

GigaPort NG Network SURFnet6 and NetherLight

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SURFnet

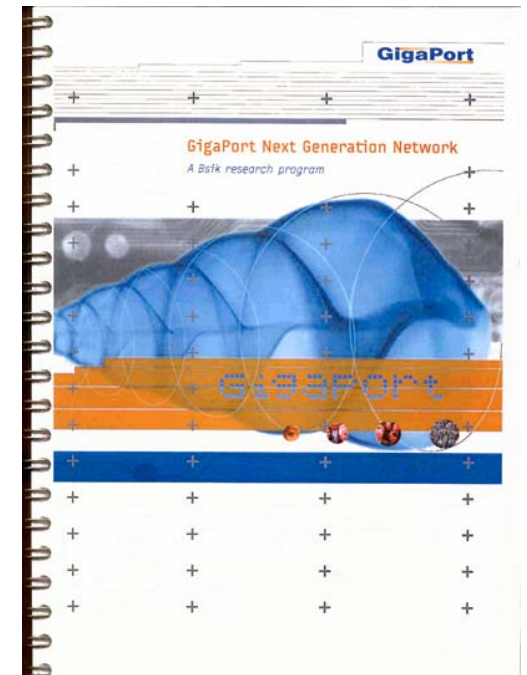
- **Provides the Dutch National Research Network**
- **Not for profit company, 50 employees**
- **100% subsidiary of Stichting SURF**
- **150 connected organizations, 750.000 users**
- **Turnover (2003): 30 MEUR**
- **Infrastructure services:**
 - **innovation paid for by government**
 - **cost effective exploitation for higher education and research**

GigaPort Next Generation Network

- Research networking as innovation engine between research and market introduction of new services

GigaPort NG Network (2004-2008)

- Consortium of 50 Dutch research organizations
- Government grant 40MEuro
- Project started January 1st, 2004
- Builds on GigaPort project ending in 2003
- Partnership with industry



Subprojects GigaPort NG Network

- **Research on Networks:**
 - Optical Networking
 - High Performance Routing & Switching
 - Management & Monitoring
 - Grids & Access
 - Testing Methodology

- **Networks for Research:**
 - Contract Industry Partner signed March 23rd, 2004
 - Blue Print SURFnet6 finalized in September 2004

SURFnet's new Industry Partners (2004-2010)

NORTEL
NETWORKS™

- Leader of the consortium
- Optical equipment
- Ethernet equipment
- Network management equipment

AVICI
SYSTEMS

- Routing equipment

TELINDUS

- Installation services
- Maintenance services

SURFnet6 overview

- **Realization of a hybrid optical and packet switching infrastructure**
- **Based on customer-owned managed dark fiber**
- **Native IPv4, IPv6 and Light Path Provisioning over a single transmission infrastructure**
 - Managed via a single control plane
 - Network from 20 routed locations to 2 routed locations

