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Network Technologies Strategy

Martin Dunmore
Victor Olifer

Contents

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- Main Strategy Areas
- Network Monitoring
- OAM
- Service Assurance
- Automated Provisioning
- Other areas
  - Transmission Capabilities
  - Software Defined Networking
  - Future Routing and Addressing

Main Strategy Areas

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- AIM
- Cloud
- Eduroam
- End-to-End Performance
- Network Technologies (this one)
- Mobility
- Security
- Voice and Video

- Community website link:
- https://community.ja.net/groups/strategy

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Network Monitoring

Capacity Planning Tool

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- New SNMP tool

- Motivation
  - Easier navigation
  - Intuitive, no ‘local knowledge’ required
  - Fast!

Capacity Planning Tool

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- Design and implementation
  - Distributed collectors
  - Separate storage and job processing
  - Native code for polling – fast
  - Mix of Cacti, RRDtool, PHP, Python for everything else

Capacity Planning Tool

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- Status
  - Internal use, work in progress
  - Basis for integrating other monitoring needs and customer access
  - Lightning talk at Networkshop
    - Ramesh Baskaran (developer)

- Overview of features…

Core Network Screenshot

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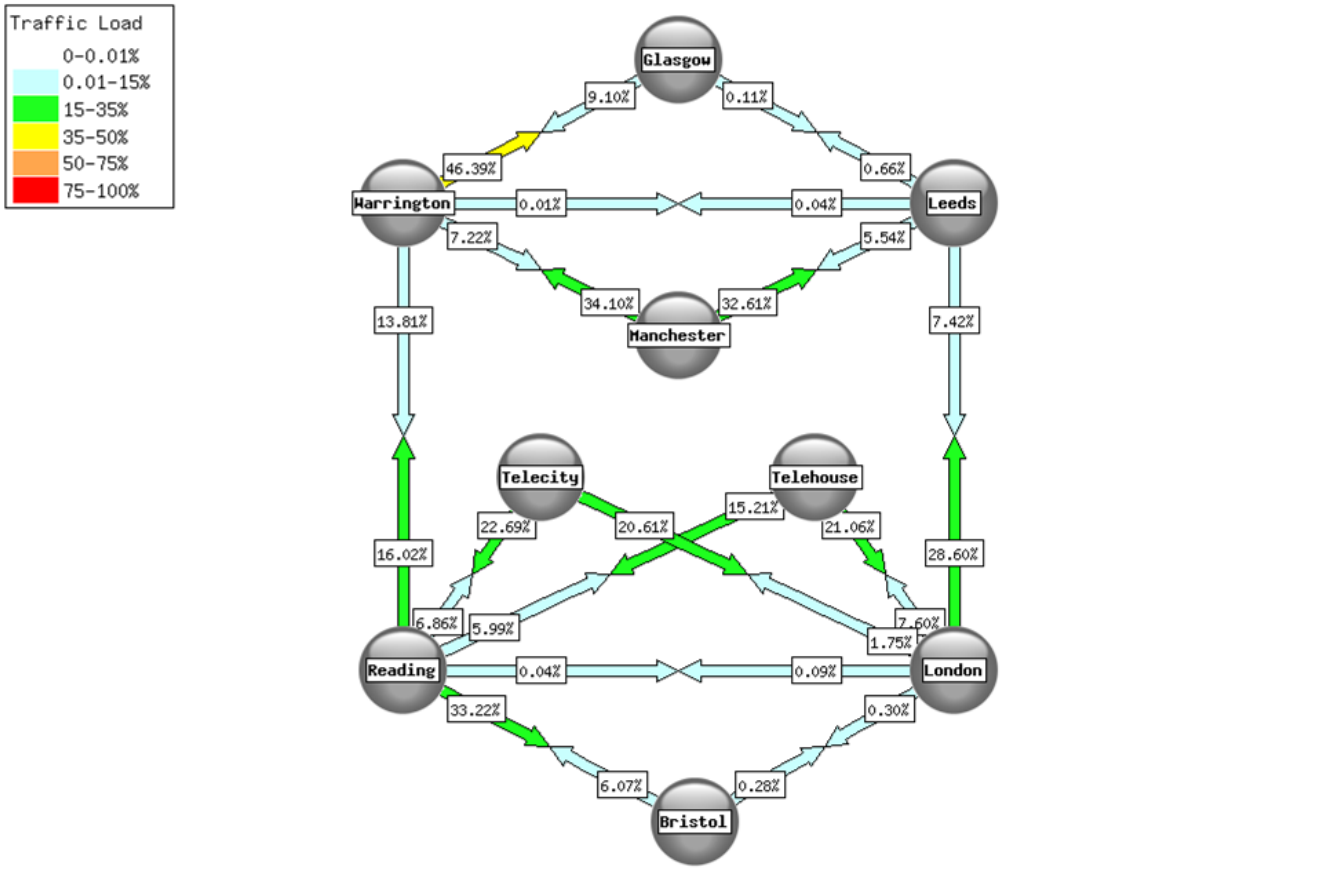
Janet Network Capacity Planning Tool

Contents

Core Network



Regional Network Entry Points

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Janet Network Capacity Planning Tool

