GLIF Technical & Control Plane Working Groups
14-15 February 2007
University of Minnesota, Minneapolis, United States

Attendees

Name	Organisation	Country
Erik-Jan Bos (Co-Chair)	SURFnet	The Netherlands
Eric Boyd	Internet2	United States
Heather Boyles	Internet2	United States
Paul Daspit	Nortel	Canada
Lars Fischer	NORDUnet	-
Licia Florio (Secretary)	TERENA	-
John Graham	Global NOC	United States
Gigi Karmous-Edwards (Co-Chair)	MCNC	United States
Dave McGaugh	PNWGP	United States
René Hatem (Co-Chair)	CANARIE	Canada
Wontaek Hong	KISTI	South Korea
Walter Huisman	SURFnet	The Netherlands
Bill Jensen	BorceasNet	United States
Akira Kato	WIDE	Japan
Geoff Lakeman	PNWGP	United States
Tom Lehman	USC/ISI	United States
Dan Magorian	MAX	United States
Kevin Meynell (Secretary)	TERENA	-
John Moore	MCNC	United States
David Morton	PNWGP	United States
Hungkuk Lim	KISTI	South Korea
Bram Peeters	SURFnet	The Netherlands
Mark Prior	AARNet	Australia
Damir Pobrić	CANARIE	Canada
Ronald van der Pol	SARA	The Netherlands
Jan Radil	CESNET	Czech Republic
Ernesto Rubi	AMPATH	United States
Matt Siniscal	MAX	United States
Jerry Sobieski	MAX	United States
Rick Summerhill	Internet2	United States
Christian Todorov	Internet2	United States
Andree Toonk	SARA	The Netherlands
Chris Tracy	MAX/UMD	United States
Alan Verlo	UIC/StarLight	United States
John Vollbrecht	Internet2	United States
Josef Vojtech	CESNET	Czech Republic
JJ Yen	TWAREN	Taiwan

1. **Actions from last meeting**

   20060911-1 Kevin Meynell to replace CANARIE StarLight diagram with updated diagram.
   - Done.

20090911-2   Kevin Meynell to set-up Wiki on GLIF website.
- Done.

20060911-3   Akiro Kato to set the date of the next teleconference.
- Done.

20060911-4   Kevin Meynell to investigate the possibilities of using Skype for GOLE teleconferences.
- Done.

20060911-5   Kevin Meynell to put SC'06 connectivity information up on the GLIF website.
- Done.

20060911-6   René Hatem to circulate fault resolution process document on Technical WG mailing list.
- Done.

20060911-7   Kevin Meynell to make arrangements for next meeting.
- Done.

2. Joint Session

2.1 Introduction

Erik-Jan welcomed everyone to the meeting and introduced René and Gigi as the co-chairs of the session. He outlined the objectives of the Technical and Control Plane Working Groups; the former focusing on provisioning global lightpaths today, with the latter looking at how to provision them in future. However, there were several activities of common interest, which was why it had been agreed to hold a couple of joint sessions; one on the first day, with another the following morning.

Thanks were extended to Internet2 and the Coffman Memorial Union for hosting the GLIF Working Group meetings.

2.2 Lightpath Monitoring in NetherLight

Ronald van der Pol gave a presentation about lightpath monitoring at NetherLight (see http://www.glif.is/meetings/2007/winter/joint-session/vanderpol-tl1.pdf). This is the largest optical exchange in Europe, and utilised a Nortel HDXc, 2 x Nortel OME6500s, a Cisco ONS 15454 and a Cisco 6509 (soon to be replaced by a Nortel ERS8600). It was therefore useful to be able to view the status of every lightpath using a web interface.

To this end, they had developed the TL1 Toolkit which was a Perl module that could interface to any TL1-compliant equipment. It took care of logging in and out of the switches, hid the arcane TL1 syntax from the user, and was able to parse the output into easy-to-use data structures. This data was then stored in a MySQL database that was linked to a web interface able to display the current status of lightpaths as well as any alarms.

The TL1 Toolkit was available as open source software under an Apache 2.0 licence (see http://nrg.sara.nl/TL1-Toolkit). The next steps were to properly package it, produce installation documentation, and add pre-defined monitoring scripts. In addition, end-to-end lightpath monitoring was desirable, but this would require the cooperation of other GOLEs to allow remote access to their equipment. If anyone was interested on working on the inter-domain requirements, they were asked to contact SARA.

2.3 Network Description Language Developments

Freek Dijkstra gave a presentation about the Network Description Language developments over the past six months (see http://www.glif.is/meetings/2007/winter/joint-session/dijkstra-ndl.pdf).

