Global Lambda Integrated Facility – Joint Technical and Control Working Groups Meeting
17 – 18 September 2007
Prague, Czech Republic

Enlighten Your Research - A contest for scientists using lightpaths; Erik-Jan Bos (SURFnet)

Erik-Jan noted most scientific users were not aware of the possibility to use lightpaths. SURFnet, in cooperation with NWO, the Dutch National Science Foundation, organised a competition for research projects that proposed to use lighpaths. The information about the competition was broadcasted to the scientific community through the established NWO channels, in addition to the standard SURFnet channels. A total of 18 interesting proposals were received and analysed by a jury consisting of SURFnet and NOW people. Five prizes, consisting of the use of lightpaths between 2 or 3 locations and 20,000 Euro funding in order to help integrating the lightpaths into the applications were awarded. Erik-Jan mentioned that SURFnet was happy to receive so many good proposals, from the various disciplines such as the medical science, weather forecasting, social sciences, and cultural such as CineGrid.

SURFnet experience has proven to be good. NRENs might consider having similar approach in their countries.

Emulation of GMPLS Using Virtual Network Experiments & DRAGON; Jeroen van der Ham (UvA), Chris Tracy (MaxGigaPop)

Jeroen presented a virtual network simulation environment based on user mode Linux virtual machines. An XML-based description of the network topology was used for configuring virtual machines corresponding to each network element. Using a scripted example, Jeroen demonstrated how the GMPLS implementation of the DRAGON control plane could be configured using terminals on the virtual machines. The example topology featured two routers, two end nodes and network provisioning element. Future directions of development included adding emulation for the data plane, a translator for OSPF(TE) configuration to NDL and multi-layer NDL as well as pathfinding.

DICE Interdomain Control Plane – John Vollbrecht (Internet2)

The initial development of the DICE inter-domain control plane was done collaboratively by GÉANT2, Internet2 and ESnet. The meetings of the DICE control plane working group led to the development of common schemas for exchanging information and common topology work for the perfSONAR framework. The inter-domain functionality was provided by an Inter-Domain Controller (IDC) entity. Federations of networks may be created by IDCs and supported by IDC-to-IDC communications. Eventually, IDCs may be made to interoperate with GOLEs and Grids. The IDC-to-IDC interface allowed a domain to advertise an abstracted topology, as well as accept, process and forward upstream reservation requests. Inside a given domain, the IDC would be in charge of routing and path computation, resource reservation and signalling. The initial implementation was based on web services authentication. However, this was only done between neighbouring domains – there was no end-to-end authentication. Improving several facets of the authentication processes, as well as integration with Grids and implications of using exchange point protocols are part of the future directions of development. John announced that a demo for dynamic circuit infrastructure provisioning using the DICE control plane was scheduled for SC'07.

Possible Action: Is it worth for the GLIF community to look at the DICE schema?

TL1 Toolkit – Ronald van der Pol (SARA)

Transaction Language 1 (TL1) was developed by Telcordia Technologies as a management language for telecommunications equipment. Although widely used, the language makes it difficult for the human operator to get the syntax right and to read the results returned after the execution of the command. The Network Management System (NMS) usually hides the TL1 syntax from the user, but this comes at the price of being unable to use scripting and limiting the number of commands available trough the NMS interface. The TL1 Toolkit was developed at SARA with funding from the GigaPort Project and SURFnet. It is written in Perl and supported certain types of equipment manufactured by Nortel, Cisco and ADVA. The section trace information read by the TL1 Toolkit may be exported in NDL format in order to be used for automated lightpath planning. Ronald announced that the TL1 Toolkit was available on the SARA website at http://nrg.sara.nl under an Apache 2.0 license.

In response to a question, René Hatem mentioned that the TL1 Toolkit complements UCLP and is an important foundation for the creation of performance monitoring tools for SONET/SDH based lightpaths.

AARNet's EN4R Programme – Alex Reid (AARnet)

