Janet-hosted test tools

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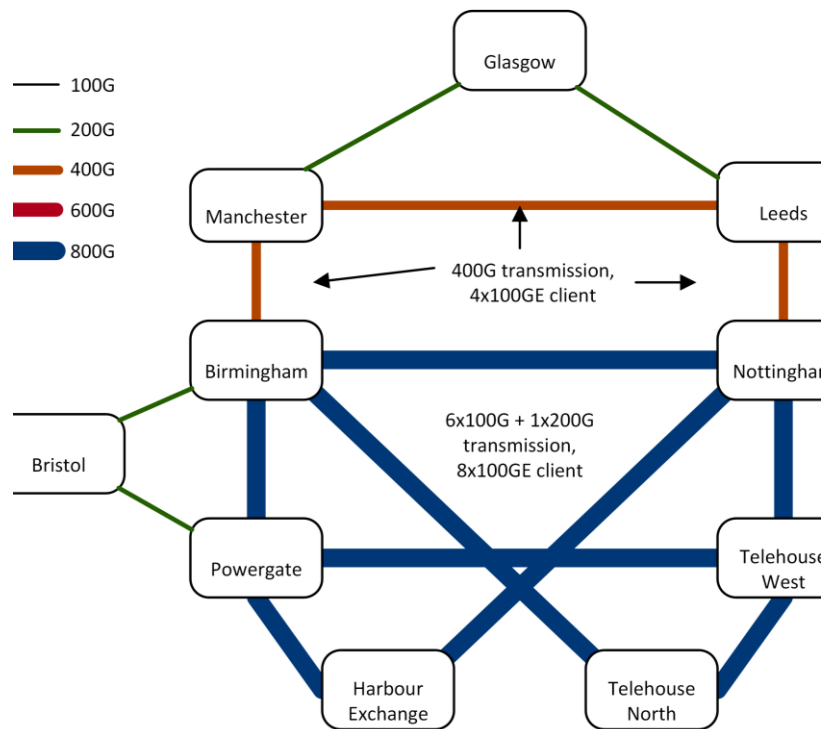
Duncan Rand, Tim Chown, Raul Lopes
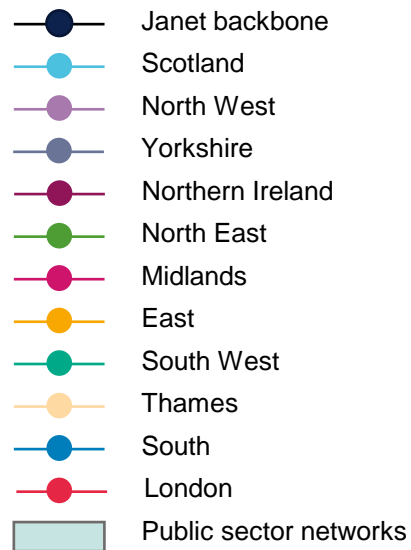
Hepsysman

