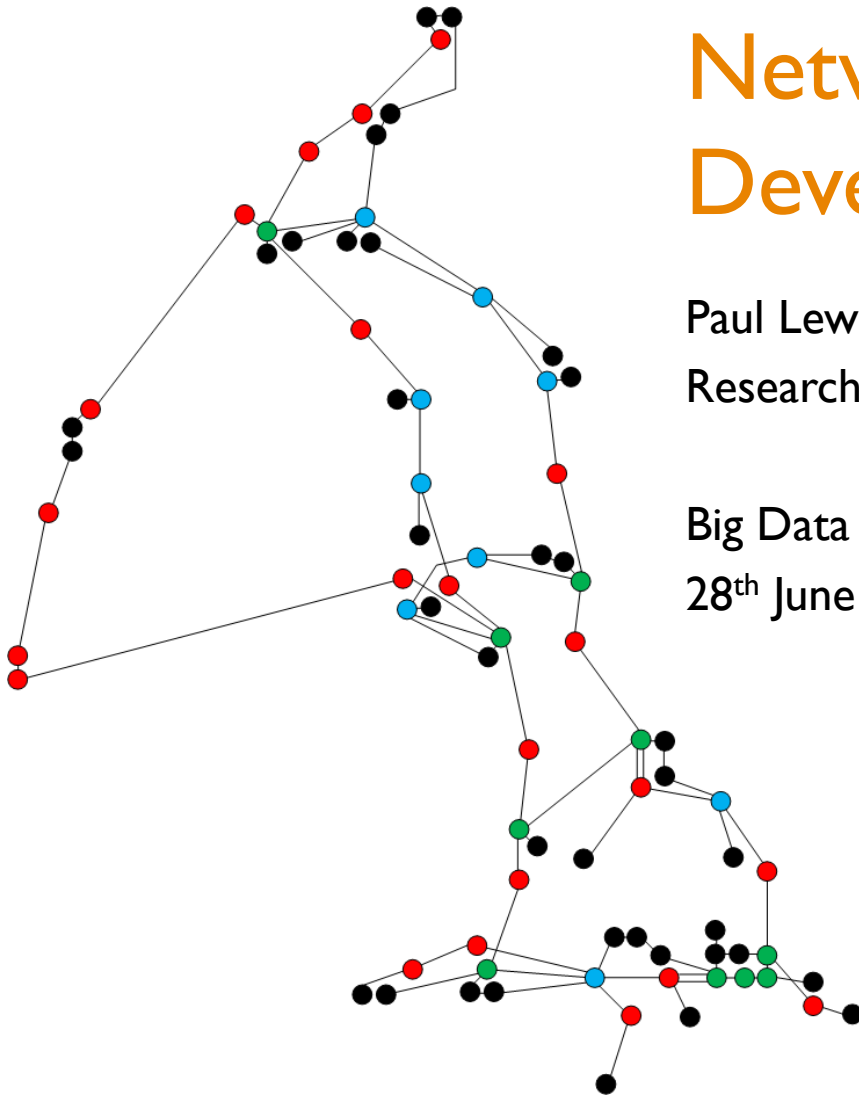# janet

Network Developments

Paul Lewis
Research Support

Big Data Imperial College
28th June 2013

janet

UK Research and Education Research Network (NREN)

Founded in 1984, covering whole of UK (England, Scotland, Wales and Northern Ireland)

Currently serves Universities, Research Establishments, Higher Education and Local Government.

