The Automated GOLE Pilot Project Update

Presented to GLIF

Feb 23, 2011

Hong Kong, CN

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- Motivation: GLIF participants see the writing on the wall:
  - Connection oriented (i.e. "Performance Guaranteed") [network] services must become an integral part of our services portfolio.
  - The growing community of GOLE operators have been exploring PG/lightpath services for many years, and now see automating the provisioning process as critical to delivering these services in the future.

- The Pilot Project was conceived to push the required automation technologies forward.

- Purpose: forward vision…
  - Organize the GLIF community to construct a global fabric of interconnected GOLEs
  - Incrementally deploy and refine real, persistent, multi-domain, multi-service, performance guaranteed and dynamically provisioned lightpath services over this fabric…
  - Provide a persistent global fabric of automated PG services for real research applications
  - Develop a set of best practices for the engineering, operation, and policy administration of these services
- The Automated GOLE TF was established by GLIF in 2009
  - Current sunset is end of 2011 – perhaps the participants will wish to continue the effort if it shows continued usefulness…

Automated GOLE Participants

- ESnet
- CANARIE
- NORDUnet
- NetherLight
- StarLight
- JGN2plus
- USLHCNET
- CERN
- CalTech

- KDDI
- G-Lambda
- MANLAN
- Internet2/ION
- UvA
- University of Essex
- CzechLight
- I2CAT

