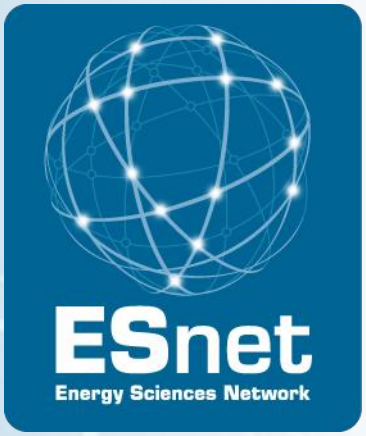


Fenius: Building Interoperability across the globe

Supercomputing 2010

New Orleans, USA

Evangelos Chaniotakis, ESnet Network Engineer

Lawrence Berkeley National Lab

Overview

- A global, well connected “network of networks” for research
- Many networks provide some circuit-oriented service,
- It is becoming increasingly common for these circuits to be stitched across multiple networks,

SC09: ~20 L2 circuits. SC10: ~50

- Stitching these “by hand” is s l o w – and cuasesss errors.
- Software does exist to automate circuit provisioning....
- But it generally doesn’t work when stitching,
- Because we don’t have a common provisioning API

Objectives

A **simple <u>common</u>** provisioning API,

+ Just good enough to support common stitching case today,

+ Software that implements it,

+ That works with existing provisioning software,

+ Motivation for network operators to deploy & operate,

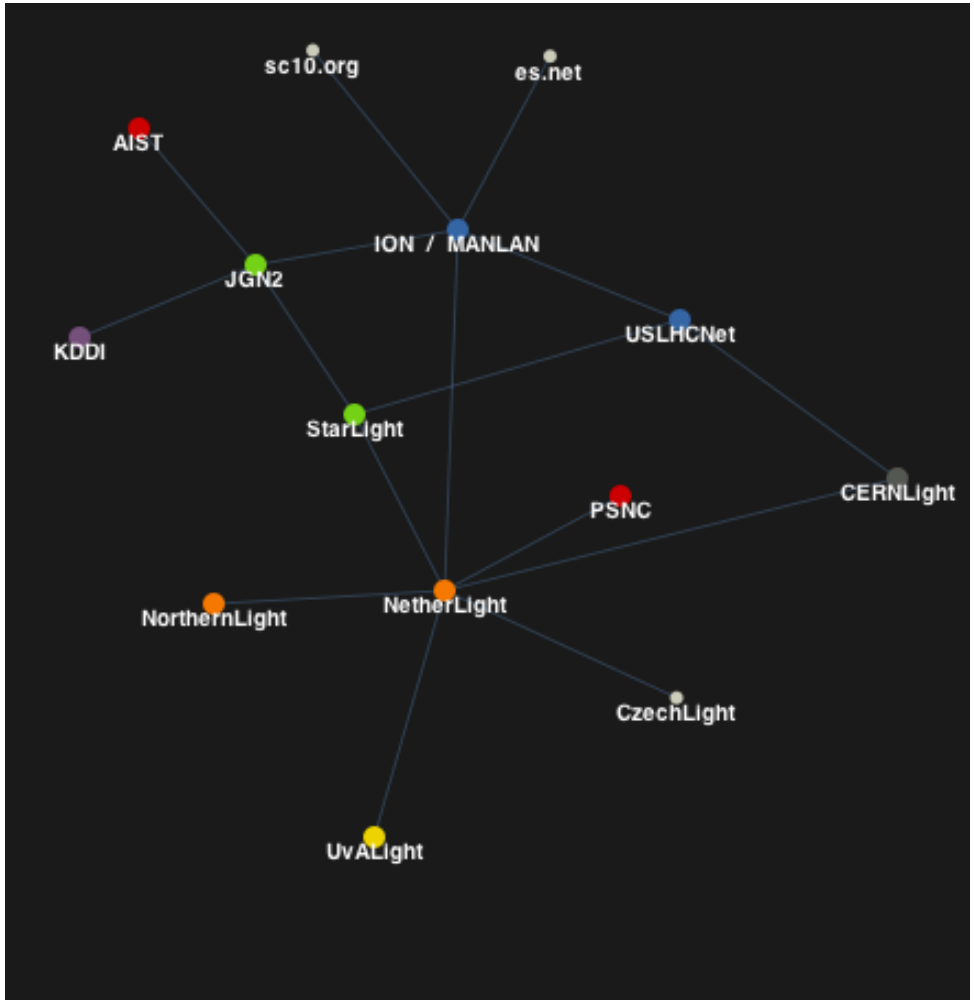
=

<u>Global Interoperability</u>

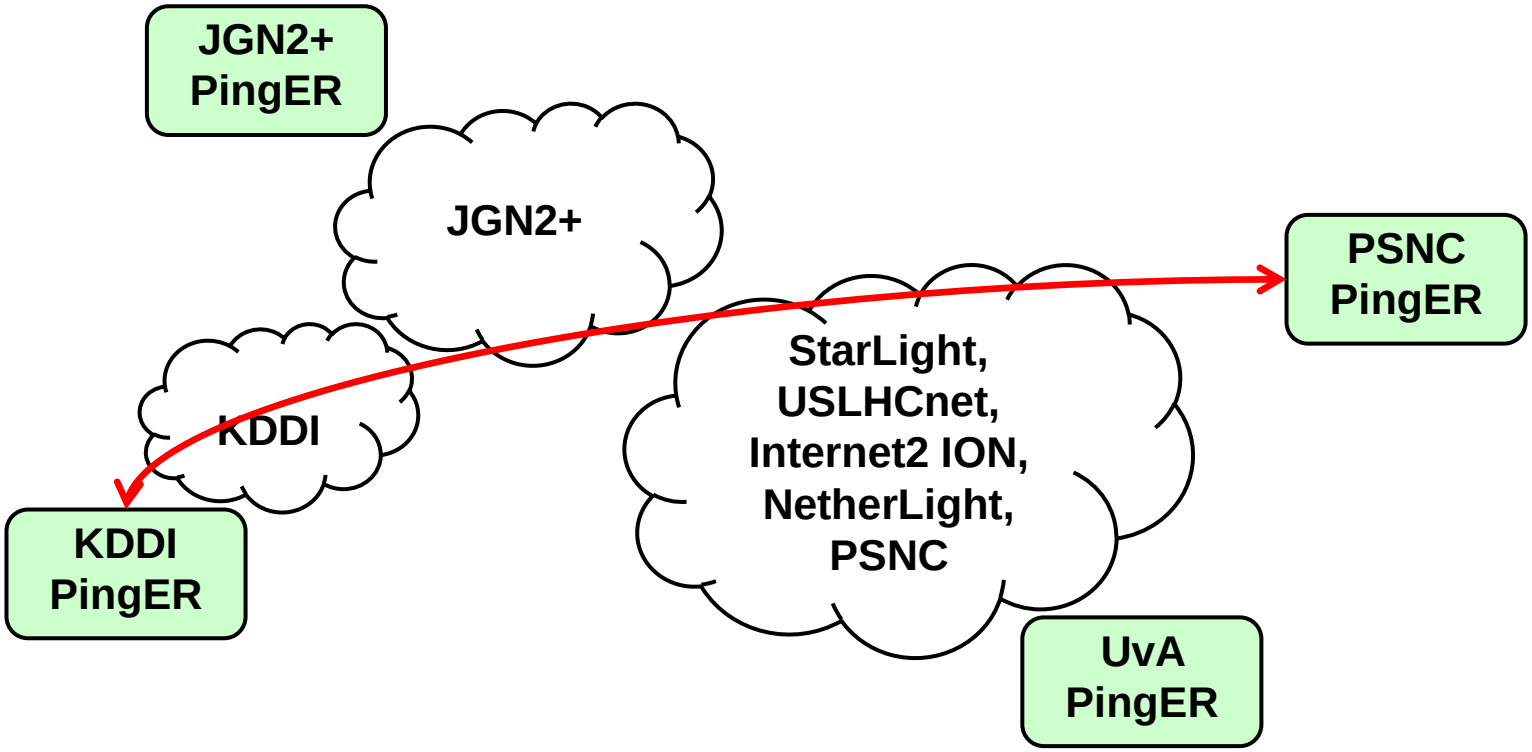
Global Deployment

- Asia:
  - JGN2+, AIST, KDDI
- USA:
  - ESnet SDN, Internet2 ION & MANLAN,
  - StarLight, USLHCnet, Caltech
- Europe:
  - Netherlight, CERNLight, University of Amsterdam,
  - NorthernLight, PSNC, CERNLight,