Approx 18m users & around 700gbit/s peerings to the Internet, private orgs and other research networks
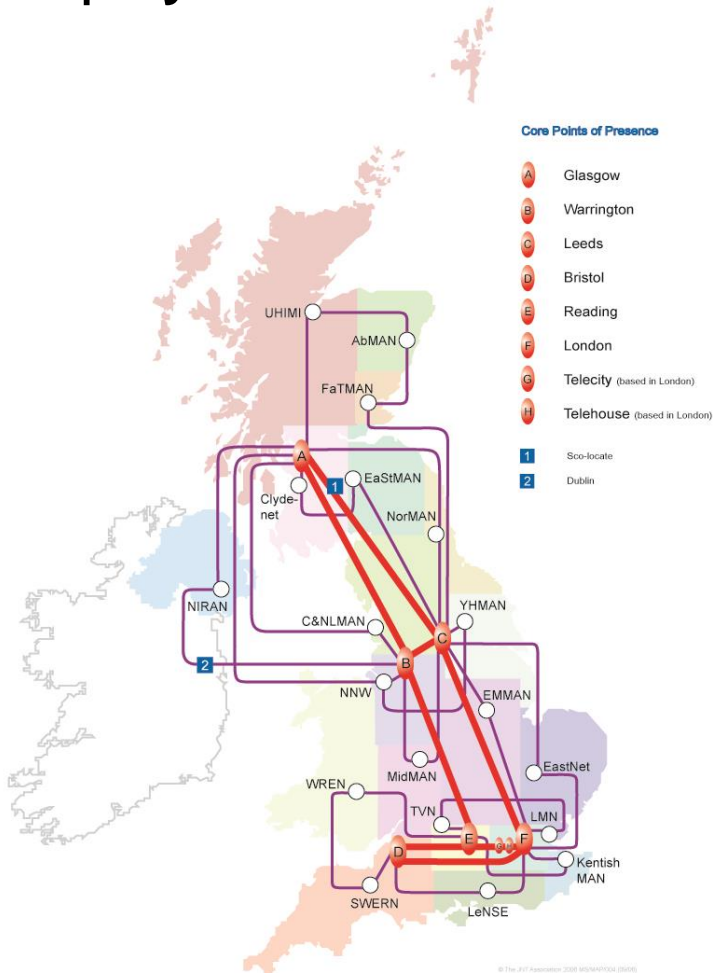
IP provision of high capacity 'commodity' connectivity.

Lightpath is a centrally managed Layer 2 service that provides dedicated point-to-point network connections between Janet-connected organisations (and internationally via GN3+).

Specialist network advice to researchers from all disciplines ranging from high energy physics to molecular biology – generally around 'big data', data throughput and many other things…

Janet6 Background 6,5,4,3,2,1…

SuperJanet5: 2006 to 2013

Core Points of Presence

A — Glasgow
B — Warrington
C — Leeds
D — Bristol
E — Reading
F — London
G — Telecity (based in London)
H — Telehouse (based in London)

1 — Sco-locate
2 — Dublin

- **Janet6:** Project to replace the UK wide Janet backbone, SuperJanet5 with Dense Wavelength Division Multiplex technology

|		
Requirements gathering & analysis		2010 to 2011
Procurement • Fibre infrastructure • Optical transmission equipment		Oct 2011 to Sept 2012
Rollout		Sept 2012 to April 2013
Transition SJ5 to J6		May 2013 to July 2013
SJ5 'turned-off'		Oct 2013

What we're building
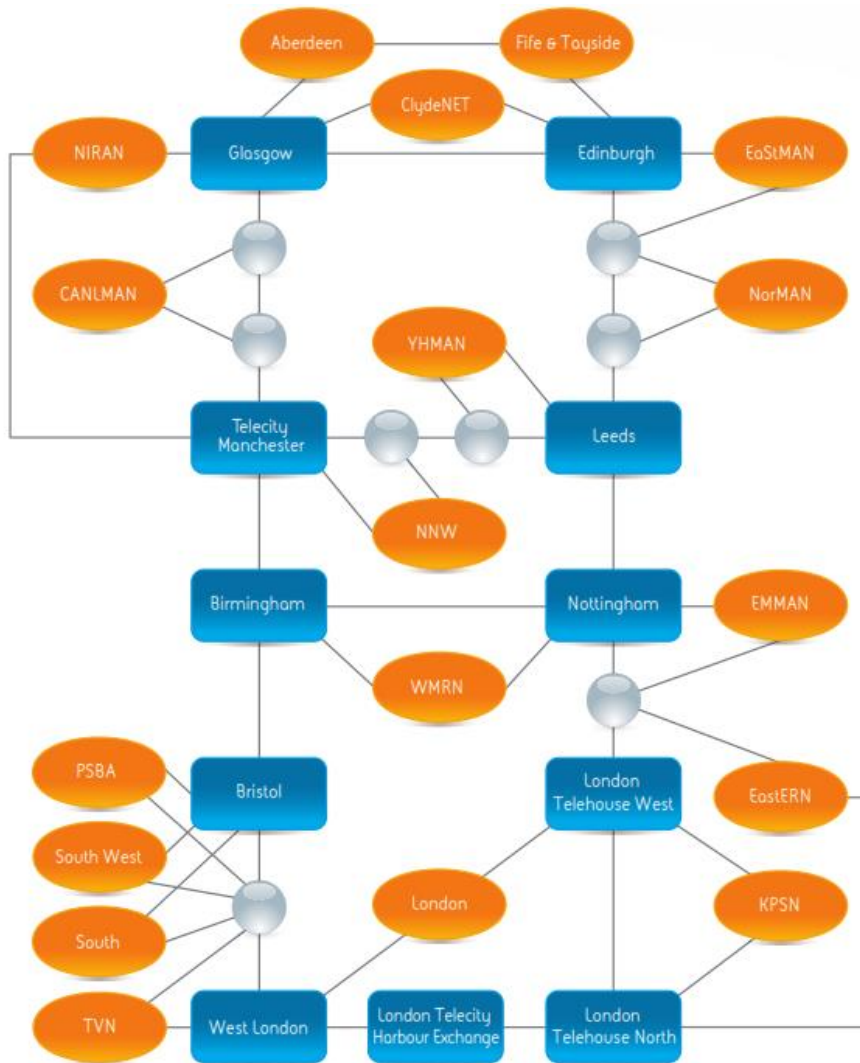
- Look familiar?