**Paving the way to a ubiquitous and scalable
Services Grid**

SURFnet6 on dark fiber

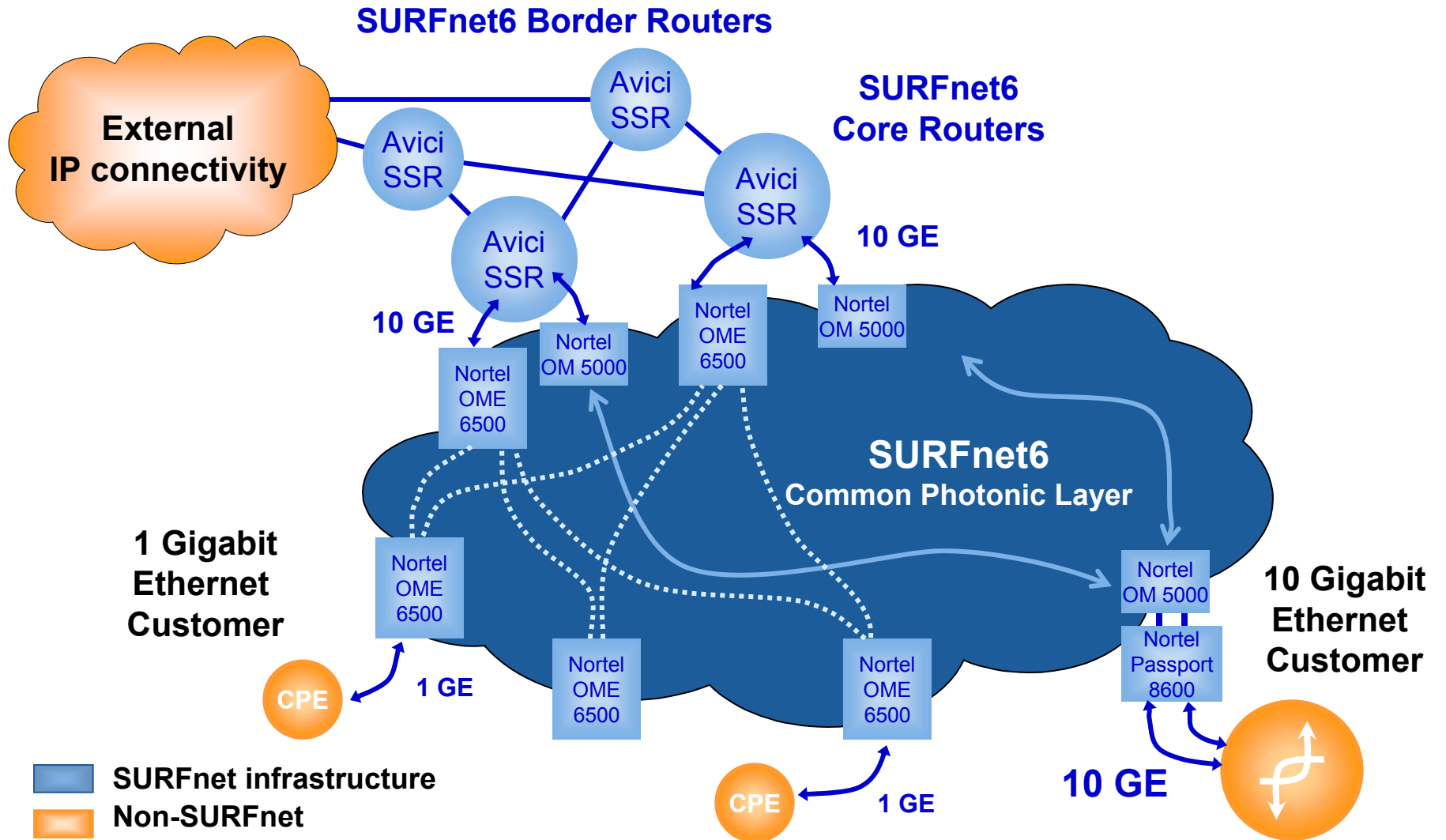


- SURFnet6 will be entirely based on own dark fiber
- Over 5300 km fiber pairs available today; average price paid for 15 year IRUs: < 6 EUR/meter per pair
- Managed dark fiber infrastructure will be extended with new routes, to be ready for SURFnet6

SURFnet6: IP Services

- **IPv4 and IPv6 connectivity**
 - Unicast
 - Multicast
- **1 and 10 Gigabit Ethernet connections**
- **Small routed IP core in Amsterdam at two separate locations**
- **Congestion-free via overprovisioning**
- **Resilient**

