

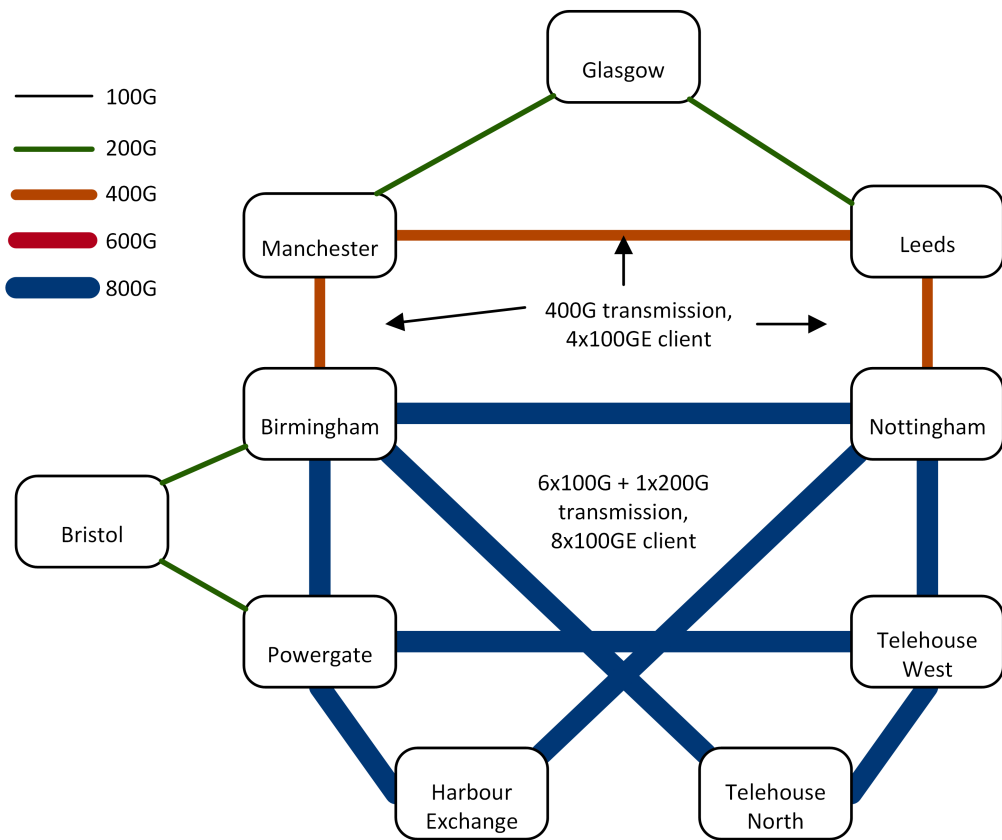
Janet network update

SIG-NOC, 16-17 November 2022

david.richardson@jisc.ac.uk

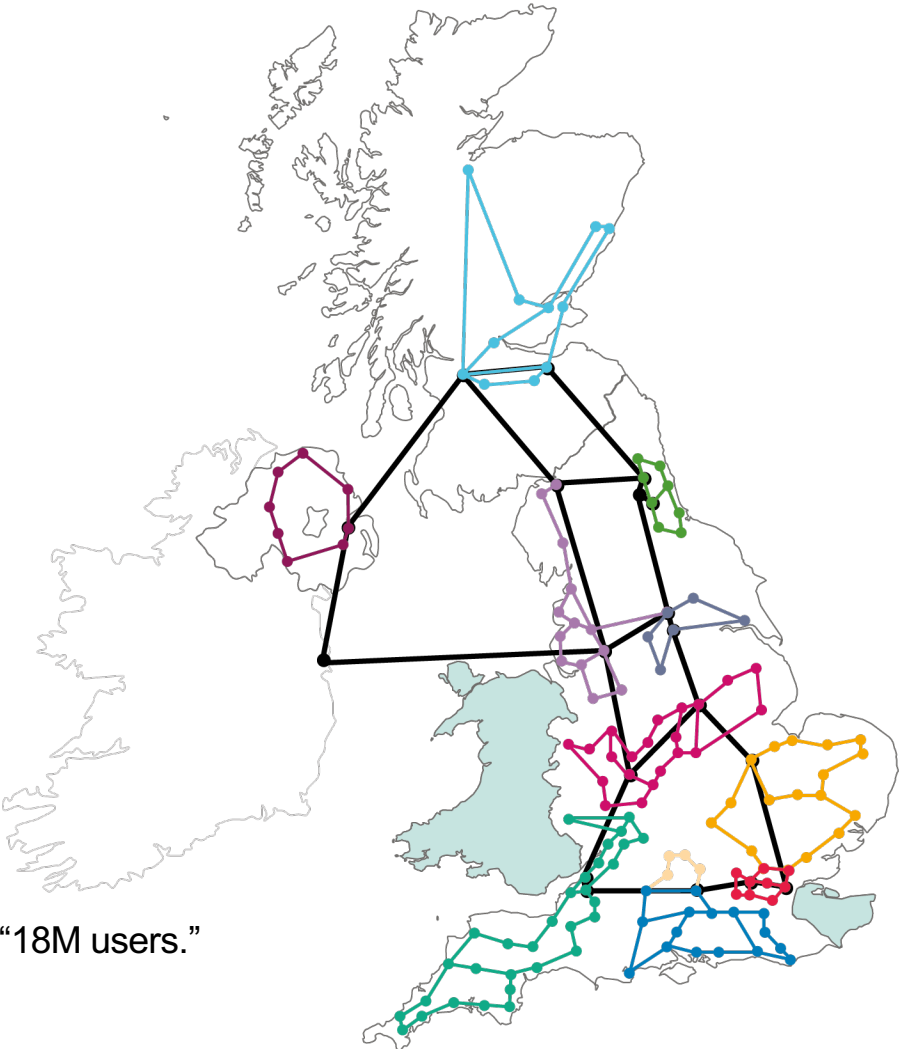
Janet

- Backbone + regional aggregation