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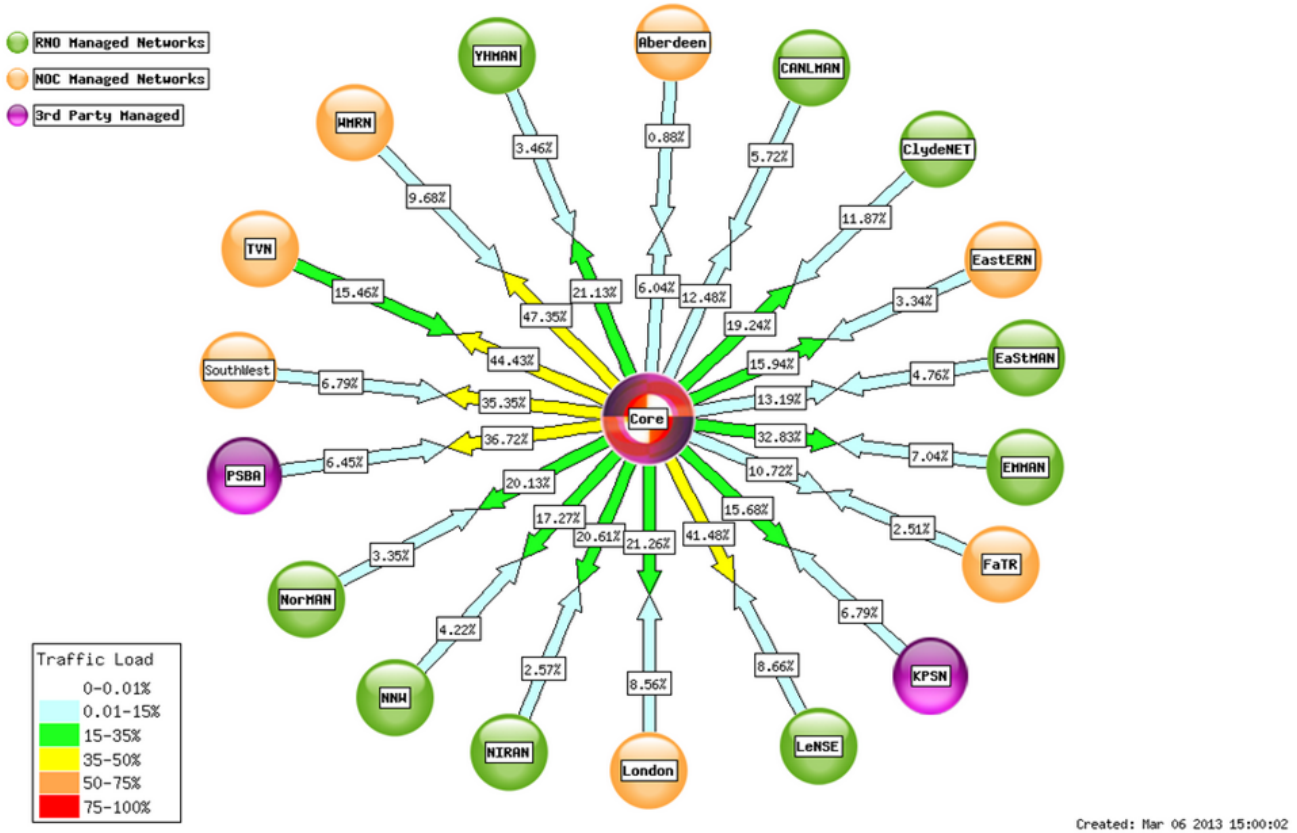
Regional Network Entry Points