Oxford, 22nd June 2023

The Janet Network
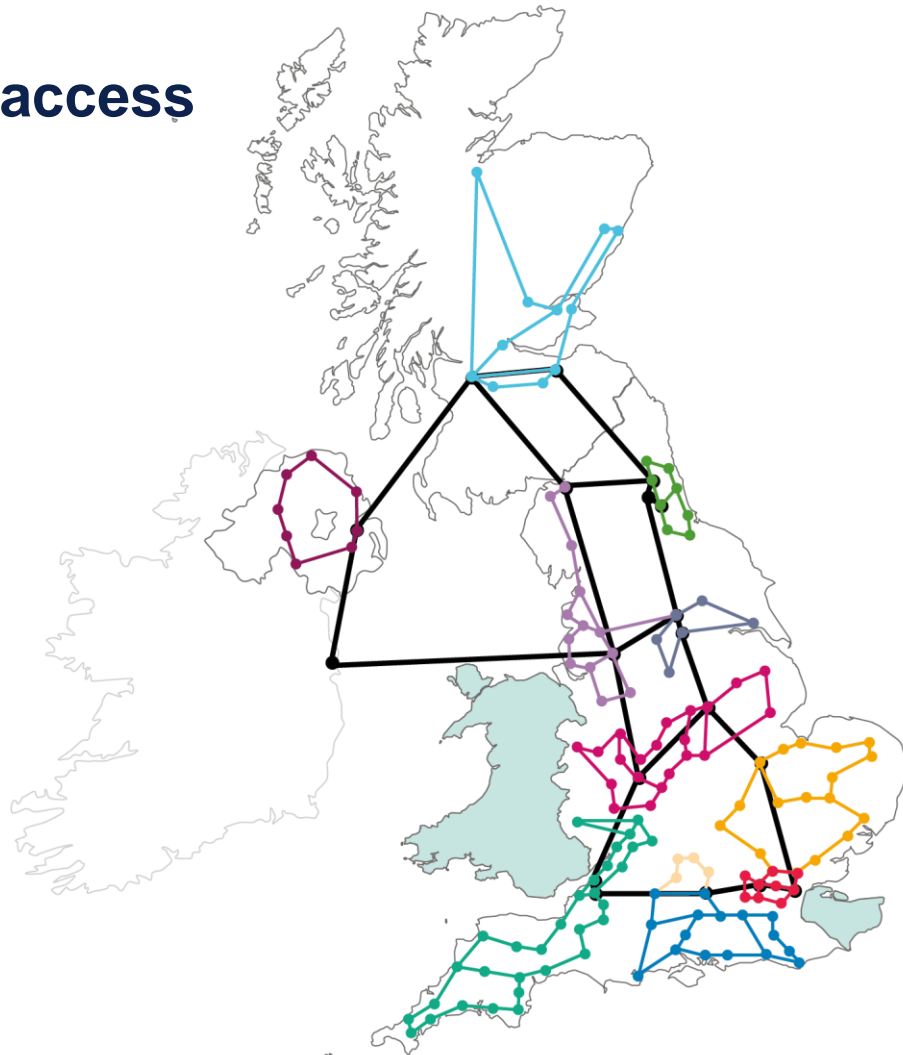
Current Backbone Status

- 8x100Gbps trunks in southern part of the network
  - Most traffic enters/exits network in London
- (Mainly) Juniper routing equipment

- Some 400Gbit/s paths in 75GHz channels
  - 4x100GE clients at the moment
  - Looking at 400GE

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Janet backbone and regional access infrastructure

- ● Janet backbone
- ● Scotland
- ● North West
- ● Yorkshire
- ● Northern Ireland
- ● North East
- ● Midlands
- ● East
- ● South West
- ● Thames
- ● South
- ● London
- ▢ Public sector networks

~1,000 customers and ~1,500 connections.

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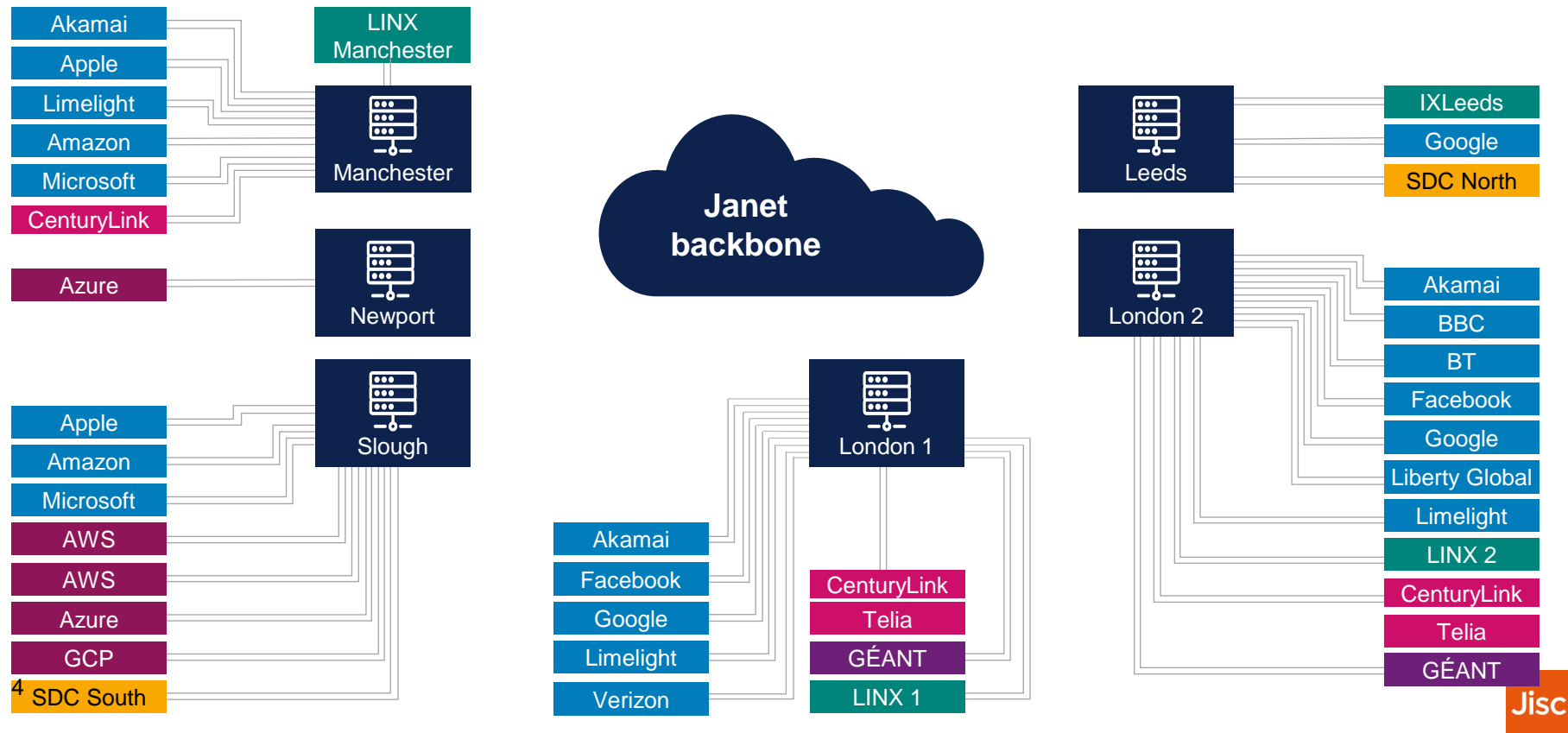
Jisc community support

