GridPP

UK Computing for Particle Physics

IPv6

Duncan Rand
Imperial College

- IPv4 addresses are running out

- CERN's new Tier-0 Wigner needs 150K virtual machines (worker nodes) and there aren't that number of IPv4 addresses available

- Current virtual machine adoption plan will cause IPv4 depletion during 2014

- Considering two options
  - VMs with only public IPv6 addresses
  - VMs with private IPv4 and public IPv6 addresses

- More details from Edoardo's slides:

  https://indico.cern.ch/getFile.py/access?contribId=2&sessionId=0&resId=1&materialId=0&confId=251056

- Started in April 2011 to look at 'whether and how IPv6 should be deployed in HEP and WLCG'
- Regular Vidyo and face to face meetings and email list
- Run by Dave Kelsey. Mark has been a long term member and Imperial and QMUL joined more recently
- Mail list ipv6@hepix.org (it is low volume)
- Please feel free to join in

- http://hepix-ipv6.web.cern.ch/
- https://w3.hepix.org/ipv6-bis/doku.php?id=ipv6:introduction
- Meetings : http://indico.cern.ch/categoryDisplay.py?categId=3538

- Set up a testbed of 11 gridftp hosts copying 1 GB files between themselves using 'globus-url-copy –ipv6'

- 2 PB of data transferred, generally reliable transfers

- Imperial and Glasgow are members

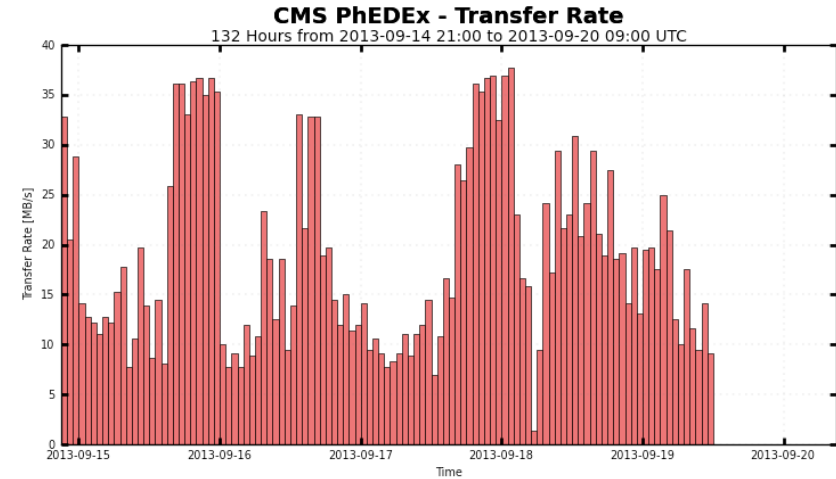- https://w3.hepix.org/ipv6-bis/doku.php?id=ipv6:testbed

HEPIX testbed transfers

- Now includes IHEP in China

- More UK sites can join the testbed or…

Slide courtesy of Tony Wildish

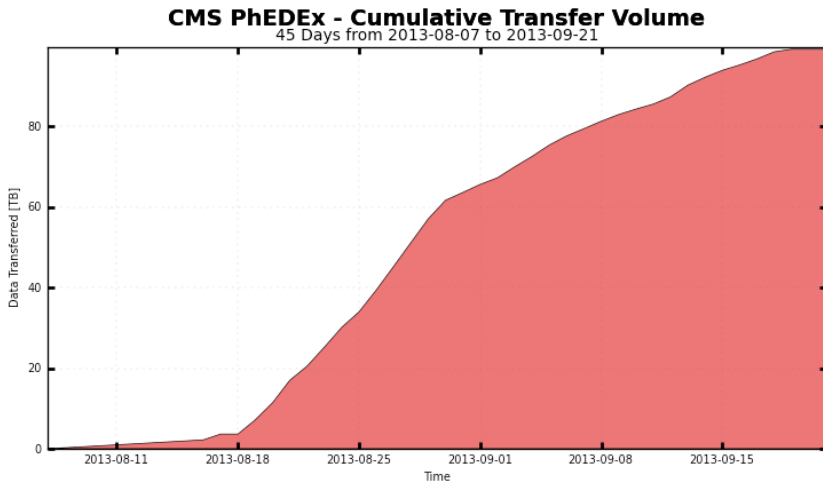- During the July F2F meeting Simon set up a dual-stack FTS3 server
  http://fts00.grid.hep.ph.ic.ac.uk:8080/fts3/ftsmon/jobs

