



OSG Area Coordinators

Network Monitoring Update: **September 7 2016**

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Review Networking Goals Year 5

1. **Maintain / update the OSG networking services / documentation.**
2. **Reach out to non-WLCG OSG sites; Integrate those interested:**
 - Advertise that OSG is ready to help sites with networking issues via:
 - OSG web pages
 - Targeted email (Cyberinfrastructure list, perfSONAR user list, etc)
 - Via interactions with sites at conferences and meetings.
 - Encourage as many NSF CC*xxx sites as possible to integrate their perfSONAR instances into OSG networking; OSG will provide them a mesh-configuration and gather their data.
 - Provide Soichi's standalone mesh-configuration tool for use by campuses and VOs.
3. **OSG will create a network alerting service to find “obvious” network problems**
 - This will involve the creation of a suitable analysis pipeline such that perfSONAR data can be analyzed on a timescale of every 1-2 hours.
 - Obvious problems include significant decrease in bandwidth between a source and destination or continuing significant packet loss along a path or correlated with a specific site.
 - Actual alerts will be issued by GOC staff based upon alarms they receive.
4. **Enable automated alerting (email, SMS) on well identified alarms.**
 - This is a “reach” goal for the year but I think it should be feasible
 - Requires accurate, synchronized mapping of sites to contacts
 - Tunable pattern of alerts (e.g., 1 alert, wait 1 day and alert if problem continues, then every 3 days until fixed)

Near-term Milestones

- Creation of initial OSG web pages informing sites of OSG services in networking --- **July 30, 2016 (ready)**
- Recruiting of 5 new sites for OSG networking -- **August 31, 2016 (slipped)**
- Need technical design of suitable analysis system based upon existing time-series technologies and proposed data and analysis workflows --- **August 31, 2016 (partial)**
- Definition of support process for integrating new sites and triaging tickets in OSG production --- **September 15, 2016 (done)**
- Initial implementation of analysis running on OSG network data --- **September 30, 2016 (in process)**
- Initial release of Soichi's standalone mesh-configuration utility packaged and available --- **September 30, 2016 (?)**

OSG Networking Web Pages

- New front page ready: Needs comments/review and then push to production
- <https://www.itb.opensciencegrid.org/osg-networking/>
 - Kyle Gross worked with me to implement the new pages
 - Has pointers to user-support for sites with questions about networking
 - Redirects to Twiki pages if problems are suspected
 - Comments or suggestions very welcome.

Recruiting non-WLCG Sites

- The passed milestone was to recruit 5 (or more) non-WLCG sites who have perfSONAR instances to “join” OSG
 - This means they will use the OSG mesh-configuration to define tests
 - OSG will gather metrics from their instances
 - Our dashboard and `check_mk` will display their metrics and monitor their perfSONAR services
- Milestone needs the updated web pages in place AND identification of likely candidate sites
 - Can someone provide possible target sites I can contact?
 - Start with list of non-WLCG OSG sites?
 - Need to identify at least 5 to recruit from.
 - Suggestions needed and welcome.

Enabling Alarming

- We have a longer term goal of alerting and alarming on network issues.
- Milestone coming up: technical design of a suitable analysis system based upon existing time-series technologies
 - TBD: Work with Brian Bockelman to define target technology(ies)
- A step in this direction is setting up a network alarm list based upon problems identified via network analytics
 - Ilija Vukotic / UC has setup an ELK instance and associated Jupyter interface to support analyzing our network metrics.
 - Jerrod Dixon / Nebraska is working with this data from the CMS perspective (details on backup slides)
 - Need to define a few specific analyses to identify
 - All paths with packet-loss > 0.05% (tunable)
 - All paths with a significant and persistent change in measured bandwidth
 - We then automate running the analysis and displaying the results...
- Marian Babik and I are looking into check_mk rule-based notifications as a future means of implementing the alerting component. Not yet enabled but is feasible.

Recent Achievements

- Web pages in ITB updated and ready to push to production.
- Revised OSG ITB network services to use only the perfSONAR testbed mesh
 - Removed overload condition and tests Soichi's mesh-config
- Document describing mesh-config goals and process written and discussed
 - <https://docs.google.com/document/d/1WW0VtkngRTekcNRM6jt53rxhgiXEMxLR-IjvmaMzwQ/edit>
- Prototype of packet-loss analysis system using Jupyter and OSG network data sent to Elasticsearch operating
- Identification of “challenges” in operating the OSG network services

Concerns

- Operation of services
 - OSG production network service was “down” from August 23 till September 6th
 - Cause: updates applied but services not restarted
 - **Concern:** operations team did not pursue a solution in a timely way and SLA was not respected
 - **We need to discuss possible changes in how OSG will operate the network services.**
- Getting Soichi’s mesh-configuration into operation this month?
 - **Can we identify some way to support Soichi’s effort at ~10% for a few months?**
 - **Longer term rely upon perfSONAR developers to take over code?**
- Identifying suitable non-WLCG sites to benefit from OSG networking services (need ~5 sites identified to recruit)
- Long-term data lifecycle management
 - Still nothing from ESnet in this area; need something by EoY
 - perfSONAR developers management alerted and investigating options
- Convergence on “alarming” system.
 - Prototypes of most of the needed components are in place. Need to build the chain and enable continuous operation

How to Operate OSG Net Services?