- Network performance
  - [Using the Janet Network performance test facilities – Jisc](#)
  - [Research network engineering (RNE) community group – Jisc](#)
    - Next talk tomorrow (June 23rd)
  - Other communities
    - [Digital research community group - Jisc](#)

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Sciencemesh.io IDP Test

CERNbox is part of this federated Dropbox like storage

- Would you mind looking at:
  - https://drive.sunet.se/
    - Does it say "Account not provisioned."
    - I'll collate results

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Testing connectivity

- **Ad hoc throughput testing**
  - *Iperf*
  - *ethr*
- **network characteristics over time**
  - perfSONAR
  - A RIPE Atlas anchor
- **Ad hoc disk to disk copying** to/from data transfer nodes (DTN)
  - A RIPE Atlas anchor, for bespoke RIPE Atlas tests
- Note: our NOC have additional tools, such as hardware line testers

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Test facility specifics

- 10G iperf and ethr
  - iperf-slough-10g.perf.ja.net
  - ethr-slough-10g.perf.ja.net
- 10G perfSONAR
  - ps-slough-10g.perf.ja.net (bandwidth tests)
  - ps-slough-1g.perf.ja.net (latency tests)
- 100G perfSONAR
  - ps-london-bw.perf.ja.net (bandwidth tests)
  - ps-london-lat.perf.ja.net (latency tests)
- [RIPE Atlas](https://atlas.ripe.net/probes/6695/) (https://atlas.ripe.net/probes/6695/)

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Ad-hoc throughput testing: *iperf3*

- There is a 10G *iperf3* server at the Jisc Slough data centre: *iperf-slough-10g.perf.ja.net* (accessible over both IPv4 and IPv6)

- Will have a 100G iperf server which will be available on request

- *iperf3* software installation:

  - CentOS7: *sudo yum install iperf3*

- Using from Windows

  - [Microsoft guide to iperf usage](#)

  - [Compiling iperf/iperf3 from source](#)

  - [Example of Windows usage](#)

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Example of using *iperf --bounceback*

```
# WIFI
$ walker@heplt024:~/src/iperf-2.1.9/src$ ./iperf -c iperf-slough-10g.perf.ja.net –bounceback
 [ ID] Interval      Transfer  Bandwidth       BB cnt=avg/min/max/stdev      Rtry  Cwnd/RTT   RPS
[  1] 0.00-1.00 sec  1.95 KBytes  16.0 Kbits/sec    10=12.841/10.149/15.303/2.115 ms   0   14K/12121 us   78 rp

# WIRED
[  1] 0.00-1.00 sec  1.95 KBytes  16.0 Kbits/sec    10=7.268/6.945/7.935/0.262 ms   0   14K/7326 us   138 rps
```

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Ad-hoc throughput testing: *ethr*

- ethr is a "comprehensive network measurement tool for TCP, UDP & ICMP" from Microsoft