- 6,000km (ish) of G.652 fibre
- 79 Points of Presence

- Core capacity n x 100Gbit/s
- RNs connect at n x 10G
- Most are getting an upgrade
  - Range from 10G to 60G

What we're building – New Lightpath Network

janet

- Run in parallel from normal IP provision
- Increase bandwidth between backbone nodes to 100GE
- Implemented via Multiprotocol Label Switching (MPLS)

Janet6 IP Platform
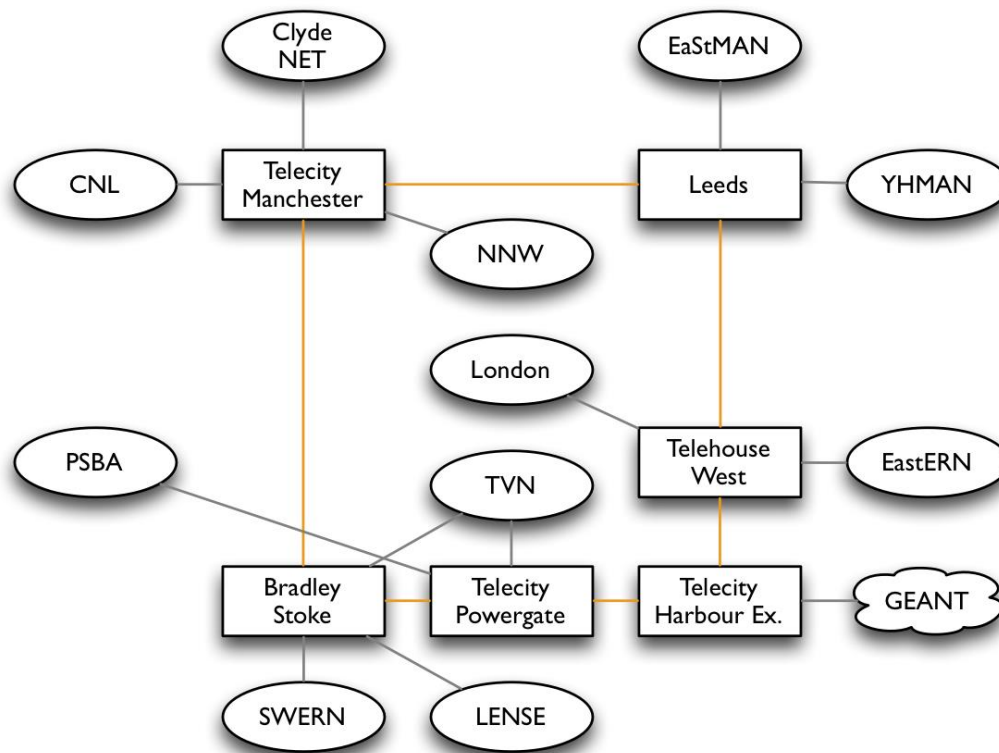
- Original 2006 T-640 chassis still in service