- 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



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



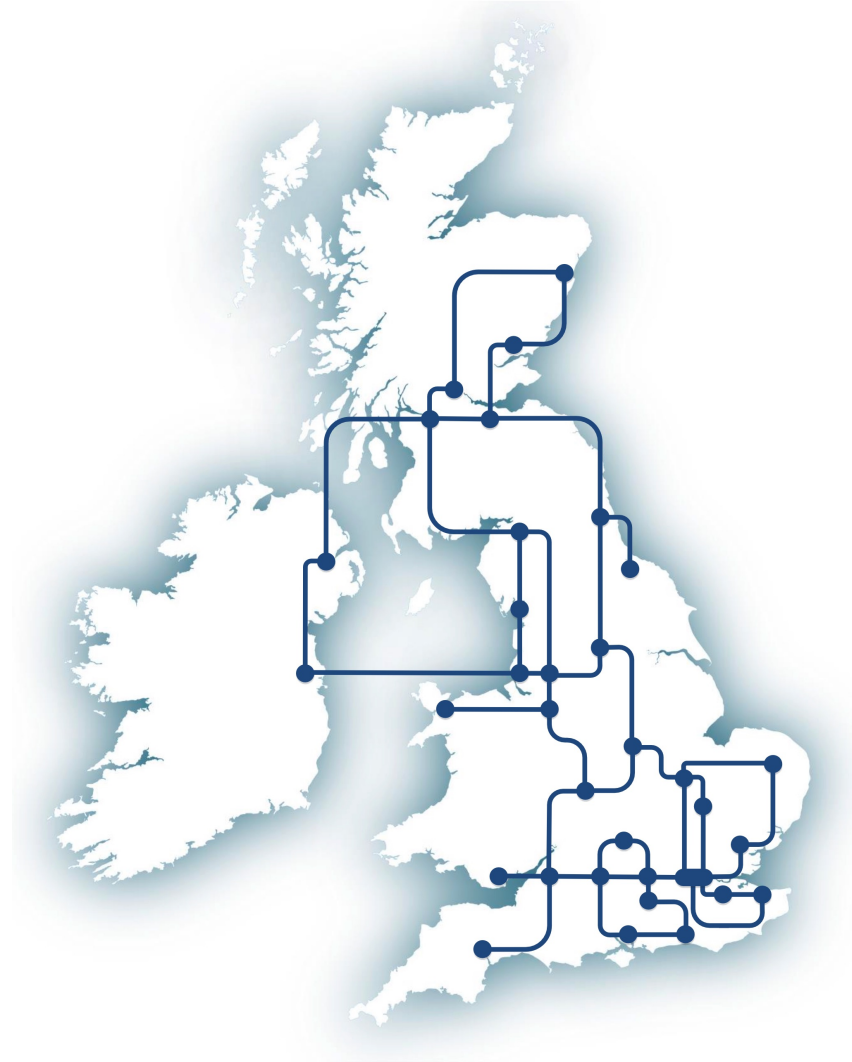
~1,000 customers and ~1,500 connections. "18M users."

