



12th Annual Global LambdaGrid Workshop
11-12 October 2012
Chicago, IL, USA

Technical Working Group session – Day 1 (in the afternoon)

Approximately 80 people attended the GLIF Technical Working Group session at the 12th Annual Global LambdaGrid Workshop, chaired by Lars Fischer (NORDUnet). The GLIF Tech WG and RAP WG sessions were organised together (instead of the parallel tracks in the past) that led to the larger number of attendees. The secretary was Peter Szegedi (TERENA).

1. Welcome, overview and administrativa

The Technical Working Group session was opened by Lars Fischer. A brief introduction to GLIF, and particularly to the active task forces of the working group, was given (<http://www.glif.is/meetings/2012/tech/slides/20121011-GLIF-TECH-Welcome.pdf>).

Lars reminded that Gigi Karmous-Edwards (NCSU) stepped down as co-chair of Tech WG last year in Rio de Janeiro, since then he has been the lone chair of the working group. Eric Boyd (Internet2) has recently volunteered to co-chair the Tech WG so that Lars recommended all to approve his nomination.

The Tech WG attendees welcomed the nomination of a person from the Americas (as Lars Fischer is from Europe) and approved Eric Boyd to be the co-chair of GLIF Tech WG.

Lars also announced that the APAN 35 conference and the Winter 2013 ESnet/Internet2 Joint Techs meeting will converge in Honolulu, Hawaii, USA to form the TIP2013 joint conference, hosted by the University of Hawaii. GLIF Tech WG is also going to go join them on 17-18 January 2013. The meeting home and registration pages are available at (<http://www.glif.is/meetings/2013/winter/>)

2. GOLE and resource updates

The technical programme started with flash presentations about the major updates from GOLEs and other resources.

- *KRLight*

Buseung Cho (KRLight) talked about the KRLight GOLE and its services managed and operated by KISTI. GLORIAD and GLORIAD-Taj connectivity was shown as well as the KRLight topology changes planned. KREONET on top of KRLight performed a number of interesting demonstrations highlighted by Buseung. (<http://www.glif.is/meetings/2012/tech/slides/2012-10-10-KRLight-updates.pdf>)

- *StarLight*

Joe J. Mambretti (Northwestern University) gave a technical overview on the current StarLight infrastructure and the major deliverables. Joe pointed out that TransLight/StarLight collaborates with all IRNC/GLIF initiatives. Some of the initiatives were highlighted in the talk.

<http://www.glif.is/meetings/2012/tech/slides/2012-10-10-StarLight-Presentation-GLIF.pdf>

- *NetherLight*

Gerben van Malenstein (SURFnet) talked about NetherLight's innovations. It was explained how lightpath services over NetherLight enable commercial services (such as VoIP or back-up storage) on campus. Bandwidth on Demand service provided by the new SURFnet7 network and the Inter-domain Open Flow initiative through Trans-Atlantic circuits were discussed in detail.

<http://www.glif.is/meetings/2012/tech/slides/2012-10-10-NetherLight-Gerben-van-Malenstein.pdf>

- *GÉANT Open Exchange*

Richard Hughes-Jones (DANTE) presented about the latest status of the one-year GÉANT Open Exchange pilot. The aim of the pilot is to deliver a business case covering the basic costs and determine commercial viability of any production service. GÉANT Open Exchange cloud fit into the GÉANT service portfolio, in case of success. The physical facility in London is up and running. Some networks have already expressed their interest to connect. In principle, the cost of connection should be as low as possible for R&E with no traffic volume charges.

<http://www.glif.is/meetings/2012/tech/slides/2012-10-10-GEANT-open-exchange.pdf>

3. Joint Tech & RAP WG session – introduction to demonstrations

The Research and Applications (RAP) Working Group session was organised jointly with the Tech WG for the first time. Due to the outstanding number of demonstrations proposed for the workshop the entire session was dedicated to the brief demo introductions so that people could set up their priorities based on their interest.