GLIF Automated GOLE Logical Topology
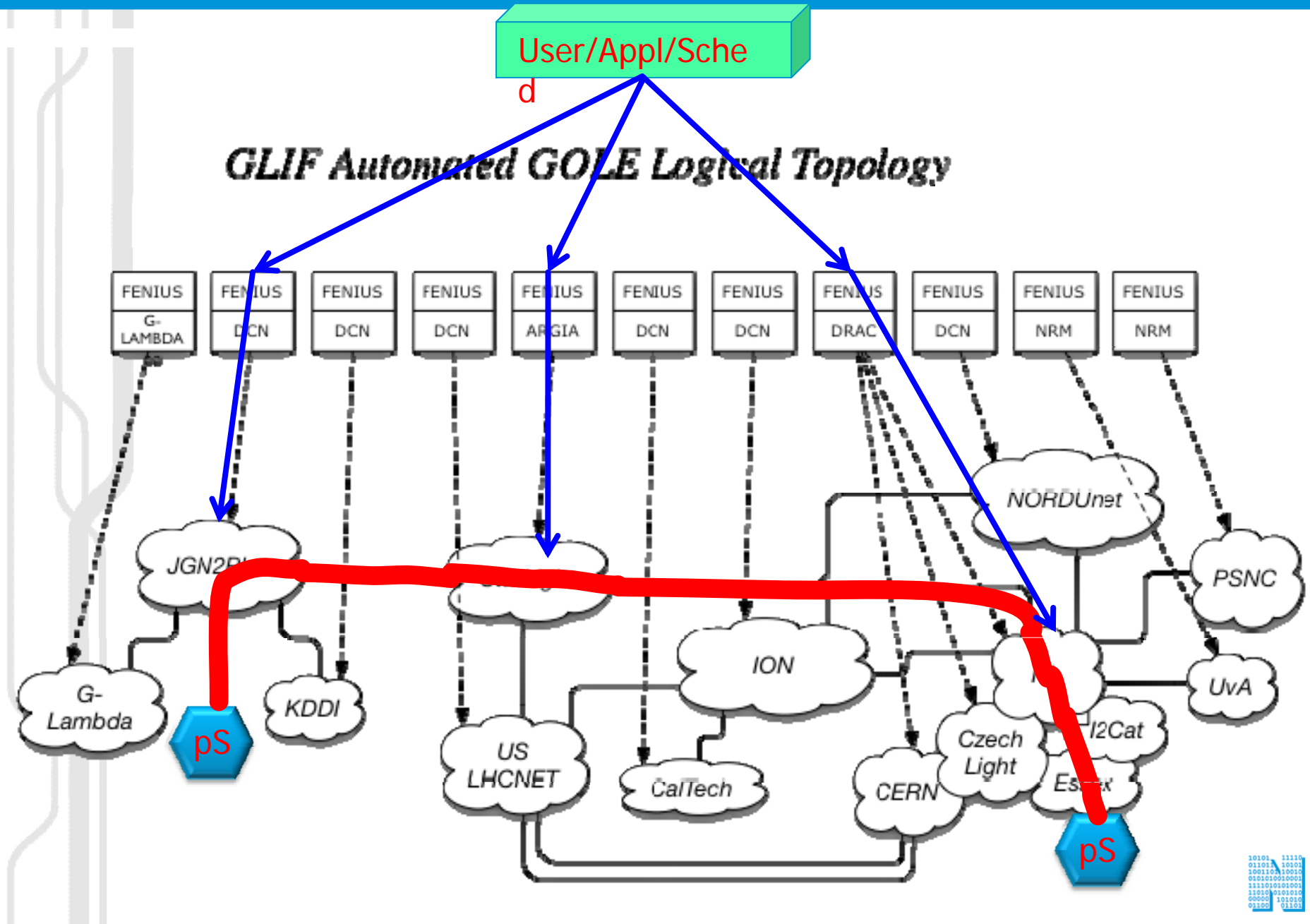
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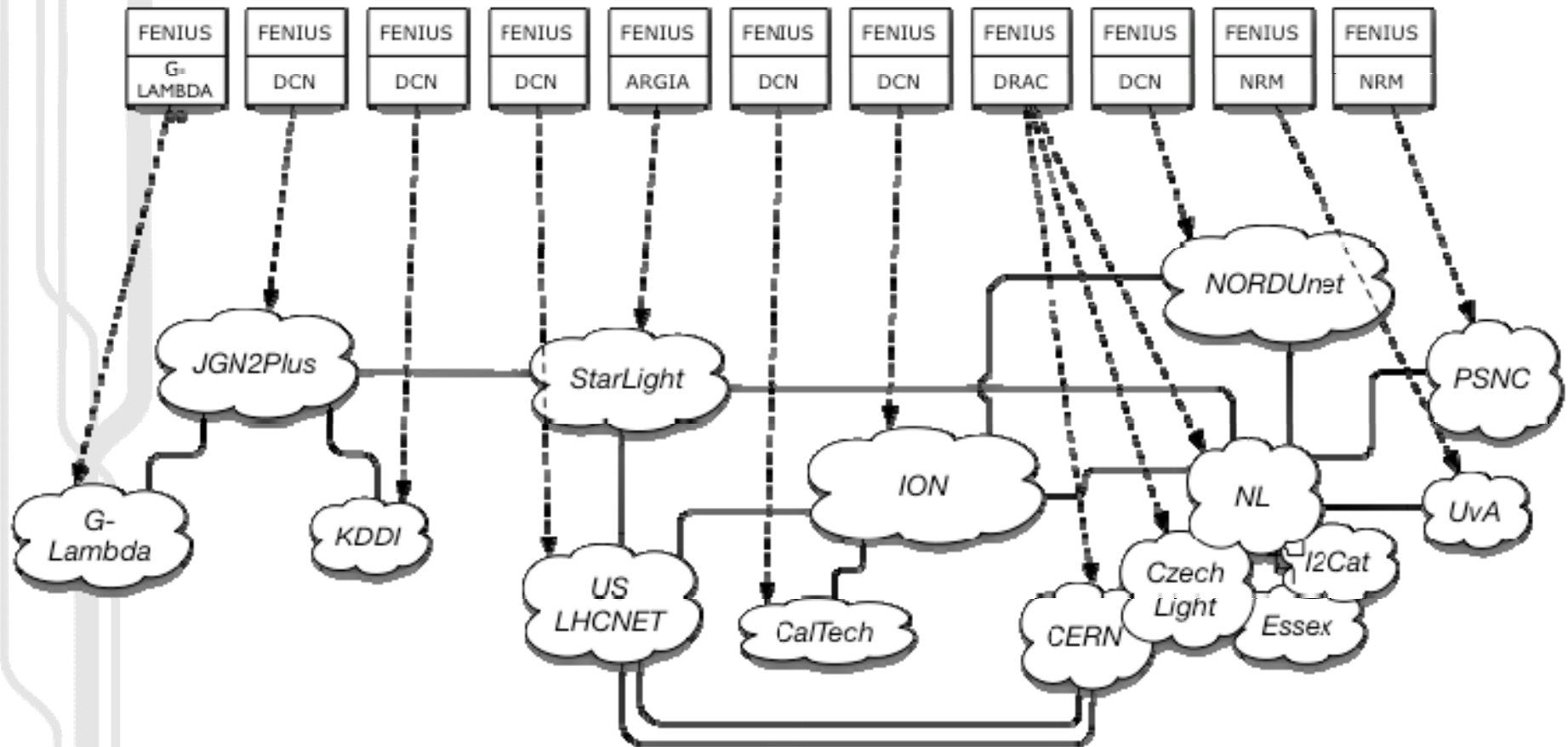
- Due to efforts of former chair John Volbrecht (Internet2):
  - Assembled the first organized Automated-GOLE network.
    - Demonstrated at GLIF Fall2010 - Geneva – Oct 2010
  - The FENIUS protocol translator was deployed -> enabled the first inter-domain automated global VLAN provisioning as part of the 2010 demos
    - Vangelis Chariotakis (Esnet) lead the FENIUS software development effort
    - Thomas Tham (CANARIE) lead the pS "PINGER" demonstration software development
  - Enhanced the demonstration for Supercomputing2010- New Orleans, Nov 2010
- New chair took over Dec 2010: Jerry Sobieski (NORDUnet)
  - Audit of facilities and YADD at APAN/GLIF 2011 in Hong Kong.