Janet Access Programme

- Inherited different regional aggregation networks with different architectures and equipment
- Rebuilding all regional aggregation networks with the same architecture
 - Dark fibre, or “dim” services from telco
 - Ciena layer 2 equipment
 - 8700/5171 for aggregation
 - 39xx for CPE
 - Juniper routing equipment
 - Moving from multiple routers per region to ~2 per region.

Fibre

- Dark fibre ~ 9000 km
 - Used for backbone and parts of the regional connectivity
- Dark fibre network, entered service in 2013
 - Ciena transmission equipment, managed in-house
 - Fibre contract runs to 2028
- Regional aggregation networks may also use Openreach Optical Spectrum Access Filter Connect (OSA FC)
 - Buy one 10G service from Openreach, get access to the DWDM ports on the Adva/Ciena equipment they use.





Transmission

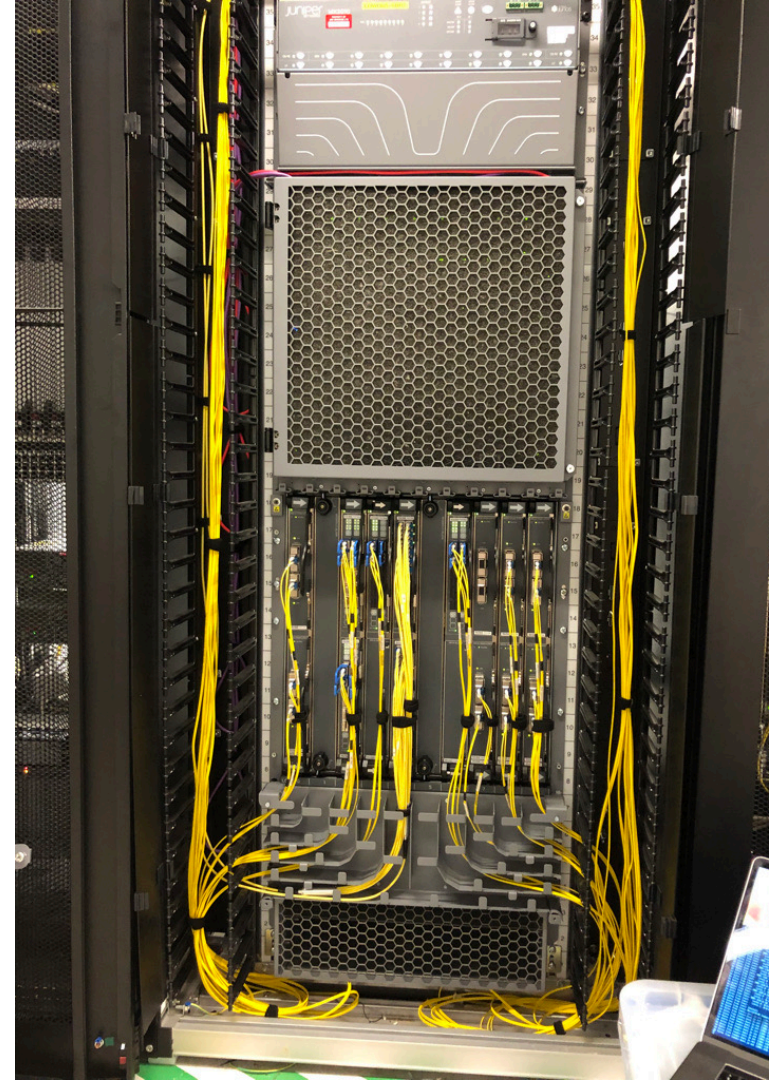
Ciena 6500

- Ciena 6500 transmission equipment, managed in-house
- ~285 chassis, forming ~154 nodes

Routing & switching

- Backbone
 - Juniper routers (MX960 and MX2010) carrying full Internet routing table.
- Regions
 - Rebuilding all regional aggregation networks with the same architecture
 - 2 routes into each region
 - Layer 2 switching elsewhere
 - Ciena 5171/8700 for aggregation
 - 39xx for CPE

Combined total of >250 PoPs



The Operations team

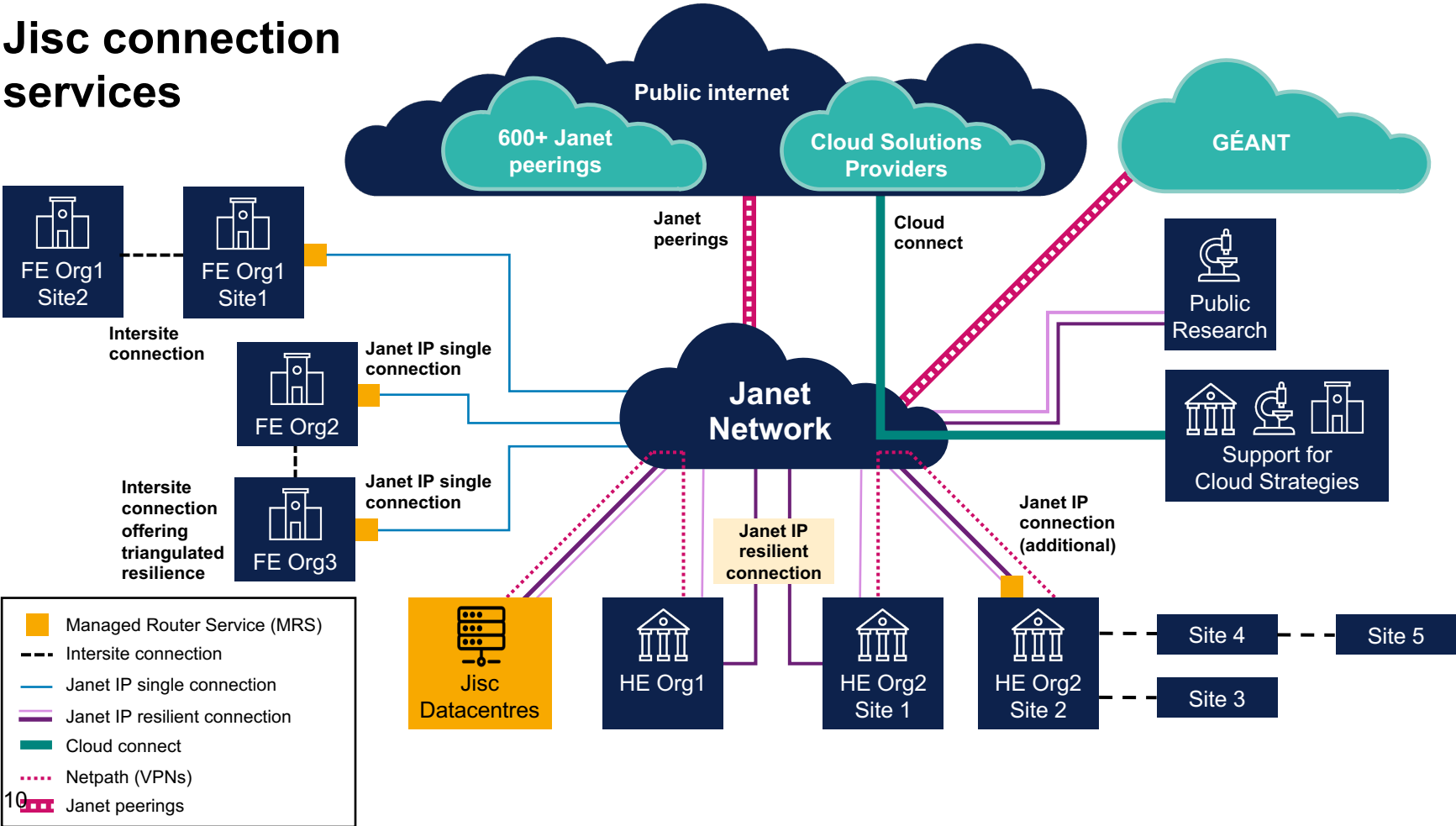
- Operations Desk (3 shifts)
 - Log fault calls, deal with suppliers, issue tickets
 - 07:00 to midnight
 - OOH Customers and suppliers make contact via external messaging service
 - 1 NEG & 1 CAT engineer on call outside standard working hours
- Planning to move to manned 24x7 service desk.