The brief summary of demonstrations can be read at

<http://www.glif.is/meetings/2012/tech/GLIF2012-Demo-Summary-101012.pdf>

List of demonstrations

- 1 - New Techniques for Uncompressed 4K Video Transmission
Rodney Wilson (Ciena)
- 2 - Use of High-Speed Networking in Film Restoration Process
Michal Krsek (CESNET)
- 3 - Remote Collaboration Over 8K Visualization Using UltraGrid and SAGE
Petr Holub (CESNET)
- 4 - Collaborative Analysis of Climate Models using Remote Scientific Visualization
Paul Wielinga (SARA)
- 5 - Multipathing with MPTCP and OpenFlow
Ronald van der Pol (SARA)
- 6 - Plugfest 2 Windy City: NSI v2.0 First Look + GLIF Automated GOLE Pilot Project
Jerry Sobieski (NORDUnet)
- 7 - High-Resolution Advanced Visualization over Long-Distance Optical Networks
Bartosz Belter (PSNC)
- 8 - TourCAVE to CAVE2

- Tom DeFanti (UCSD)
- 9 - The Open Science Data Cloud
Robert Grossman (University of Chicago)
- 10 - Highly Efficient LHC Data Transfer over WAN among 40Gbps Disk Servers using FDT
Harvey Newman, Artur Barczyk, Azher Mughal (Caltech)
- 11 - Slice Around the World
Joe Mambretti (Northwestern University/iCAIR)
- 12 - 100Gbps High-End Computer Networking for Petascale Science
Joe Mambretti (Northwestern University/iCAIR)
- 13 - InstaGENI Distributed Dynamically Programmable Environment
Joe Mambretti (Northwestern University/iCAIR)
- 14 - International OpenFlow Experimental Network Testbed
Joe Mambretti (Northwestern University/iCAIR)
- 15 - High Performance Digital Media Network
Joe Mambretti (Northwestern University/iCAIR)
- 16 - EVL CAVE2 Demonstrations
Maxine Brown or Jason Leigh (University of Illinois at Chicago's EVL)

The demonstrations were held at the Electronic Visualization Laboratory of University of Illinois at Chicago.

Technical Working Group session – Day 2 (in the morning)

4. Software Defined Networks – discussion

Eric Boyd (Internet2) gave a presentation about GLIF's implications and opportunities in Software Defined Networking (SDN). In principle, Internet2 is committed to extend a policy-free approach to the Internet2 advanced Layer 2 network. In fact, Internet2 has just launched a production, nationwide, 15k+ route-mile, OpenFlow-based 100G Advanced Layer 2 Service. It is planned to support OpenFlow 1.3, Multipoint VLANs, NSI API, GENI API and User OpenFlow Slicing next year. The time is ripe for GLIF to try and make an impact on major OpenFlow vendors while they are still listening. Challenges are ahead to experiment with peering of OpenFlow domains and architecting a multi-domain 'network research service'.

<http://www.glif.is/meetings/2012/tech/slides/20121012-GLIF-SDN.pdf>

Guy Roberts (DANTE) talked about SDN in the context of OGF NSI WG. At OGF36 there was a session dedicated to SDN, it's recommended to look at the presentations (can be downloaded from the OGF website). OpenFlow has multitude of potential uses, for instance: platform for innovation of Networking 'Apps'; network virtualization; forwarding to grades QoS based on applications; programmable networks (empowering users). A potential GLIF use case to go to NSI WG was also presented by Guy.

<http://www.glif.is/meetings/2012/tech/slides/20121011-OF-NSI-GLIF.pdf>

Eric Boyd (Internet2) suggested that to put together a SDN-focused GLIF Tech WG task force to define/answer open questions.

Cees de Laat (UvA) commented that GLIF should not be religions about OpenFlow rather be open to any potential SDN technology. The Open Exchanges need to have general technology adoption points.

Richard Hughes-Jones (DANTE) agreed that OpenFlow is just a protocol, GLIF should focus on functions and mechanisms.

Erik Jan Bos (NORDUnet) commented that vendors do not think about multi-domain OpenFlow. It's a potential topic for GLIF to talk about.

