

GLIF, the Global Lambda Integrated Facility



GLIF

Update

Kees Neggers
Managing Director SURFnet

iGRID2005
La Jolla, San Diego, CA, USA

Linking the World with Light

- Optical networks are the central architectural element in support of this decade's most demanding e-science applications
- Research has no geographical boundaries

2nd LamdaGrid workshop attendants at iGrid2002



What is GLIF

- **GLIF is an international virtual organization that promotes the paradigm of lambda networking**
- **GLIF is a collaborative initiative among worldwide NRENs, consortia and institutions working with lambdas**
- **GLIF is positioned on the demand side of the market**
- **GLIF is a world-scale Lambda based Laboratory to facilitate application and middleware development**
- **GLIF was established at the 3rd LambdaGrid Workshop in Reykjavik, Iceland, in August 2003.**

GLIF Founding Members



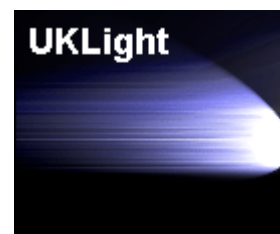
GLIF organization

- GLIF is an open community
- GLIF has participants, not members
- GLIF “glues” together the networks and resources of its participants
- GLIF will be managed as a cooperative activity
- GLIF participants agreed to operate under a “lightweight” governance structure
- TERENA to serve as the GLIF Secretariat

GLIF participants

- Participation in GLIF is open to any organization that
 - subscribes to the GLIF vision and
 - contributes to the GLIF activities
- 38 participants listed on the GLIF website

GLIF Participants



UNIVERSITEIT VAN AMSTERDAM

Send us your logos

Sponsors GLIF Secretariat



CANARIE



INTERNET[®]

JISC



SURFnet



UIC The University of Illinois
at Chicago



Thank you!

GLIF Goals

- **Jointly make lambdas available as an integrated global facility for use by scientists and projects**
- **Work together to develop, test and implement new lambda networking technologies, middleware and applications**
- **Exchange information to learn from each other's experiences**
- **Bring together leading networking engineers and users worldwide**

GLIF 2004 Annual Workshop in Nottingham



GLIF Nottingham Participants



GLIF Working Groups

- **Governance and Growth**
 - Chair Kees Neggers
- **Research and Applications**
 - Chair Peter Clarke
- **Technical Issues**
 - Co-chairs Erik-Jan Bos and Rene Hatem
- **Control Plane and Grid Integration Middleware**
 - Chair Gigi Karmous-Edwards

Governance and Growth Working Group

Role:

- Sets overall objectives and ways of working of the GLIF
- Formulates GLIF policies
- Defines rules concerning the participation in the GLIF
- Supervises the GLIF Secretariat, which has been outsourced to TERENA
- Secretarial support by Karel Vietsch

Technical Issues (Tech) Working Group

Role:

- Design and implement an international LambdaGrid
 - Identify which equipment is being used
 - Identify connection requirements
 - Identify functions and services to be provided.
-
- Secretarial support by Kevin Meynell

Control Plane and Grid Integration Middleware WG

Role:

- Agree on the interfaces and protocols that talk to each other on the control planes of the contributed Lambda resources.
- People working in this field already meet regularly in conjunction with other projects, notably the NSF-funded OptIPuter and MCNC Controlplane initiatives.
- Secretarial support by Licia Florio

Research and Applications (RAP) Working Group

Role:

- Identify applications that can benefit from LambdaGrids and define the services that the user communities need.
- Stimulate the use of the emerging LambdaGrid

GLIF activities

- GLIF will maintain a Repository of GLIF Resources
- GLIF will produce Best Current practice documents on
 - Interoperability and interconnectivity
 - GLIF Open Lightpath Exchange
- GLIF organizes Workgroup meetings
- GLIF holds a yearly Global LambdaGrid Workshop

2006 GLIF Workshop

- The 2006 GLIF Workshop will be in Tokyo, Japan on 11-14 September, hosted by NICT, the WIDE Project and JGN-II
- Local Organising Committee
Tomonori Aoyama and Jun Murai



Paradigm shift

In less than 4 years Hybrid Networking has moved from the pioneering phase into mainstream