- This week's demonstration shows lightpaths being established on a book-ahead (scheduled) basis.
  - The light paths eminate from a perfSonar servers attatched to four of the GOLEs
  - A total of 15 circuits are scheduled. A new circuit will be provisioned every minute and will stay in service for 15 minutes.
  - Each of the four orginating servers has an IP interface configured with the VLANs of each circuit request.
  - The perfSonar "pinger" tool pings the remote hosts that are expected to be attached at the far end of the connection.
    - The pings fail until the connection appears
  - An independent collector script is running that queries the ping results every 10 seconds. The results are displayed in a web page.

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User/Appl/Sched

GLIF Automated GOLE Logical Topology

Pinger Display

http://205.189.33.44/toolkit/pinger.php

- Detailed planning and realistic analysis of technology maturity is crucial going in...
  - Adhoc systems design (while sometimes necessary) is not a substitue for detailed advanced engineering.
- GOLEs, like airplanes, deteriorate if you don't use them
  - Certificates expire, software gets updated (in some places, and not in others), assets get used or re-allocated
  - Implication: Do we need an "operational" aspect to the auto-GOLE fabric? (monitoring and exercising, PoC, ...?)
- We need additional software and systems experts
  - We have a single point of failure in Vangelis (!) – as we transition to NSI we need to insure that we have broader support for the operational systems that we deploy.
  - We need code writers.

- Automated provisioning alone does not a "service" make:
    - We urgently need smart path finding...
    - ...Which means we urgently need valid and standardized topology information
    - Automated end point registration processes
    - Just delivering a connection to the end point does not make it useful E2E....
        - Intelligent orchestration of distributed applications is required
        - Agents, protocols, and APIs are needed to dynamicaly interact with the application and configure end systems.
    - Existing service verification and monitoring processes are not automated sufficiently nor appropriately for these emerging PG services.

- Application developers cannot [easily] use the existing provisioning tools
  - The APIs are incomplete, complex, and poorly defined
  - Deployment and installation of software is onerous
- There is no formal "service architecture" (yet)
  - We must express the service model to the app developers in a way that alows them to extrapolate how it *could* be used..(!!)

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- Deployment of NSI CS 1.0 is the foremost objective in 2011

  - The OGF Network Service Interface (NSI) WG has developed a framework for deployment and interoperation of Network Services.

  - The NSI Connection Service draft protocol standard v1.0 is scheduled to be available at end of March 2011.

  - We hope to have three initial implementations. SURFnet, Esnet, and NORDUnet have made noises...hopefully...

  - Target demonstration at Supercomputing 2011 – Nov 2011, Seattle; dress rehearsal at GLIF Fall 2011 – Sep 2011, Rio

- Note: While this is a priority, it is not the only objective or need for automating GOLE services

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- Topology information "management"
    - Fundumental next step... prerequisite for intelligent automated path selection.
    - We will be working closely with the GLIF DToX WG to
        - Adopt a common [interim] topo description format
        - Develop rules for coherent autonomous topology processing in a distributed environment
        - Develop a communication model for distribution and exchange (i.e. learning) of topology
- End System Orchestration
    - End systems in distributed, multi-species applications must coordinate dynamic configuration processes.
    - We will be looking at potential models for Dynamic End System Configuration (DESC) processing
        - Must include: network layer address negotiation, network service performance verification, long term application management, etc.

- ## Dynamic End System Registration
  - Simple, fool-proof/resistent mapping of new end systems to the network edge Service Termination Point (STP) to which it is connected.
    - "Magically", when a system is attached to a GOLE port, an autonegotiation will take place to register the name, port information, and other pertinent toplogy information.
    - This will improve ease of use for users, and address existing scaling issues for network operations teams.
  - We want to simplify the management of the end systems – this is critical to user adoption. Simple, simple, simple.
    - Ideally, we want a Plug-n-Play analogy for Automated GOLEs.
    - These autoconfiguration capabilities should also apply to GOLEs connecting to other GOLEs.

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- We have a growing commitment of GOLEs that want to participate in this effort! This is GOOD!
  - 14 GOLES and probably 100,000 km of transport links!!!
  - We need a better project participation processes...as more facilities become part, the scaling issues increase rapidly
- We need a coordinated approach to developing the software capabilities of a more mature service environment

- ### *We need software development.*
  - We can coordinate and federate these efforts, but to move forward we need to write code.   Meetings, conf calls, and powerpoints are not enough.
- There is still a lot of design and architecting needed – this will be challenging and fun, but we need also to balance this with *implementation* of emerging consensus.

- If you or your organization are interested in participating in the Automated-GOLE Pilot Project, contact:
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  - Or
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