GLIF Americas (GLIF-Am) Community Meeting
Wednesday, October 2, 2013 (1:30 – 4:30pm)
Nanyang Technological University, Singapore

DRAFT Minutes
Distributed August 20, 2014

Attendees

Heidi	Alvarez	FIU/AMPATH	heidi@fiu.edu
Eric	Boyd	Internet2	eboyd@internet2.edu
Jacqueline	Brown	Pacific Wave/CENIC	jbrown@nordu.net
Maxine	Brown	UIC/StarLight	maxine@uic.edu
Hsin-Yen	Chen	ASGC	hychen@twgrid.org
Buseung	Cho	KISTI	bscho@kisti.re.kr
Greg	Cole	GLORIAD	gcole@gloriad.org
Steve	Cotter	REANNZ	steve.cotter@reannz.co.nz
Cees	de Laat	UvA	delaat@uva.nl
T.R.	Elass	KAUST	tareck.elass@kaust.edu.sa
Vinícius	Ferrão	RNP	ferrao@if.ufrj.br
Dale	Finkelson	Internet2	dmf@internet2.edu
Jill	Gemmill	Clemson University	gemmill@clemson.edu
Bertrand	Houde	Tata Communications	bertrand.houde@tatacommunications.com
Julio	Ibarra	FIU/AMPATH	julio@fiu.edu
Hyzak Ro	Lee	KISTI	leehr@kisti.re.kr
Marc	Lyonnais	Ciena	mlyonnai@ciena.com
Joe	Mambretti	NU/iCAIR/MREN/StarLight	j-mambretti@northwestern.edu
Inder	Monga	ESnet	imonga@es.net
Mauricio	Mota	RNP	mota@if.ufrj.br
Alex	Moura	RNP	alex@rnp.br
Kees	Neggers	SURF	neggers@surf.nl
Predrag	Radulovic	GLORIAD	predrag@gloriad.org
John	Silvester	USC/CENIC	silvester@usc.edu
Thomas	Tam	CANARIE	thomas.tam@canarie.ca
Alan	Verlo	UIC/StarLight	verlo@uic.edu
Robert	Vietzke	Internet2	rvietzke@internet2.edu
Leena	Wadia	ORF Mumbai	leena.wadia@gmail.com
David	Wilde	AARNet	David.Wilde@aarnet.edu.au
Rodney	Wilson	Ciena	rwilson@ciena.com
Linda	Winkler	ANL/StarLight	winkler@mcs.anl.gov

A. Meeting Objectives

The goal of the GLIF-Am meeting is to capture issues critical to US Exchange Points. While this meeting cannot discuss topics in detail, discussions are captured. Topics in previous years have dealt with expanded capacity for international networking, more sophisticated exchanges, programmability, and programmability at exchanges.

B. Major Trends in the Americas International Connection Requirements and Communities Served

1. New opportunities for 100 Gbps international paths

As in previous years, meeting participants discussed the need for additional trans-oceanic capacity, including the need for 100 Gbps paths. Rob Vietze discussed the ANA-100G. As network organizations implement 100G paths, several questions arise: (1) will it be possible to buy amplified spectrum versus services from carriers, and (2) the issue of 100 Gbps technologies per se. The ANA consortium encountered many challenging issues by undertaking a pilot prototype (not a production service), which he and others will talk about in more detail during the GLIF meeting. Regarding buying amplified spectrum, the consortium approached Tata, which was willing to do this. Now they are aware of other carriers willing to sell amplified spectrum if an entity buys a substantial block of capacity. The primary challenge is implementing the path from the landing station to terrestrial locations, as carriers only sell from landing station to landing station.

Regarding 100 Gbps transpacific, prices are prohibitive, but there have been trials, so it is forthcoming.

2. Projections for resources required *beyond* bandwidth 2013-2020

*Programmability…*Requesting amplified spectrum from carriers is a new approach. However, it is a new type of resource that carriers provide. Stitching it with end resources remains a challenge. Programmability – of services, capabilities and resources – is required, for example, to allow network resources to become extensions of scientific workflows. A number of control planes and control frameworks have been developed. GLIF is working on NSI; NSI is an API that talks to control frameworks. Within GENI (the US National Science Foundation's Global Environment for Network Innovation), there are 4 control frameworks (ORCA, ProtoGENI, Orbit, PlanetLab). These frameworks enable users to claim, integrate and customize the services and infrastructure they access and utilize.

*Cloud Computing…*Another growth area is cloud computing (private clouds, interoperable clouds, science clouds, public clouds, hybrids).

*Green Networking…*Green is not unimportant; however, unfortunately, it has received little interest and funding. Rob Vietze is interested in it because he has a large power bill. Inder Monga notes that green doesn't mean "cheap." ESnet and University of Amsterdam are working on GreenSONAR. Are the large carriers worried about green? Kees Neggers says that those who want to do full routing in the future will have issues; the Internet architecture of the future must change so one doesn't own all the routers in the middle. Those using L2 and L1 are being green efficient by not putting L3 routers in the middle. Marc Lyonnais notes that the cooling power per bit is actually lower; the cost follows the inflation of data. DC is more efficient than AC, but this is because of devices showing up in computing centers.