- IP + lambdas
 - Packet switched internet for regular many-to-many usage
 - Lightpath for new high speed few-to-few usage
- GLIF Open Lightpath Exchanges

GLIF Open Lightpath Exchanges

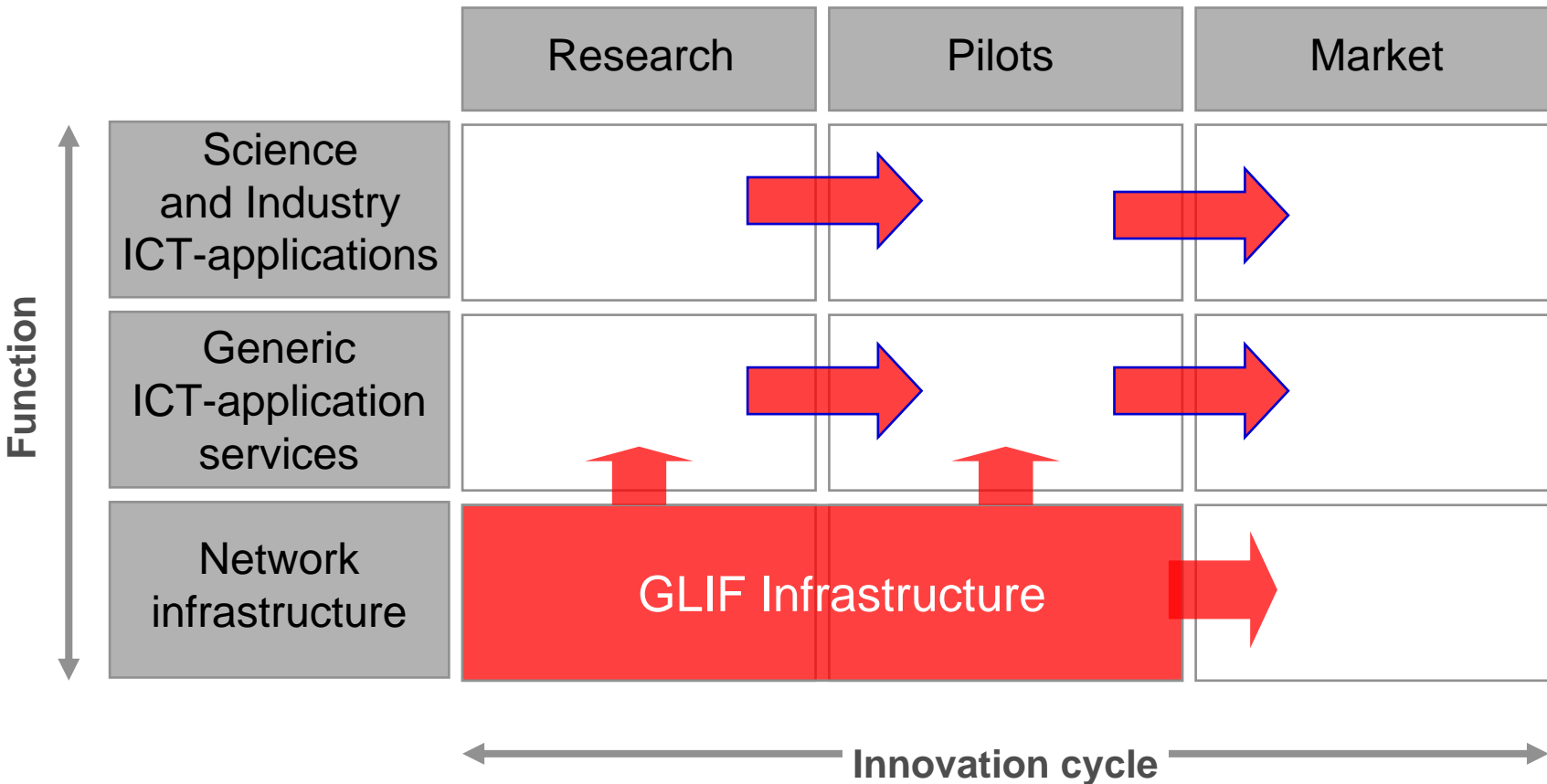
- GLIF infrastructure will be Multi-domain
- Like the Internet lambda networking will move from research to commercial networks

