

# GLIF

## End to end architecture

### Green paper

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# Green Paper

- EC uses the concept of a green paper: A green paper released by the European Commission is a discussion document intended to stimulate debate and launch a process of consultation, at European level, on a particular topic. A green paper usually presents a range of ideas and is meant to invite interested individuals or organizations to contribute views and information. It may be followed by a white paper, an official set of proposals that is used as a vehicle for their development into law.

# Context of Green Paper

- GLIF has been a huge success
  - Connects over 55 countries, thousands of universities and tens of thousands researchers and educators
- GLIF and GLORIAD only global organizations dedicated to deploy international infrastructure to support global big science and data and collaboration
- NSI is now in production
- GOLEs are now deployed across virtually all continents
- **What next?**

# End to end architecture

- As agreed upon at Rio and Chicago meetings
- Currently GLIF is a NREN to NREN construct. How do we truly develop an end to end architecture right to the application (or user)?
- Taking into consideration following developments:
  - User applications versus traffic engineering
  - SDN networks
  - Multi-domain issues

# What is GLIF role and next steps?

- What role should GLIF take to realize vision of end to end architecture
  - Set up working task force with contributions from participants?
  - Report on related work or activities by participants and how it relates to end to end architecture?
  - Coordinate work amongst participants?
  - Develop appropriate working groups within IETF or OGF, etc?
  - Wait and see?

Hand over to Erik-Jan

# User Profiles (2.1)

- Small and Medium Science Users (2.1.1)
  - Individual requirements → IP routed; campus and backbone level → BoD
- Big Science Users (2.1.2)
  - 10Gs and beyond, especially in need for performance tools
- Guinea Pig Users (2.1.3)
  - Users willing to suffer (a little) in return for advanced services

# Lightpath Applications for small and medium science (2.2)

- Global Tier 1 Peering Applications (2.2.1)
  - Bringing global peering to NRENs, increasing quality and lowering costs
- R&E Content Distribution Network (2.2.2)
  - Examples include LHCONE and CineGrid content distribution
- Cloud Applications (2.2.3)
  - Important for R&E, example AWS' 10G VPN service



# Lightpath applications

## Big Science (2.2)

- Big Data Applications (2.2.4)
  - The usual suspects, new developments like ScienceDMZ
- Large Sensor Applications (2.2.5)
  - Using predefined topologies for big data streams, e.g. SKA or LOFAR
- Low carbon emission apps (2.2.7)
  - Bring computing and storage resource in a “green” way, e.g. GreenQloud

# Lightpath Applications - Guinea Pig

- Experimental Testbeds (2.2.8)
  - Supplying bandwidth to testbeds, e.g. for GENI
- Private Lightpath or SDN networks across Multi-domain optical networks (2.2.9)
  - Optical Private Networks (in every form or shape)

Hand over to Inder

# Discussion and Next Steps

What are people interested in that they can bring together under the GLIF umbrella?

- Four possible cases based on use cases
- Maybe more or less

# Discussion and Next Steps

Developing Bandwidth on Demand and Traffic Engineering toolsets that use both NSI and SDN but interoperate with (G)MPLS-TE?

- Use case: Provide the GLIF lightpath circuit with new set of network technologies, hopefully moves it end-to-end
- An architecture white paper that includes all protocols

# Discussion and Next Steps

Integrating lambda and SDN networking within applications that are routable, discoverable and scalable at Internet layer 3 and layer 2

- Use case: IP networking works over legacy and with SDN domains
- OpenFlow testbeds –
- International ones

# Discussion and Next Steps

Developing inter-domain and multi-domain SDN for both the forwarding, control and management planes.

- No discussion
  - SDN inter-domain WG

# Discussion and Next Steps

Content, Storage and its intersection with Networking

- Use-case: R&E CDNs



Thank you.

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