- Addionally, Imperial and Glasgow have both set up IPv6-only DPM SE's

- Recently, Tony Wildish (CMS) set up a PhEDEx service using the IC FTS server and existing IC PhEDEx host to transfer between IPV6 DPM's at IC and Glasgow
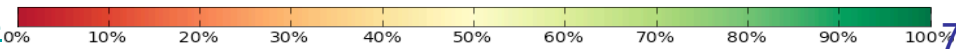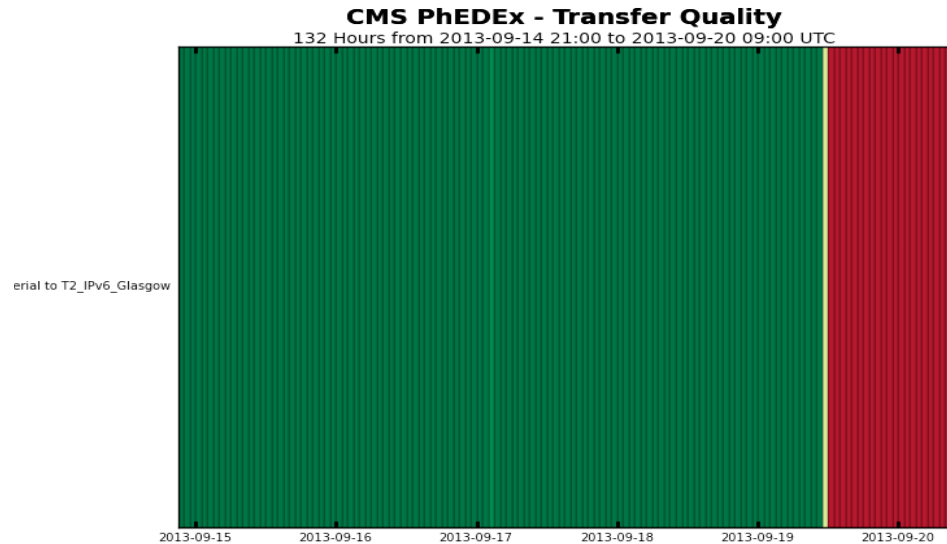
- About 100 TB transferred

- Generally very good transfer quality

CMS PhEDEx - Transfer Rate
132 Hours from 2013-09-14 21:00 to 2013-09-20 09:00 UTC

T2_IPv6_Imperial to T2_IPv6_Glasgow

Maximum: 37.78 MB/s, Minimum: 1.39 MB/s, Average: 19.01 MB/s, Current: 9.17 MB/s

CMS PhEDEx - Cumulative Transfer Volume
45 Days from 2013-08-07 to 2013-09-21

T2_IPv6_Imperial to T2_IPv6_Glasgow

Total: 99.25 TB, Average Rate: 0.00 TB/s

CMS PhEDEx - Transfer Quality
132 Hours from 2013-09-14 21:00 to 2013-09-20 09:00 UTC

erial to T2_IPv6_Glasgow

https://brazil.accre.vanderbilt.edu:4443/phedex/prod/Activity::Rate
https://phedex-web-dev.cern.ch/phedex/tbedii/Activity::Rate

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- Several of the member institutes of HEPIX WG, including CERN, are in the process of building IPv6 test clusters

- In the UK Glasgow have an IPv6 DPM (with MariaDB rather than MySQL) and are developing a compute cluster

- Imperial have set up a small IPv6 EMI-3 test site with DPM (head node only), CREAM CE (SGE) and one WN. Dual-stack services include UI, WMS, top BDII, site BDII, LFC, squid, nagios etc

- Oxford have a dual-stack EMI-3 UI and plan to deploy IPv6 test cluster once EMI-3 SL6 transition completed

- QMUL are preparing to test Storm

- Can run jobs from dual-stack UI to IPv6-only CREAM CE and WN via dual-stack WMS
  - SGE needs a 'semi-private' IPv4 network to operate

