

GLIF Americas (GLIF-Am) Community Meeting 2011
Monday, September 12, 2011 (5:00 – 8:00 pm)
Rio De Janeiro, Brazil

DRAFT Minutes
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Attendees

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A. Meeting Objectives

Reviewed agenda/meeting objectives. Reviewed key topics/conclusions from the GLIF Americas 2010 meeting at CERN, Switzerland (see minutes of last year).

B. Major Trends In Americas International Connection Requirements and Communities Served

Projections for resources required *beyond* bandwidth. Increasingly, capacity is not the primary issue that needs to be addressed when meeting application requirements. Another important issue is the ability to dynamically program network resources; for example, using programmable networking techniques (such as SDN) to segment capacity and to provide customized services to different communities. “One size fits all” is an old, inadequate model that is being replaced by distributed processes. New innovative ideas are coming out of the U.S. Global Environment for

Network Innovations (GENI) initiative (funded by the National Science Foundation), European FIRE, Germany's G-Lab, and related Asian advanced networking research programs. As GLIF members, we want to quickly push emerging technologies and services to communities as soon as possible (new protocols, control frameworks, methods for programmable networks, techniques for controlling primitives provided by Openflow, IPv6, Green IT, etc).

Areas of major potential new opportunity. This community has always developed innovative ways of addressing new requirements. New requirements include different GOLE models and new ways of dealing with services, control frameworks, and underlying infrastructure, such as circuits. Other challenges/opportunities involve technical, financial, and operational issues, which require adjustments as new approaches are implemented.

C. **Key Initiatives Related to North and South American R&E International Networking**

IRNC GLORIAD – Greg Cole

[PPTs](#)

Infrastructure update: Korea-China-US circuit upgraded to 12.5Gb; China-US circuit upgraded to 10Gb. US-Russia circuit upgraded to 1Gb. New US-Nordic 10Gb link added to IceLink. First Egypt-Africa-Amsterdam-US R&E network to be operational Sept 20, 2011. A new circuit from Bangalore-Singapore-HongKong-Seattle is awaiting a local connection in Bangalore. GLORIAD-Africa is an Egypt-US project recently funded (began 9/1/11 for \$7.5M for 5 years).

Network services: Finished “nprobe” measurement device. Now have a GLORIAD weather map.

IRNC AmLight – Julio Ibarra

[PPTs](#)

Infrastructure: AmLight East (20Gb Miami-Sao Paulo); AmLight West (2Gb Tijuana-Los Angeles; increasing to 12Gb); AmLight Andes (1Gb Sao Paulo-Santiago); AmLight Central (1Gb Mexico City-San Antonio).

Hybrid network services: OSCARS IDC implemented at AMPATH. Collaborating with DYNES and DyGIR projects, RNP, FLR and I2. Dynamic circuit provisioning established between RNP, AMPATH. See PPT presentation for other efforts.

AMPATH/AmLight is currently evaluating OpenFlow because of the communities in the US and South America that it works with. GLIF would be a great fabric to stand up an OpenFlow network; might be an interesting project for the next few years.

Bill St. Arnaud suggests that we keep this discussion above the level of OpenFlow and talk about higher-level service-based processes or software-defined services. Many companies, including Google, are working on OpenFlow and exploring Software Defined Networking concepts. Our specialty will not be in developing OpenFlow, but using it in innovative ways.

IRNC TransLight/PacificWave – Dave Reese

New connections are UHawaii ARI 2x10Gb coming into Seattle and Los Angeles. Still have 20Gb capacity on the PacificWave backbone. Have integrated PacificWave with western region partners (Hawaii Colorado, New Mexico). PacificWave is working to expand west coast fiber to 100Gb (Los Angeles to Seattle).

IRNC TransPAC3 and ACE – Jacqueline Brown

TransPAC3 received an additional NSF grant for a circuit from Beijing to Los Angeles, which it hopes to have available by the end of year. ACE is making connections from New York and DC to London. At the CCIRN meeting in Reykjavik, there was general agreement about creating an open exchange in London, but there are no definite plans. The new general manager of DANTE was open to the idea of creating an open exchange experiment.

IRNC TransLight/StarLight – Joe Mambretti

StarLight is increasing capacity; Mambretti and multiple research partners staged 100Gb showcase demonstrations and trials last year at SC10 and are planning another series for SC11. In addition, the StarLight community, in partnership with CANARIE and Ciena, implemented a 100Gb testbed between Chicago and Ottawa for a conference at the Ciena research lab, and this consortium will stage a similar event in 2011. StarLight is designing and implementing a multi-100Gb communications exchange facility (StarWave) that will interconnect multiple locations that have 100Gb (UIC, NCSA, U Chicago, Northwestern, Argonne, Fermi, the ESnet ANI, NASA, MAX/Pittsburgh Supercomputing Center, etc). GLIF-Am had some discussions about international 100Gb connections in addition to the Canada-US connection.