Top RNEPS at a Glance

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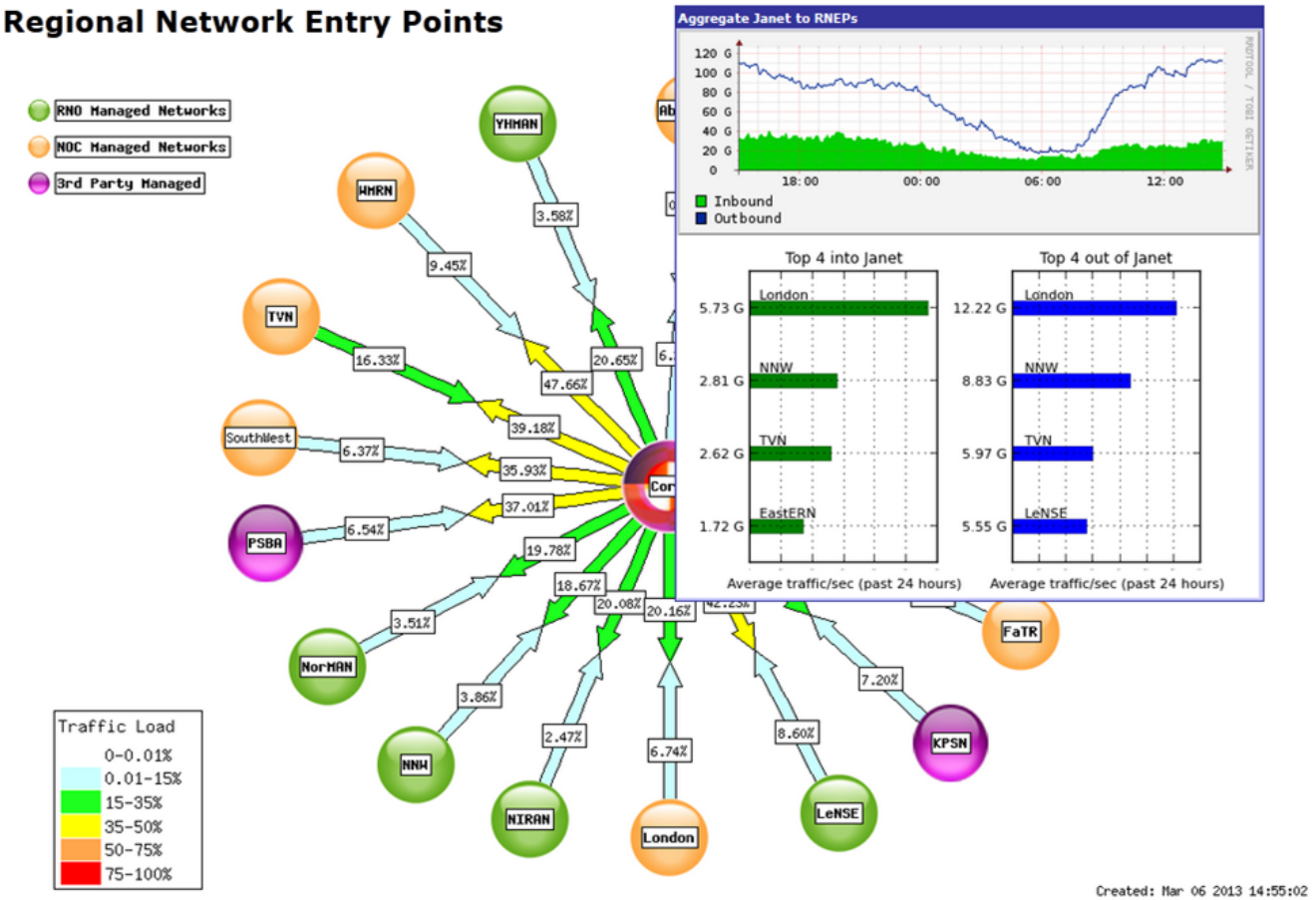
Regional Network Entry Points



Regional Networks

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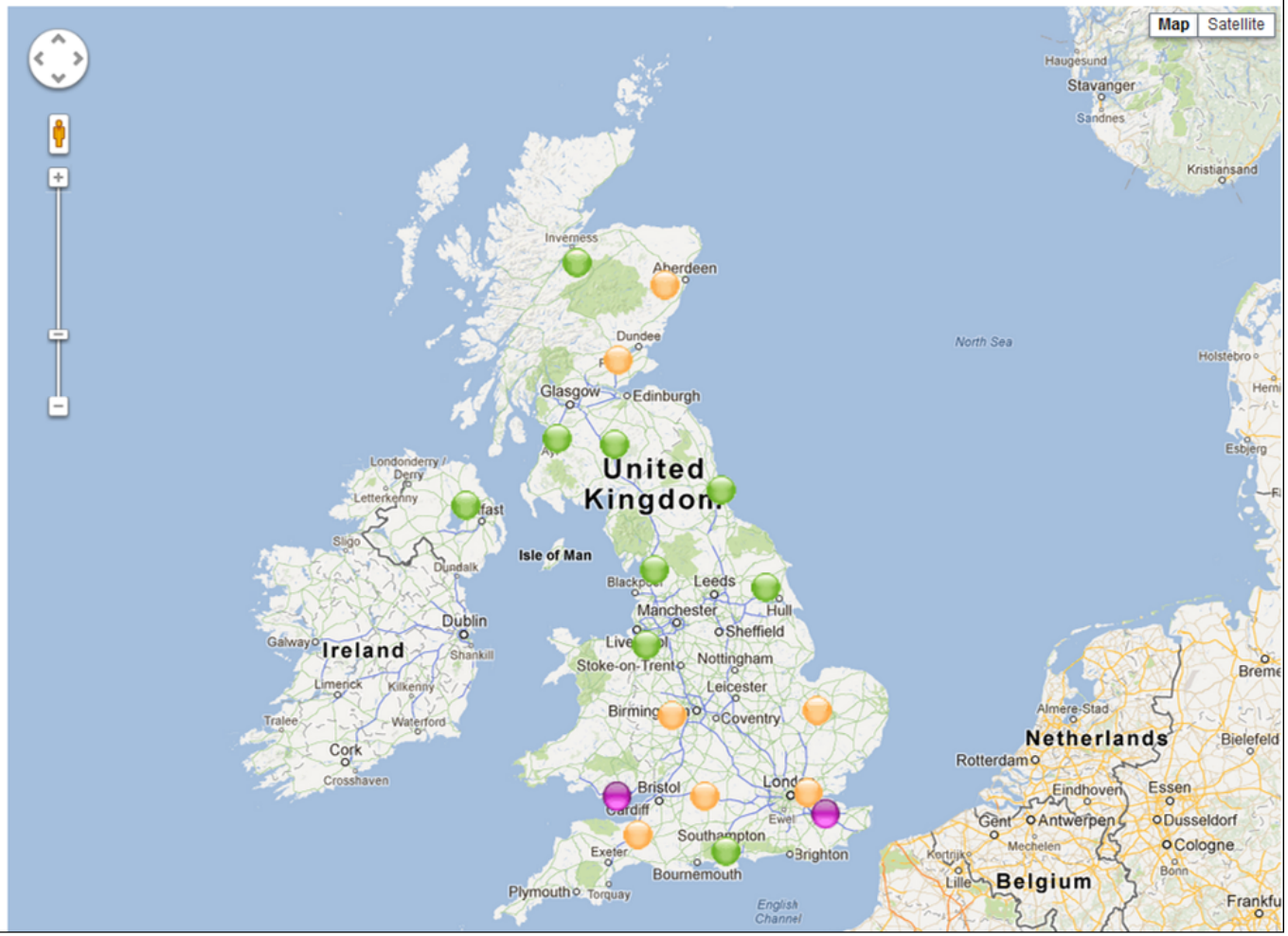
Regional Networks