- Natively cross platform thanks to *golang*

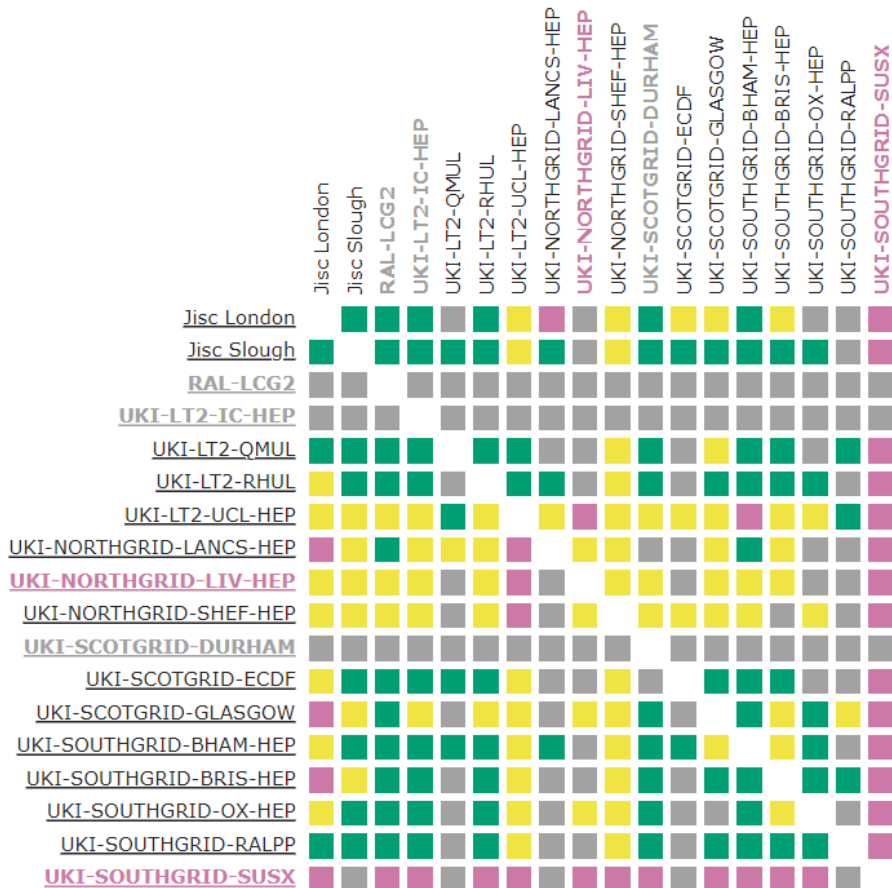- Available for CentOS7 with 'snap' & installed on our 10G server at Slough

```
$ ethr -d 4s -c iperf-slough-10g.perf.ja.net
Connecting to host [2001:630:3c:f803::12], port 9999
[  6] local 2001:630:3c:f803::6 port 51706 connected to 2001:630:3c:f803::12 port 9999
- - - - - - - - - - - - - - - - - - - - - - -
[ ID]   Protocol    Interval      Bits/s
[  6]     TCP      000-001 sec     6.67G
[  6]     TCP      001-002 sec     9.77G
[  6]     TCP      002-003 sec     7.49G
[  6]     TCP      003-004 sec     9.45G
Ethr done, duration: 4s.
```

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Persistent measurement over time: perfSONAR

- Free, open source: https://www.perfsonar.net

- Easy to download and install on CentOS7 (and Debian)

- **Very useful to have persistent testing**: collect history of network characteristics – throughput, loss, latency, path

- Test against our 10Gbps node in the Jisc Slough data centre
  - Bandwidth: https://ps-slough-10g.perf.ja.net
  - Latency: https://ps-slough-1g.perf.ja.net
  - We also are testing 1Gbps small nodes (including RPi) and Docker versions

- We have a GÉANT PMP small node (Gigabyte Brix):

- https://pmp-central.geant.org/maddash-webui/

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Persistent measurement over time: perfSONAR

- We have installed a 100G perfSONAR host in London
  - Uses 9000 MTU
- https://ps-london-bw.perf.ja.net
- https://ps-london-lat.perf.ja.net
- Perfsonar 5.0.3 now available
  - Supports EL 8 and 9 (beta)