GLIF Open Lightpath Exchanges will be key for

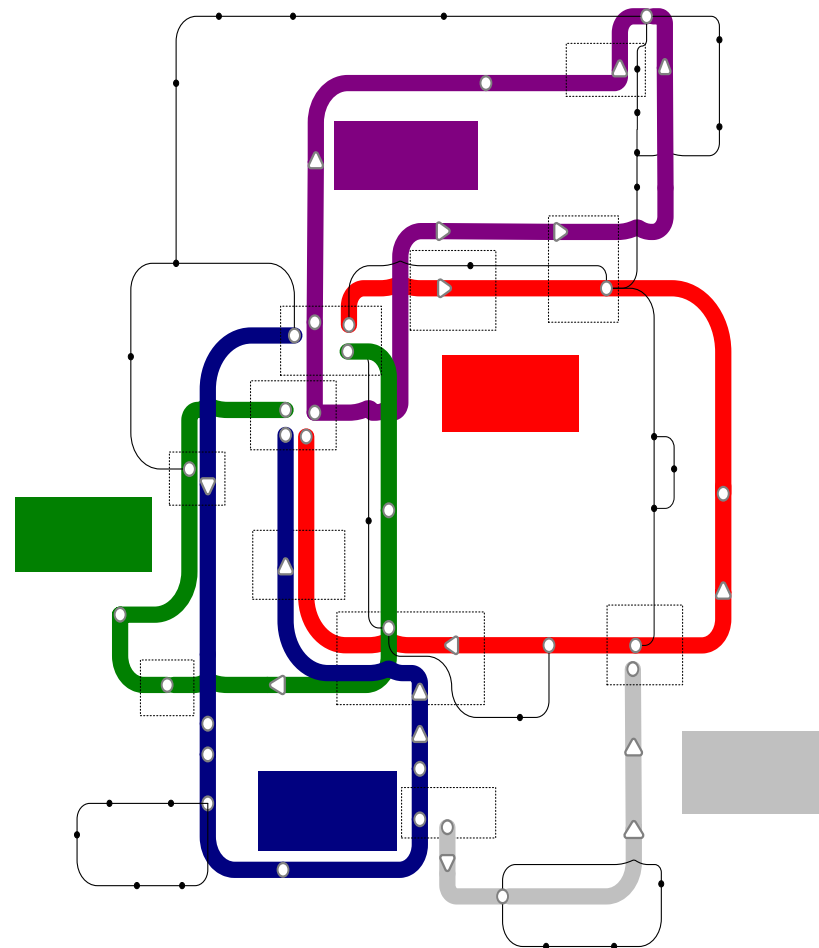
- the further evolution and scaling of the emerging GLIF infrastructure.
- the interworking with the commercial domain
- the smooth migration from the research area to the market