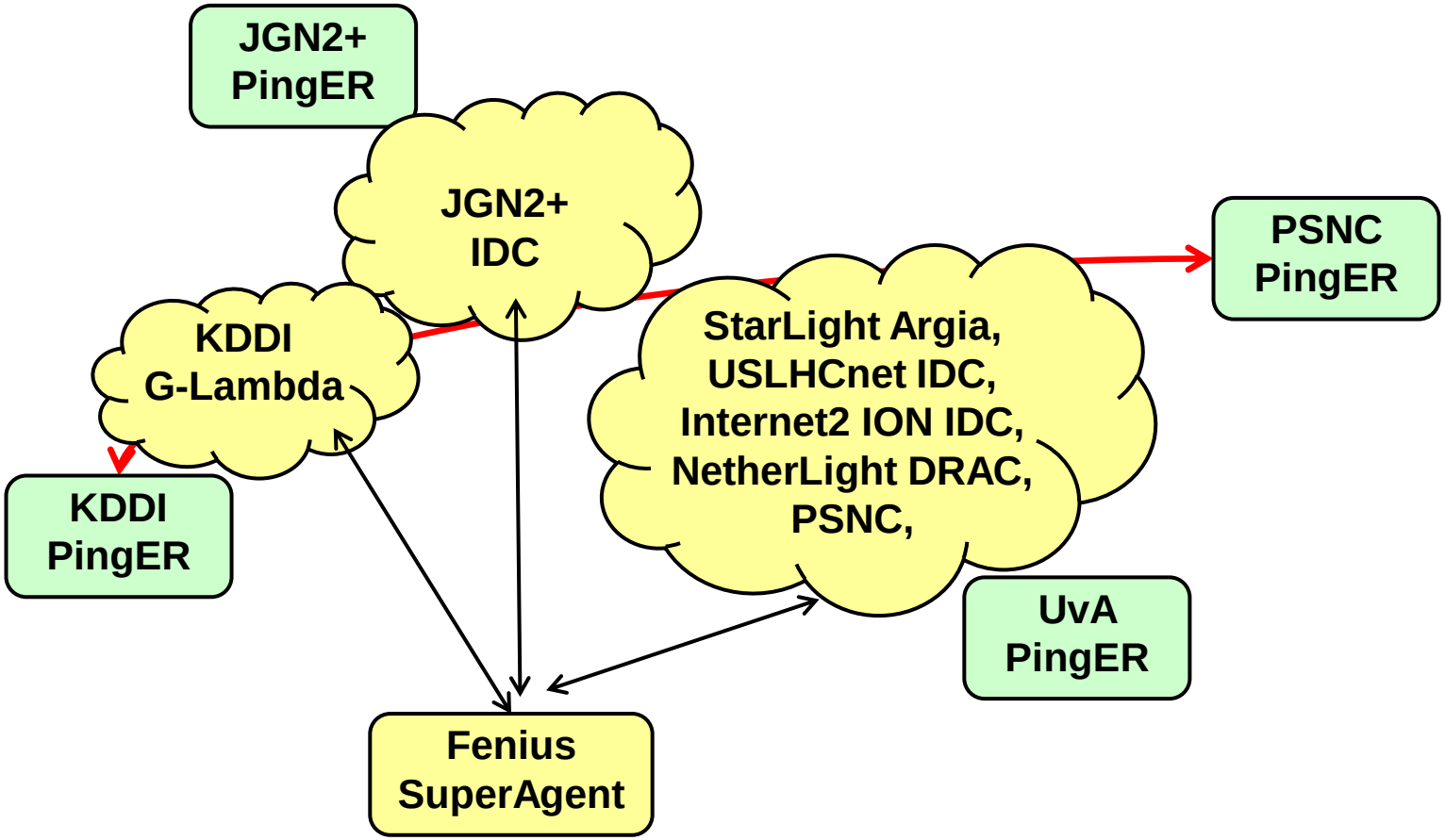
Global Deployment



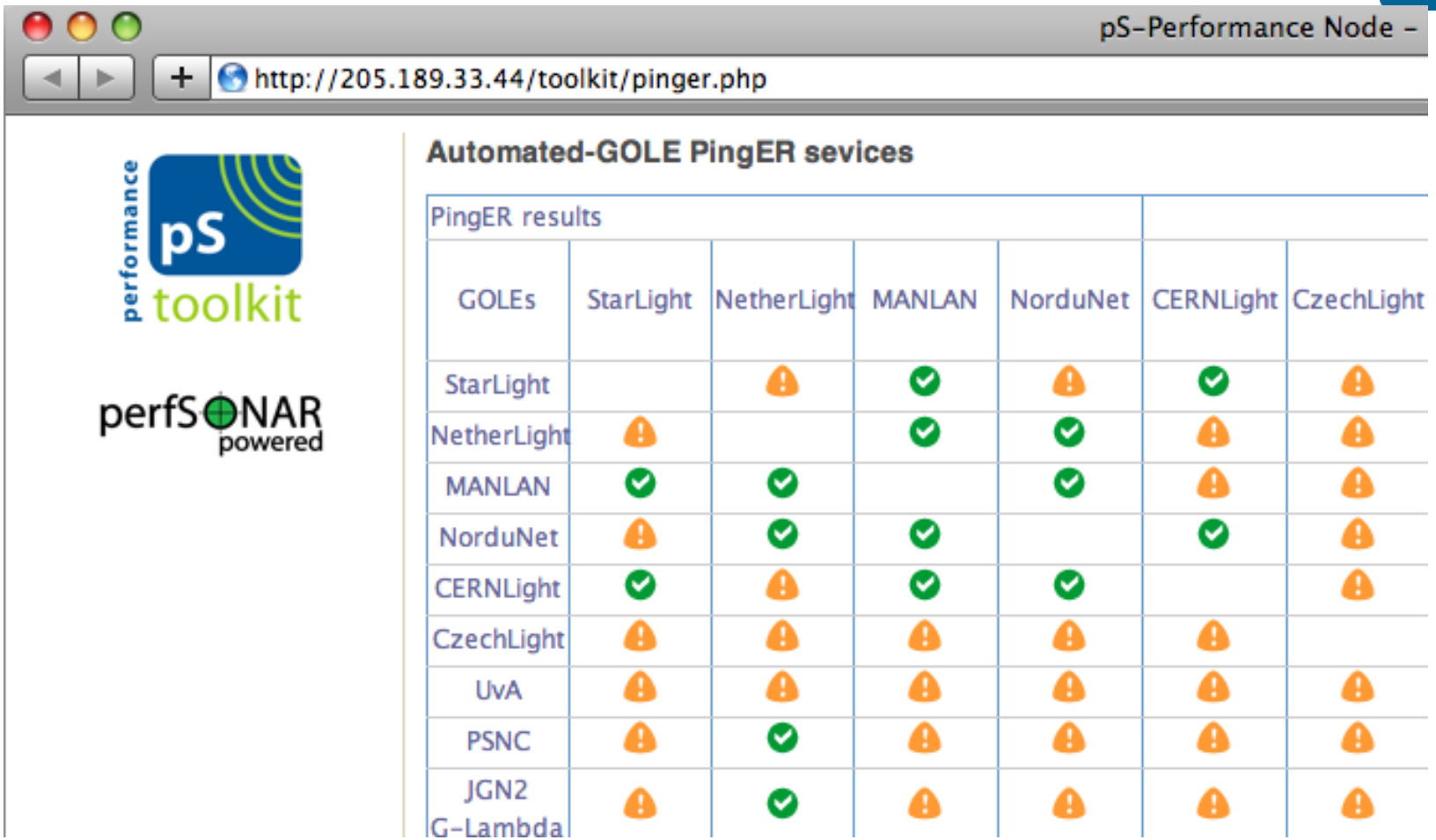
PingER Demonstration



Demonstration control plane



Demonstration

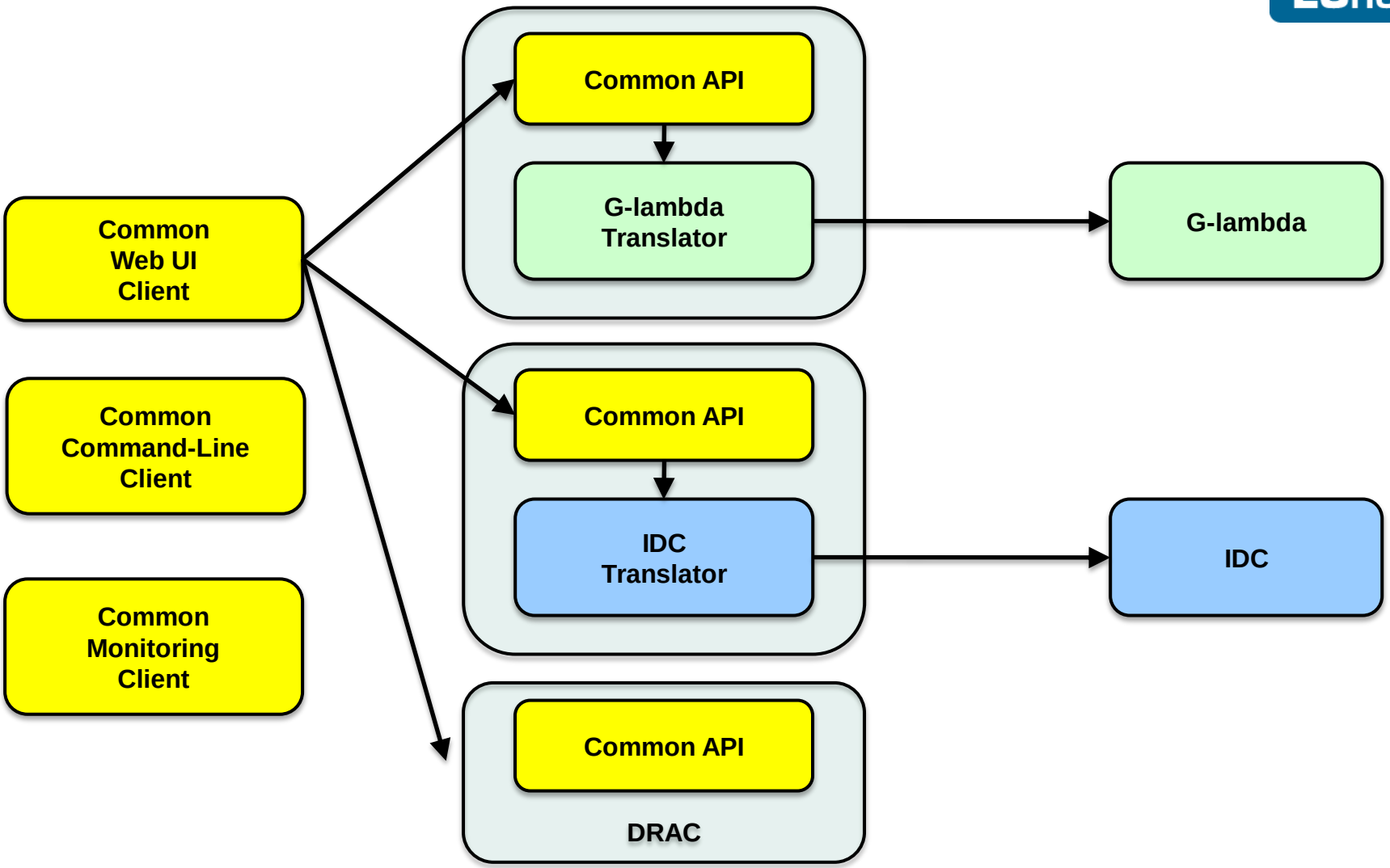


GOLEs	StarLight	NetherLight	MANLAN	NorduNet	CERNLight	CzechLight
StarLight		⚠	✓	⚠	✓	⚠
NetherLight	⚠		✓	✓	⚠	⚠
MANLAN	✓	✓		✓	⚠	⚠
NorduNet	⚠	✓	✓		✓	⚠
CERNLight	✓	⚠	✓	✓		⚠
CzechLight	⚠	⚠	⚠	⚠	⚠	
UvA	⚠	⚠	⚠	⚠	⚠	⚠
PSNC	⚠	✓	⚠	⚠	⚠	⚠
JGN2 G-Lambda	⚠	✓	⚠	⚠	⚠	⚠

Fenius Components

- Common provisioning API over web services,
- Translation framework for Java (optional)
- Translators for IDC, G-lambda, Harmony, dynamicKL