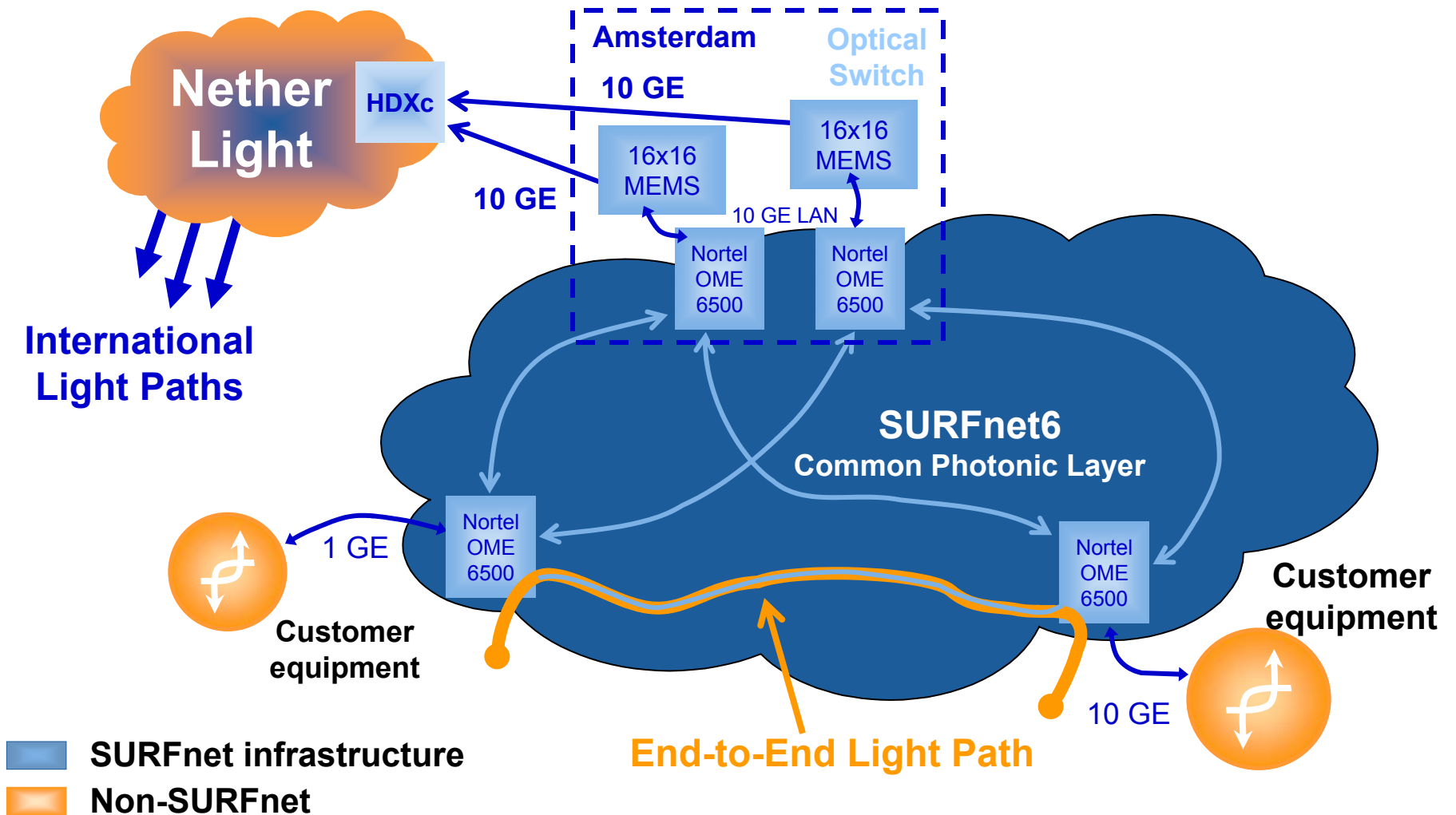
SURFnet6: IP network implementation



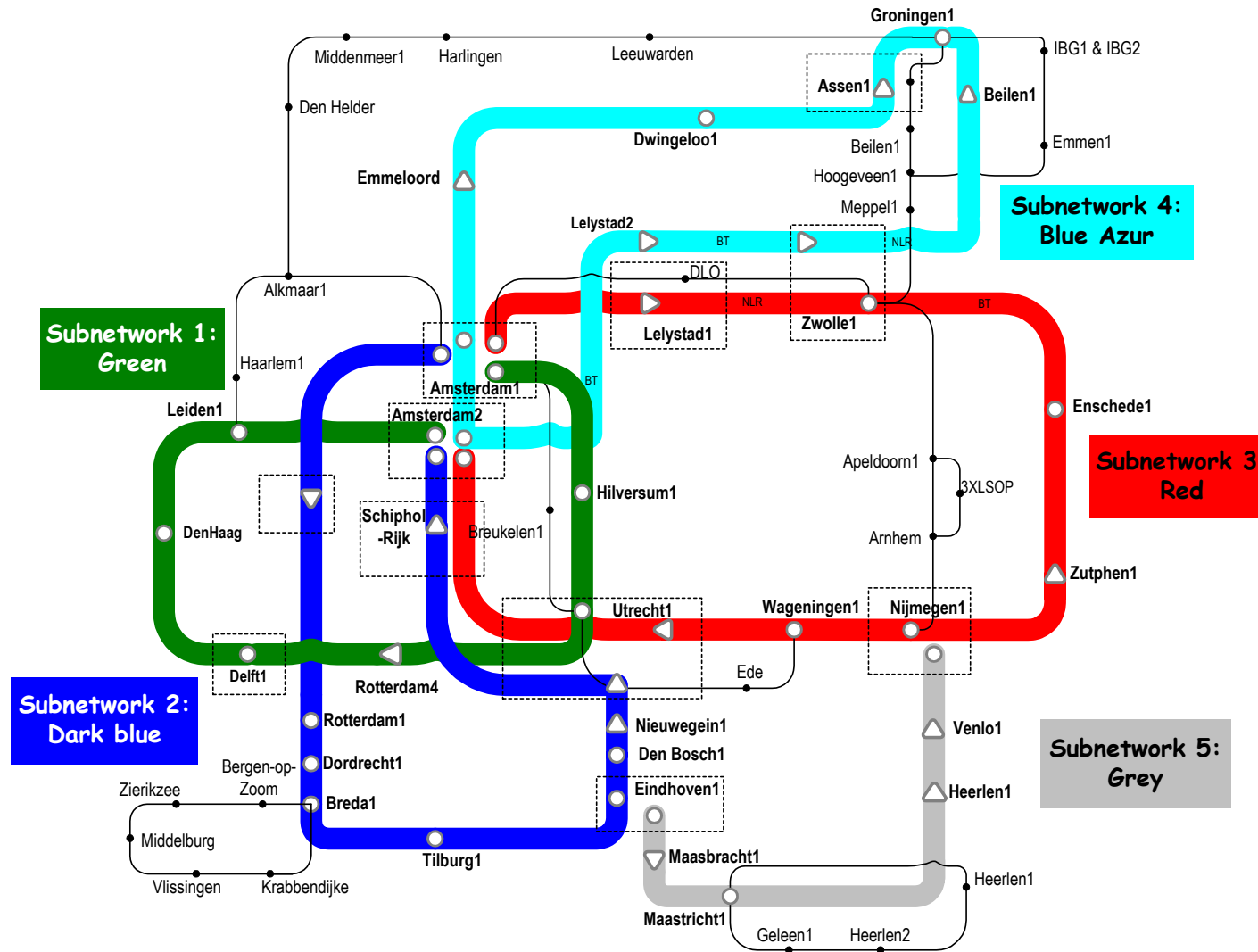
SURFnet6: Light Path Provisioning

- **Lambdas form an excellent basis for IP networking**
- **Enables users or applications to create layer 1/2 end-to-end Light Paths**
- **Provides excellent quality on point-to-point connections at very high speed (1-10G)**