Regional Network: EastERN

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Janet Network Capacity Planning Tool

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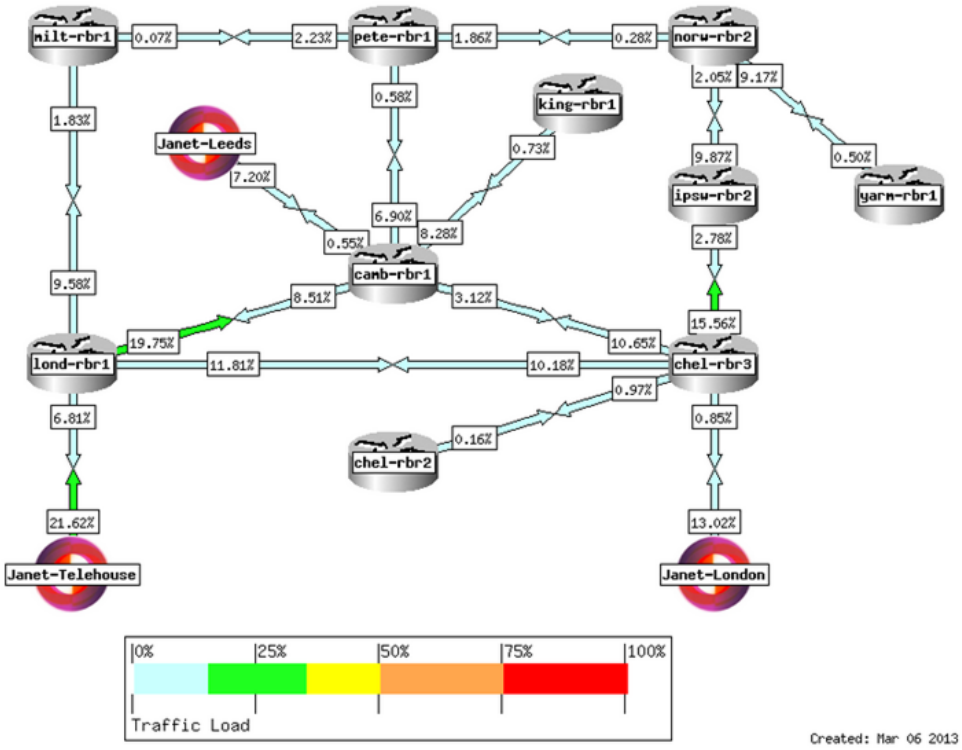
EastERN

Core



Customer Aggregates

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Janet Network Capacity Planning Tool

Contents

Core Network

Regional Network Entry Points

Regional Networks

-Aberdeen->
--*Endsites*
-CANLMAN
-ClydeNet
-EastERN
-EMMAN
-EastMAN
-FaTR
-KPSN
-LeNSE
-London
-NIRAN
-NNW
-NorMAN
-PSBA
-SouthWest
-TVN
-WMRN
-YHMAN

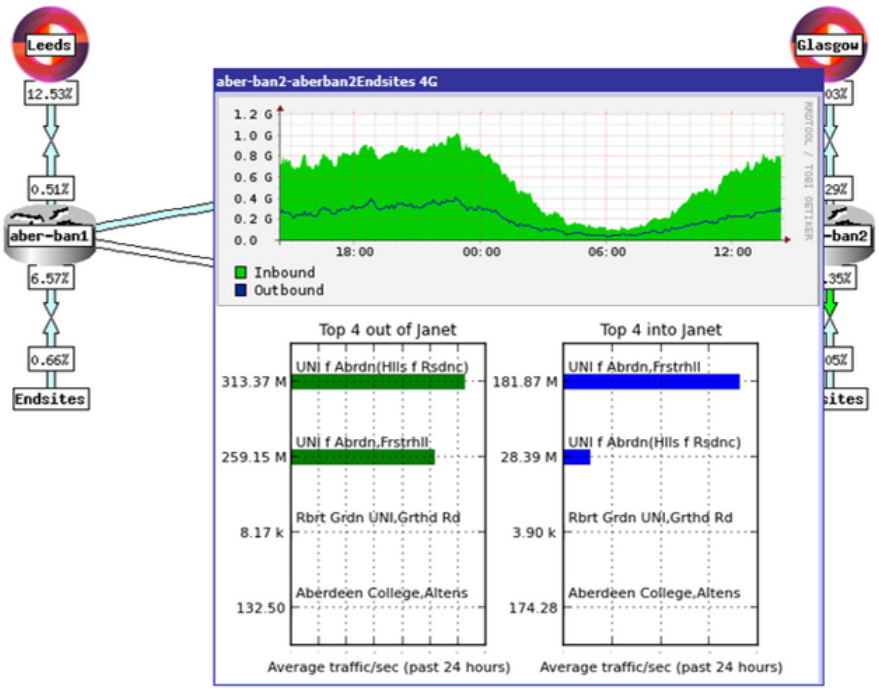
Lightpaths

External(Peering/Transit)