- https://psmad.opensciencegrid.org/mad ash-webui/index.cgi

RNE - Janet-hosted test tools

Perfsonar – services to watch

systemctl start perfsonar-lscachedaemon.service

systemctl start postgresql-10.service

systemctl start httpd

systemctl start pscheduler-archiver.service

systemctl start pscheduler-runner.service

systemctl start pscheduler-scheduler.service

systemctl start pscheduler-ticker.service

systemctl start psconfig-pscheduler-agent.service

systemctl status opensearch.service

/usr/lib/perfsonar/scripts/service_watcher

pscheduler monitor

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Perfsonar

Common errors

- ICMPv6 blocked

- Certificates not in browser

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10G Data Transfer Node (DTN) & Globus endpoint

- We have a DTN in the Jisc Slough data centre: *dtn-slough-10g.perf.ja.net* (dual-stack)

- A number of files are available: 1M.dat, 2M.dat, 10M.dat, 50M.dat, 1G.dat, 10G.dat, 20G.dat, 100G.dat, 1000G.dat accessible with *globus-url-copy*

- Can copy to /dev/null or to the file system, e.g. copying a 10GB file to /dev/null

    $ globus-url-copy -vb ftp://dtn-slough-10g.perf.ja.net:2811/space00/10G.dat /dev/null

- There is also a directory with 100 x 1GB files for more sustained testing:

    $ globus-url-copy -r -vb ftp://dtn-slough-10g.perf.ja.net:2811/space00/small/ file:///tmp/

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100G Data Transfer Node (DTN) & Globus endpoint

- We are installing a 100G DTN facility in the Jisc London centre

- This will use a distributed files system – most likely Ceph or BeeGFS with multiple DTNs

- One goal is to provide a Globus endpoint to enable Janet connected sites to test their own Globus endpoints up to 100G

- However, other transfer tools can be made available on request to netperf@jisc.ac.uk

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Browser-based speed tests

The devil you know!

- Easy to use, familiar to most of us

- Provide a useful first assessment from a browser
  - But often not accurate and generally have a limited performance

- Generally insufficient to demonstrate full connectivity

- We have installed a Librespeed instance as it allows us to offer this service from facilities that we control and understand
  - We will publish it with appropriate text about its limitations
  - People will be directed to contact us for iperf or perfSONAR tests and advice
  - Planning to include a URL for test results, and a CLI/API to the tool

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Librespeed instance

Likely to be at https://speedtest.perf.ja.net

https://github.com/librespeed/speedtest
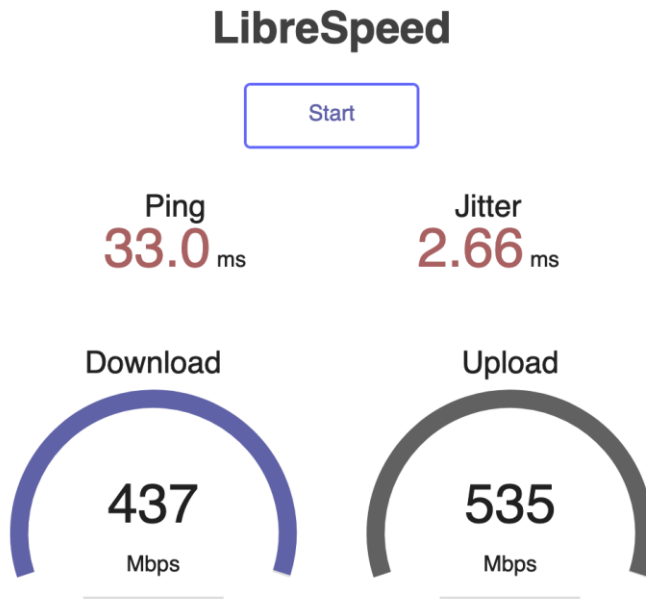
RIPE Atlas anchor

- See https://atlas.ripe.net/

- Supports measurements from RIPE Atlas nodes
  - Hardware (available from RIPE) or software probes

- The RIPE Atlas ecosystem is mature
  - Over 11,000 probes around the world

- Our anchor node is deployed at Slough
  - See https://atlas.ripe.net/probes/6695/
  - Useful for loss and latency, but can do more bespoke tests

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Open questions

- What performance problems are you facing?

- What help might Jisc be able to provide?

- What other backbone-hosted tools would be useful for you?

- Any other suggestions for areas we should be covering?
  - WiFi performance?
  - Residential quality of experience (to campus and cloud)?
  - Low latency (and jitter) applications?
  - Experiments with (say) TCP BBR, or 9000 MTU?
  - Disk to disk testing at >100G

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Thank you

- Please feel free to get in touch

- Email: netperf@jiscmail.ac.uk

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