GLIF shift register

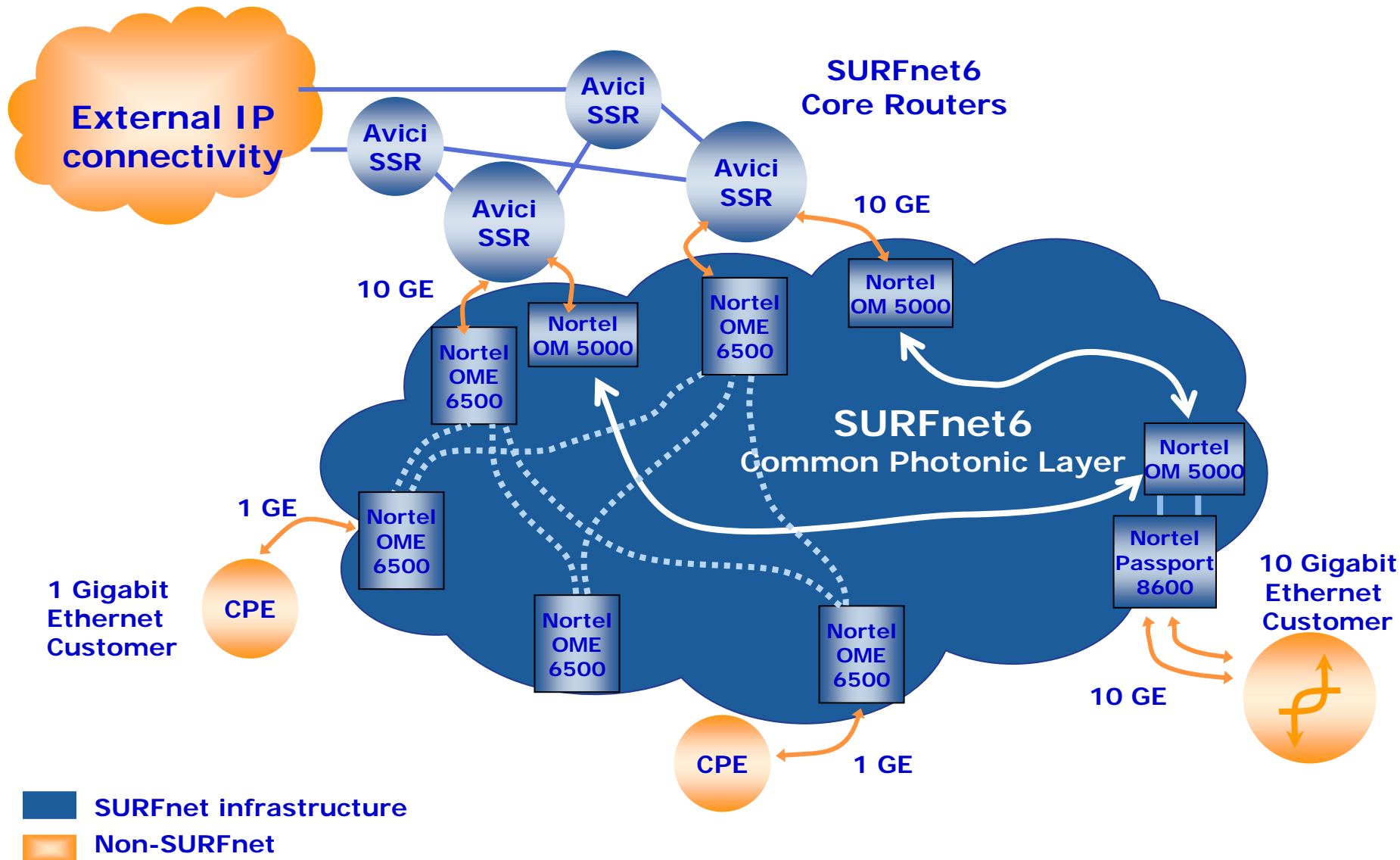
GLIF is a 'shift register' for innovative applications, using the LambdaGrid infrastructure



