

**GLIF North America (GLIF-NA) Community Meeting**  
**Thursday, October 29, 2009 (12:00-4:00 pm)**  
**KISTI, Daejeon, Korea**

**Meeting Minutes**  
**DRAFT August 15, 2010**

**Attendance:**

Artur Barczyk (CERN/CalTech), Eric Bernier (CANARIE), Erik-Jan Bos (SURFnet), Eric Boyd (Internet2), Natalia Bulashova (RIPN), Evangelos Chaniotakis (ESnet), Greg Cole (GLORIAD), Steve Cotter (ESnet), Tom DeFanti (StarLight), Dale Finkelson (Internet2), Lars Fischer, (NORDUnet), Laurin Herr (CineGrid), Ron Johnson (Univ of Washington/Pacific Wave), Joe Mambretti (StarLight), Kees Neggers (SURFnet), Mark Prior (Juniper), David Reese (CENIC/Pacific Wave), Michael Stanton (RNP), Thomas Tam (CANARIE), Rod Wilson (Nortel).

**A. Lunch Provided**

**B. Meeting Objectives**

- a. Brief overview  
The goals and objectives for the meeting were stated: to enhance communication and coordination among North American GLIF participants and their key partners; to review emerging and anticipated requirements; to identify new technologies and opportunities for additional collaboration; and, to highlight any other major issues that are important to this community. A major goal for this meeting is to have participants identify key topics, but not try to discuss them at length or to resolve any issues (given the limited time of the meeting). This was the third meeting of the GLIF-NA community. The first was held at the GLIF 2007 Workshop in Prague, and the second at the GLIF 2008 Workshop in Seattle.
- b. Agenda review  
There were no changes suggested for the agenda topics.
- c. Key topics/conclusions from the prior GLIF-NA meeting in Seattle  
Key conclusions of the previous GLIF-NA meeting were reviewed. The minutes for that meeting have been distributed and posted on the GLIF web site.

**C. Major Trends In North American International Connection Requirements and Communities Served**

- a. Projections for 2010-2015 were identified:
  1. The need for significant additional capacity, especially for global data-intensive science projects, although all areas of R&E networking, not just capacity, are experiencing major growth. The cost imbalance for capacity among regions in the world was noted, with some imbalances being fairly large.
  2. The need for more flexibility in networking, including dynamic provisioning and inter-domain multi-layer provisioning. Capacity alone is not sufficient to meet community requirements. Greater flexibility is required to match resources with specific application and service requirements. In part, this means that multi-layer, multi-domain services are required in all regions – not merely one standard homogenous service across minimal domains.
  3. The expansion of capabilities at North American facilities to enable advanced R&E network services to be provided to more regions in the world.
- b. Areas of major potential new opportunity were identified:
  1. New science projects provide new areas of opportunity. Increasing collaborative data-intensive science requires advanced network services.

2. New technologies provide opportunities for improving services, services support, and network operations.
  3. GreenIT may be an area of opportunity, especially given the power efficiencies of lightpaths.
  4. 100 Gbps technologies may be an area of major opportunity, although the significant challenge of 100 Gbps for trans-oceanic services is recognized.
  5. There is potential for this community to participate in international consortia that are constructing trans-oceanic fiber builds, another area recognized as especially challenging.
  6. Research programs encouraging experimental resources, such as GENI and FIRE, provide opportunities to support the research community and to bring new concepts, architecture, and technologies to wider communities.
- c. Potential options for addressing requirements
    1. Many key requirement areas are being addressed by the GLIF Technical Issues Working Group and by cooperative processes established among GLIF GOLES.
    2. However, some areas constitute major challenges that are beyond the capability of standard procedures and processes.
    3. To address such challenges, additional initiatives are required.
  - d. Potential new cooperative processes to allow the community to benefit from these opportunities
    1. One approach to address exceptional challenges may be to select one or two key topics, e.g., 100 Gbps trans-oceanic services, and organize an effort to develop requirements, options, potential recommendations.