- lcg-cp broken because of globus-url-copy problems but a fix may be on the way soon with release of Globus Toolkit 5.2.5 due this week

  https://ggus.eu/ws/ticket_info.php?ticket=86101

- ARC CE was thought to be IPv6 ready
  - can submit jobs to an ARC CE from a dual-stack UI running older arc clients
  - but recently I discovered this no longer seems to be the case with latest arc clients
  - seems to be a gridftp problem
    http://bugzilla.nordugrid.org/show_bug.cgi?id=3254

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- The WLCG recently set up an IPv6 task force, led by Andrea Sciaba and Simone Campana, to establish a close collaboration with the HEPiX IPv6 WG

- Wiki with a list of use cases and software status:
    https://twiki.cern.ch/twiki/bin/view/LCG/WlcgIpv6

- perfSONAR is IPv6 ready and used in the US research and education networks (REN) like ES2net and Internet2

- e.g. KanREN have modified the GUI to show IPv6 and IPv6 results explicitly
  http://ps-data.kanren.net/toolkit/

- For more details see
  http://www.nitrd.gov/nitrdgroups/images/2/2a/JET-pS-IPv6-V2.pdf

Service Graphs

Throughput
IPv4 Throughput Mesh
IPv6 Throughput Mesh
One-Way Latency
IPv4 Jitter Mesh
IPv6 Jitter Mesh
Ping Latency (WSU)
Ping Latency (KSU)
Ping Latency (KU)
Ping Latency (Grand)

```
{
    "administrators" : [
        {
            "email" : "duncan.rand@imperial.ac.uk",
            "name" : "Duncan Rand"
        }
    ],
    "organizations" : [
        {
            "sites" : [
                {
```

- Imperial perfSONAR hosts are both dual-stack with –v4 and –v4 hostnames
- QMUL has a similar dual-stack perfSONAR host in IPv6 VLAN
- Oxford perfSONAR hosts also have IPv6 addresses and –v4 and –v6 hostnames, but at the moment, only the latency host is accessible over IPv6
- Developing a UK IPv6 mesh with 'ipv6_only=1' flag

```
            ],
            "measurement_archives" : [
                {
                    "read_url" : "http://netmon01-v6.grid.hep.ph.ic.ac.uk:8086/perfSONAR_PS/services/traceroute_ma",
                    "write_url" : "http://netmon01-v6.grid.hep.ph.ic.ac.uk:8086/perfSONAR_PS/services/tracerouteCollector",
                    "type" : "traceroute"
                },
                {
                    "read_url" : "http://netmon01-v6.grid.hep.ph.ic.ac.uk:8085/perfSONAR_PS/services/pSB",
                    "write_url" : "netmon01-v6.grid.hep.ph.ic.ac.uk:8569",
                    "type" : "perfsonarbuoy/owamp"
                },
                {
                    "read_url" : "http://netmon01-v6.grid.hep.ph.ic.ac.uk:8075/perfSONAR_PS/services/pinger/ma",
                    "type" : "pinger"
                }
            ],
            "description" : "UKI-LT2-IC-HEP Tier-2 IPv6 Latency Host"
        }
```

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- Please keep the GridPP sites status wiki up to date so we can track the situation

- Our expertise is in running sites

- Do we want to roll out a few more dual-stack hosts at more sites?

