Delivery of Network Services Across Heterogeneous Optical Domains

Announcing a joint effort between GLIF and OGF ghpn

http://www.glif.is/working-groups/controlplane/

&

http://www.ogf.org/gf/group_info/view.php?group=ghpn-rg

Agenda

- Introduction- Aims of the BOF (D. Simeonidou, Cees de Laat)

- Statements of associated research projects (PHOSPHORUS, ENLIGHTENED, GLambda, StarPlane)

- Open discussion

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GHPN RG Mission

- Chair: Dimitra Simeonidou

- The Grid High-Performance Networking Research Group focuses on the relationship between network research and Grid applications and infrastructure development

- Two specific goals of the GHPN-RG are identifying:
  - a) Grid application requirements and implementations that are not supported or understood by the networking community
  - b) Advanced networking features that are not being utilized by grid applications

- The GHPN-RG communicates the results of its work through the periodic release of informational documents

GLIF Control Plane Group

- Chair: Gigi Karmous-Edwards (MCNC), Secretary: Licia Florio (Terena)

- The goal of this working group is to agree on the interfaces and protocols that talk to each other on the control planes and the Grid middleware of the contributed Lambda resources

- The community identified several key areas we need to focus on:
  - Define and understand real operational scenarios
  - Define a set of basic network services
  - Interdomain exchange of information: < http://www.glif.is/working-groups/controlplane/interdomain.html>
  - Grid community: < http://www.glif.is/working-groups/controlplane/liaise.html>
    - Define a Grid control plane architecture
    - Work closely with E-science applications to provide vertical integration
    - Contribute to standardization of interfaces and protocols

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Common Ground

- Advanced networking features for grid applications

- Define basic network services

- Network integration with grid and eScience applications

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Complementarities and Benefits

- Established discussion forum (GLIF & GHPN)

- A structured documentation process (OGF)

- Infrastructure (GLIF)
  - Implementation and operational experience

- User communities (GLIF, OGF)

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Rationale behind this BOF

- A strategic alliance between the two international groups: GLIF control plane and OGF ghpn

- Focus:
  - End-to-end on-demand scheduling of optical network resources for high-end grid applications
  - Still many outstanding issues: technical, organizational and policy based

- Why Now?
  - A number of funded research projects to contribute experience and effort
  - Initiatives planning the next generation of research infrastructures
  - Wide consensus from the community that we need to change the way we design and deploy networks
  - Standardisation efforts in parallel with OGF

Basis for the proposed liaison

- Collect and analyze existing experience on delivering network services across heterogeneous optical domains
  - Establish strategic relationships with relevant projects and initiatives:
    - Research projects (i.e. Enlightened-US, PHOSPHORUS-EU, G-Lambda-Jp, Starplane, GEANT2, UCLPV2, Optiputer, Viola, ePhoton/ONE+ WP-JP-G, COST 291, NOBEL2)
    - Initiatives (i.e. EARNEST-EU)
  - Critical appraisal of operational and research experience
  - Technology benchmarking
  - Deployment roadmaps
- Contribute towards the ghpn standardisation effort
  - Focused documents defining network interfaces among multiple network and Grid layer

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The ENLIGHTENED project-US

- To design and develop a Grid framework that allows applications to dynamically request computing and storage resources along with the necessary dedicated high-bandwidth, and secure network connections

- Develop algorithms, protocols, and software tools that enable fast network reconfiguration and on-demand intelligent provisioning of lightpaths for easy application level access

- Develop Grid middleware that views the network as a Grid resource at the same level as the compute and storage resources

- Determine how to abstract the network resources and how to distribute the network intelligence among the network control plane, management plane, and the Grid middleware

www.enlightenedcomputing.org

www.ogf.org

The PHOSPHORUS PROJECT-EU

- A European and Global alliance of 21 partners to develop advanced solutions of application-level middleware and underlying management and control plane technologies

- Project Mission and Vision:
  - The project will address some of the key technical challenges in enabling network services
    - On-demand
    - End-to-end
    - Across multiple heterogeneous domains
  - In the PHOSPHORUS implementation the underlying network will be treated as first class Grid resource (G^2MPLS)

www.ist-phosphorus.eu

www.ogf.org

The G-lambda Project-JP

- A joint project of KDDI R&D labs., NTT, NICT and AIST (Telcos and national labs collaboration)

- Objective is to establish a standard web services interface (Grid Network Service / Web Services Interface: GNS-WSI) through which bandwidth can be reserved in advance