Miscellaneous

Aberdeen

Core



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Major Peerings

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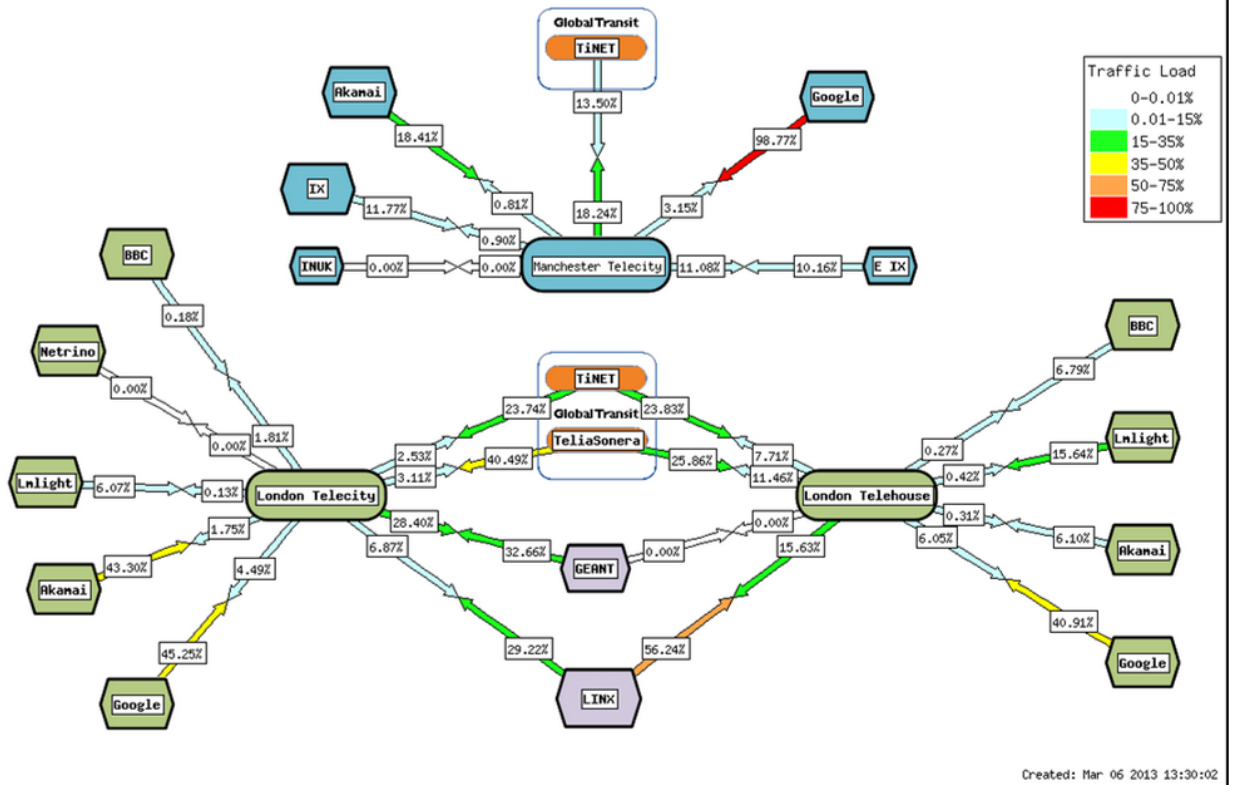
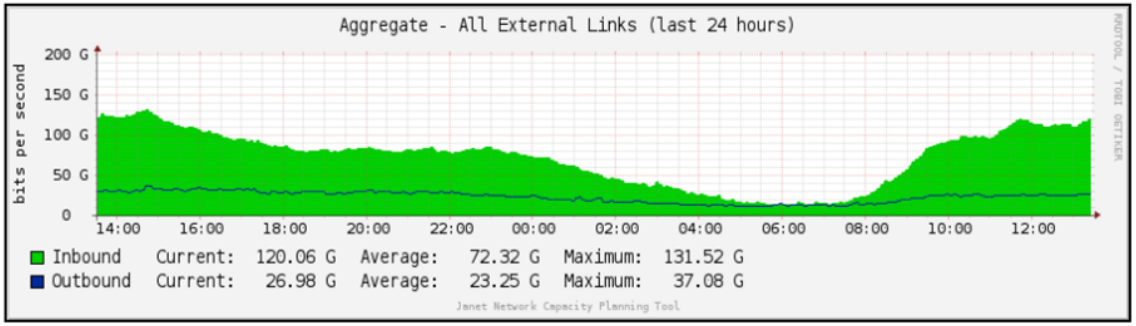
Contents

Major External Links





Future Plans

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- Enhanced capacity planning features
  - Trending, ‘what if’ scenarios
- But not just capacity planning
- Traffic flow analysis
  - Scalable netflow system
  - COTS = expensive and/or lacking in features
  - Roll our own?

