

# IPv6 and the WLCG

Alastair Dewhurst

**Two louder than IPv6!**

# Motivation

- We want the LHC physics program to be limited by as few things as possible.
  - Cost limits the total CPU, Disk, Tape available.
- IPv6 should NOT be a limiting factor.
  - For sites with limited IPv4 addresses, native IPv6 could be cheaper/simpler.
  - Opportunistic resources (eg HPC) might only have IPv6 addresses.
- We need (most) sites to be IPv6 ready BEFORE the first genuine use case.
- Migrations take a long time:
  - Some sites may choose to re-engineer entire site networking.
- Success is measured by how little users notice they are now using IPv6!



# De-Motivation

I am pleased to report record levels of apathy for my IPv6 talks!

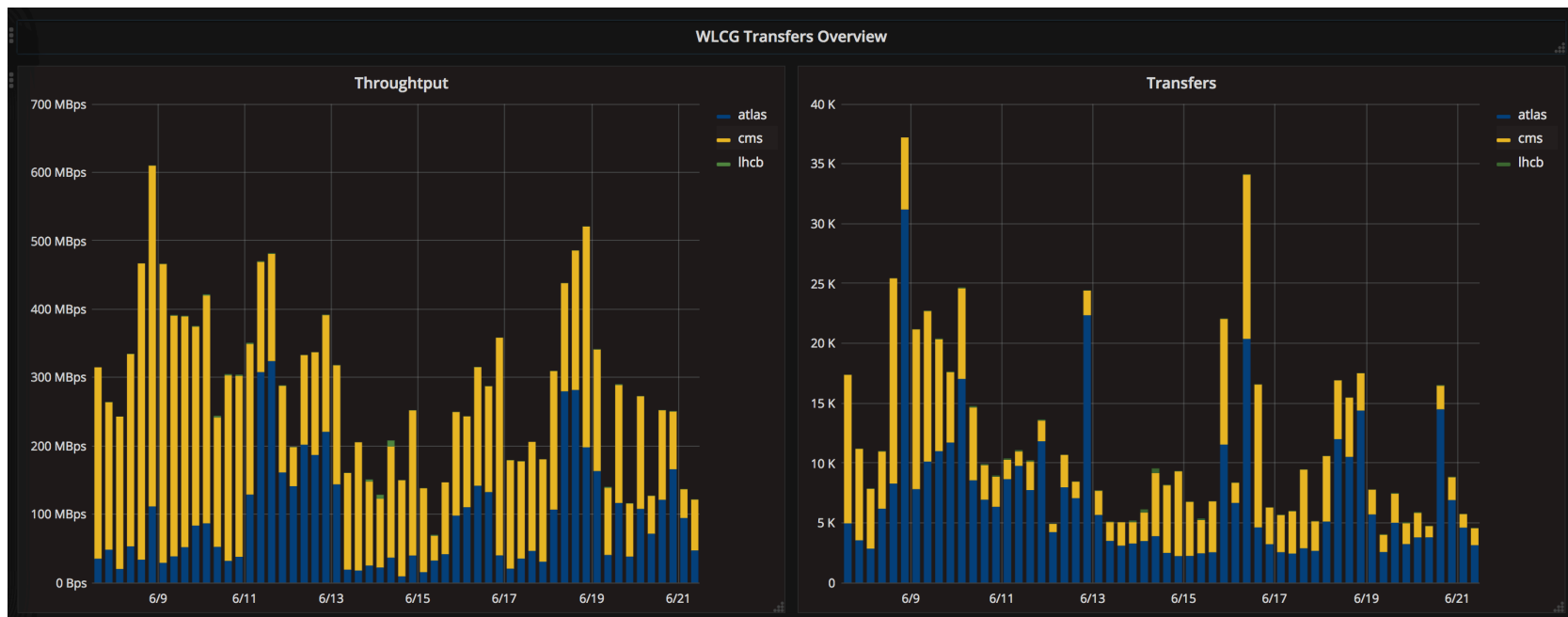


Alastair Dewhurst, 21<sup>st</sup> June 2017



# Current Status

- IPv6 Traffic makes up about 2% of total WLCG throughput.
- 9% of WLCG services are dual stack (according to Bdii):
  - [http://orsone.mi.infn.it/~prelz/ipv6\\_bdii/](http://orsone.mi.infn.it/~prelz/ipv6_bdii/)
- ~20% of google searches are from IPv6 addresses.