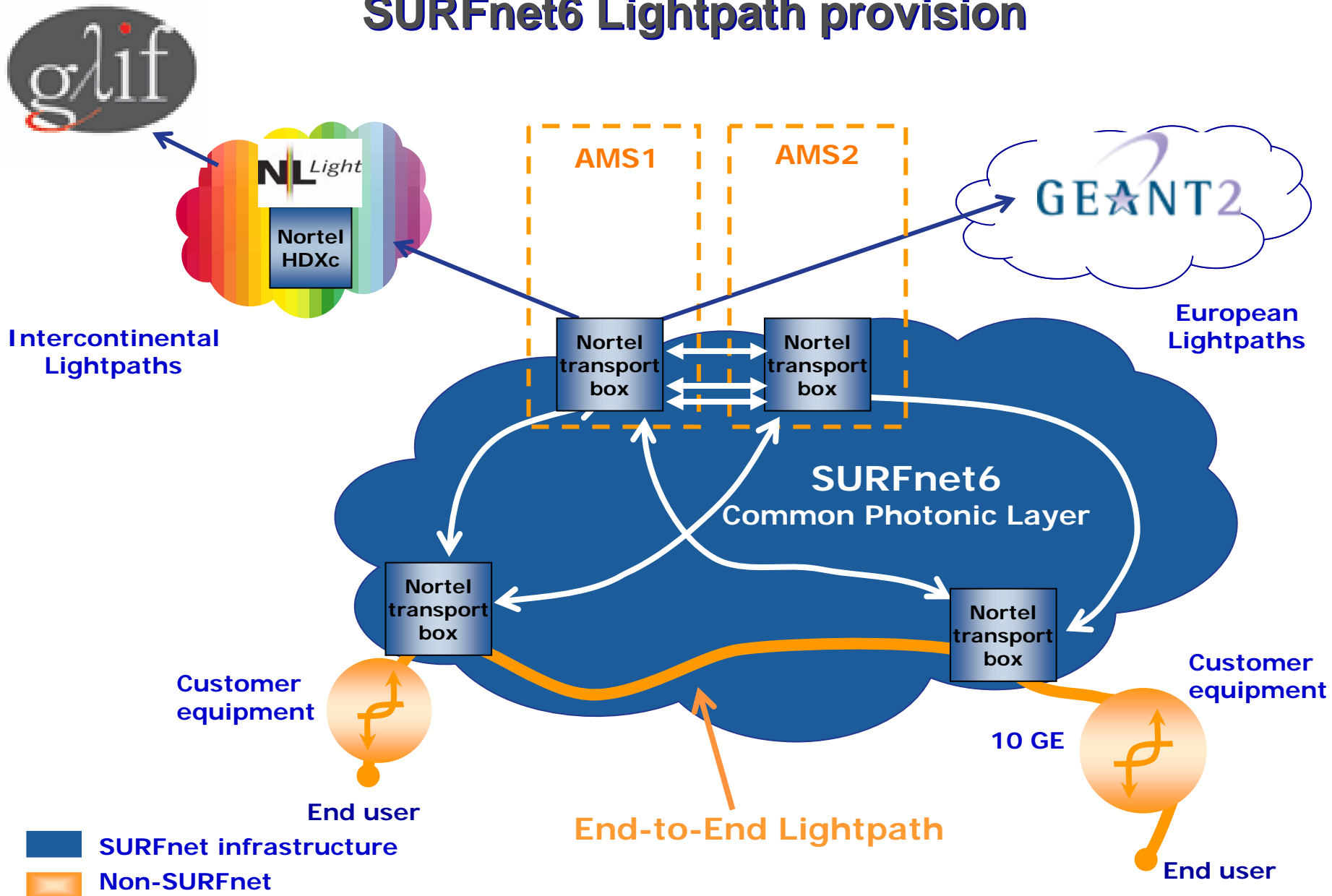
SURFnet6 on dark fiber



SURFnet6: IP network



SURFnet6 Lightpath provision

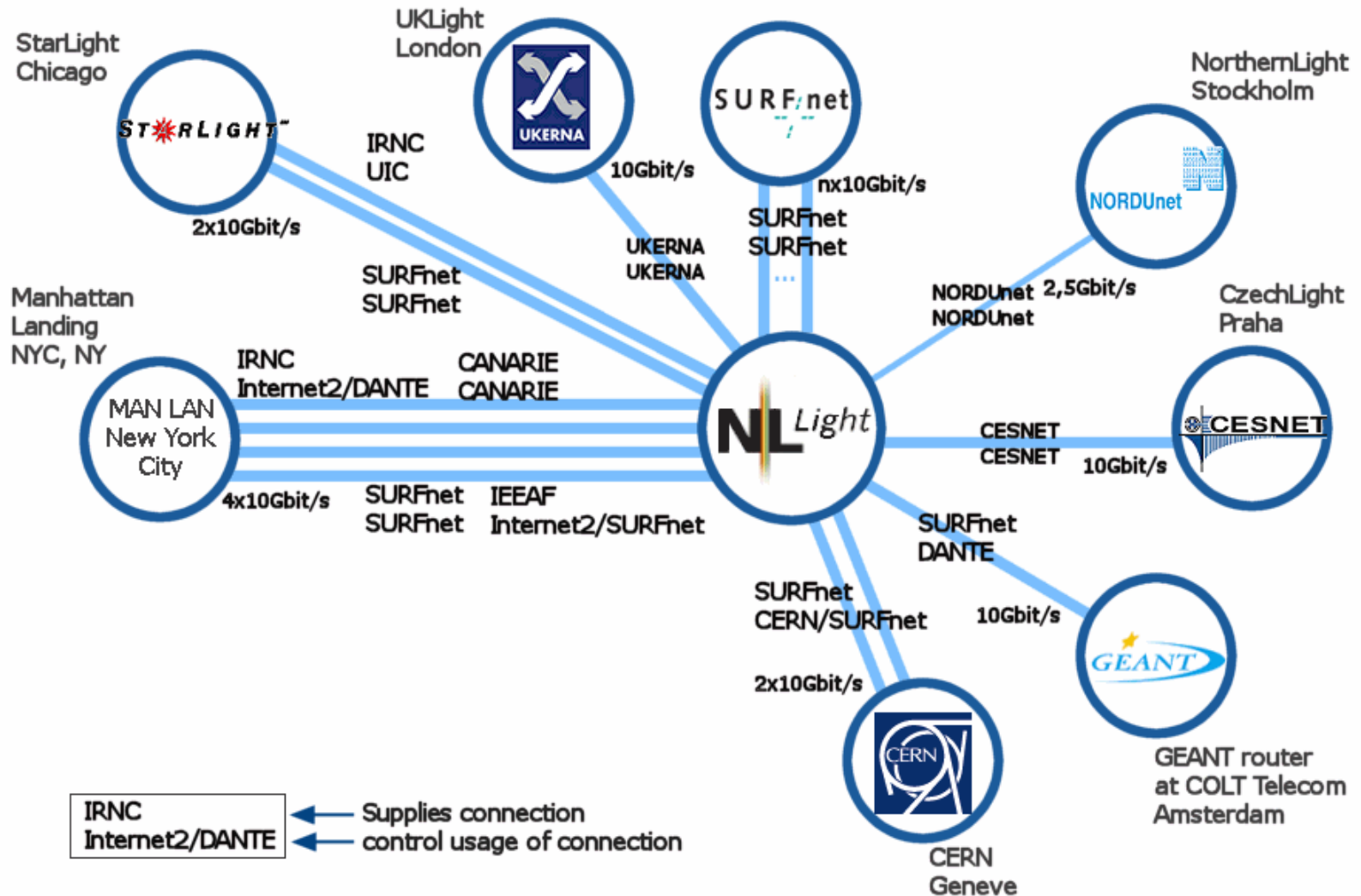


NetherLight: GLIF Open Lightpath Exchange



- **GLIF Open Lightpath Exchange in the Science Park Amsterdam**
 - Operational since January 2002
 - Built and operated by SURFnet
- **Nortel Networks HDXc at the centre with full duplex 640G non-blocking cross-connect capability**
- **Nortel OME6500 and Cisco15454 at the edge**

Lambda connections to NetherLight



3rd quarter 2005

GLIF Lightpath Exchanges

- NetherLight-Amsterdam
- CzechLight-Prague
- UKLight-London
- NorthernLight-Stockholm
- Barcelona
- StarLight-Chicago
- MAN LAN-New York
- PNWGP-Seattle
- Pacific Wave-Los Angeles
- Atlantic Wave-
NY/WashingtonDC/Atlanta/
Miami/Sao Paulo
- TLEX- Tokyo
- HKLight-Hong Kong
- DragonLight-HK/Beijing
- Sydney
- BLEX-Bangkok
- Singapore
- Korea

Connectivity challenge

- Reaching out to the users
- So far most researchers have to come to the emerging GLIF infrastructure
- Challenge is to bring GLIF to the desk top of the researchers and to their scientific instruments
- This means bringing dark fiber to remote instruments and hybrid networking functionality into the LANs at the campuses
- Best Current practice documents needed on interconnectivity and GLIF Open Lightpath Exchanges

Middleware challenge

- How do we glue things together?
- Users need ubiquitous end to end Lightpath connectivity over a multi-domain infrastructure
- Harmonize use of existing protocols
- Invent new protocols when needed
- Create user friendly AAA features
- Best Current practice documents needed on interoperability