Future Plans

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- Community access
- Automated reports

Example Customer Report

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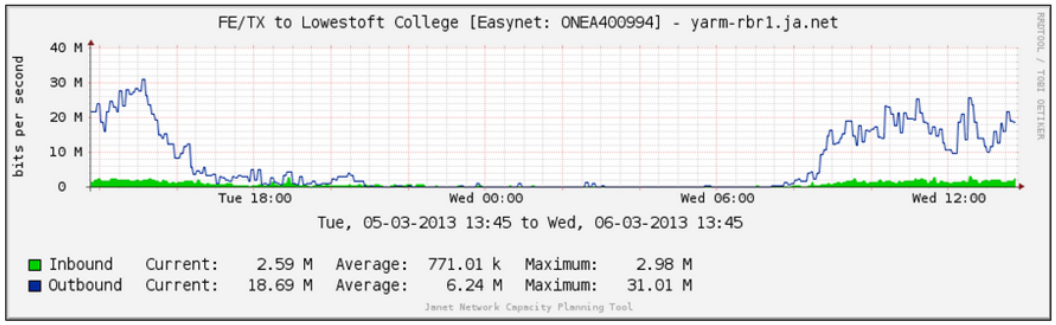
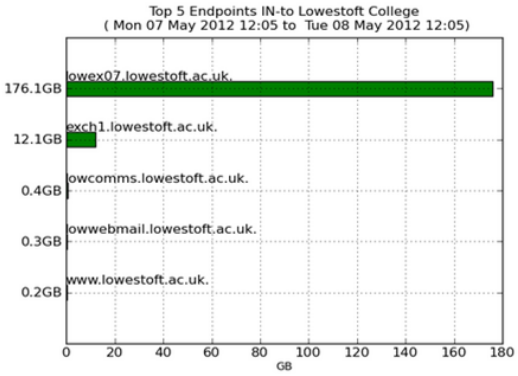
-LeNSE
-London
-NIRAN
-NNW
-NorMAN
-PSBA
-SouthWest
-TVN
-WMRN
-YHMAN

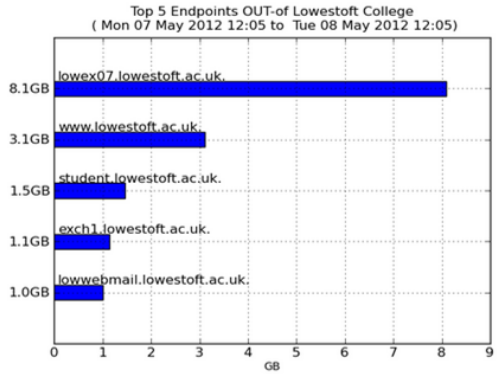
Lightpaths

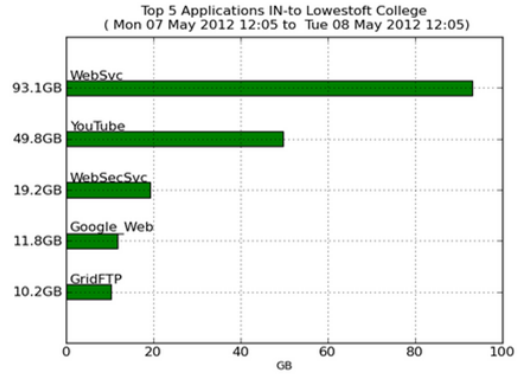
External(Peering/Transit)

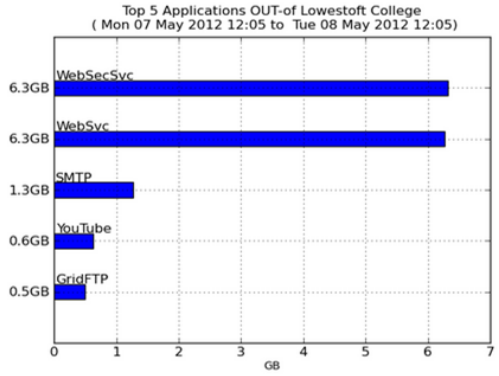
Miscellaneous











Future Plans

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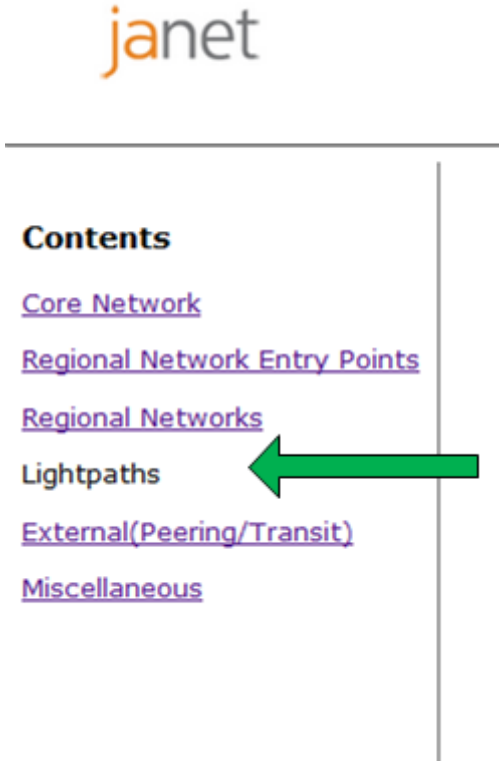