NDL allows network resources to be described in distributed files (using an RDF scheme), and then correlated in order to exchange information about network capabilities, and to generate topologies. NDL files can either be automatically generated from inputs entered into a web form (see http://trafficlight.uva.netherlight.nl/NDL-demo/NDL-Generator.html), or can be produced by hand and before being validated (see http://trafficlight.uva.netherlight.nl/NDL-demo/NDL-Validator.html). An NDL visualiser is then able to graphically display topologies using GraphViz and Google Maps.

A demonstration of NDL capabilities was given at Supercomputing 2006. This used NDL descriptions of GOLEs in order to calculate available lightpaths between them. The applicability of NDL to other types of networks was also demonstrated using the Internet2 and OptiPuter networks as examples.

In addition, the NML Working Group had been formed under the auspices of Open Grid Forum to standardise this work. NDL currently allowed simple paths to be found, but for more realistic path finding and provisioning, multi-layer descriptions would be required. Therefore current work was focused on developing NDLv2 that incorporated standardised topology, layer, domain and location schemas.

3. Technical Working Group Meeting

3.1 GLIF Wiki

Kevin provided an overview of the GLIF Wiki (see http://wiki.glif.is/) that had been setup in order to improve the exchange of information between GLIF participants. He had already transferred the information about each GOLE to the Wiki, in order to enable the GOLE operators to more easily keep their entries up-to-date. He also asked the operators to check their entries, and to add any missing information.

There was a discussion about whether cable provider information should be added to the GOLE entries, particularly for trans-oceanic connections. It was agreed this would be useful if the information was available.

ACTION 20070214-1: Kevin Meynell to add cable provider names to GOLE information.

3.2 Agenda Steering Committee

René discussed the possibility of forming a committee to help formulate the agenda for future meetings.

The general consensus was that agendas were not published sufficiently far in advance for participants to comment on. Getting them out earlier would provide the opportunity for more feedback and suggestions. However, René and Erik-Jan could use the GOLE mailing list to help advise them on relevant agenda topics.

ACTION 20060214-2: René Hatem and Erik-Jan Bos to solicit potential candidates for proposed agenda steering committee.

3.3 GOLE Updates

AMPATH
Ernesto reported that the circuit from Miami to Sao Paulo had been upgraded. 50 Mbps of this was dedicated to a link to a radio telescope in Chile. They were currently working on a GLIF topology diagram.

PacificWave
Dave McG reported there had been a lot of discussion about how to represent their optical exchanges on the GLIF topology diagrams. PacificWave was a collaboration between CENIC and Pacific Northwest GigaPoP and had optical exchanges in Seattle, Los Angeles and Sunnyvale. It had been agreed that the GOLE formerly known as Pacific Northwest GigaPoP should be renamed PacWave (Seattle), whilst the GOLE formerly known as CENIC should be renamed PacWave (Los Angeles). There had also been a discussion about whether the optical exchange in Sunnyvale should also be considered a GOLE, although this currently only provided access to the CENIC backbone so should strictly speaking be represented as a cloud on the diagram.

AARNet
Mark reported that AARNet had an optical network running between Brisbane, Sydney, Canberra, Melbourne and Adelaide. This was mostly based on permanent circuits for cost reasons, with management being completely outsourced. 2 x 10 Gbps circuits from Sydney to Los Angeles via Hawaii were currently being brought into operation. The drop-off in Hawaii would allow connectivity to be provided to observatories located there.

CERN
No-one from CERN was present, but Erik-Jan presented his knowledge of the situation at CERN. He proposed to contact David Foster to find out more about the current status.

ACTION 20070214-3: Erik-Jan Bos to contact David Foster to ask about the current status of the CERN optical exchange.

CzechLight
Jan reported that CzechLight had a 10 Gbps link to NetherLight via GÉANT2, and a 10 Gbps link to StarLight. There were also several other links to sites within the Czech Republic.

Erik-Jan asked CzechLight whether they could update their information on the GLIF Wiki, and produce a GLIF topology diagram.

ACTION 20070214-4: Jan Radil to update CzechLight information on GLIF Wiki, including topology diagram.

HKOEP
No-one from CSTNET was present, but they should be advised that their topology diagram needed to be updated to show GOLEs rather than onward networks (in line with GLIF convention). In particular, GLORIAD should be PacWave (Seattle), and KISTI should be KRLight.

ACTION 20070214-5: René Hatem to ask CSTNET to update the HKOEP topology diagram.

KRLight
Huhnkuk gave a presentation about KRLight (see http://www.glif.is/meetings/2007/winter/tech/lim-krlight.pdf)

Erik-Jan asked whether it was possible to produce a GLIF topology diagram for KRLight.

ACTION 20070214-6: Huhnkuk Lim to produce KRLight topology diagram.

MAN LAN
Christian reported there was a new connection to TWAREN which needed to be reflected on their GOLE topology diagram.