Jerry Sobieski (NORDUnet) agreed that the global aspect of SDN is yet missing from the picture. GLIF should look at the issues how SDN domains can be interconnected.

Steve Wolff (Internet2) commented that sharing of information between domains starts with service requests. We need a common understanding on the service, first.

Lars Fischer (NORDUnet) asked the question whether GLIF can be a home of an SDN experimental fabric. Is this something that the 'Defining GLIF Architecture Task Force' should look at or we should create a new task force?

Erik Jan Bos (NORDUnet) said that the Architecture Task Force is meant to be longer lived while a potential SDN Task Force should be short lived and could feed the architecture related discussion.

Steve Wolff (Internet2) said that Internet2 would be happy to lead a very short lived experimental task force focused on OpenFlow.

Cees de Laat (UvA) commented that the task force should focus only on the multi-domain issues of OpenFlow and should deliver preliminary results by January 2013.

Lars Fischer (NORDUnet) summarised that Eric Boyd, Steve Wolff (Internet2), et.al. are going to put together a draft charter for a new Inter-domain SDN Task Force circulated on the tech mailing list. Preliminary results and the role of SDN in GLIF will be discussed at GLIF Tech Winter meeting in January 2013.

5. GreenSONAR - discussion

Paola Grosso (UvA) presented the GreenSONAR initiative. Finding right balance between performance and power consumption is important, she said. The idea is to apply NM and PerfSONAR methods and architecture to green and energy information. The roadmap would be to collect GLIF community power measurements using the GreenSONAR tool, share the data with EDL, and ultimately produce a GLIF energy footprint.

<http://www.glif.is/meetings/2012/tech/slides/20121012-GreenSONAR-GLIF.pdf>

Lars Fischer (NORDUnet) proposed to create a dedicated GLIF Wiki space where GOLE operators can start collecting their green and energy related information potentially exposed to GreenSONAR. Progress report will be at the GLIF Tech Winter meeting in January 2013.

6. Defining GLIF Architecture Task Force

Inder Monga (ESnet) introduced the motivations, challenges, and next steps of the 'Defining GLIF Architecture Task Force' proposed last time in Rio de Janeiro. The GLIF end-to-end architecture requirements were put into the context of basic challenges such as increasing goodput for all applications and delivering resilient, interoperable network services. Erik Jan Bos (NORDUnet) has drafted a charter to the task force that will soon be finalised and circulated for approval

<http://www.glif.is/meetings/2012/tech/071012-Charter-GLIF-Architecture-Task-Force.pdf>

It is also recommended to read the Use Case Analysis written by Bill St. Arnaud, Erik Jan Bos and Inder Monga

<http://www.glif.is/meetings/2012/tech/071012-use-case-analysis.pdf>

The next steps include the drafting of a green paper about strengths, weakness and opportunities, presenting the short-list of topics identified, and asking the applications group to focus on the campus upgrade/architecture. This discussion was considered as the official task force kick-off.

<http://www.glif.is/meetings/2012/tech/slides/20121011-GLIF-Arch.pdf>

7. Distributed Topology Exchange Task Force update

Jeroen van der Ham (UvA) gave an update on the latest progress of the DTOX task force. The OGF NML group has published the first draft of the NML schema at <http://bit.ly/nml-schema>

Comments on the draft NML Schema are more than welcome!

Jeroen stated that a scalable topology distribution mechanism is needed; topology maintenance is only practical in a distributed manner. He described the evolution of topology exchange in NML, moving from the Dictator Model to the Distributed Model and now to the Peer-to-Peer topology exchange model that is also in the NSI Topology Service roadmap. The task force needs to figure out how to implement this in production.
(<http://www.glif.is/meetings/2012/tech/slides/20121011-DTOX.pdf>)

It was agreed that given that a standard topology-exchange mechanism is not on the table, it is time for the operators to become involved with DTOX and to work on having actual topologies for deployed networks. This also calls for revisiting the DTOX charter by January 2013.

