WLCG Networking Topics from the LHCONE/LHCOPN Meeting

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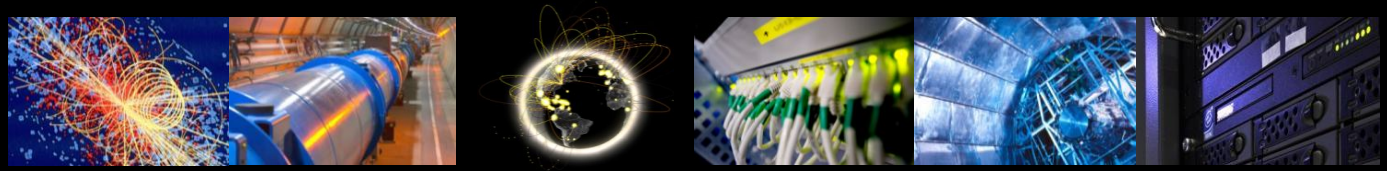
https://indico.cern.ch/event/1162261/contributions/5124358/



WLCG Worldwide LHC Computing Grid

Open Science Grid

Overview

The October LHCONE/LHCOPN meeting at CERN two weeks ago covered a number of interesting network topics: https://indico.cern.ch/event/1146558/

Besides the usual presentations on the LHCOPN and LHCONE networks, there were updates and inputs from HEP / Astro collaborations and talks on new tools, methodologies and technologies.

That meeting, which brought together the networks and experiments, also provided an opportunity for these communities to discuss the WLCG Data Challenges via a follow-on side meeting: https://indico.cern.ch/event/1212782/

Today I want to note some important topics from these meetings

Network Topic: perfSONAR infrastructure

Updating and maintaining our perfSONAR infrastructure

- New version of perfSONAR (v5) will transition to a new measurement archive and enable a transition to a new network data pipeline (lower lat/less parts)
  - Sites will need to manually update (New OS) but don't need to backup/restore data.
- We have seen some challenges keeping perfSONAR's properly operational, with some instances failing to run tests, not properly implementing the central configuration or going offline/crashing
  - perfSONAR devs have open bug reports to address many of these
  - Need to plan a campaign after v5 is released, especially if we want to use this infrastructure to identify and fix network issues before DC24.
- Sites need to plan to update **hardware** as well as keeping the perfSONAR software updated
  - It is important to have bandwidth instances match typical storage servers at a site.

Network Topic: Network Capacity Planning

Network capacity planning, both for sites and network providers

- Are sites aware of HL-LHC networking requirements?
  - Need to incorporate the requirements with an appropriate timeline: too early is too expensive while waiting too long risks crippling the usability of the site; also supply chain, implementation delays also need to be considered.
  - We need to make sure all our sites ARE aware and planning appropriately.
- Are campus network teams & administrators incorporating LHC needs into their planning?
  - It is very important that everyone involved is aware of the requirements and timescale so they can appropriately plan and time their upgrades.
- Are regional networks aware of both HL-LHC and site requirements?
  - If sites upgrade to new higher capacities, it has implications for their regional networks (as well as the R&E backbone providers).
  - Does the regional network plans mesh with those of its sites?

Network Topic: Expansion and Evolution of LHCONE

Expansion and Evolution of LHCONE

- Will we continue to add new collaborations to LHCONE or create new L3 VPNs (MultiONE)?
- How best to coordinate the use of our global R&E networks amongst an increasing number of scientific collaborations using those networks?
- Are there missing features or capabilities that we should consider adding to “LHCONE” or our R&E networks in general?
- How can opportunistic resources like commercial clouds or HPCs be incorporated into LHCONE?

Topics from the WLCG Network DC Side Meeting

The side meeting (after the LHCONE/LHCOPN) was targeted towards identifying milestones and mini-challenges to prepare for the next data challenge.

- Notes are available at https://docs.google.com/document/d/1zWZMR5U6-nhX1Zo8u-_TR0Nt9L3sUiTyQAo9c9Qsjts/edit

However the discussion evolved in interesting ways and we didn't end up finishing many concrete steps or timelines.