- Native implementation in OpenDRAC,
- Scriptable command-line client
- Web UI “Superagent” with topology and pathfinding
- Monitoring and visualization (in progress)

Translation Framework



Collaborations

- OGF NSI
  - Fenius will provide “lessons learned” experience
  - Can be used as a stepping stone towards standardsa doption
- OGF NML
  - We want to use NML topology information
- GLIF Automated GOLE
  - Fenius is used as the control plane that manages the automated GOLE effort

Future directions

- Deploy in more networks,
- Implement missing features,
- Extend API (keeping it simple!),
- Gain support from more network management software,
- Harden software & make it operational,
- Improve user interface
- Better documentation
- Take over the world!

Special Thanks

- Frank Blankman
- Scott Campbell
- Joan Garcia Espin
- John Graham
- Jeroen van der Ham
- Takatoshi Ikeda
- Nils Jacobson
- Gigi Karmous-Edwards
- Tomohiro Kudoh
- Kavitha Kumar
- Ali Lahlou
- Andrew Lake
- Tom Lehman
- Mathieu Lemay
- John MacAuley
- Gerben van Malenstein
- Edoardo Martelli
- Takahiro Miyamoto
- Azher Mughal
- Fumihiro Okazaki
- Jan Radil
- Jordi Ferrer Riera
- Sandor Rosza
- Ryousei Takano
- Thomas Tam
- Jin Tanaka
- Alan Verlo
- John Vollbrecht
- Fred Wan
- Xi Yang