine for Innovation

Mission

To improve higher education and research by promoting, developing and operating a trusted, connecting infrastructure that facilitates optimum use of the possibilities offered by ICT.

Vision

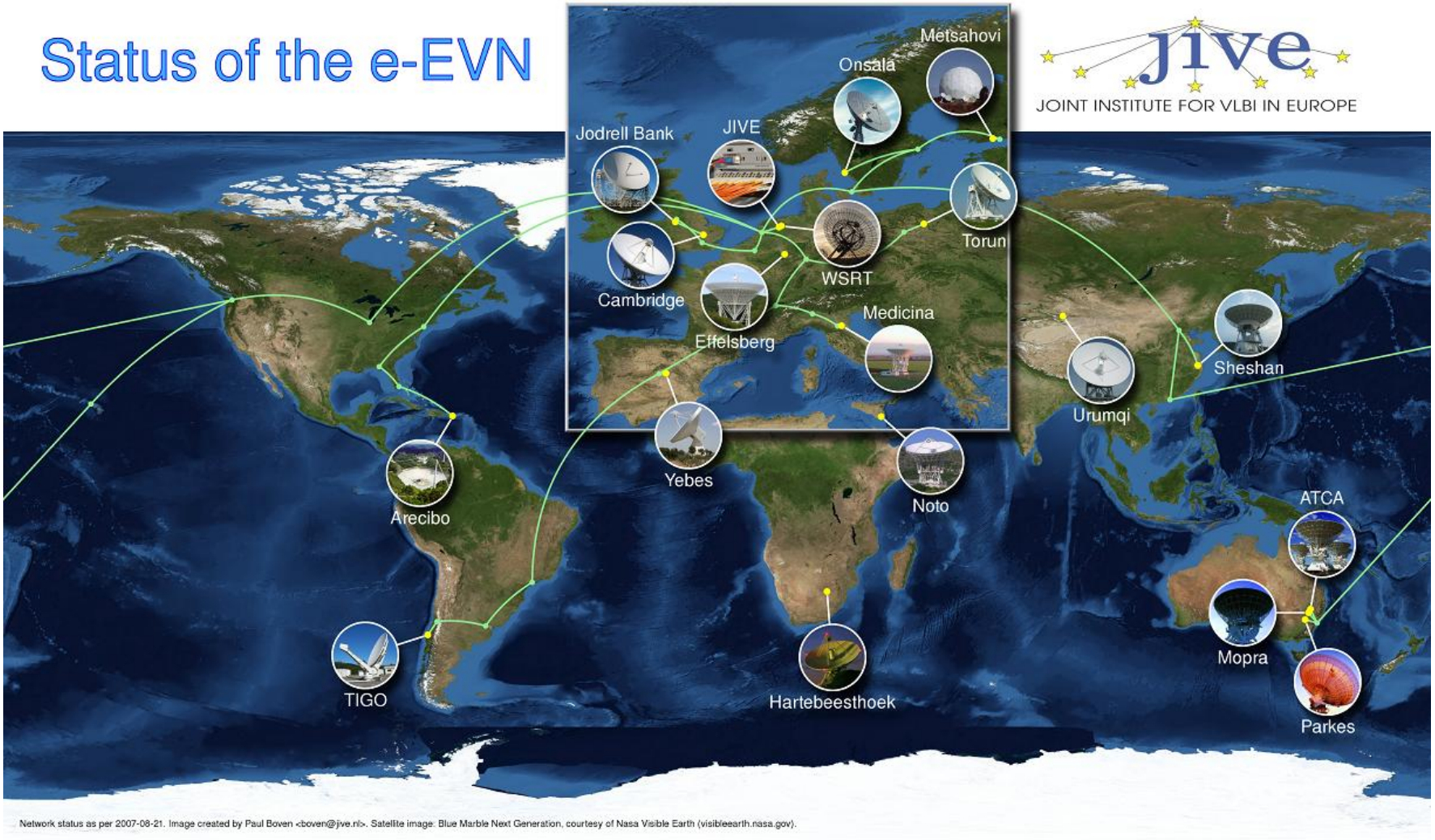
We make a unique contribution by ensuring that researchers, instructors, and students can work together simply and effectively by linking individuals and teams seamlessly together and by giving them access to services, data, and tools and by encouraging and developing new ICT applications.

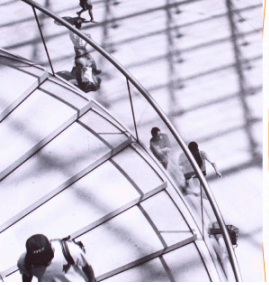
Results

Network infrastructure
a hybrid fixed-wireless network as the basis for all collaboration, providing efficient, unlimited data transport.

Collaboration infrastructure
pioneering collaboration environment that seamlessly connects systems, services, tools, and people

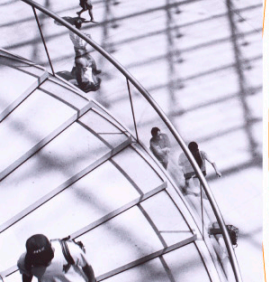
Network users
e-VLBI, a global radio telescope





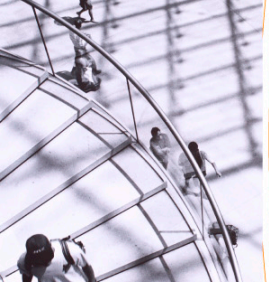
SURFnet

- Dutch National Research & Education Network (NREN)
  - Network, services and innovation partner for research institutes, universities, colleges, academic hospitals, cultural institutions…
- Not for profit organisation, approx 80 employees
- 180 connected institutions, 1M end-users
- Business model:
  - Innovation through project subsidies
  - Revenue through tariffs from institutions



SURFnet6 highlights

- World's first NREN with a nationwide "hybrid" network, truly collapsed IP backbone **(routers at 2 locations only)**
- IPv4 and IPv6, unicast and multicast, plus lightpath provisioning, over a single DWDM transmission infrastructure
- Dynamic Lightpath services in production in 2008
  - www.opendrac.org
- Professional (outsourced) NOC: 7x24hrs active monitoring