- **Light Paths aren't constrained by traditional framing, routing, and transport protocols**
- **Lambdas are becoming an integral part of scientific instruments**
- **Enables creation of Optical Private Networks (OPN)**

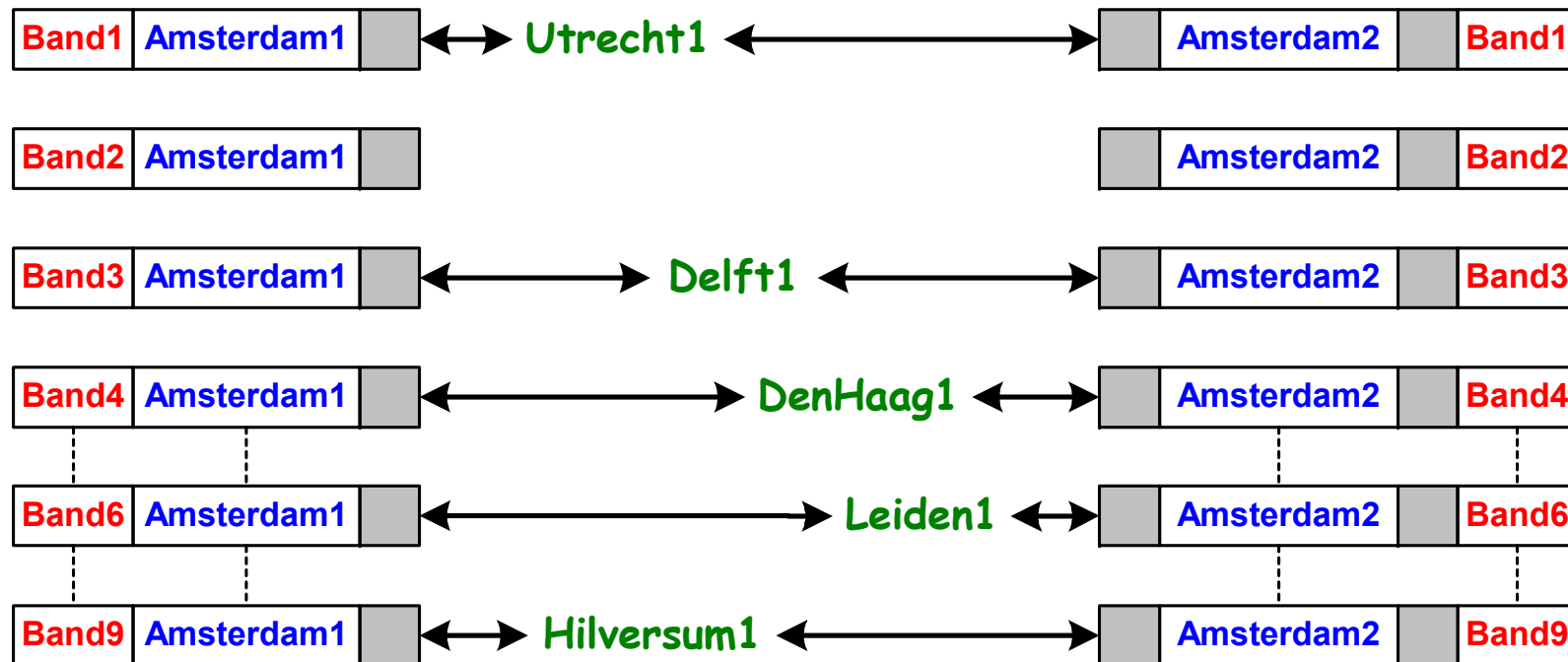
SURFnet6: Light Path Provisioning implementation