#### **D. Review of Key Initiatives and Major Emerging Challenges Related to North American R&E International Networking**

- a. US Federal agency programmatic support of international networking
  1. An overview was provided of current major US Federal programs, including the National Science Foundation's International Research Network Connections program (IRNC) and the DOE Office of Science's international networking efforts. The award recipients of the new NSF IRNC solicitation will be announced next year (2010).
  2. DOE's Office of Science funds the US LHCnet, which is now in production, and supports major data flows from the LHC to Tier 1 and Tier 2 sites in the US.
- b. Internet2 international networking perspective
  1. Internet2 provided an overview of its international networking activities.
  2. Internet2 emphasized its efforts to bring the concept of NRNs to those countries that have not yet established such R&E networks. Internet2 has had a number of successes in this area, and indicated that it would continue to pursue this initiative.
- c. National LambdaRail (NLR) international networking perspective
  1. NRL provided an overview of its international networking activities, which includes support for a trans-atlantic circuit between New York and the NetherLight exchange in Amsterdam.
- d. ESnet international networking
  1. ESnet continues to develop its new national fabric, including its multi-10 Gbps core Science Data Network (SDN).
  2. ESnet is developing an Advanced Networking Initiative (ANI), which will create a national 100 Gbps backbone.
- e. CANARIE international networking perspective
  1. CANARIE provided an overview of its international networking activities, which includes support for GLORIAD and for trans-atlantic paths, including one between New York and the NetherLight exchange in Amsterdam.
- f. Major emerging challenges for North American R&E international networking
  1. There is minimal support in the US to fund international networking. Total US funding is significantly less than external funding.

2. To some degree, the funding structure is also problematic, e.g., the majority of funding is for circuits vs operations.
- g. North American GLIF GOLE international networking perspective: MANLAN, StarLight, Pacific Wave, AMPATH, MAX
  1. All exchanges provided brief updates on their facilities. They are successfully providing services to their communities.

**E. Potential for Leveraging New International Trans-oceanic Fiber Builds**

- a. There was discussion of some of the requirements to become involved in trans-oceanic fiber builds, including logistics, financial models, organization, access, coordination with consortia, and related issues.
- b. The consensus was that this is a difficult challenge, but may be worthwhile to investigate further.

**F. Potential for a New Services Model across International Facilities, Especially for Large-scale Research Projects**

- a. GLIF has been successful in developing and implementing new services across multiple international domains; e.g., L1/L2 services. However, more work is required in this area.
- b. The GLIF Technical Issues Working Group continues to identify key issues and to make progress toward solutions *in this area*. It is a major focus of its bi-annual meetings.

**G. GLIF Dynamic Provisioning Architecture and Services**

- a. GLIF is making progress in developing a mechanism for a common API to dynamically provision services. Currently there is no common dynamic provisioning control framework among GLIF GOLEs; each has implemented its own approach. There will be no common control framework for the foreseeable future. Consequently, the GLIF Technical Issues Group is developing a mechanism (Fenius) that can be used as a common API to enable local access to lower-layer control framework services. Communities then can write applications incorporating calls to Fenius without having to know the details of lower-layer GLIF GOLE control frameworks. A Fenius prototype implementation was demonstrated at the GLIF workshop.
- b. Another dynamic provisioning capability demonstrated at the GLIF workshop was HPDMnet, which uses a control framework that could benefit from Fenius.

**H. Potential for a Distributed GLIF-NA GOLE NOC and Related Processes**

- a. The legacy model of centralized NOCs has limitations. New approaches related to distributed NOC services and technologies have the potential to benefit this community.

**I. Wrap-Up**

- a. Summary of identified key topics/issues/recommendations
  1. Key themes and concepts were summarized, especially requirements for increased international capacity and networking flexibility.
- b. Final items, plans for subsequent communications, schedule for next meeting, plans for distribution of minutes
  1. Plans will be made to organize a GLIF-NA meeting at the GLIF Workshop at CERN in 2010.