Lightpaths

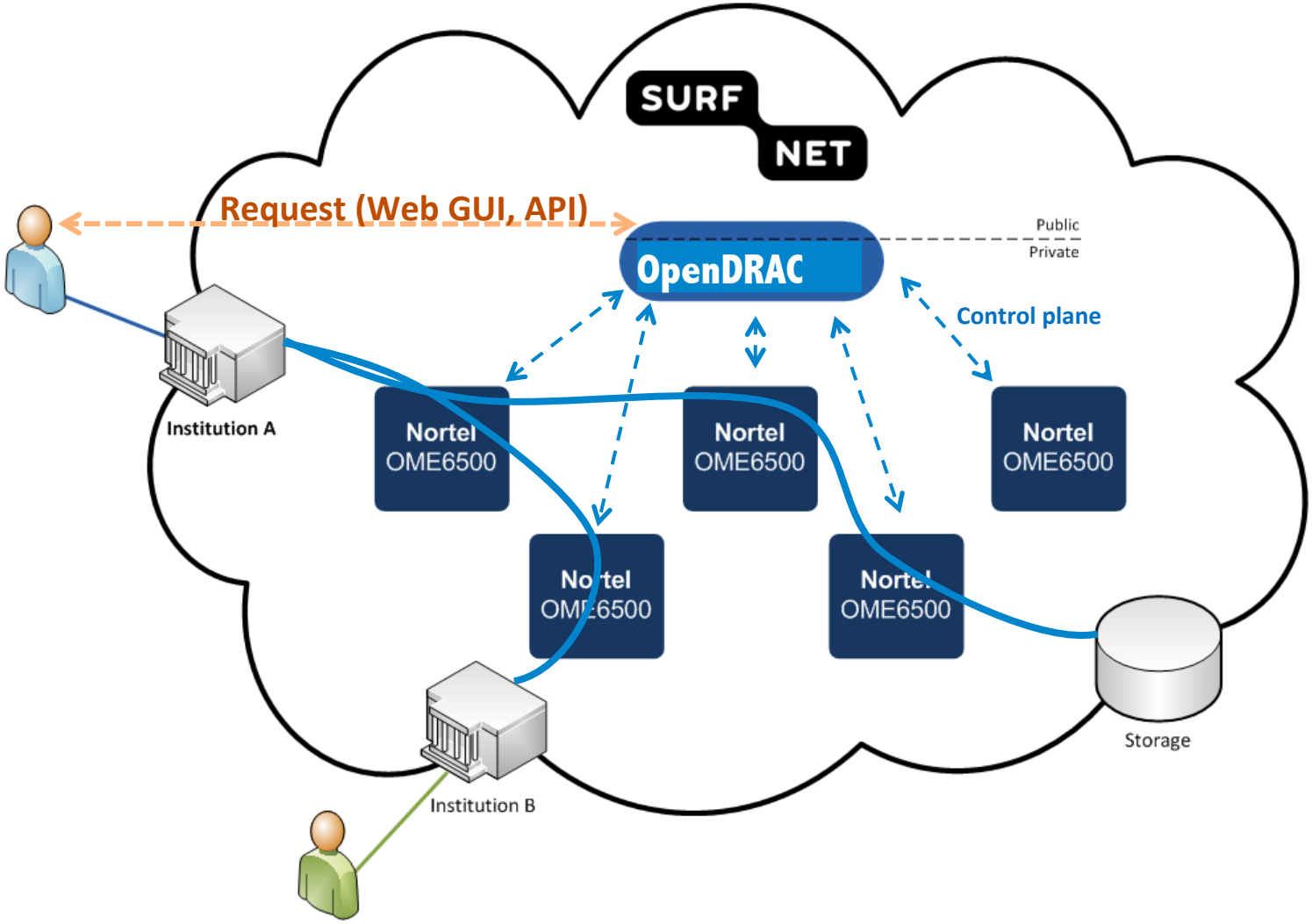
Lightpath:

- Point-to-point connection
- Within SURFnet6 based on SDH
- SURFnet7 offers NGE

Lightpaths offer:

- Exclusive network connection
- Guaranteed bandwidth
- Minimal latency (in NL < 10 ms)
- Minimal jitter
- Minimal packet-loss
- Secure (separated from the routed Internet)

Dynamic lightpaths



More information OpenDRAC: http://www.opendrac.org

SURFnet fiber footprint

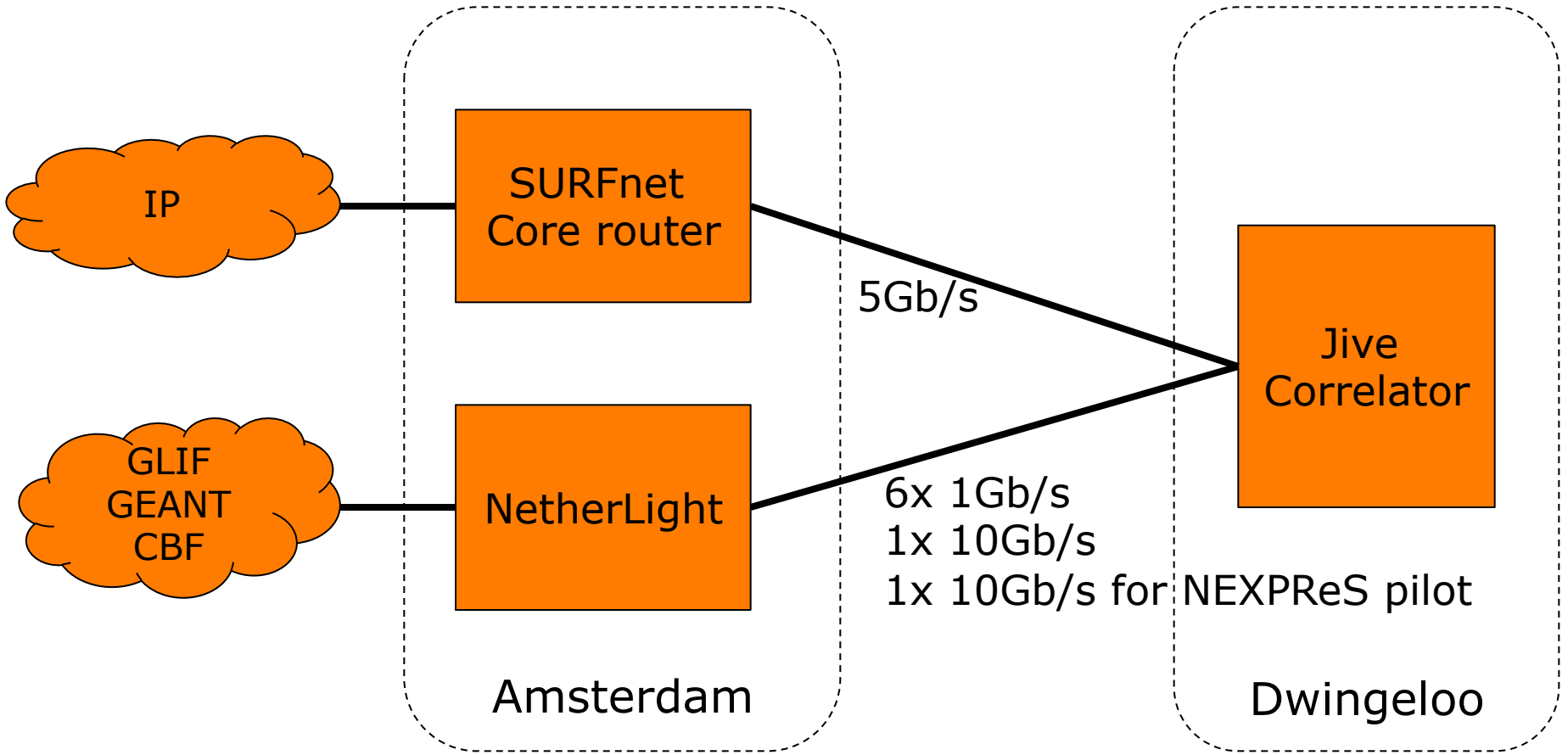
- 11.000+ km dark fiber
- Cross Border Fibers