8. NSI Implementation Task Force

Five different domains (JGN-X, AutoBAHN, Kreonet, OSCARS, OpenDRAC) summarised the lessons learned from NSI-based service deployments in their network domain:

- Jin Tanaka (KDDI) represented JGN-X
(<http://www.glif.is/meetings/2012/tech/slides/20121011-NSI-Japan.pdf>)
- Guy Roberts (DANTE) represented AutoBAHN
(<http://www.glif.is/meetings/2012/tech/slides/20121012-BoD-Lessons.pdf>)
- Jeonghoon Moon (KISTI) represented Kreonet
(<http://www.glif.is/meetings/2012/tech/slides/20121012-KRLight-NSI.pdf>)
- Chin Guok (ESnet) represented OSCARS
(<http://www.glif.is/meetings/2012/tech/slides/20121012-oscars.pdf>)
- John MacAuley (SURFnet) represented OpenDRAC
(<http://www.glif.is/meetings/2012/tech/slides/20121012-SURFnet-on-Demand.pdf>)

Inder Monga (ESnet) summarised that NSI has reached a stage where operators are ready to adopt it as a platform for services in operation. He also mentioned some open issues in the end such as: inter-domain service management and troubleshooting, monitoring and measurement of circuits, security profiles and best practices, creation of topology, policy enforcement, NSI Client API, service definitions, understanding end user needs and user outreach. The priorities need to be discussed by the task force.
(<http://www.glif.is/meetings/2012/tech/slides/20121012-NSI-Impl-summary.pdf>)

Gerben van Malenstein (SURFnet) offered to talk about NSI client API at the GLIF Tech Winter meeting in January 2013.

9. Dynamic GOLE Services Task Force update

Jerry Sobieski (NORDUnet) talked about the Automated GOLE Pilot Project. The GLIF Automated GOLE Pilot was initiated in 2010 to provide a global fabric of Open Lightpath Exchanges for the express purpose of maturing the dynamic provisioning software, demonstrating the value of GOLEs to emerging network service models, and to develop a set of BCP for these services. Jerry talked about the NSI deployment roadmap with regards to the Automated GOLE fabric. NSI architecture is proven: Version 1.0 software is reliable and Version 2.0 is still to come. Jerry suggested the GLIF community renew their commitment to the facility and continue to be a rich facility for proving GLIF concepts and recommendations. The next step is to demonstrate NSI v2.0 on the Automated GOLE fabric. (<http://www.glif.is/meetings/2012/tech/slides/20121012-autoGOLE.pdf>)

Participants discussed the role of the AutoGOLE going forward, and agreed that while it has served its purpose in facilitating development of NSI connection service, the AutoGOLE is still needed for important work going forward and that for future work it may need additional capacity and a more complex topology.

Participants agreed that the charter of the Dynamic GOLE Services Task Force should be revised by the GLIF Winter workshop in January 2013.

It was also announced that Jerry Sobieski (NORDUnet) will be taking on important roles in GN3+ project starting from April 2013. Therefore, a new chair is needed for the “Dynamic GOLE Services Task Force” (aka. Automated GOLE Pilot). Any proposal can be sent to Lars Fischer (NORDUnet) and Eric Boyd (Internet2).

10. GLIF Performance Verification Architectures Task Force

The GLIF PV Task Force is a greenfield effort to define an architecture for end-to-end verification of light path services, and a strategy for automated fault localization, mitigation, and recovery. Jerry stressed that this group is developing recommendations, not standards. During last summer it turned out that the discussions had difficulty shedding existing perspectives to think outside the box. The TF chairs believe the topic is still very real...but a different approach is required. We need a near term readout from the PV Task Force that can guide the thinking, if not the detailed development efforts, Jerry said. (<http://www.glif.is/meetings/2012/tech/slides/20121012-GLIF-PV.pdf>)

Jerry said that the short term plan is still that the task force will deliver the concept paper as specified in the charter in advance of at he GLIF Winter workshop in January 2013. The concept paper will be the basis for discussion among GLIF participants for next steps.

11. Summary

Lars Fischer (NORDUnet) summarised the GLIF Technical Working Group discussion as follows:

- Eric Boyd, Steve Wolff (Internet2), et.al. are going to put together a draft charter for a new Inter-domain SDN Task Force circulated on the tech mailing list. Preliminary results and the role of SDN in GLIF will be discussed at GLIF Tech Winter meeting in January 2013.