*Transoceanic Fiber Builds…*Buying amplified spectrum seems a better approach.

*Distributed NOCs…*Distributed NOCs provide a full rich view of the network at all times. Information is made available to edge processors, not just people in a NOC.

Other topics:

- Distributed instrument for network science.
- Creating new network architectures.
- Instrumentation at all levels.
- Programmable at all levels.
- Encapsulating data at all levels.

To bring people together around these topics, specialized environments are being developed in geographical regions (GENI in US; FIRE in Europe; Future Internet Testbeds in Brazil, etc). There are discussions taking place to explore options for a federated model that interconnects these existing

experimental testbeds.

3. Expected emerging major challenges to be addressed

What's the relationship between these issues and the US NSF CC-NIE program on campuses? The NSF Campus Cyberinfrastructure – Network Infrastructure and Engineering program (CC-NIE) results from a policy recognition that data-intensive scientific research requires network services with specialized attributes that are different from general R&E networks on and among campuses. The CC-NIE program was developed to support specialized services/capabilities for data-intensive science on campuses (e.g., Science DMZ networks). One program accomplishment has been to teach campuses about this need, which they only partially recognize. International/national infrastructure knows about these requirements, as do some regional networks. In the US, CC-NIE funds a number of projects that have motivated campuses to upgrade their infrastructure to support data-intensive science, a trend that is also influencing developments in regional and national R&E networks. Recently, for example, Clemson and USC sent 70 Gbps across the Nation, and SC12 staged multiple 100 Gbps demonstrations on national testbeds. NSF has announced approximately 100 awards.

We would like CC-NIE successes to be replicated internationally. At this point it is not how to do this, or what we can do as a community to make this happen. It requires funding to get it going. In the Netherlands, it's happening slowly. Brazil is working on it.

Many use cases involve big file transfers that happen a few times a year; i.e., the services provisioned are not sustained. This is a new way of using networks that carriers don't understand yet. It's not a model.

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

1. NSF International Research Network Connections Program (IRNC)
a. GLORIAD
PPTs

Greg Cole described GLORIAD's new performance measurement system. He would be happy to make the system available to others, and would like international partners to manage their data. The Taj project has been incorporated into GLORIAD. He also mentioned the new GLORIAD SDN/OpenFlow hub in Singapore, which is now part of the international GENI (iGENI) testbed and which is being used for demonstrations at the GLIF meeting.

b. AmLight
PPTs

Julio Ibarra gave an update on AmLight. He introduced the OpenWave 100G project to deploy a 100 Gbps alien wave between the US and Brazil; this is a 2-year project. He is interested in working with GLIF partners on applications that people want to perform on the infrastructure once it is operational.

c. TransLight / Pacific Wave
Jon Silvester talked about Pacific Wave. There is now a 100 Gbps connection between ESnet and Internet2. AARNet has a 40 Gbps and 10 Gbps into Pacific Wave. Pacific Wave has the capability to do dynamic circuits, but there is not much demand yet; he is interested in working with international partners who want to test with California/CENIC institutions.

Heidi Alvarez said AmLight is interested in doing tests with multiple GOLEs and partners in Brazil and Japan.

d. TransPAC3
No representatives attended the GLIF-Am meeting. Joe told people that Jennifer Schopf will be taking over the IRNC TransPAC3 and ACE projects.

e. ACE

Dale Finkelson gave the update. There are three ACE circuits into MAN LAN and three into WIX. There is also a single circuit from StarLight to Amsterdam; 6 repeaters had to be replaced on the undersea cable so it has been down for several months. He wants to operate the latter circuit as an OpenFlow circuit. On one of the links, packet loss has been happening sporadically, but has been hard to identify – Internet2 and GÉANT have put perfSONAR boxes on them.

Jennifer Schopf has a 100 Gbps supplement to IRNC; she will be organizing a 100 Gbps assessment workshop at SC13.

f. TransLight/StarLight
PPTs

Joe Mambretti talked about the IRNC 100 Gbps supplement to TransLight/StarLight that is supporting a one-year experiment to design and develop 100 Gbps services for trans-oceanic paths, eventually leading to production services. With its research partners, the StarLight consortium is planning multiple national-scale 100 Gbps demonstrations for SC13 in Denver. He also described international GENI (iGENI) projects (e.g., a large-scale multi-continent SDN/OpenFlow testbed and a series of "Slice-Around-the-World" demonstrations).