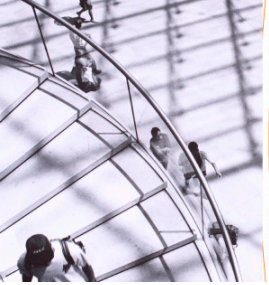
NORDUnet and
PSNC, Hamburg
LOFAR and Onsala

Aachen, LOFAR and
Effelsberg

LHC, Geneva

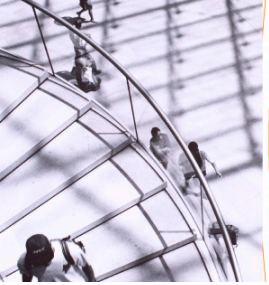
What's in place for Jive?



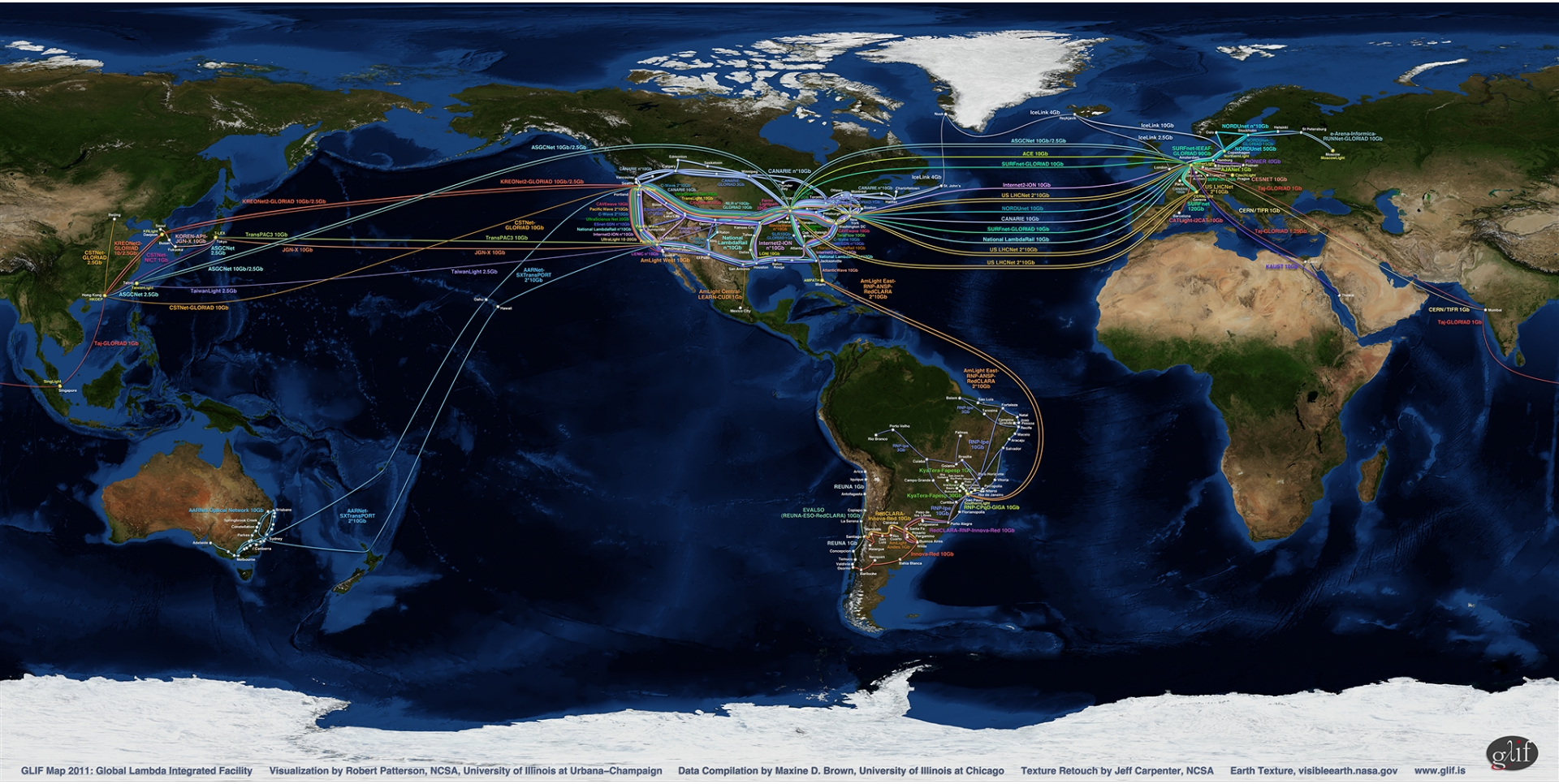


NetherLight

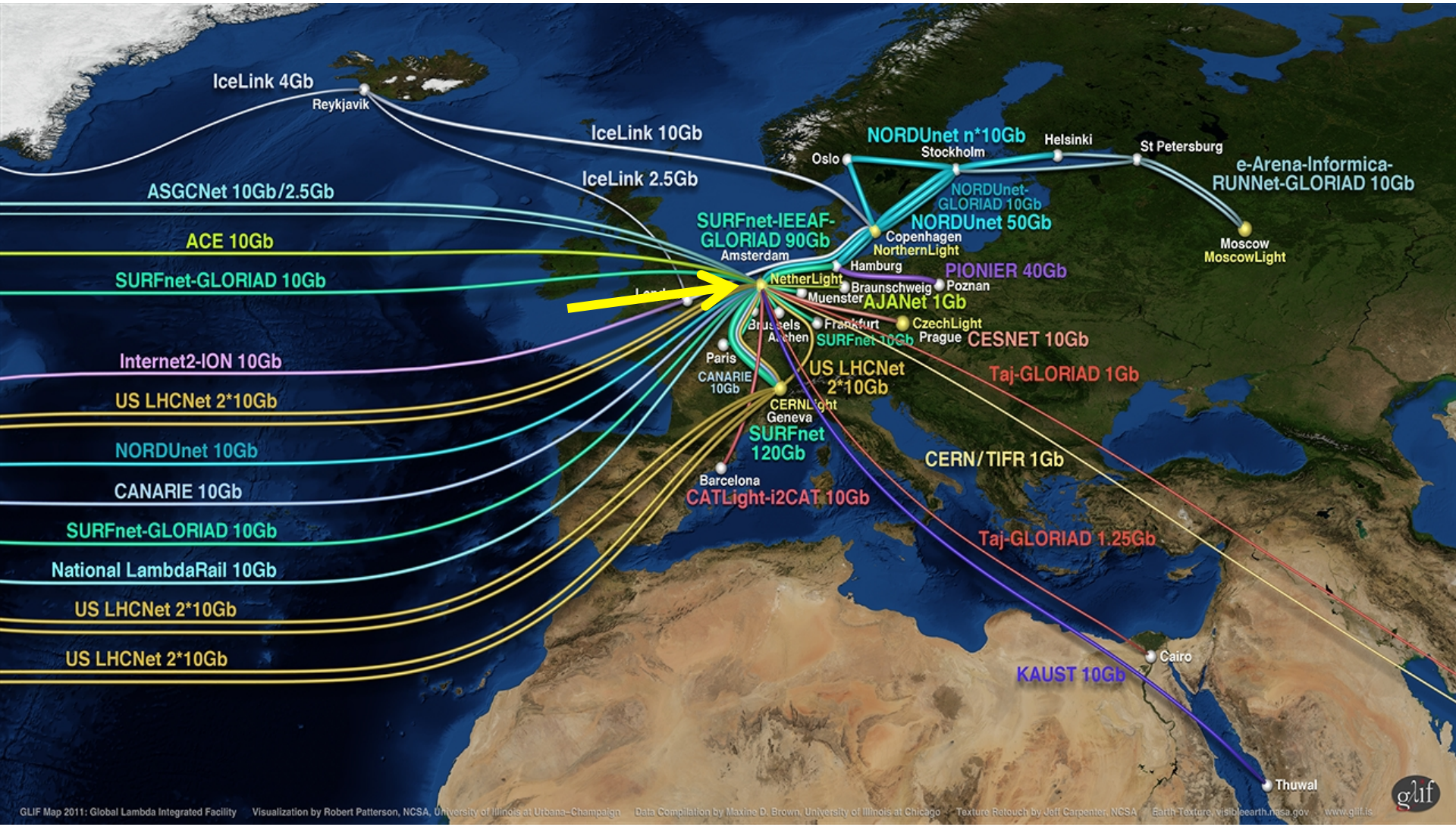
- Open Lightpath Exchange
  - www.glif.is
  - No policy for connecting to NetherLight
- Supporting Ethernet Layer 2 and Sonet Layer 1 lightpath services transparently
- Co-located with AMSIX