ACTION 20070214-7: Christian Todorov to update MAN LAN topology diagram to include TWAREN link.

AtlanticWave
Dan provided an overview of AtlanticWave. This was a collaboration between four operators to provide optical links and common operations between New York, Washington, Atlanta and Miami. There are currently several 10 Gbps connections to StarLight, as well as to DRAGON, Internet2 and Southern LightRail. AtlanticWave had been used to provide connectivity for SC'06.

It was agreed that the NGIX-East optical exchange in Washington DC should be recognised as a GOLE.

ACTION 20070214-8: Kevin Meynell to add NGIX-East to list of GOLEs.

NetherLight
Wouter gave a presentation about NetherLight (see http://www.glif.is/meetings/2007/winter/tech/huisman-netherlight.pdf). Two additional 10 Gbps lambdas to CERN had been added to take the total to four. In addition, a 10 Gbps connection to i2CAT in Barcelona, and a 2.5 Gbps connection to MoscowLight was in the process of being added. The cross-border fibre project was also planning to establish connections to NORDUnet (via Hamburg), as well as DFN (via Münster and Aachen) during the second quarter of 2007. One of the main lightpath users would be the JIVE project which needed to send large amounts of data from its radio telescopes to a data correlator located in the

Netherlands. There was also a proposal to make NetherLight an independent entity with a cost recovery model for funding further development.

Erik-Jan added that MoscowLight planned to become a GOLE, with onward connections to GLORIAD and other networks. It should be added to the list of GOLEs, although it was currently unclear how it should be represented.

ACTION 20070214-9: Kevin Meynell to add MoscowLight to list of GOLEs.

René asked whether i2CAT should be represented as a cloud on the NetherLight diagram. Erik-Jan replied that unless it had onward connections to other networks, it should appear as a cloud.

ACTION 20070214-10: Wouter Huisman to contact i2CAT and MoscowLight to ask whether they should appear as clouds on the NetherLight diagram.

Dave McG asked how the NetherLight topology diagram was produced, and whether the source files could be made available.

ACTION 20070214-11: Wouter Huisman to send source files of NetherLight topology diagram to the mailing list.

Dave McG also asked for clarification about how connections should be represented on GLIF topology diagrams (e.g. as circles or clouds). He said he'd be willing to summarise this information on the GLIF Wiki.

ACTION 20070214-12: Dave McGaugh to create legend for GOLE diagrams on GLIF Wiki.

NorthernLight
Lars gave a presentation about the NORDUnet optical backbone (see http://www.glif.is/meetings/2007/winter/tech/fischer-northernlight.pdf). This was being built over dark fibre, with each lambda initially running at 10 Gbps. The Stockholm to Copenhagen link was already live, with most other links scheduled to go live in February or March. The remaining links, including the international link to Hamburg, were planned for the second quarter of 2007. There were also plans to connect Russia (MoscowLight) and the Baltic states.

Lars said a proper GLIF topology diagram still needed to be produced for NorthernLight.

ACTION 20070214-13: Lars Fischer to produce NorthernLight topology diagram.

StarLight
Alan said there was nothing new to report, but that the GLIF topology diagram needed to be updated to reflect the connections to CzechLight and OmniPoP (serving the US Mid-West). The link to CANARIE should also be represented as a cloud, and lambdas rather than lightpaths should be shown. He clarified that the link to Washington DC actually terminated at NGIX-East.

ACTION 20070214-14: Alan Verlo to update StarLight topology diagram.

T-LEX

Akira gave a presentation about T-LEX (see http://www.glif.is/meetings/2007/winter/ tech/kato-tlex.pdf). New 10 GE links had been established to Keio and SINET, which were being used for CineGRID and TransPuter activities amongst other things. T-LEX had also been involved in an IPv6 land-speed record test over a 30,000 km link.

UKLight

Erik-Jan said it was unclear who was responsible for UKLight now that John Graham had left ULCC. Kevin volunteered to contact David Salmon at UKERNA to find out the new contact details.

ACTION 20070214-15: Kevin Meynell to ask David Salmon for new UKLight contact details.

3.4 Fault Resolution

René presented an updated version of the document that had been drafted by CANARIE and SURFnet (see http://www.glif.is/working-groups/tech/fault-resolution-0.9.pdf). This proposed a fault resolution process for multi-domain lightpath connections between GLIF organisations. The processes elaborated on in this document could be accompanied by a monitoring system such as that developed by the University of Munich for GÉANT2 (see http://cnmdev.lrz-muenchen.de/e2e/lhc/G2_E2E_index.html).

There followed a discussion about user requirements and the types of information that should be collected. Ronald suggested that monitoring could be distributed, provided a standard format could be agreed for circulating information. He said he would circulate some pointers about the end-to-end information formats and web services used for showing the status of lightpaths at NetherLight.