  - 40Gbit/s per slot, 32 10Gbit/s ports per chassis
- Most upgraded to T-1600
  - Same chassis, new switching fabric and PSUs
  - 100Gbit/s per slot
- T-4000
  - Same chassis, new switching fabric and PSUs
  - 240Gbit/s per slot, 192 10Gbit/s ports per chassis
  - Two power supplied for resilience
    - Each one takes 6, 60A, 48VDC feeds – 17kVA!
- Migration
  - Janet6 will be in new PoPs
  - Can't move all the connections overnight
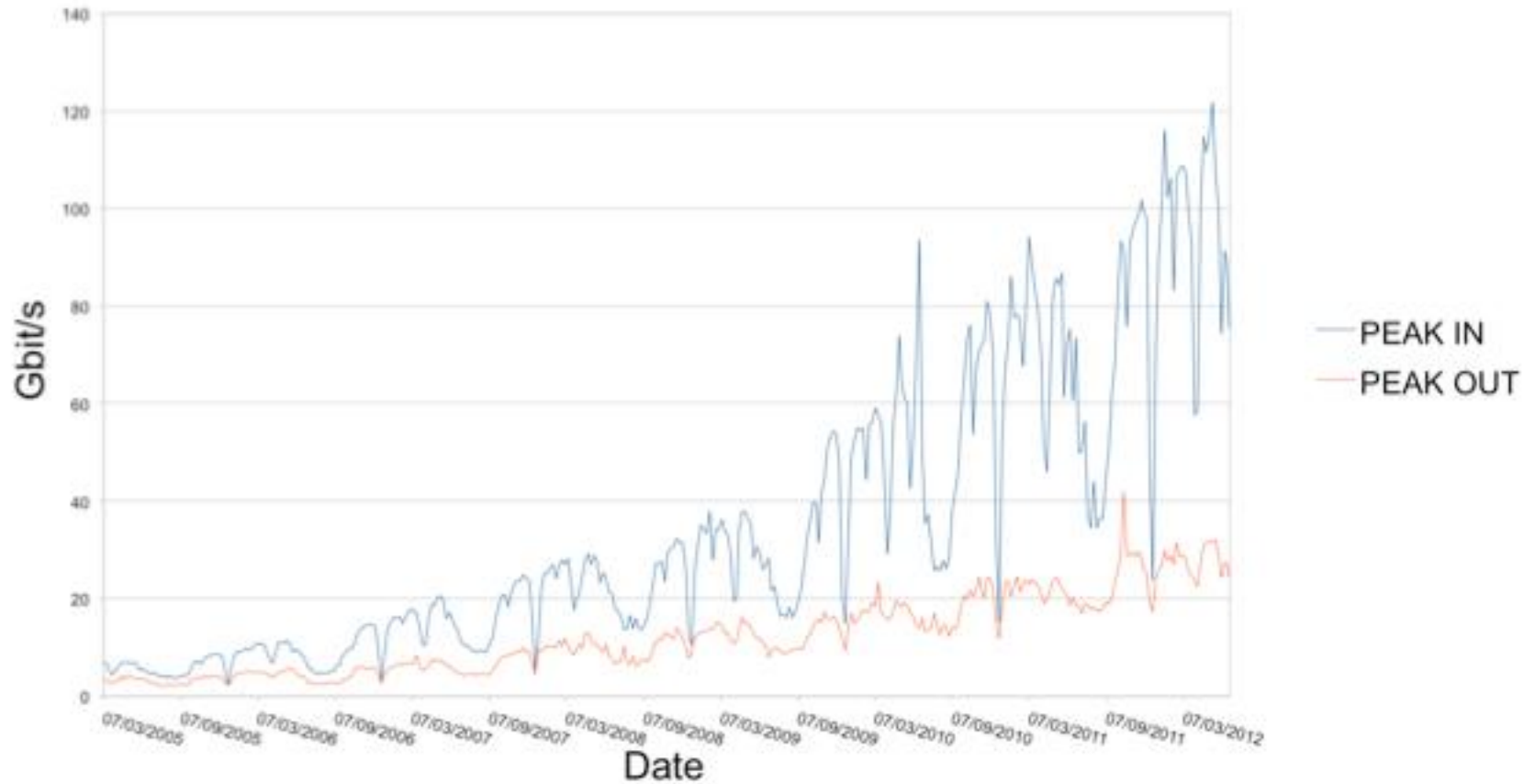 - New routers and hand back the old