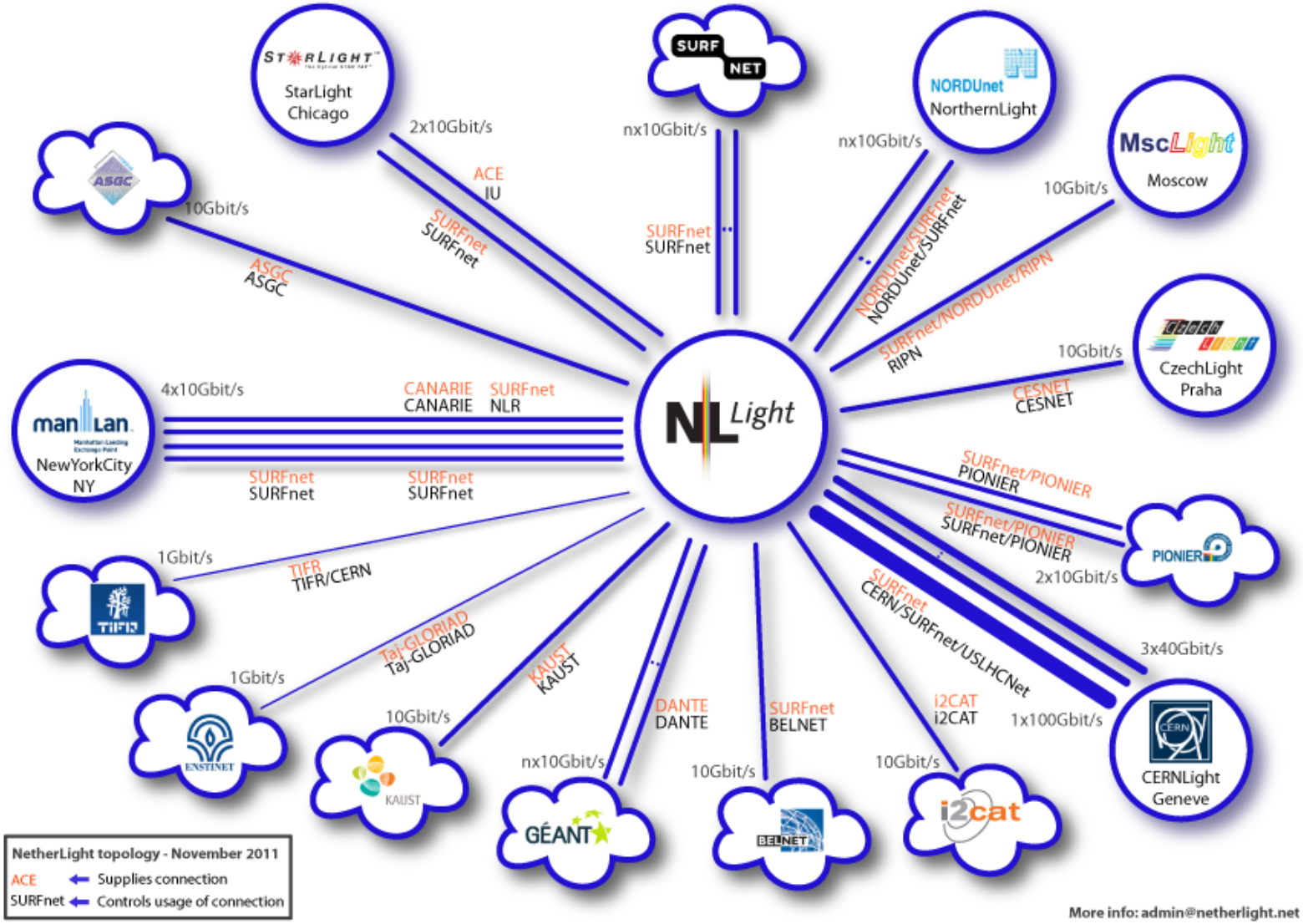
World GLIF map



European GLIF map

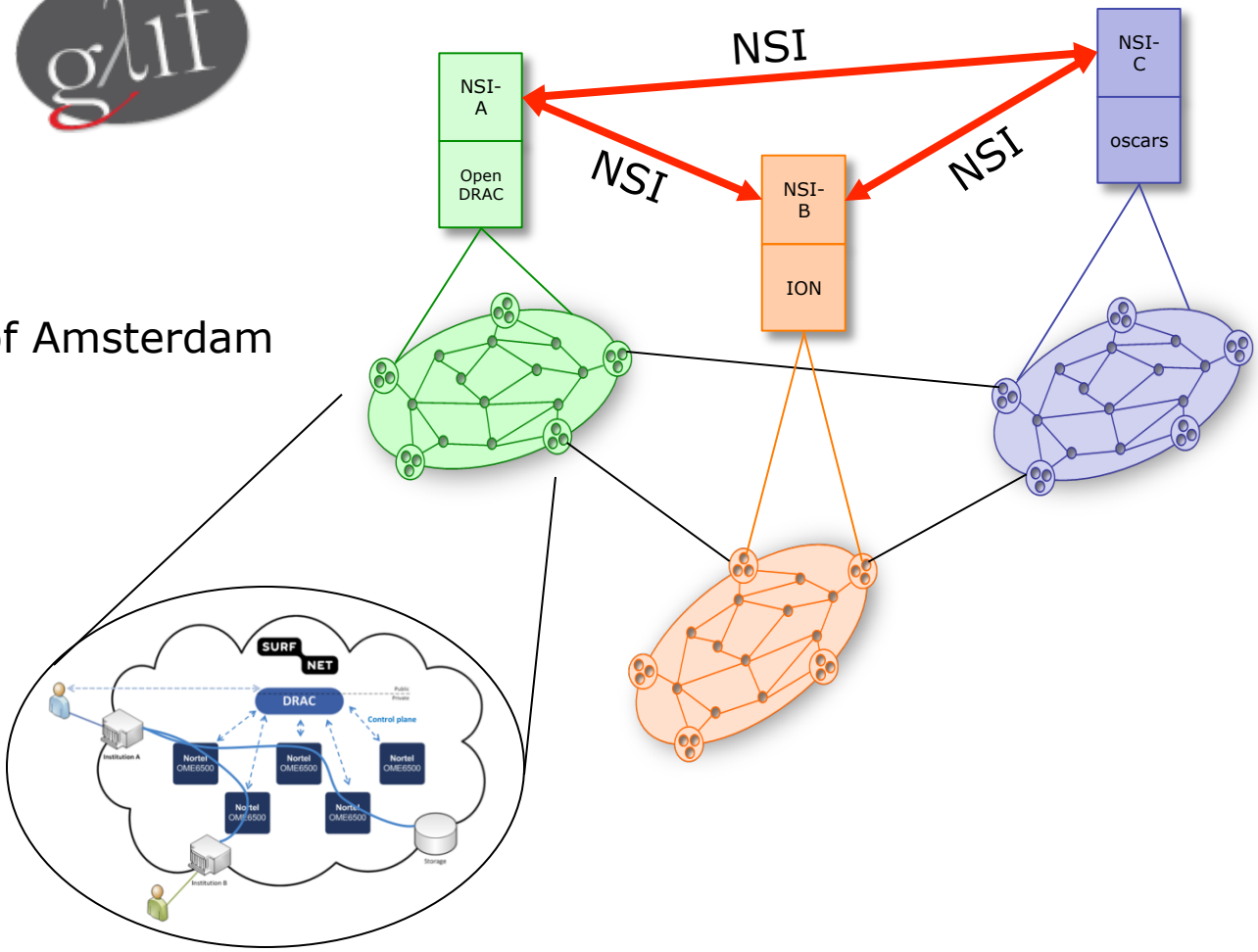


NetherLight connectivity



Automated GOLE Project
Creating dynamic lightpaths

- Partners:
  - University of Amsterdam
  - Internet2
  - StarLight
  - JGN2
  - CERN
  - NORDUnet
  - CESNET
  - PSNC
  - SURFnet
  - ESnet



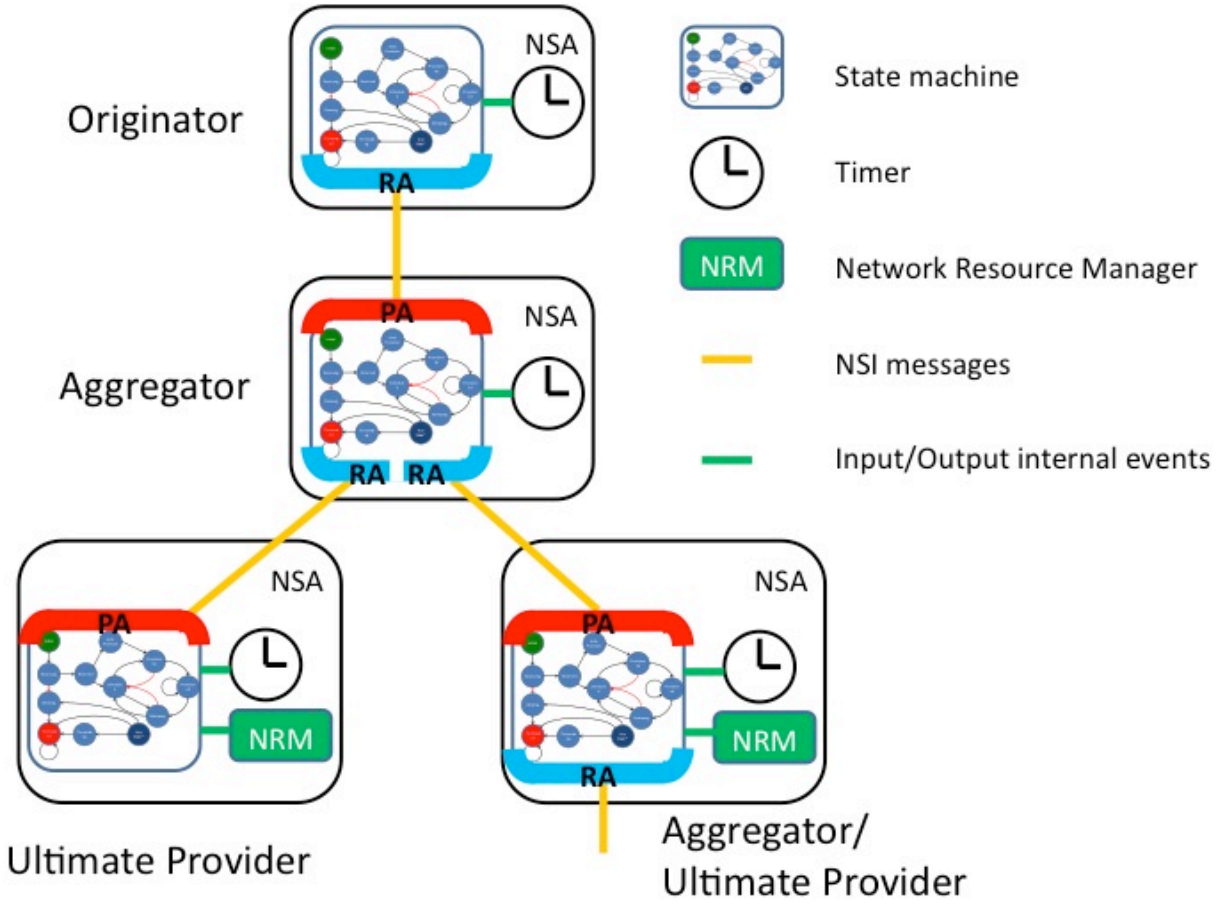
Network Services Interface (NSI)