- Create a dedicated GLIF Wiki space where GOLE operators can start collecting their green and energy related information potentially exposed to GreenSONAR. Progress report will be at the GLIF Tech Winter meeting in January 2013.
- Comments on the draft NML Schema are more than welcome! It was agreed that given that a standard topology-exchange mechanism is not on the table, it is time for the operators to become involved with DTOX and to work on having actual topologies for deployed networks. This also calls for revisiting the DTOX charter by January 2013.
- Gerben van Malenstein (SURFnet) offered to talk about NSI client API at the GLIF Tech Winter meeting in January 2013.
- Participants agreed that the charter of the Dynamic GOLE Services Task Force should be revised by the GLIF Winter workshop in January 2013.
- It was also announced that Jerry Sobieski (NORDUnet) will be taking on important roles in GN3+ project starting from April 2013. Therefore, a new chair is needed for the “Dynamic GOLE Services Task Force” (aka. Automated GOLE Pilot). Any proposal can be sent to Lars Fischer (NORDUnet) and Eric Boyd (Internet2).
- Performance Verification Task Force is going to deliver the concept paper as specified in the charter in advance of at the GLIF Winter workshop in January 2013. The concept paper will be the basis for discussion among GLIF participants for next steps.

<http://www.glif.is/meetings/2012/tech/slides/20121012-summary.pdf>

The GLIF Tech WG session was finished on time; special tanks were extended to Maxine Brown, Joe Mambretti, and all the local organisers.

Overview of GLIF Tech WG task forces

Closed	Running	Just proposed
<i>None</i>	<i>Dynamic GOLE Services</i> Chaired by Jerry Sobieski (NORDUnet) until January 2013. <i>Open position for a new chair.</i>	<i>Inter-domain SDN Task Force</i> Proposed by Eric Boyd, Steve Wolff (Internet2)
	<i>Distributed Topology Exchange</i> Co-chaired by Jeroen van der Ham (UvA) and Inder Monga (ESnet)	
	<i>GLIF Performance Verification Architectures</i> Co-chaired by Steve Wolff (Internet2) and Jerry Sobieski (NORDUnet)	
	<i>NSI Implementation</i> Chaired by Inder Monga (ESnet)	
	<i>Defining GLIF Architecture</i> Co-chaired by Bill St. Arnaud, Erik-Jan Bos	

	(NORDUnet), and Inder Monga (ESnet)	
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List of 12th Annual Global LambdaGrid Workshop attendees

David Wilde	AARNet
Atsuko Takefusa	AIST
Tomohiro Kudoh	AIST
Chip Cox	AMPATH
KyoungMin Lee	ANDONG NATIONAL UNIVERSITY
Linda Winkler	Argonne National Laboratory
David Martin	Argonne National Laboratory
Rick Stevens	Argonne National Laboratory
Venkat Vishwanath	Argonne National Laboratory
George Clapp	AT&T Labs
Harvey Newman	California Institute of Technology
Artur Barczyk	Caltech
Azher Mughal	Caltech
Michael Bredel	Caltech
Jim Ghadbane	CANARIE
Mark Wolff	CANARIE
Thomas Tam	CANARIE
David Reese	CENIC
Louis Fox	CENIC
Jiri Matela	CESNET
Michal Krsek	CESNET
Petr Holub	CESNET
Martin Kolbe	CESNET
Jan Gruntorad	CESNET
Marc Lyonuais	Ciena
Rod Wilson	Ciena
Jim Archuleta	Ciena
Dustin Atkins	Clemson University
Kate Mace	Clemson University
Tracey	Clemson University
Jim Bottum	Clemson University/Internet2
Jiangning Chen	Computer Network Information Center/CAS
Jani Myyry	CSC/Funet
Guy Roberts	DANTE
Niels Hersoug	DANTE
Richard Hughes-Jones	DANTE
Majid M.Alsadek	Egyptian National S&T Information Network
JD Pirtle	Electronic Visualization Laboratory
Dana M. Plepys	Electronic Visualization Laboratory
Jason Leigh	Electronic Visualization Laboratory
Jonas Talandis	Electronic Visualization Laboratory