- Add Lightpath monitoring
  - That's Layer 2, so need OAM capability…

Bringing it all together

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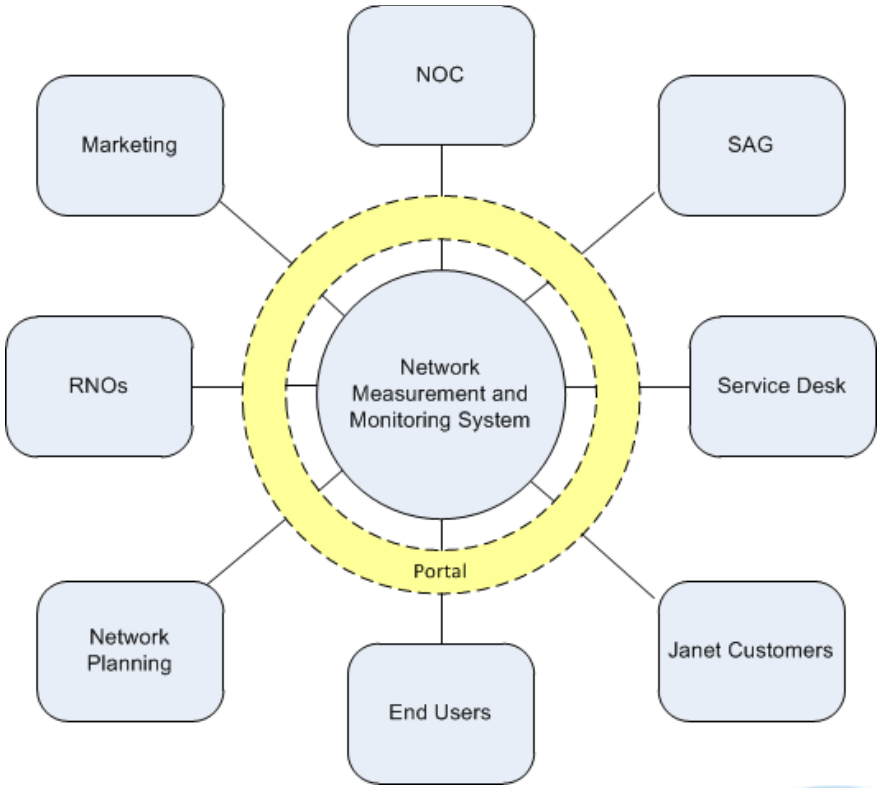
- SNMP, Netflow, OAM, OSS, Customer logins/reports
- Recognise need for dedicated team for network monitoring and OAM



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OAM

Operations Administration Maintenance

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OAM stands for Operations Administration and Maintenance

- Different standards
  - 802.1ag aka CFM
  - Y.1731
- Advantages
  - Layer 2
  - Fault location in multi-domain contexts
  - Link tracing
  - Hierarchical viewpoints