- Standardized by NSI working group in OGF

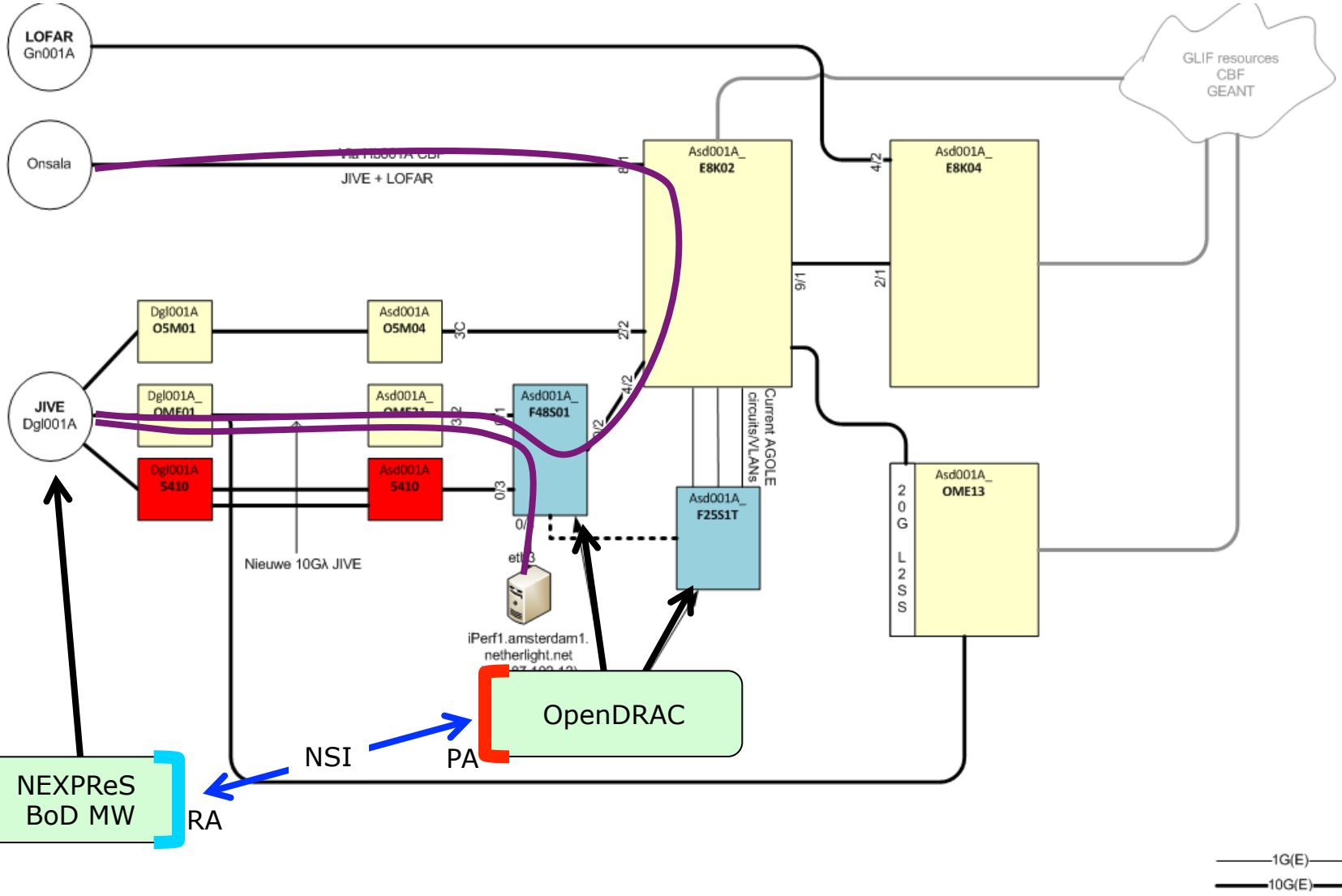
Intend to define 3 protocols:

- Service Connection protocol
  - Allows reserve, delete, query services
  - R1.0 is due for ratification → demo'ed at SC'11
  - R2.0 includes modify services
- Topology Exchange protocol
  - Needed to automatically discover other networks
- Event protocol
  - State change and event