The GENI community is undertaking additional innovative projects that are of interest to the GLIF community – from creating a large-scale distributed instrument for network research and experiments, to experiments being conducted within that environment (e.g., content-based routing). TransLight/StarLight provides support for the International GENI (iGENI) initiative.

IRNC Archipelago – Joe Mambretti (on behalf of Kim Claffy, CAIDA)

[PPTs](#)

Archipelago does global measurement, analytic and distribution tools. CAIDA is looking for more probing sites. Mambretti suggested that maybe GLIF could build on this, as well as other advanced measurement tools that are out there now.

IRNC IPv6Watch – Joe Mambretti (on behalf of Lixia Zhang, UCLA)

[PPTs](#)

This project is interested in helping advanced research communities with IPv6 capabilities.

IRNC IRIS and DyGir

Internet2 will present information on IRIS and DyGir during the GLIF meeting.

DOE ESnet – Inder Monga, ESnet

[PPTs](#)

ANI network overview: ESnet will have an Optical Transport Network with Internet2 (10/40/100Gb); 100Gb routed/Virtual Circuit Network); Dark fiber network (13,000+ mile long-haul and metro to be used for testbeds and disruptive research and available to anyone). Dark fiber is based on a 20-year IRU.

Timeline: ANI four primary sites will be completed before December 2011.

ANI testbed initiative and research: This is a national testbed with a limited footprint, but 100Gb will be available as part of a larger testbed later this year; 16 projects have used the testbed so far. Another research project is building a power baseline for the 100Gb network (a Green IT infrastructure instrumented for power). In 2012, the ANI will become part of the ESnet production network.

Green IT is important to the GLIF community. Monga may propose a GLIF Green Task Force.

DOE USLHCnet/LHCOPN/LHCONE – Artur Barczyk

[PPTs](#)

Barczyk will talk more about LHCONE tomorrow during the GLIF meeting.

LHCONE: This is an approach to construct global L2 network services for the LHC community. The LHCOPN has been established to interconnect the LHC Tier 1 and CERN Tier 0 sites. There are 140 Tier2 sites and over 300 Tier3 sites worldwide, which also require interconnectivity, including with Tier 1 sites. The LHCONE is being designed and implemented in prototype with a switched core with routed edge sites, connecting NetherLight, CERNLight, MANLAN, ESnet, Internet2, StarLight, ASGC, UNAM in Mexico City, etc.

VLAN 2000 and VLAN 3000 are being established: Previously, there was one VLAN, but two questions arose: (1) how do you use bandwidth efficiently over the Atlantic (there are 2 paths today but more will be implemented and data will be sent over multiple paths); and (2) resiliency. Several VLANs will provide multiple production paths over the Atlantic as well as resiliency – though this approach is not cast in concrete and may change.

This is a good example of custom services built on top of existing networks. The goal is to provide connectivity among sites with high-performance efficiency and reliability. This is a multi-point service (connections are shared) and once the flows are identified, dynamic lightpath point-to-point services can be implemented. There is no plan to make flows use one path versus the other at this time (e.g., a graduate student might use a routed network to download a petabyte file); however, given this is a closed private network, and major user can be easily identified.

Internet2 – Rob Vietzke and Steve Wolff, Internet2

PPTs

International networking: Global reach is a priority area. Internet2 is adding to its global programming staff. Global campus support – Internet2 is helping universities with reliable connectivity, potential data centers, and telepresence. Global capital planning group – Internet2 is getting NRNs to combine capital to purchase capacity. Atlantic Wave and the Washington Exchange Support – Internet2 is working with Julio Ibarra and MAX on the Atlantic Wave architecture of the future. Internet2 has IRNC performance and dynamic circuit awards (IRIS/DyGir).

NDDI – distributed open exchange capability built on OpenFlow/SDN (not sure how to implement financially, but committed technically). Chinese colleagues are interested in this as well.

Internet2 Network next-generation backbone is a new 20-30 year dark fiber IRU (all 40Gb and 100Gb waves) on an expanded footprint with over 8.8Tbs of wave capacity; it will be completed July 2012.

Internet2, with Indiana U and Stanford U, is working on OS³E (Open Science, Scholarship and Services Exchange), which uses OpenFlow.

NLR – Joe Mambretti, on behalf of NLR

PPT

The *new* NLR – NLR will continue to serve as the R&D community, but is adding significant financial stability and upgrade capabilities (Chan Soon-Shiong Institute and the National Coalition for Health Integration are providing funding for genomic and proteomic data movement – sequencing centers, storage and supercomputing are transforming healthcare). Also working on telepresence with Cisco. Have OpenFlow deployment paths at key PoPs, supporting the NSF GENI initiative.

CANARIE – Thomas Tam, CANARIE

PPT

CANARIE has been doing internal projects to get services (IPv6, etc) to its users and increasing capacity to 40Gb and 100Gb wave support. CANARIE provides connectivity for TRIUMF, GreenStar and HPDMnet projects. University of Victoria is working with Caltech on a 100Gb trial, which may be showcased at SC11.