Open Science Data Cloud has a target of October 15, 2013 to connect 100 Gbps from StarLight to University of Chicago to Bob Grossman's high-performance computational science clusters. Heidi Alvarez also talked about the NSF PIRE program, where US students are recruited and sent abroad to international hosts. University of Amsterdam will host a one-week introductory session, the week of June 9, 2014. Contact Heidi if you are interested in observing.

g. Other IRNC projects (IRIS, DyGir, 6Watch, CAIDA)

Eric Boyd said that the IRIS (performance monitoring project based on perSONAR) and DyGir (deployment of dynamic circuit infrastructure, particularly OSCAR) have wrapped up. The goal of projects was to develop software suites that could be deployed.

No updates were available for 6Watch and CAIDA.

2. DOE ESnet international networking initiatives
PPTs

Inder Monga gave a summary of ESnet activities. He talked about having DOE offer a tender for a European extension.

3. DOE USLHCnet/LHCOPN/LHCONE

LHC is doing very innovative things to stress the networks at L2-to-L2. Doing remote mounting of data. Greg Bell was part of a DOE meeting that recently released a report.

4. Internet2 international networking perspective

Rob Vietze talked about how I2 is working with campuses. I2, as of last spring, has a "services hub" in Singapore for US institutions (FIU, Duke, etc); he talked of putting storage, GENI equipment, etc. there. ANA-100G is an early pilot, and Rob will talk about it during the GLIF meeting in the next few days.

5. NLR international networking perspective

No representative attended the GLIF-Am meeting.

6. CANARIE international networking perspective
PPTs

Thomas Tam will talk about the ANA-100G tomorrow. Today, he mentioned that with new funding, CANARIE is able to continue its fiber build in the eastern (Montreal to Halifax) and central regions of Canada. International opportunity – Halifax is a carrier landing location. CANARIE plans to move to a 100 Gbps core upgrade and get 100 Gbps connections to StarLight, Seattle, and MAN LAN. Currently CANARIE has 10x10 Gbps to MAN LAN.

---

7. RNP
Alex Moura gave a summary. The World Cup and Olympics in 2016 are pushing international 100 Gbps connections. Internationally, RNP is part of the AmLight consortium, RedCLARA, and cross-border connections.

8. RedCLARA
Alex Moura briefly mentioned RedCLARA in his RNP presentation.

9. KyaTera-Fapesp
No representative attended the GLIF-Am meeting.

D. Potential for Implementing International Control Frameworks, Specifically Migrating the Emerging Standard Network Service Interface (NSI) To Production

NSI has been in development and standards mode for some time. We would like the current version to be frozen and deployed in production mode at AMPATH, StarLight and Pacific Wave. (MAN LAN will also adopt when stable.) Inder reported that the NSI Connection Service specification version 2.0 is almost finalized; there will be a demo tomorrow night. GLIF is not freezing it until the bugs are fixed. The freeze date for NSI v2 is January 1 (open-source code still needs to be developed). Needs to be maintained before people use it.

NSI Aggregator will be demoed tomorrow and available for distribution.

Re OpenFlow and NSI, there are 3-4 models that work with SDN to make it go inter-domain.

OIF wants to use the NSI interface for OIF setup; Inder is working with Bell Labs and AT&T. (GLIF community isn't necessarily interested in the commercial world; Inder is trying to think of how they differ.)

We don't yet know all the problems that need to be solved.

NSI broke the chain model.

E. Projected Future Plans (2-3-5 Years) for the Americas GLIF GOLE Exchange Points

1. SouthernLight
No updates were provided.

2. Pacific Wave/PNWGP
Pacific Wave is very stable. We need to talk with Ron Johnson to learn the status of NorthernWave 100 Gbps circuit from Seattle to Chicago.

3. MAN LAN
Dale Finkelson said I2 is exploring the best way to connect other circuits and/or users to the ANA-100G at MAN LAN. The AL2S connects to the ANA-100G switch; they build VLANs to interconnect people.

At MAN LAN, many 10 Gbps circuits are connected. What is the future topology?

4. AMPATH
AMPATH upgraded its core this year for 40 Gbps circuits. AMPATH is working with regionals to support 100 Gbps capacity – to extend OpenWave to Jacksonville to connect to I2. Also wants to support 100 Gbps connections to Atlantic Wave (SouthernLight, AMPATH, SOX, WIX, MAX, MAN LAN), and interconnect exchange points to AL2S. In 5 years, there could be an L2 distributed exchange among all the GOLEs.

5. StarLight International/National Communications Exchange Facility

StarLight has ~15 100 Gbps connections being implemented with another 10 coming in the next 12 months. StarLight continues to support a large number of national and international network research testbeds. StarLight is adding additional capabilities for network and communication services programmability and has implemented multiple control frameworks. StarLight is planning to provide a production environment with multiple control frameworks.

6. MAX/WIX

Dale Finkelson gave an update on WIX.

MAX is involved in several 100 Gbps projects and is working with StarLight on many of these projects.

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

There was no significant discussion on this topic (the iGENI project was discussed earlier).

G. Wrap-Up

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