- 2nd Line Support
 - Network Engineering Group (NEG) - 14 engineers
- 3rd Line support
 - Core Architecture Team (CAT) – 8 engineers

NOC - responsibilities

- Network deployment and operations
- Backbone
- Regional Aggregation
- Managed Router Service (more later)
- DNS
- IP address assignments
- Jisc project support

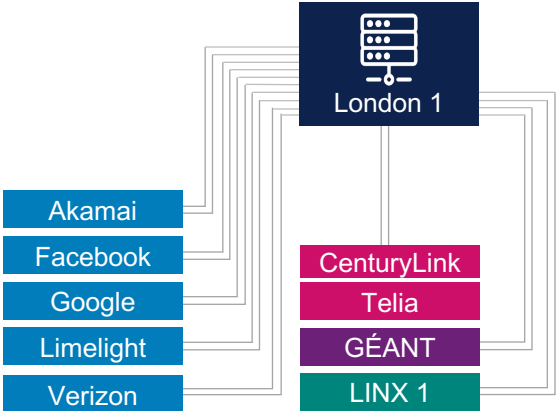
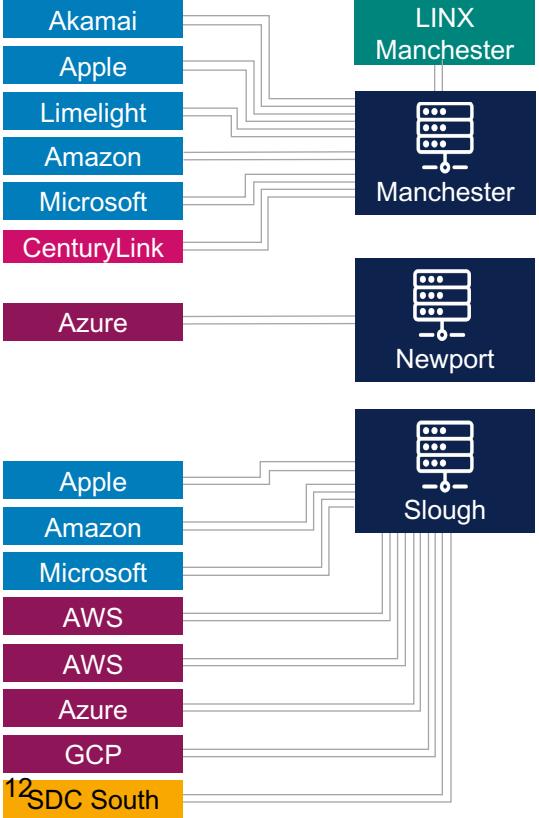
Jisc connection services