- The recent extended outage for OSG production network services is prompting a discussion about what changes we should make
 - OSG “production” rules are in place to ensure SLA is met: didn’t work for OSG networking services
 - OSG networking is a complicated set of services including storage. No one expert for the entire system...many experts responsible for different components
 - Find root causes of service failures has been slow and complicated

Possible Changes / Discussion

- **Expose more information from OSG networking services for experts to access**
 - Put ALL relevant logs at a location accessible from jump and give all experts jump access
 - Put ALL relevant configs at a location accessible from jump and give all experts jump access
- **Give experts control of OSG network services**
 - Give root access on the OSG production network service VMs to the set of relevant experts.
 - Put configuration control of the OSG production network service VMs into the hands of relevant experts
- **Improve monitoring to identify states where the OSG network services are failing**
 - RSV probe checks
 - Message Queue status checks
- **Other options?**

Questions or Comments?

Thanks!

URLs of Relevance

- OSG Network Datastore Documents
 - Operations https://docs.google.com/document/d/11144BS0-88M0cLMMjKcKMIE-Q5s2IX-w3IYl-0Pn_08/edit#
 - SLA <https://twiki.grid.iu.edu/bin/view/Operations/PSServiceLevelAgreement>
- Current OSG network documentation
<https://www.opensciencegrid.org/bin/view/Documentation/NetworkingInOSG>
- Draft OSG web page document
<https://drive.google.com/drive/u/0/folders/0B63jqzjmiVgcOG5aMmgIcFo2SDA>
- OSG networking year-5 goals and milestones:
<https://docs.google.com/document/d/1FzmXZinO4Pb8NAfd5SWUzaAFYOL23dt66hQsDmaP-VI/edit>
- perfSONAR adoption tracking: http://grid-monitoring.cern.ch/perfsonar_coverage.txt
- Deployment documentation for both OSG and WLCG hosted in OSG (migrated from CERN)
<https://twiki.opensciencegrid.org/bin/view/Documentation/DeployperfSONAR>
- ATLAS Analytics: <http://cl-analytics.mwt2.org:5601/>
- Mesh-config in OSG <https://oim.grid.iu.edu/oim/meshconfig>
- Beta Mesh-config: <https://ps-test.sca.iu.edu/meshconfig/>
- MadAlert: <http://madalert.aglt2.org/madalert/diff.html>
- perfSONAR homepage: <http://www.perfsonar.net/>

Details on Ilija's / Xinran's Work

Concerning our own activities, we have been discussing with Shawn the possibility to start running notifications/alarms on some of the measurements, I guess two most obvious cases would be to detect sudden loss of throughput on a link (breaking a trend for N days moving average or similar) as well as detecting consistent packet loss and any changes in packet reordering and jitter (I guess last two are not currently imported in ES). Can the ES service help us compute some of this, so we could just query it and issue an alarm (we can start off with simple avg over all links for a site, but eventually we will probably want to look at each individual link) ?

I have a summer student Xinran Wang that I have tasked to understand the measurements we are collecting and creating an alerting service and you can see his task list here:

https://docs.google.com/document/d/1YPSjPzLn9uwI1rl_6_pZmekJ-GK8yLV0tXx-AhTe6QQ/edit?usp=sharing

The other thing we have been discussing was to generate a network map of WLCG and use it to detect when routing changes occur and maybe correlate this with some other measurements - here I'm not sure how ES could help, I have done some prototyping with Neo4J and heard that ES plans to have support for graphs, but not sure about the details. An alternative might be to implement some of this in SPARK graphX, which is what I mentioned at the throughput call some time ago, do you plan to support some streaming analytics platform in the future ?

I was also thinking about adding path data to the ES... I thought that it would be the best to:

- a) calculate hashes for paths
- b) once a day report paths and hashes and the rest of the time only hashes.
- c) store paths in a new index, store hashes together with the data on OWD, packet loss, throughput.
- d) for investigative plotting we could use Jupyter
- e) for some fancy page one could use whatever jquery + whatever plotting library + ES as a backend.

We will have streaming analytics later but nothing right now.

Details on Jerrod's Work

- The perfSONAR data gathered on the ATLAS-kibana server is currently assisting a project investigating the affects of the grid network on the performance of jobs based on geographic location and the transference of the dataset between storage location and computing location.
- Jerrod is using the Jupyter portal at <http://uct2-lx2.mwt2.org:9999/> to do this investigation