IPv6 site status

Site	Discussed with local networking team	Asked for some IPv6 addresses	Has IPv6 addresses	IPv6 enabled hosts (1)	IPv6 hostnames resolvable via IPv6 (2)	Joined HEPIX testbed	Notes
RAL Tier-1							
UKI-LT2-Brunel	Yes	Yes	Yes				
UKI-LT2-IC-HEP	Yes	Yes	Yes	Yes	Yes	Yes	
UKI-LT2-QMUL	Yes	Yes	Yes	Yes	No	No	Test VLAN including additional dual-stack perfSONAR host which also does jumbo frames. RIPE atlas probe.
UKI-LT2-RHUL	Yes	Not yet	No	No	No	No	
UKI-LT2-UCL-HEP	Not yet	No	No	No	No	No	
UKI-NORTHGRID-LANCS-HEP	Yes	Not yet	No	No	No	No	Revisiting in the autumn, hope to set things up then.
UKI-NORTHGRID-LIV-HEP	Yes	No	No	No	No	No	No
UKI-NORTHGRID-MAN-HEP							
UKI-NORTHGRID-SHEF-HEP							
UKI-SCOTGRID-DURHAM	Yes	Yes	No				
UKI-SCOTGRID-ECDF							
UKI-SCOTGRID-GLASGOW	Yes	Yes	Yes	Yes	Yes	Yes	Building a dual stack test cluster.
UKI-SOUTHGRID-BHAM-HEP	Yes	No	No	No	No	No	University is (in theory) going to roll out IPv6 with the network upgrade in the next 6-12 months
UKI-SOUTHGRID-BRIS							
UKI-SOUTHGRID-CAM-HEP	Yes	No	No	No	No	No	University ready and willing - limited manpower at site
UKI-SOUTHGRID-OX-HEP	Yes	Yes	Yes	Yes	No	No	Testing stage
UKI-SOUTHGRID-RALPP	Yes	No	No	No	No	No	
UKI-SOUTHGRID-SUSX	Yes	Yes	No	No	No	No	

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United Kingdom Universities

Organisation (domain)	Web	Mail	DNS	NTP
Brunel University (brunel.ac.uk)	FAIL	FAIL	0/3 1/4	
Imperial College London (ic.ac.uk)	SUCCESS	SUCCESS	2/3 3/4	PROBLEM
Kings College London (kcl.ac.uk)	FAIL	FAIL	0/4 1/5	FAIL
London School of Economics and Political Science (lse.ac.uk)	FAIL	FAIL (M)	0/3 0/5	
Loughborough University (lboro.ac.uk)	SUCCESS	FAIL	0/0 4/4	FAIL
Newcastle University (ncl.ac.uk)	PROBLEM	FAIL	0/3 0/4	
Queen Mary, University of London (qmul.ac.uk)	FAIL	FAIL	0/0 0/4	PROBLEM
Royal Holloway, University of London (rhul.ac.uk)	FAIL	FAIL	0/2 0/2	
University College London (ucl.ac.uk)	FAIL	FAIL	0/1 1/4	
University of Birmingham (bham.ac.uk)	FAIL	FAIL	0/2 0/2	FAIL
University of Bristol (bris.ac.uk)	FAIL	FAIL (P)	0/2 1/3	FAIL
University of Cambridge (cam.ac.uk)	FAIL	FAIL	3/5 3/6	
University of Durham (dur.ac.uk)	FAIL	FAIL	0/2 1/4	
University of Edinburgh (ed.ac.uk)	FAIL	FAIL	0/6 0/6	
University of Glasgow (gla.ac.uk)	FAIL	FAIL	0/3 0/3	
University of Lancaster (lancs.ac.uk)	FAIL	FAIL	0/2 0/2	FAIL
University of Liverpool (liv.ac.uk)	FAIL	FAIL	0/2 0/4	
University of Manchester (manchester.ac.uk)	FAIL	FAIL	0/0 1/4	
University of Nottingham (nottingham.ac.uk)	FAIL	FAIL	0/2 0/4	FAIL
University of Oxford (ox.ac.uk)	FAIL	FAIL	0/3 1/4	PROBLEM
University of Reading (reading.ac.uk)	SUCCESS	SUCCESS	0/0 3/5	
University of Sheffield (shef.ac.uk)	FAIL	SUCCESS	2/2 2/3	
University of Southampton (soton.ac.uk)	FAIL	FAIL	0/4 0/4	
University of St Andrews (st-and.ac.uk)	FAIL	FAIL	0/3 1/4	
University of Sussex (susx.ac.uk)	FAIL	FAIL	0/3 0/4	
University of Warwick (warwick.ac.uk)	FAIL	FAIL	0/2 0/2	FAIL

A handful of UK university websites are currently accessible over IPv6

http://www.mrp.net/ipv6_survey/#uk

- In the UK most of the work that I am aware of was done by Mark, Sam, Gareth, Simon, Ewan, Chris and myself

- Discussion