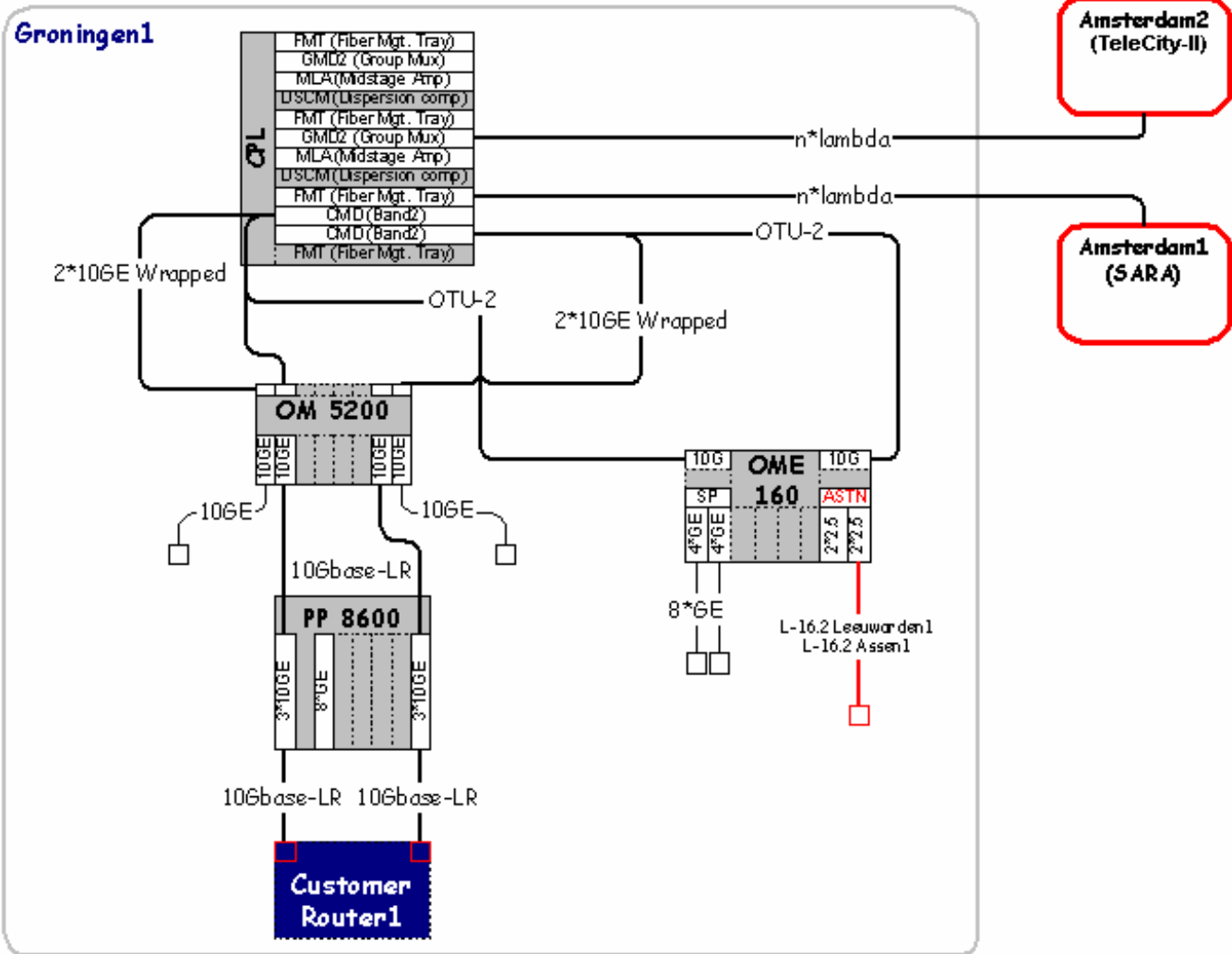
Common Photonic Layer (CPL) in SURFnet6



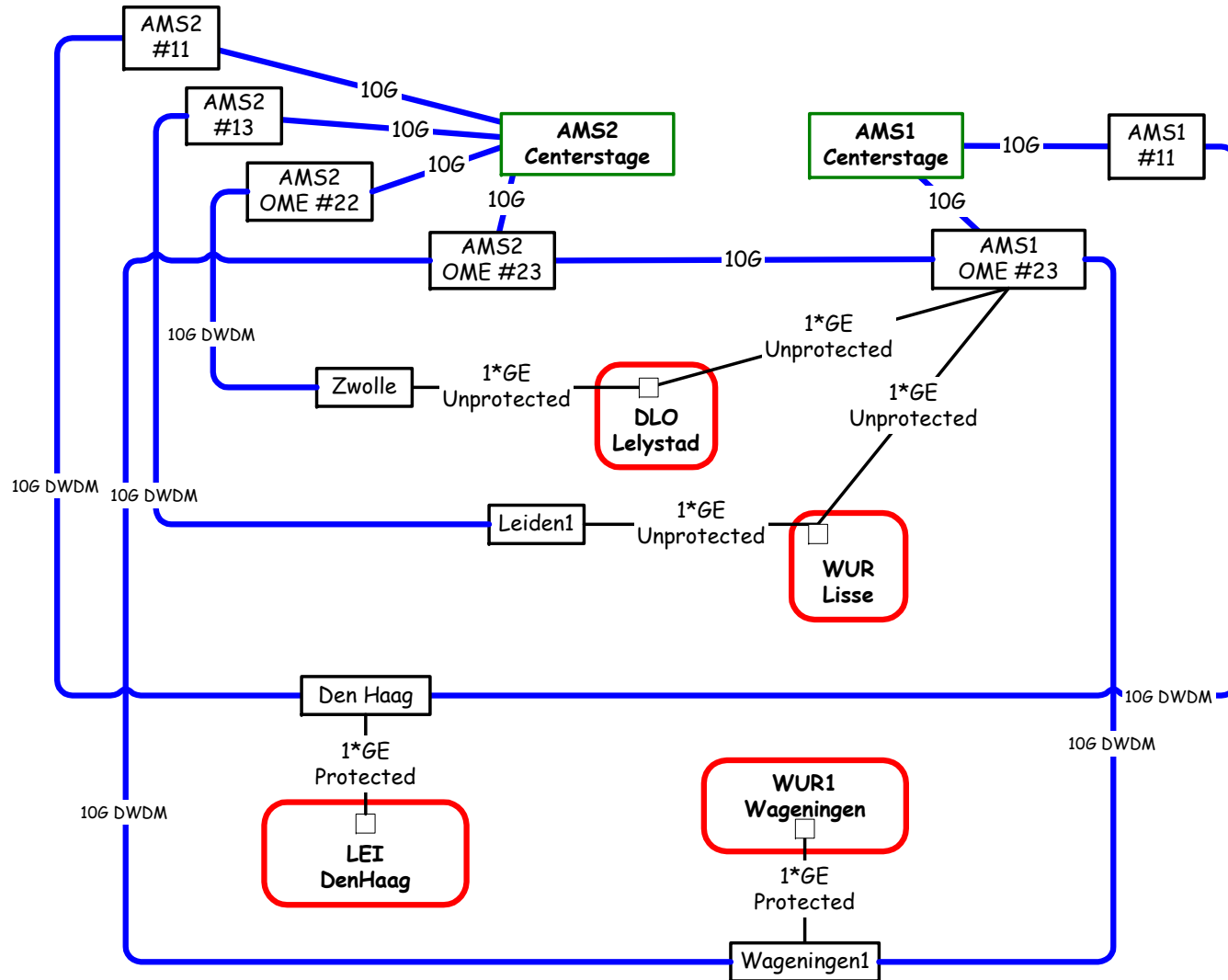
Subnetwork 1: Green



Groningen1 PoP infrastructure



Optical Private Network (OPN): WUR