Lance Long	Electronic Visualization Laboratory
Chin Guok	ESnet
Andrew Johnson	EVL / University of Illinois at Chicago
Julio Ibarra	FIU-CIARA
Heidi Alvarez	FIU-CIARA
Tom Balint	Global Netwave
Greg Cole	GLORIAD / Univ. of Tennessee
Fei Yeh	iCAIR / Northwestern Univ.
Jim H Chen	iCAIR/Northwestern Univ
Chief Charles Ugo Eke	Infotechs Systems
Eric Boyd	Internet2
Dale Finkelson	Internet2
Edward Moynihan	Internet2
Jason Zurawski	Internet2
Rob Vietzke	Internet2
Stephen Wolff	Internet2
JJ Jamison	Juniper Networks
Takahiro Miyamoto	KDDI R&D Laboratories Inc.
Kunitake Kaneko	Keio University
Tareck Ellass	King Abdullah Univ of Science & Technology
Buseung Cho	KISTI
Haehyun Kim	KISTI
Jeonghoon Moon	KISTI
Seunghae Kim	KISTI
Fernando Redigolo	LARC/USP - Univ. Sao Paulo
Inder Monga	LAWRENCE BERKELEY NATIONAL L
Brian Tierney	LBNL
Gregory Bell	LBNL
Kurt Snodgrass	National LambdaRail, Inc.
Kevin Thompson	National Science Foundation
Jeffrey Weekley	Naval Post Graduate School
Bill Kramer	NCSA/University of Illinois
HIDEKI OTSUKI	NICT
Takatoshi Ikeda	NICT
Takaya	NICT
Jin Tanaka	NICT
Erik-Jan Bos	NORDUnet
Jerry Sobieski	NORDUnet
Lars Fischer	NORDUnet
Leena Wadia	Observer Research Foundation Mumbai
Laurin Herr	Pacific Interface Inc.
Natalie Van Osdol	Pacific Interface, Inc
Michał Kierzyńska	Poznan Supercomputing and Networking Center
Gwendolyn Huntoon	PSC
Chip Elliott	Raytheon BBN Technologies
Fausto Vetter	Rede Nacional de Ensino e Pesquisa - RNP

Leandro Ciuffo	Rede Nacional de Ensino e Pesquisa - RNP
Michael Stanton	Rede Nacional de Ensino e Pesquisa - RNP
Paul Wielinga	SARA
Ronald van der Pol	SARA
Tijs de Kler	SARA
Bu Sung Lee	SingAREN
Bill St. Arnaud	St. Arnaud-Walker & Assoc
Victor Lawrence	Stevens institute of Technology
Kees Neggers	SURF
Alexander van den Hil	SURFnet
Bram Peeters	SURFnet
Gerben van Malenstein	SURFnet
Hans Trompert	SURFnet
John MacAuley	SURFnet
Migiel de Vos	SURFnet
Peter Hinrich	SURFnet
Kevin Meynell	TERENA
Peter Szegedi	TERENA
GUEN WOO GIM	TONGMYUNG UNIVERSITY
Grace Lee	TWAREN/NCHC
Tom DeFanti	UCSD
Larry Smarr	UCSD/Calit2
Ron Johnson	Univ of Washington/PNWGP
Luc Renambot	Univ. of Illinois at Chicago / EVL
Cees de Laat	University of Amsterdam
Jeroen van der Ham	University of Amsterdam
Paola Grosso	University of Amsterdam
Allison Heath	University of Chicago
Robert Grossman	University of Chicago
Alan Verlo	University of Illinois at Chicago
Maxine Brown	University of Illinois at Chicago
Lopez	University of Sao Paulo
Celeste Anderson	University of Southern California
Takeshi Utsumi	GLOSAS/USA
Joe Mambretti	Northwestern University/iCAIR
Bin Lay Ong	SingAREN