janet

- Upgrade: Juniper T1600 ⟶ Juniper T4000

janet

Weekly 5-minute Traffic Peaks

janet

Major Peerings

janet

E-Infrastructure
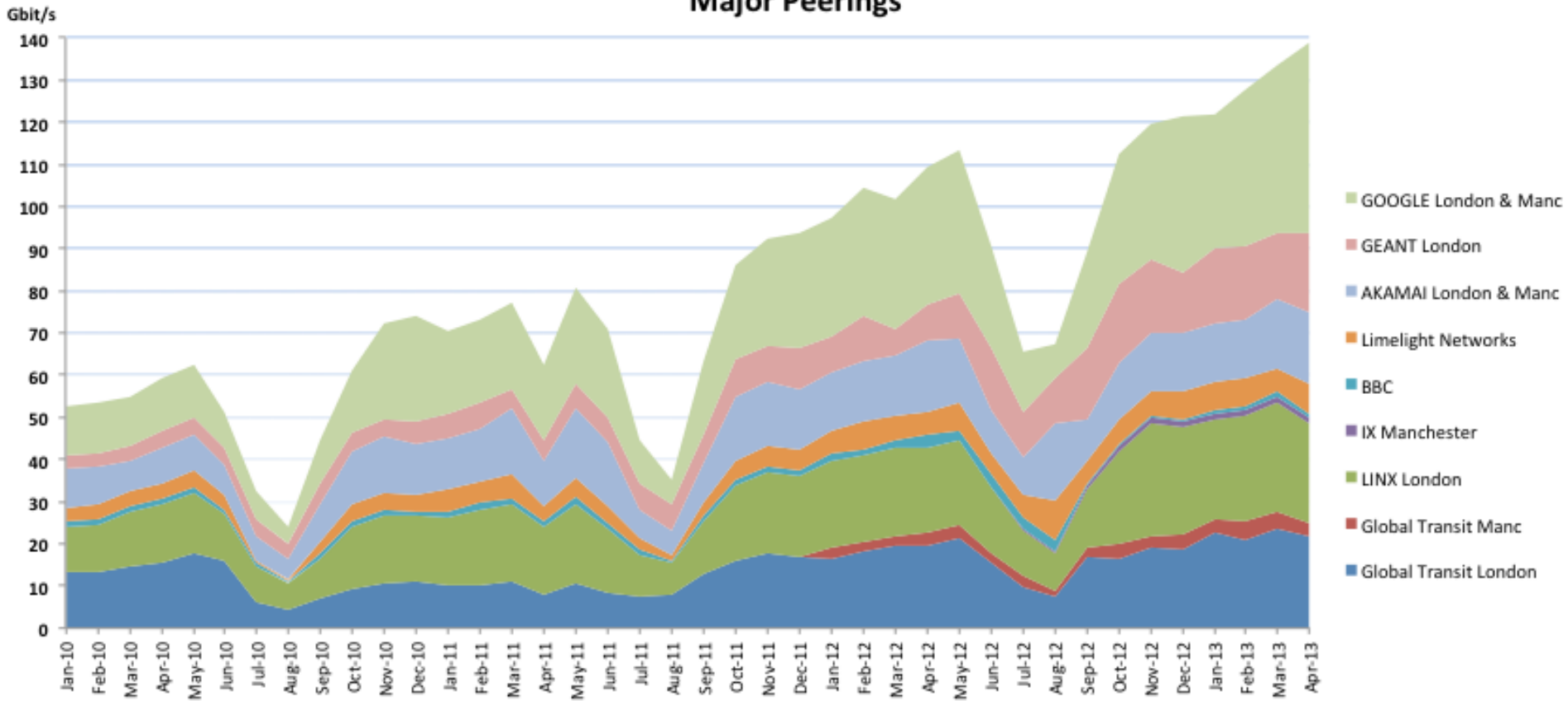
Janet & E-Infrastructure

janet

Oct 2011 – E-infrastructure announcement - £26M

- **Phase 1** – Augmentation of Janet6 plans

- **Phase 2** – Strategic Sites
    - *Hinxton Genome Campus (Cambridgeshire)*
    - *Norwich Research Park*
    - *Met Office (Exeter)*
    - *Francis Crick Inst (London)*

- **Phase 3** – Industrial connectivity/Services.
    - Moonshot
    - State Aid
    - Test cases

- **Phase 4** – Further plans for potential connectivity upgrades

High Throughput SIG

- Over the past 2-3 years a number of scientific disciplines have instruments that are capable in generating appreciably large datasets or have researchers that have collected big datasets (social networks).

- Generation and processing capabilities are generally physically located in different locations around the UK,

- Growing requirement from the community to transfer large (>1Tb) files, or multiples thereof, in the shortest possible time frame.

- Whilst the Janet network provides significant capability at the wide area network level we need to look at the problem holistically.

- http://tinyurl/HTNSIG - 24th July

Finally a Thought Experiment....

Theoretical maximum throughput for network connections:

- 100 Mbit/s = ~ 41 Gigabytes per hour

- 1 Gbit/s = ~ 0.41 Terabyte per hour

- 10 Gbit/s = ~ 4.1 Terabytes per hour

- 40 Gbit/s = ~ 16 Terabytes per hour

Health warning!

Assumes no contention, simple infrastructure,' specialist' transfer applications and protocol 20% overhead.

janet

Thanks!

Janet, Lumen House
Library Avenue, Harwell Oxford
Didcot, Oxfordshire
t: +44 (0) 1235 822200
f: +44 (0) 1235 822399
e: Service@ja.net