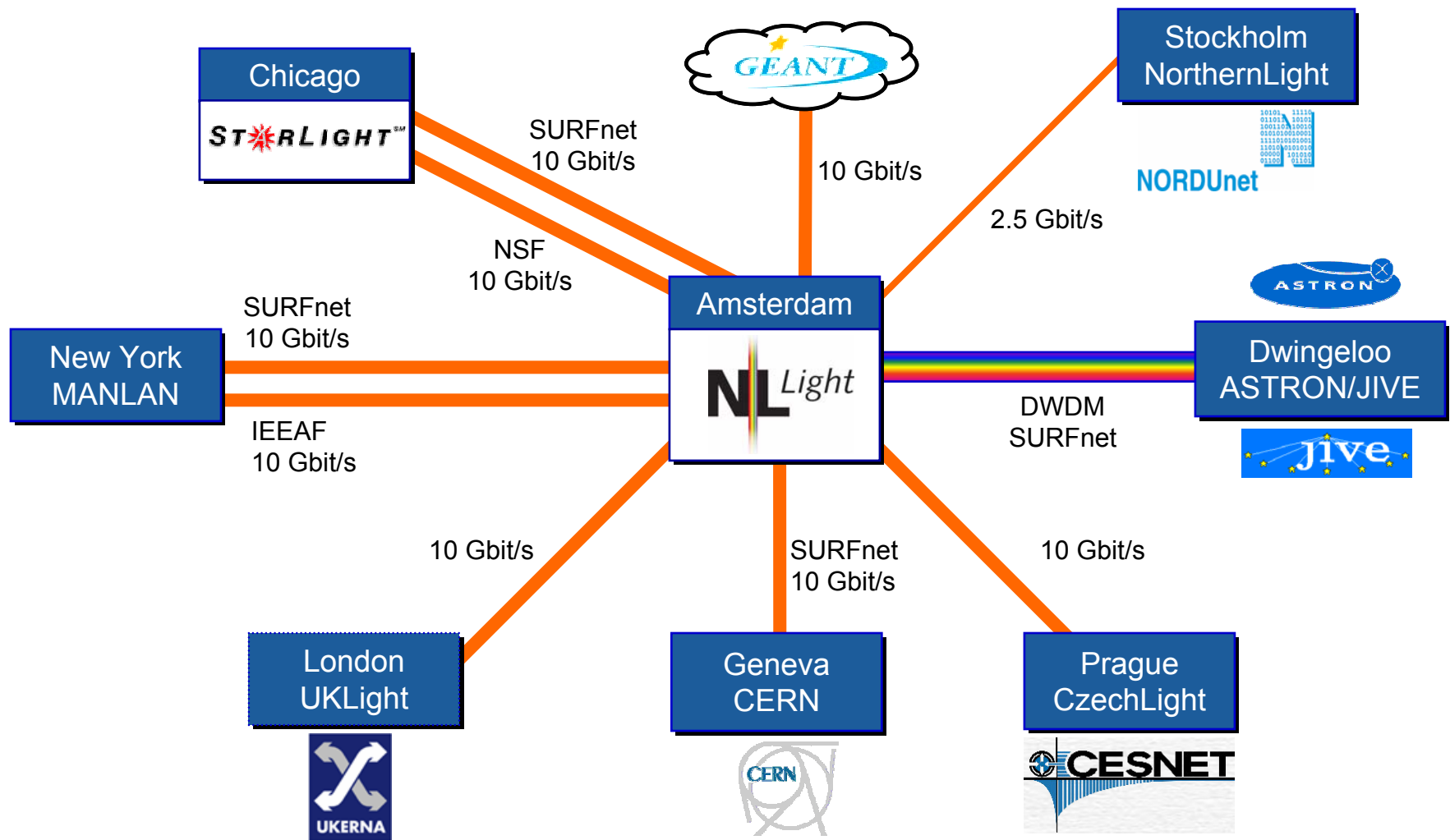


NetherLight: Open Optical Exchange



- **Open Optical Exchange in Amsterdam**
 - Operational since January 2002
 - Built and operated by SURFnet
 - **Nortel Networks HDXc at the centre**
 - **Full duplex 640G non-blocking cross-connect capability**
 - **GE grooming, GE switch for access to clusters**
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- **Experiments with light path provisioning in a multi-domain environment**