Alex started his presentation by outlining AARNet's network footprint that covered an area approximately of the size of Europe. Multiple high-speed links were available for international connectivity to the US, Asia and Europe. The domestic network was built using two parallel 10Gbps circuits on all paths. One of these circuits was carved in 9 x 1 Gbps sub-circuits. On one of the trans-Pacific circuit connecting AARNet to NLR, two 1 Gbps lightpaths could be made available for activities within the GLIF framework and the EN4R programme. The Experimental Networks for Researchers (EN4R) programme was thought as a “try before you buy” initiative to provide dedicated 1 Gbps circuits between two geographically disparate locations. Until now, AARNet supported eResearch projects through temporary lightpaths dedicated to experiments like eVLBI and EXPReS, and high-bandwidth IP connectivity for the LHC (for example). The goal of the EN4R programme was to encourage researchers to think about using such high-speed circuits in production. Prospective proposals had to apply for the lightpath use to AARNet. The applications would be assessed by a panel of independent experts. Lightpaths could be made available free of charge for up to six months to the projects that won the competition. The plan called for reduced fees to be applied for another six months afterwards. Following this, standard prices would be charged for the circuit used in production. One of the conditions of participation was that the traffic on the lightpath would be exclusively reserved for research and one of the end-points would be an AARNet-connected institution. Contractual requirements would be minimised. Certain types of equipment (such as GBICs) could be made available on loan free of charge for the duration of the EN4R contract. Also, AARNet offered technical support for tuning the performance of the data transfers. In addition to the fibre-only EN4R conenctivity available only where spare fibres could be obtained, the AARNet3 Multiservice Platform allowed for 1 Gbps circuits based on VPLS technology to be provisioned throughout the entire footprint of the network.

Interdomain monitoring requirements – Ronald van der Pol (SARA)

Ronald noted that interdomain monitoring issues were on the agenda for the last two Tech Working Group meetings. Software available on the GLIF participants consisted mainly of the TL1 Toolkit and perfSONAR. The requirements for such software covered a diversity of areas, including end-to-end topology information that could be auto-detected from the network, ease of setup and

maintenance and good visualisation capabilities. Alarm information would need to be provided. Support for protected lightpaths, Ethernet VLAN-based circuits and the integration of timeslots for dynamic lightpaths were considered to be more advanced features. A key feature for interdomain monitoring was related to a distributed setup where information about particular domains was made available through web services such that each site could collect all the information or just partial information of special relevance.

Multi-layer network descriptions – Freek Dijkstra (University van Amsterdam)

Freek started by presenting a hypothetical example of multi-layer path finding in a network topology similar to a particular GLIF application scenario from around 2004. Due to the particular network characteristics, the Layer 2 end-to-end path from the example contained a loop when viewed at Layer 1. This example illustrated the need to create a computer-readable network description providing enough information to allow for automated path finding at different layers of the network. For this, a model of the network would have to be expressed in a machine-readable syntax that could be interpreted by software to carry on the actual path finding process. Network elements were mapped for functional (in the G.805 sense) elements. Later on, these graphical symbols and the relationships between them could be expressed in a language such as NDL. The Resource Description Framework (RDF) could be used for the technology descriptions. Four basic schemas (for network topology, layer specification, device capabilities and configuration), together with six layer-specific schemas were developed. The software to make use of these schemas for path walking (finding existing connections) and path finding (finding best or new connections) was made available under a BSD licence. Freek ended his presentation by presenting another hypothetical example of path finding, this time between University of Chicago and The Charles University in Prague.

ACTION: how could the GLIF community make use of what was presented by Freek ?

Preliminary Findings of the EARNEST Technical study – Catalin Meirosu (TERENA)

EARNEST was a Foresight Study into the issues of Research and Education networking in Europe, to take part between March 2006 and October 2007, funded within the framework of the GEANT2 project. The presentation focused on the preliminary findings of the sub-study on technical issues, one of the seven sub-studies carried through the EARNEST framework. Interviews with vendors and experts in the field concluded that within 3-5 years, the core network were expected to become more agile due to the introduction of multi-degree ROADM equipment and widespread use of tunable lasers, electronic dispersion compensation and OEO conversion based on photonic integrated circuits. The study found no obvious path for SONET/SDH beyond 40 Gbps, and considered this legacy technology to be replaced by OTN deployments. Higher speeds (up to 100 Gbps) and carrier-grade operations, administration and management features together with solutions for the current scalability problems would make Ethernet a true carrier-grade solution. Network virtualisation techniques started to be applied at lower layers of the network, but were expected to become more widespread during the forecast interval of the study. Projects such as GENI (in the US) and FEDERICA (in Europe) were just a few examples of the work already started in this direction. In terms of operational findings, one of the recommendations of the study was to extend the scope of PERT teams and perhaps integrate them with the NOC. The findings in the middleware area confirmed the role of identity federations as the solution for supporting user access to remote services. The NRENs were considered the ideal candidates for supporting and representing the national federations in the academic and research environments. Schemas such as eduPerson and SCHAC were found to be evermore important for interoperability between federations.

The final results of the study will be made available on the EARNEST website at http://www.terena.org/activities/earnest/index.html approximately by the end of 2007.