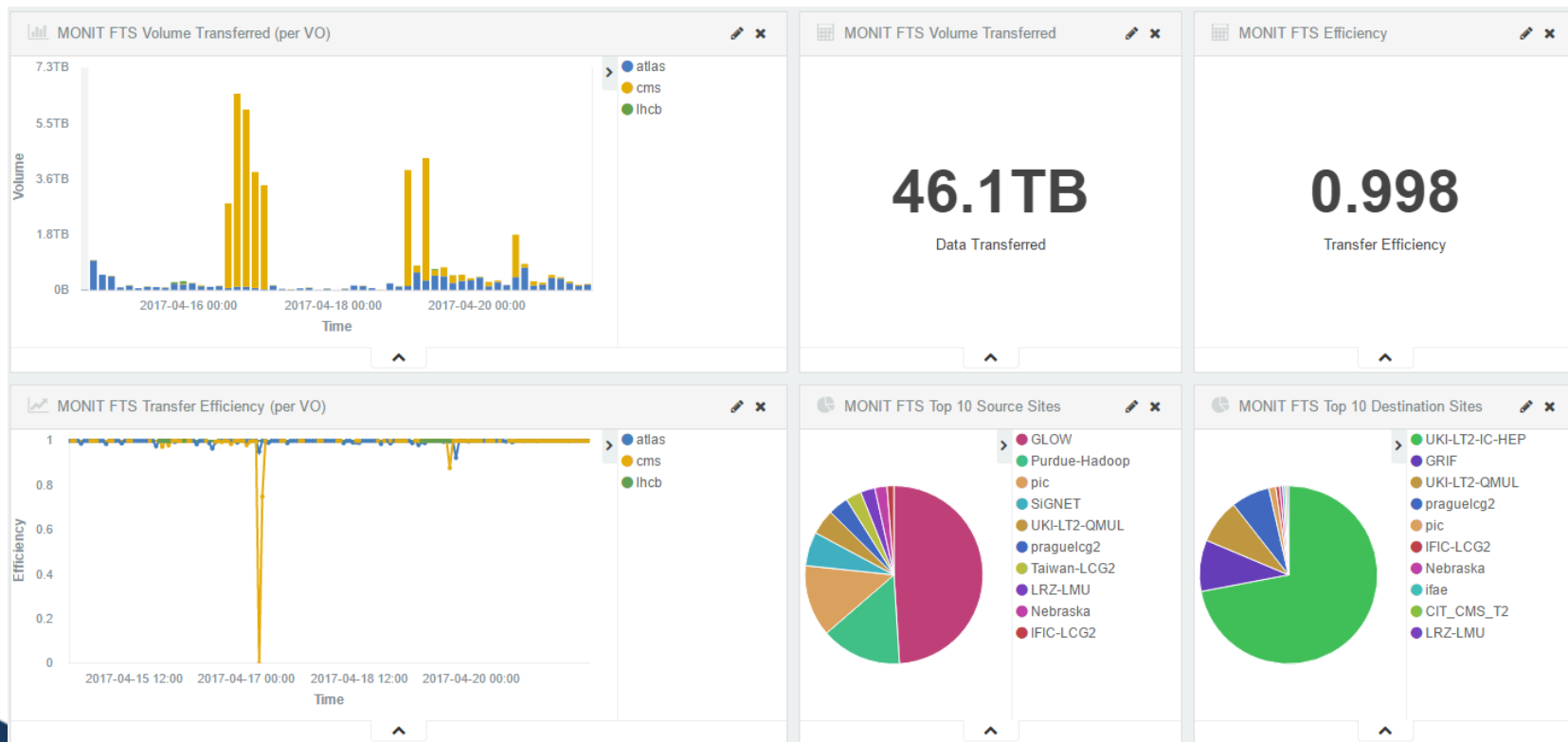
[https://monit-grafana.cern.ch/dashboard/db/wlcg-transfers-dashboard-detailed?orgId=1&from=now-14d&to=now&var-group\\_by=vo&var-vo=All&var-src\\_country=All&var-dst\\_country=All&var-src\\_site=All&var-dst\\_site=All&var-technology=All&var-bin=6h&var-rp=&var-filters=ipv6%7C%3D%7Ctrue](https://monit-grafana.cern.ch/dashboard/db/wlcg-transfers-dashboard-detailed?orgId=1&from=now-14d&to=now&var-group_by=vo&var-vo=All&var-src_country=All&var-dst_country=All&var-src_site=All&var-dst_site=All&var-technology=All&var-bin=6h&var-rp=&var-filters=ipv6%7C%3D%7Ctrue)

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# Network Monitoring

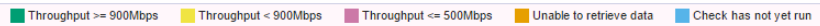
- 'Old' Network monitoring pages were better!
- Plot from HEPiX (Almost exactly 2 months ago)
- 0.5% of Traffic went over IPv6



# Dual-stack mesh

If only there had been some kind of network monitoring discussion where I could have raised my concerns...

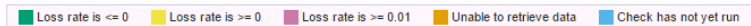
Dual-Stack Mesh Config - IPv6 Bandwidth Test



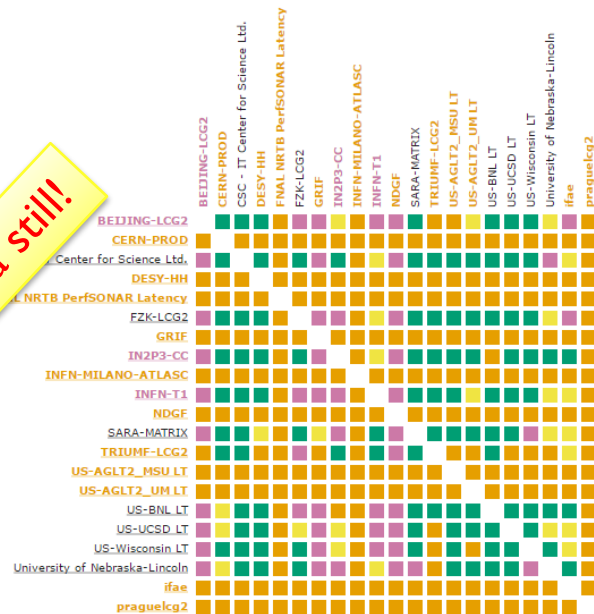
⚠ Found a total of 29 problems involving 16 hosts in the grid



Dual-Stack Mesh Config - IPv6 Latency Test



⚠ Found a total of 14 problems involving 14 hosts in the grid



Lots of missing data still!