ACTION 20070214-16: Ronald van der Pol to send pointers about end-to-end information formats and web services to the mailing list.

It was also suggested that GLIF approach the people behind the E2E monitoring system to see whether their experience had any applicability to GLIF. Perhaps a workshop could be organised in order to help with the learning curve.

ACTION 20070214-17: Erik-Jan Bos to ask University of Munich whether they'd be interested in participating in a lightpath monitoring workshop, possibly at TNC 2007.

Damir said it was necessary to share information about problems, and that an automated ticketing system should be established. Although you might get the same problem reported more than once, this was better than not being aware of the problem in the first place.

3.5 Issue Analysis Hybrid Networks

Erik-Jan presented the issue analysis document that had originally been written for the GigaPort Project (see http://www.glif.is/working-groups/tech/hybrid-network-issues.pdf). This recognised that hybrid networks brought new challenges, and attempted to address some of the issues that would likely arise.

Two main issues were identified. The first issue is that end-users are not always aware of the possibilities of lightpath services, and neither are the IT organisations of the connected institutes always aware of the needs of these users. Can providers therefore improve user awareness of the advantages, limitations and consequences of lightpath services within their own networks and across other networks?

The second issue is that providers need to monitor and report on the usage of network resources. For lightpaths, this requires new tools and best practice to be developed, and indeed there needs to be agreement on actually what to measure. Another question is whether lightpath utilisation data can be used to help plan future service provision.

In order to help develop these issues further, wider input from the GLIF community was being sought. The document would therefore be put-up on the GLIF Wiki for further discussion.

ACTION 20070214-18: Kevin Meynell to put hybrid networks issue analysis document on the GLIF Wiki.

3.6 Lightpath Measurement

Erik-Jan presented a document that SURFnet had produced about how to measure the usage of lightpath services (see http://www.glif.is/meetings/2007/winter/tech/bos-measurement.pdf). NRENs had largely only offered IP services in the past, for which there were many established metrics, measurement methods and tools. However, hybrid networks operate on several layers with lightpaths being connection-oriented and established on static, scheduled or dynamic basis. This meant that new metrics needed to be developed to take into account overall network usage.

Three main categories of metrics are required for different bodies: the policy makers to justify funding; the connected organisations to understand usage of the service and justify costs; and network operators who need to allocate costs, plan network build-outs, and make routing decisions. In general, the policy makers require very simple metrics (e.g. bytes transported), whilst at the opposite end of the spectrum are the network operators who need much more complexity (bytes per service, at any particular time, and in any given timeframe). Unfortunately, many of the traditional metrics used in telephony (which is also connection oriented) will not work for lightpaths as it's difficult to accurately model the variable usage associated with them.

The next steps are to investigate whether the network equipment can actually provide suitable metrics, and how the data can be collected and integrated. If the network can not provide the data, alternatives such as measurement probes and data extrapolation will have to be investigated.

5. Date of next meeting

The 7th Annual Global Lambda Workshop would be held on 17-18 September 2007 in Prague, Czech Republic. This would include a meeting of both the Technical and Control Plane Working Groups.

Open Actions

20070214-1   Kevin Meynell to add cable provider names to GOLE information.

20060214-2   René Hatem and Erik-Jan Bos to solicit potential candidates for proposed agenda steering committee.

20070214-3   Erik-Jan Bos to contact David Foster to ask about the current status of the CERN optical exchange.

20070214-4   Jan Radil to update CzechLight information on GLIF Wiki, including topology diagram.

20070214-5   René Hatem to ask CSTNET to update the HKOEP topology diagram.

20070214-6   Huhnkuk Lim to produce KRLight topology diagram.

20070214-7   Christian Todorov to update MAN LAN topology diagram to include TWAREN link.

20070214-8   Kevin Meynell to add NGIX-East to list of GOLEs.

20070214-9   Kevin Meynell to add MoscowLight to list of GOLEs.

20070214-10   Wouter Huisman to contact i2CAT and MoscowLight to ask whether they should appear as clouds on the NetherLight diagram.

20070214-11   Wouter Huisman to send source files of NetherLight topology diagram to the mailing list.

20070214-12   Dave McGaugh to create legend for GOLE diagrams on GLIF Wiki.

20070214-13   Lars Fischer to produce NorthernLight topology diagram.

20070214-14   Alan Verlo to update StarLight topology diagram.

20070214-15   Kevin Meynell to ask David Salmon for new UKLight contact details.

20070214-16   Ronald van der Pol to send pointers about end-to-end information formats and web services to the mailing list.

20070214-17   Erik-Jan Bos to ask University of Munich whether they'd be interested in participating in a lightpath monitoring workshop, possibly at TNC 2007.

20070214-18   Kevin Meynell to put hybrid networks issue analysis document on the GLIF Wiki.