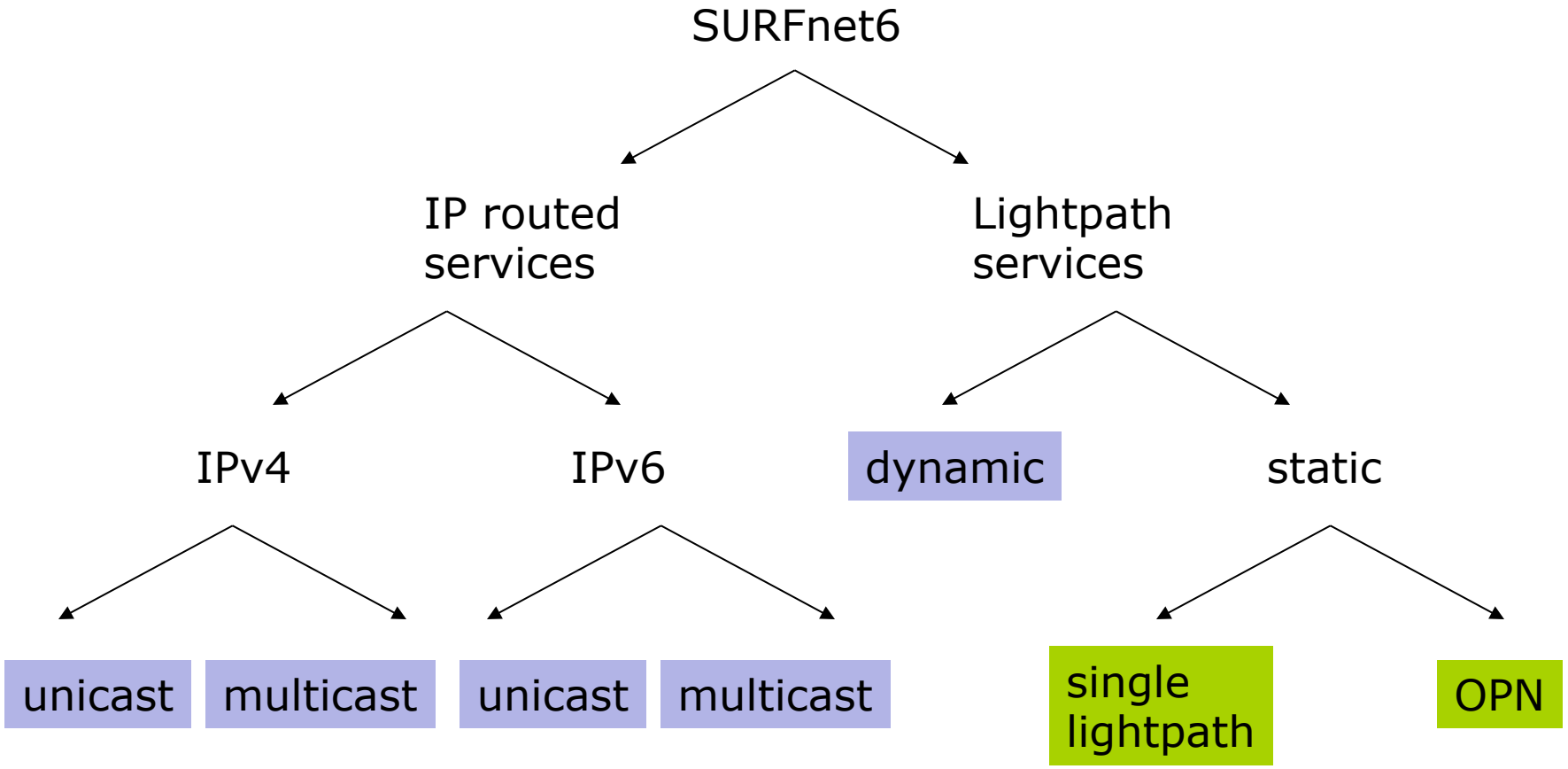
NSI requestor and provider interface



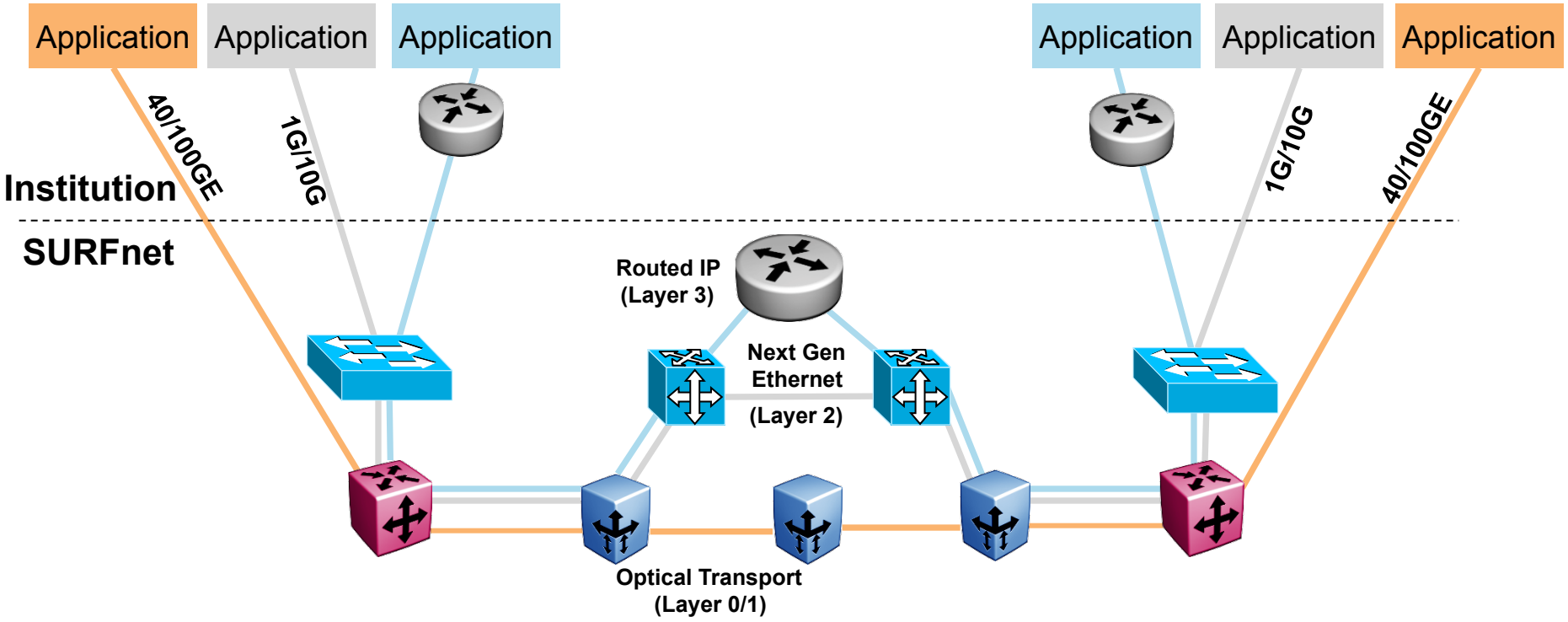
NEXPReS connectivity



Current network services: SURFnet6



SURFnet7: the scalable hybrid network



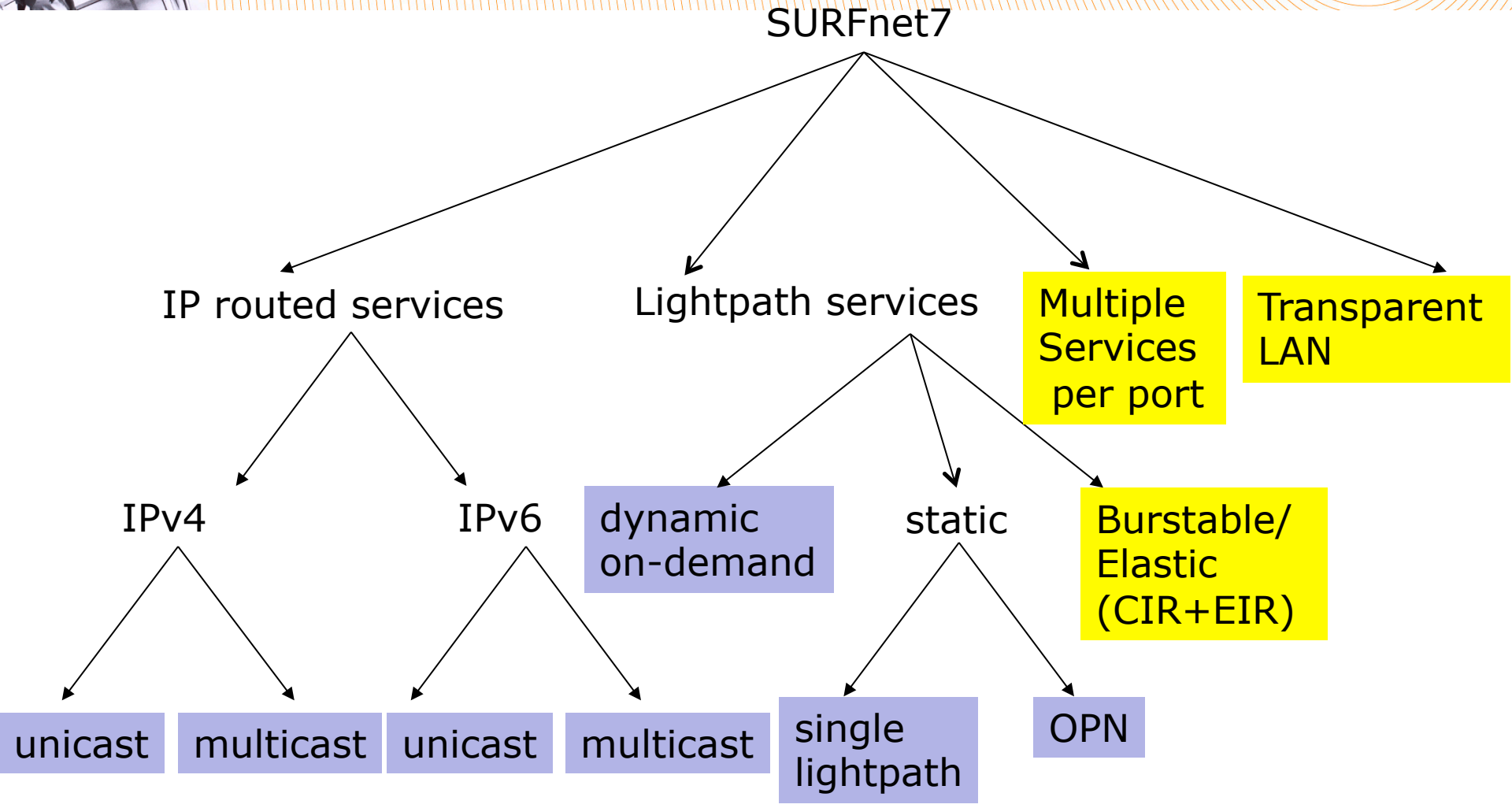
Institution

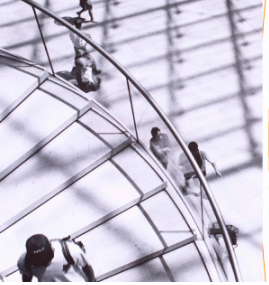
Layer 3 service (IP)

Layer 2 service (Ethernet)

Layer 0/1 service (Lambda)

SURFnet7: network services





SURFnet7 network

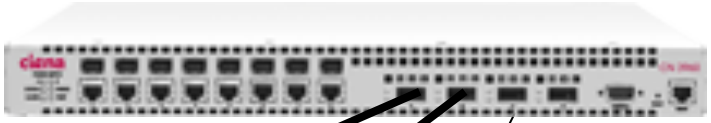
- All network services (IP and lightpaths) on a converged Carrier Ethernet platform
  - IP: improved aggregation layer
  - Lightpaths: guaranteed bandwidth services, minimal delay and jitter, 50ms restoration time (1:1 protection), simple (point and click provisioning), transparent, scalable and flexible