<http://maddash.aglt2.org/maddash-webui/index.cgi?dashboard=Dual-Stack%20Mesh%20Config>

Alastair Dewhurst, 21<sup>st</sup> June 2017



# WLCG deployment plan

- By April 1<sup>st</sup> 2017:
  - Sites can provide IPv6-only CPUs if necessary.
  - Tier-1's must provide dual-stack storage access.
  - **1 GB/s performance and 90% availability.**
  - CVMFS Stratum-1 service at CERN must be dual-stack.
  - A dedicated ETF infrastructure to test IPv6 services must be available.
  - The VOs must deploy all services interacting with WNs in dual-stack.
- All the above, to be achieved without disrupting normal WLCG operations.



# WLCG deployment plan (2)

- By April 1st 2018:
  - Tier-1's must provide dual-stack storage access in production.
  - Tier-1's must upgrade their Stratum-1 and FTS to dual-stack.
  - The official ETF infrastructure must be migrated to dual-stack.
  - GOCDB, OIM, GGUS, BDII should be dual-stack.
- By end of Run2:
  - A large number of sites will have migrated their storage to IPv6.
  - The recommendation to keep IPv4 as a backup will be dropped.





# Site Progress

- A significant amount of progress has been made by most Tier 1 sites.
  - Not all sites managed to meet deadlines, requests for more details of when they will be met have been sent out.
  - Please Update: <http://hepix-ipv6.web.cern.ch/sites-connectivity>
- Not going to name and shame any sites today, but might be necessary at next WLCG workshop...
  - Is this because RAL may have missed the deadline?
    - You might think that, I couldn't possibly comment.
- Steady rate of Tier-2s contacting working group about migration!



# VO Progress

- Brunel have a (test) CE with IPv6 only WN behind it.
- Test jobs have succeeded from ATLAS, CMS and LHCb.
- [http://bigpanda.cern.ch/jobs/?computingsite=UKI-LT2-Brunel\\_ipv6\\_TEST&hours=12&display\\_limit=100](http://bigpanda.cern.ch/jobs/?computingsite=UKI-LT2-Brunel_ipv6_TEST&hours=12&display_limit=100)
- ALICE claim their software is ready.
- They require all their data to be available over IPv6.



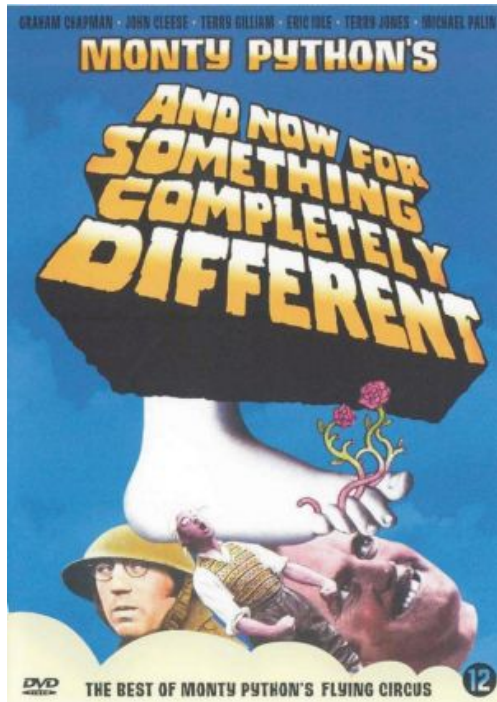
# Conclusion

- IPv6 usage worldwide continues to grow rapidly.
- A lot of progress has been made by the WLCG but we are still behind.
  - Need to engage with ALL Tier-1s this year.
  - Encouraging Tier-2 to migrate.
- VO infrastructure is working but with limited testing so far.



# Up Next...

Talks from people who actually understand IPv6!



16:00	<b>WLCG and IPv6</b> <i>University of Manchester</i>	<i>Alastair Dewhurst et al.</i> 16:00 - 16:20
	<b>An introduction to IPv6</b> <i>University of Manchester</i>	<i>Mr. Terry Froy</i> 16:20 - 16:50
17:00	<b>Deploying IPv6</b> <i>University of Manchester</i>	<i>Francesco Prez</i>  16:50 - 17:10
	<b>DHCPv6 at CERN</b> <i>University of Manchester</i>	<i>Edoardo Martelli</i>  17:10 - 17:30
18:00	<b>Hands-on preparation</b> <i>University of Manchester</i>	17:30 - 18:00