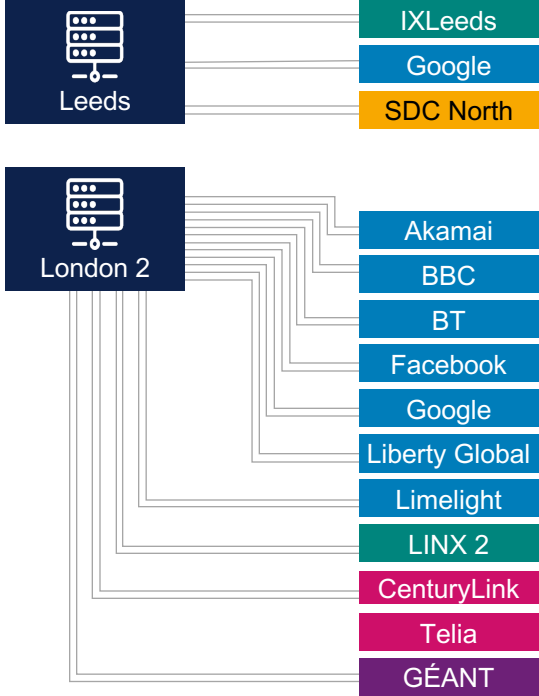
Network Services

- Ethernet point-to-point circuits
- Layer two point-to-point paths across the network.
 - VLANs on “new” regional access networks, MPLS L2VPN across the IP backbone
 - Higher capacity paths can be provisioned as dedicated wavelengths
- Layer 3 VPNs
- LHCONE
- Cloud Connection Services
 - Microsoft Azure ExpressRoute
 - AWS Direct Connect
 - Google Cloud Platform

Jisc interconnectivity



■ Global transit	■ GÉANT
■ Peer	■ Shared Data Centre
■ Internet exchange	■ Cloud providers