For this presentation, I wanted to call out a few specific topics in the next few slides.

We should have time to discuss any of the topics and determine what action items and next steps are needed.

Discussion about DC24

During the side meeting after the LHCONE/LHCOPN, we discussed DC24 topics:

- Clarifying the Target DC24 Details
- Monitoring
- Transfer tools and applications
- Storage configuration and use-cases
- Network Capabilities, SDN and Orchestration
- Scope, experimental coordination, involvement of VOs outside of WLCG, HEP?

Goal was to create a table highlighting milestones or mini-challenges needed:

Milestone / Mini-challenge	Target Dates	Description
Milestone	March 2023	Get perfSONARs upgraded (to 5.x?) and operational across most important WLCG sites.
Capability	March to October 2023	Define and then instantiate performance metrics at all participating organizations for data challenge 2.
SDN milestones		Steps to get Rucio/SENSE SDN stuff working at sites willing/able to incorporate in DCs to do this

Network Topics from the DC24 Discussions

Some of the important network related areas we need to work on for DC24:

- Update and utilize **perfSONAR** to clean up links before DC24.
- Enable **packet marking** and **flow labeling** for a significant portion of DC24.
- Instrument and document **site networks**, for at least our largest sites.
- Plan for network orchestration using **Rucio/SENSE** for a set of production sites
  - We will need a set of sites who are interested in testing things out using their production systems.
- **Network planning**: we need to make sure our sites and their local and regional networks are aware of our requirements and timeline and are planning appropriately
  - May need to extend what ESnet has been doing in the US to other regions
- **IPv6** should be enabled everywhere not just because of packet marking, but because it will allow us to get back to a single stack sooner!

My Takeaways from the Discussion

For DC24, sites should **NOT** prematurely purchase equipment just to meet the target.

The “Flexible” target involving our Tier-2s is the relevant target (x2 from base)

Planning and executing on a set of quarterly milestones or mini-challenges in specific areas will be **crucial** for our success.

Since data challenges are meant to evaluate our capabilities when all WLCG experiments are operating at the same time, it may also be important to involve other VOs that will have a large global footprint to also participate.

Part of the value of DC24 will be to engage with sites, regional, national and international networks to ensure the **planning** and **timelines** for upgrades are well matched to our needs and as cost effective as possible.

Possible Action Items for Discussion

We need ongoing activities in perfSONAR, the WLCG Monitoring TF, the RNTWG and the GNA-g/SENSE/NOTED areas to continue, with appropriate milestones / mini-challenges leading to DC24. **How best to organize the work and get the needed effort to ensure our success?**

The scale and timing of the DCs was set before the HL-LHC schedule slipped. It seems to make sense to formally change the target for DC24 to something like **20% (or 22% or 25%)** and we should discuss this and then formally make the change if agreed.

Critical to our success will be defining and acting on a set of ~quarterly milestones and mini-challenges leading up to DC24. Can we agree on a timeline and set of names to create the needed items in an “official” doc?

Questions, Comments, Discussion…

Comments, Discussion?

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Relevant URLs

- OSG/WLCG Networking Documentation
  - https://opensciencegrid.github.io/networking/
- perfSONAR Infrastructure Dashboard
  - https://atlas-kibana.mwt2.org:5601/s/networking/goto/9911c54099b2be47ff9700772c3778b7
- perfSONAR Dashboard and Monitoring
  - http://maddash.opensciencegrid.org/maddash-webui
  - https://psetf.opensciencegrid.org/etf/check_mk
- perfSONAR Central Configuration
  - https://psconfig.opensciencegrid.org/
- Toolkit information page
  - https://toolkitinfo.opensciencegrid.org/
- Grafana dashboards
  - http://monit-grafana-open.cern.ch/
- ATLAS Alerting and Alarming Service: https://aaas.atlas-ml.org/
- The perfSONAR Dashboard application: https://ps-dash.uc.ssl-hep.org/
- ESnet WLCG Stardust Dashboard: https://public.stardust.es.net/d/XkxDL5H7z/esnet-public-dashboards?orgId=1