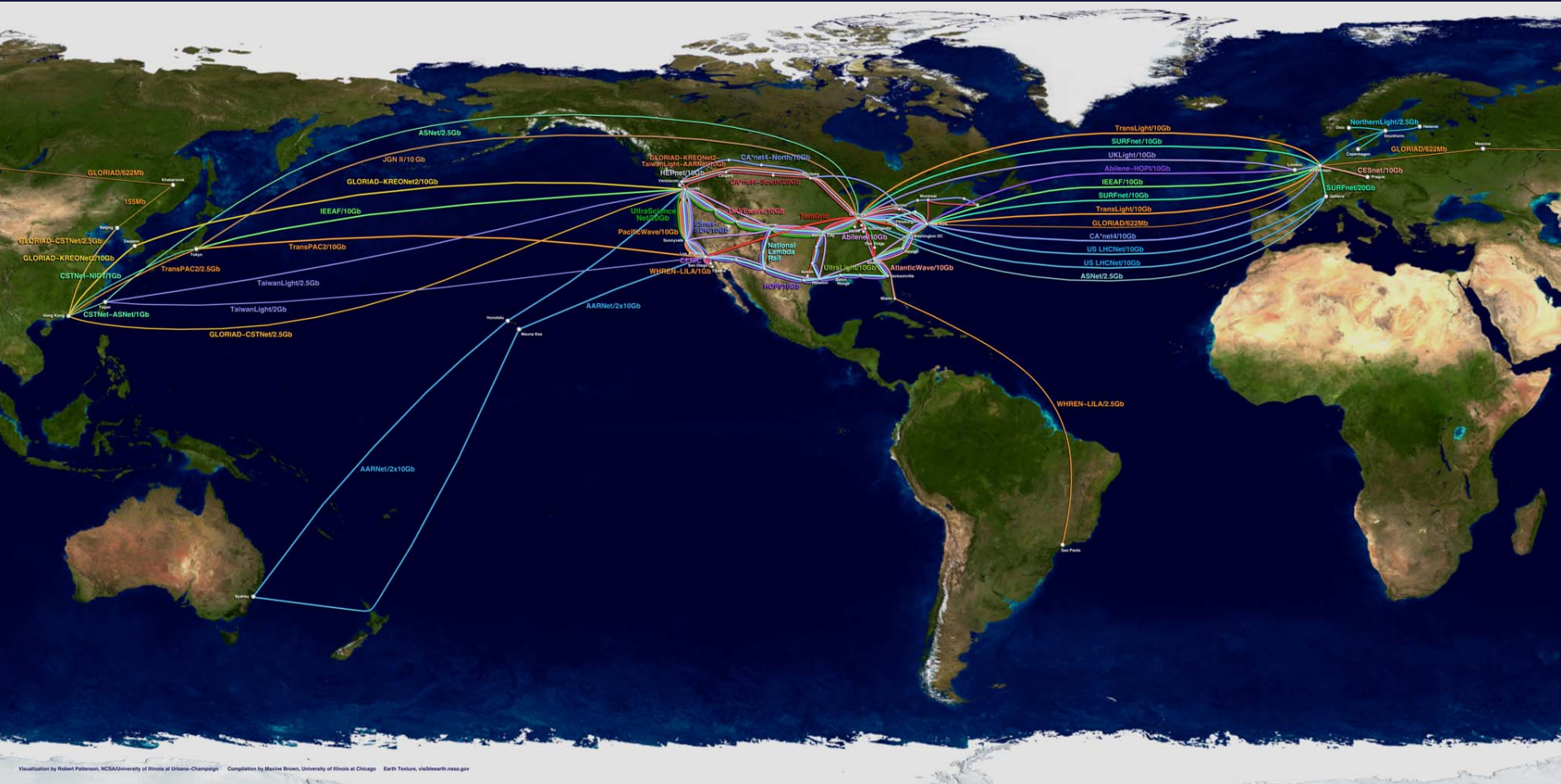
Application Challenge

- In the end its all about applications
- Stimulate the development of applications that explore the new hybrid functionality
- Work closely with the GLIF users on best practices to overcome the connectivity and middleware challenges
- Explain the opportunities to other researchers

Key Themes

- Access to Dark Fiber all the way to all institutes
- Economies of scale via hybrid approach
- Inter-domain issues
- Dynamic provisioning and user control
- Open Lightpath Exchanges
- Hybrid LANs on Campus
- Global Cooperation
- KISS

Thank You



GLIF, Linking the World with Light