RNP – Michael Stanton, RNP

PPT

Connectivity: US-Brazil links (AmLight East) now 10Gb protected and 10Gb unprotected; RNP new Phase 6 backbone (10Gb to 16 cities); new GLIF map includes Argentina and Chile.

Services: Experimental dynamic circuit services over RNP, including interoperation with Internet2 ION (DYNES); other Internet2 collaborations (DyGir, NDDI); CineGrid and remote visualization; testbeds with HPDMnet and iGENI in the U.S. and the OpenFlow-based European FIRE; 100Gb transmission developed by CPqD; and, new international cable systems to Africa/EU. Brazil is also looking at 100Gb transatlantic cabling.

KyaTera-Fapesp – Luis Lopez, ANSP

This is the State network for Sao Paulo. The KyaTera project is not currently funded but fibers are in place. ANSP is a major contributor to AMPATH and AmLight. The ANSP exchange point in Sao Paulo is involved in two projects with Brazilian hardware companies, including 100Gb testbed by next year.

Note: The following networks, though invited, were not represented at this meeting: Innova-Red, RedCLARA, REUNA.

D. Potential for Implementing International Control Frameworks

OpenFlow is not a control framework but is comprised of a set of primitives that can be used by a control framework. FENIUS is a successful umbrella control framework API. In partnership with the GLIF community, OGF is defining the Network Service Interface (NSI) framework architecture as a standard; FENIUS is being built to that emerging standard. Several demonstrations of NSI will take place during GLIF and during SC11.

The applications are global, so it takes a global community to work on this.

Last week there was a CineGrid@AMS (Amsterdam) day, with streaming from Brazil, Prague, Amsterdam, US, and Japan. You needed NSI to set up the circuits. The LOFAR people are also interested in this type of interface.

E. Projected Future Plans (2-3-5 Years) for the Americas GLIF GOLE Exchange Points: What will these GOLEs look like in 5 years?

SouthernLight – Michael Stanton

SouthernLight only serves Brazil currently but is expanding to other countries in South America. Also, SouthernLight is planning a terrestrial link up South America to Mexico and the US. In addition, it is planning for 100Gb connectivity. Currently, ANSP and RNP support SouthernLight part time, and they need to improve this.

Pacific Wave – Dave Reese

Short-term demands are 10/40/100Gb. Also, PW is planning to push more traffic down to L1 optical infrastructure.

MAN LAN – Rob Vietzke

MAN LAN has been dabbling in dynamic circuits for awhile, and is now looking at dynamic services. Also looking at other higher-level services (Net+).

AMPATH – Julio Ibarra

Looking at increasing capacity at AMPATH. AMPATH is developing more expertise with hybrid services. Is adding cloud services with University of Chicago and Open Cloud Consortium. Wants to better support the science community. The Caribbean is another area they are looking at, so are working more with partners in that area. AMPATH supports RedCLARA with Latin America.

StarLight – Joe Mambretti

StarLight is focused supporting on multi-100Gb links (as well as a planned multi-100 Gbps communications exchange), segmentation, dynamic provisioning services, signaling, segment resources and specific customized services, as well as capabilities to give communities the ability to control such services and processes themselves. StarLight is supporting multiple GENI projects,

including demonstrations at the GENI Engineering Conferences. The StarLight community, through the International GENI initiative (iGENI) is expanding GENI activities internationally and interconnecting that experimental testbed environment to similar environments in other countries. Measurement is important; perhaps StarLight should work with other GOLEs to share additional measurement information.

MAX – Joe Mambretti on behalf of MAX

StarLight is working with MAX to do 100Gb exchange. MAX is working on connecting to StarLight, with interest in getting to New York and AMPATH. MAX would like to develop an international exchange beyond Atlantic Wave. MAX is also interested in the other themes/topics discussed above.

Atlantic Wave – Julio Ibarra

Consists of 4 US exchange points (AMPATH, SOX, MAX, MANLAN) and extends to SouthernLight. The Governance team is working on new 5-year agreement and design; extending the current NLR wave for 1 more year, after which they will either add or replace with 100Gb wave. A major focus is to support IRNC awardees, as well as circuits that land in Washington DC.

F. Processes for Implementing Innovative New Services Across International Facilities, Including for Large-Scale Research Projects

Many of these discussions will feed into the future of GLIF; there will be a panel on this subject during the GLIF plenary. We need quicker deployment from advanced networking testbeds to the GLIF fabric.

G. International Research Testbeds (US's iGENI/GENI, Europe's FIRE, Japan's New Generation Network (NWGN), etc.)

Advanced networking research testbeds directly feed innovative concepts and techniques to GLIF. GLIF should more aggressively support such deployments, making transition to production better/faster.

H. Summary of identified key topics/issues/recommendations

These notes will be distributed and posted on the GLIF website.