- 1G, 10G and 40/100G (future) client connections

- Chosen Vendor: Ciena

Multiple Services per Port

- Single client port aggregating IP, E-LINE, E-LAN and Dynamic lightpaths as long as line BW allows.
- 1G/10G client or line speed
- Services distinction by VLAN on UNI
  - All services on client port are tagged
- Flexibility with service activation (no installation work)
- Bundeling services , price per port model

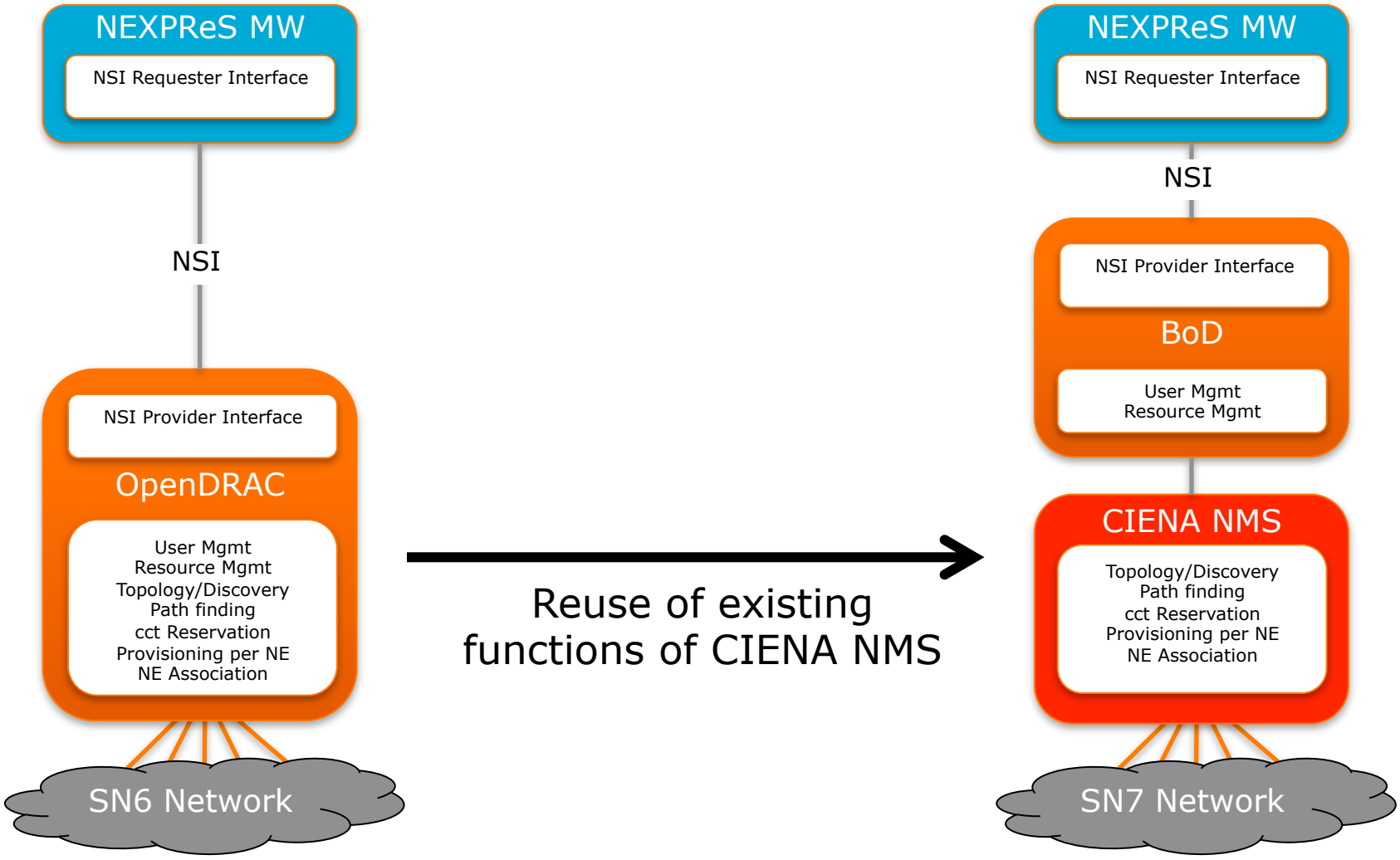


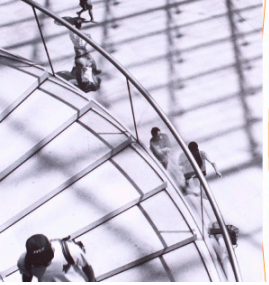
Uplink1

Uplink2

UNI: IP1, Lightpath1, E-LAN, Dynamic services

Bandwidth on Demand evolution for SN7





Thank you!

Wouter Huisman

wouter.huisman@surfnet.nl