Network Services

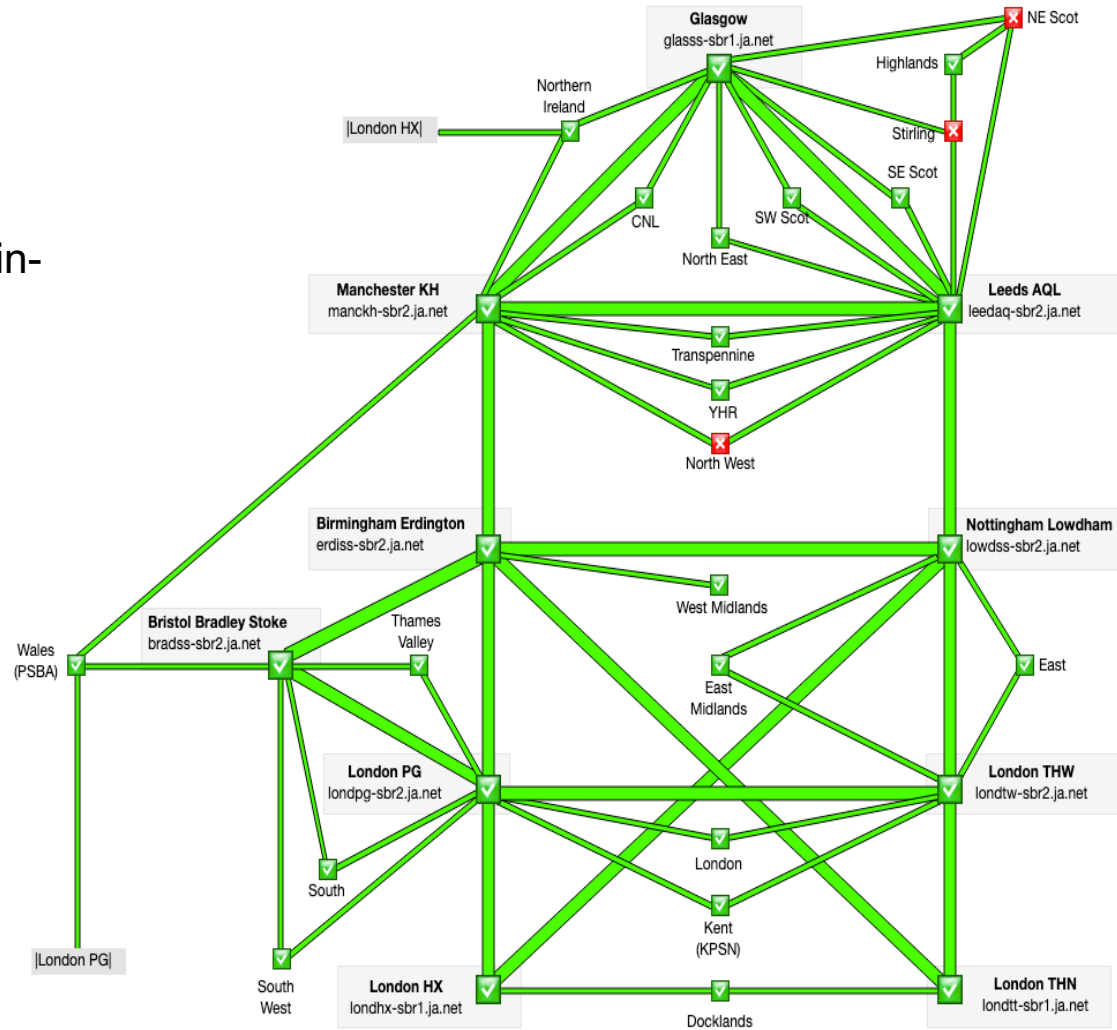
- Managed Router Service
 - On-premise equipment
 - ~430 customers subscribed
 - ~700 devices managed by Janet NOC

- Managed Firewall Services (New)
 - On-premise equipment
 - Managed by third party (with plan to bring in-house)

- Session Border Controller (New)
 - On-net gateway between Microsoft Teams and PSTN via SIP providers.
 - Investigating other ways it may be useful (e.g. Zoom)

Tools

- Teams / Zoom for NOC collaboration
- Monitoring and ticketing via a mix of in-house and vendor specific tools
- Wiki for documentation
- MCP for Ciena Optical and Carrier Ethernet
- Remedyforce ticketing system
- Currently reviewing market for replacement
 - Systems integration
 - APIs for automation



Automation

- Ansible for managed router service & new access architecture
 - Junos upgrades & configuration changes
 - Templated config generation for infrastructure and CPE devices
- Investigating “single source of truth”
 - E.g. Netbox
- Major effort towards more automation
 - “SDN”
 - Engaging with other NRENs to learn from their experiences

Cyber Security – SOC manged

- On-network DDoS Mitigation. Two locations, 400G each
- External border routers constantly sending Netflow information to analysis system.
- If traffic matches known attack patterns, dropped into a separate VRF to take it through the DDoS mitigation system.
- Once it has been ‘cleaned’, traffic dropped back into the routers and sent to destination.

- Centralised firewalling
 - Primary use-case is Geo-IP blocking of specific ports
 - E.g. inbound RDP from outside the UK.

Questions/Comments?

david.richardson@jisc.ac.uk

For more information:

***Tech 2 Tech - Have you ever wondered
how Janet works?***

Rob Evans - Chief Network Architect

<https://youtu.be/tasfUrjHp70>