NetherLight 2004



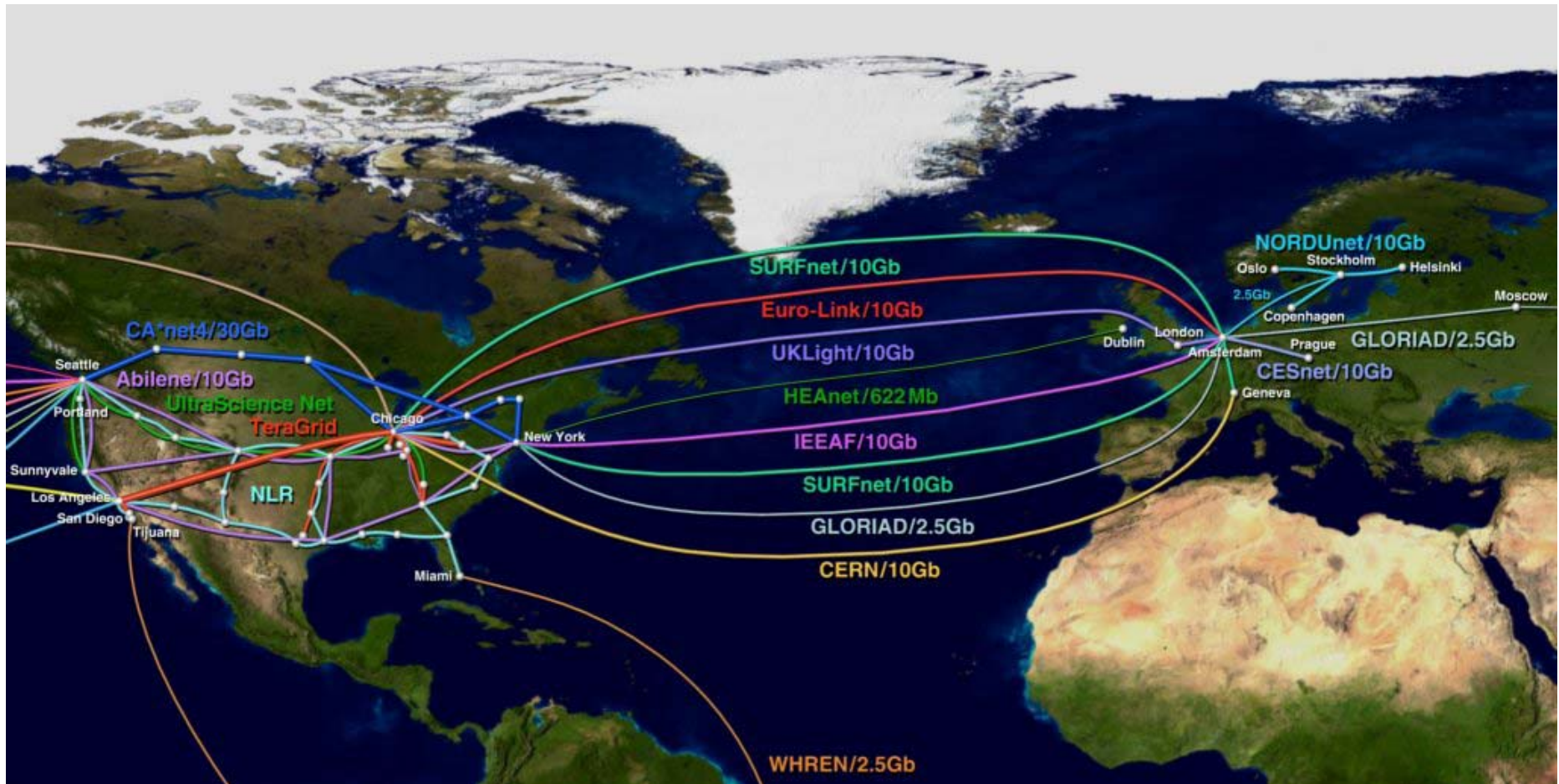
GLIF: Global Lambda Integrated Facility

- **Established at the 3rd LambdaGrid Workshop, August 2003 in Reykjavik, Iceland**
- **Collaborative initiative among worldwide NRENs, institutions and their users**
- **A world-scale Lambda-based Laboratory for application and middleware development**

GLIF vision:

To build a new grid-computing paradigm, in which the central architectural element is optical networks, not computers, to support this decade's most demanding e-science applications.

Global Lambda Integrated Facility 3Q2004



www.glif.is

Visualization courtesy of
Bob Patterson, NCSA.

Thank you

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<http://www.surfnet.nl/>

<http://www.gigaport.nl/>

<http://www.netherlight.net/>

<http://www.glif.is/>