- Successfully conducted experiments:
  - Advance reservation of computing and bandwidth resources in single domain using resources in Japan (iGrid2005 & SC|05)
  - Advance reservation of multi-domain resources in US and Japan, in cooperation with Enlightened computing project (GLIF2006 & SC06)
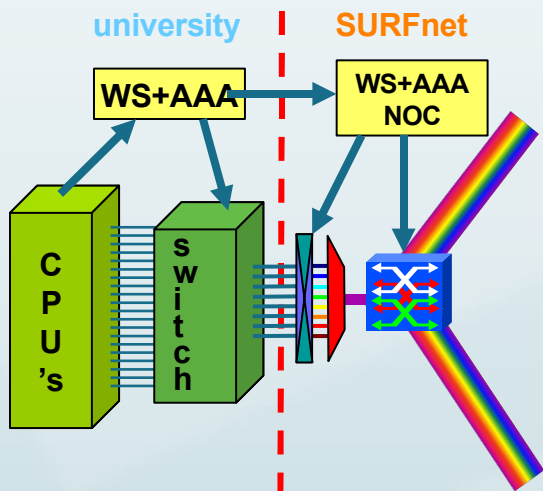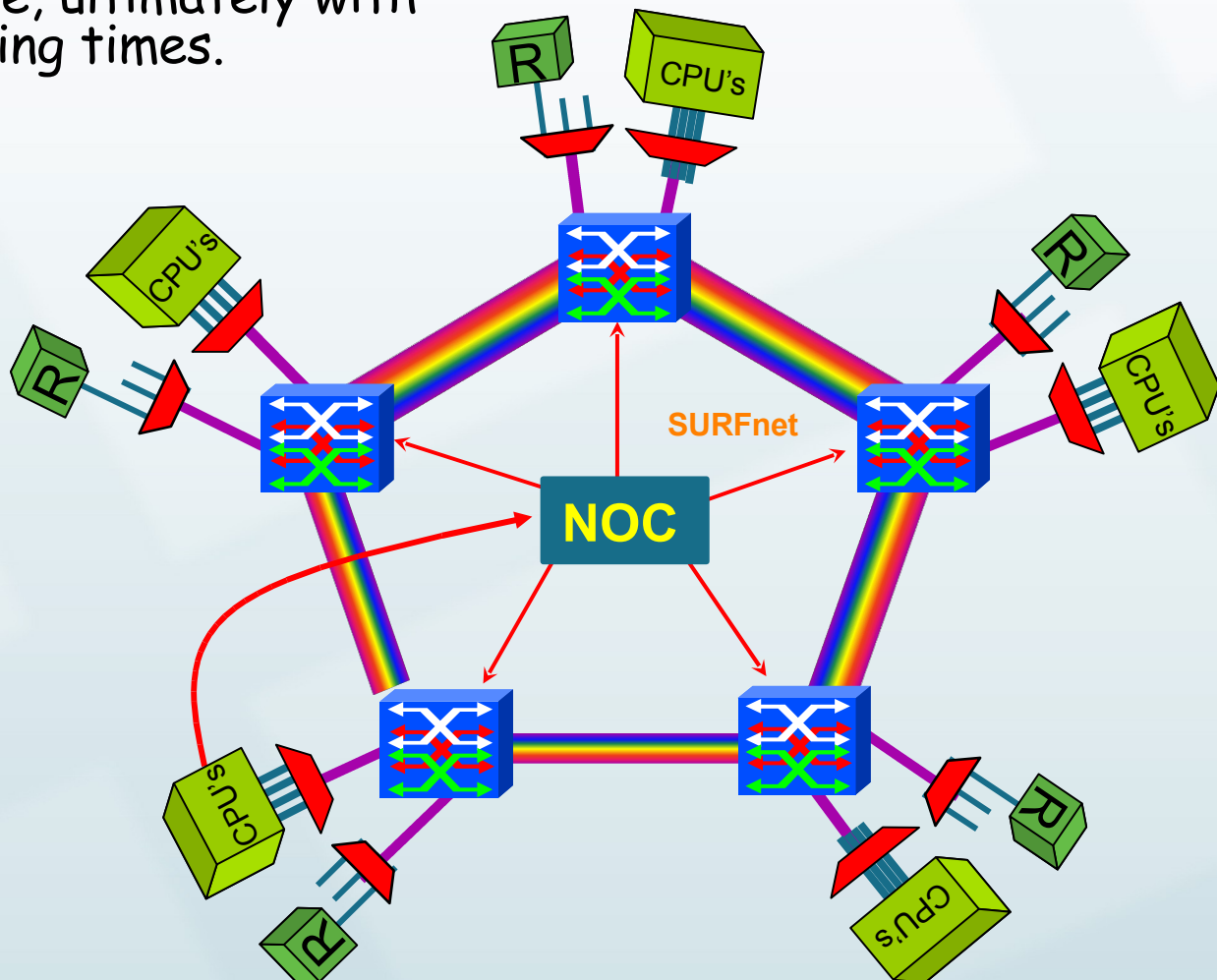
- AIST booth #325

www.g-lambda.net

www.ogf.org

The StarPlane Project

The novelty: to give flexibility directly to the applications by allowing them to choose the logical topology in real time, ultimately with sub-second lambda switching times.

CdL

Network Researchers

- Optical Networking Community in Europe:
  - ePhoton/ONE+:
    - Aims at integrating and focusing the rich know-how available in Europe on optical communication and networks. The project works towards reaching consensus on deployment of optical technologies as the foundation for the future Internet, http://www.e-photon-one.org

  - Cost 291:
  - Focus on novel network concepts and architectures exploiting the features and properties of photonic technologies, to enable future telecommunications networks (http://www.ait.gr/research/cost291.asp)

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Focus for this BOF

- To increase community awareness and engagement to this common GHPN/OGF and GLIF research and development agenda

- To widen participation and accelerate problem solving in delivering network services to scientific community in a global scale

- To facilitate the interaction between the research networking community and network researchers in order to identify new and/or disruptive networking technologies, architectures and protocols to address the increased scale and complexity of the Future Research Networks

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Expected Results

- High level vision document capturing experience and forecasts of research network operators and network researchers
  - Consider technology options, including new and disruptive technologies that could influence the implementation of future service oriented network architectures and deployment of advanced network services
- Expected contribution to standards
- Architectures and visions in ghpn
- Spin off when necessary WGs e.g.
  - Net measurements
  - Distributed information model about network topologies and policies

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