Operations Administration Maintenance

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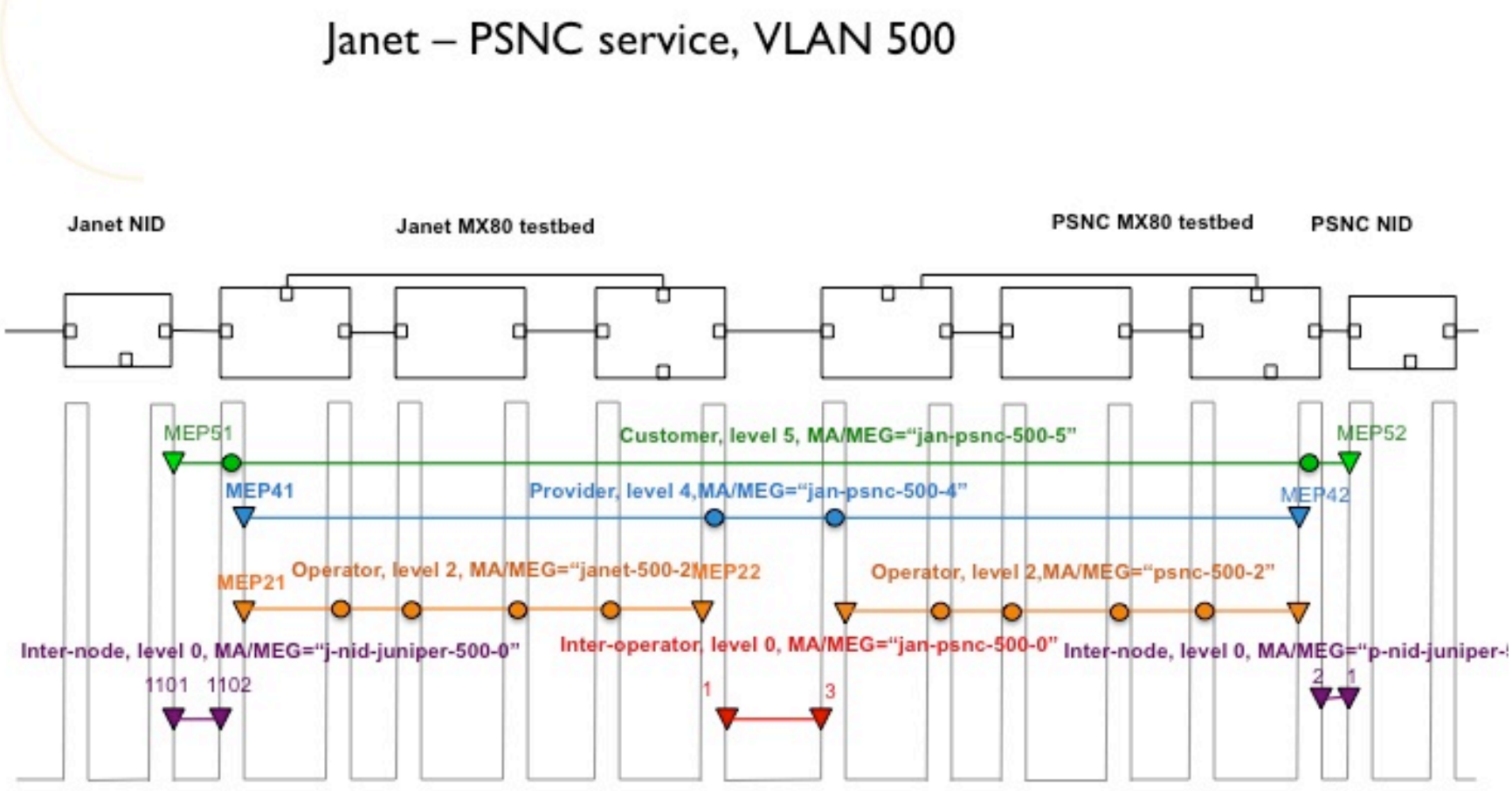
- Activities
  - Short Ethernet OAM trial in GEANT3 JRA1 T1
  - Expanded trial in GEANT3 Y4
  - Report end of March 2013

- Incremental rollout on Janet Lightpath
  - Monitor Bandwidth-on-Demand users (see later)

Example OAM Hierarchy



Service Assurance

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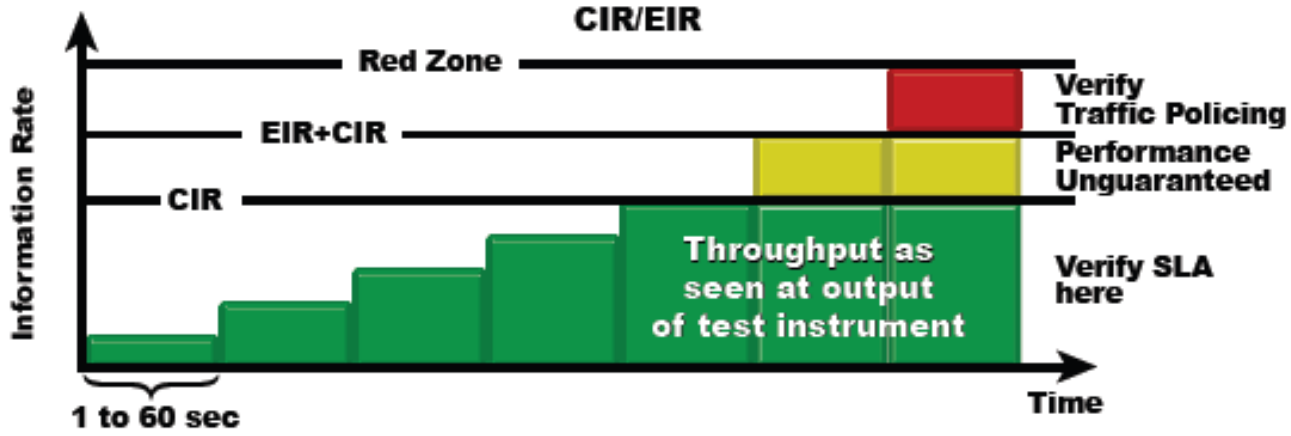
- Complements End-to-End Performance strategy
  - Separate strategy
- But more precise/stringent measurements
- Standards
  - RFC 2544
  - Y.1564



Service Assurance

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- Service Provisioning and Assurance
  - Verify configured service matches
    - Customer requirements
    - Device configs

- Also leverages OAM tools for service monitoring and troubleshooting

Service Assurance

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- Trials
  - With Janet Lightpath customers
    - Lumen House to Bristol
  - Inter-domain with NORDUnet
    - Lumen House to Copenhagen

- Janet Service Assurance Project
  - September 2012 to August 2013
  - Community website page coming soon
  - Testing reports should be available from May onwards

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Automated Provisioning

‘Bandwidth-on-Demand’

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- Technology Trials within the GEANT Bandwidth-on-Demand service

Janet Involvement

- Autobahn Inter-domain and Domain Managers located in Janet
  - IDM talks with other IDMs in participating NRENs
- Users request circuits via Autobahn Client Portal
  - Or Autobahn API
- DMs configure appropriate paths via ‘Technology Proxies’
  - Juniper MX Technology Proxy developed by PSNC

Janet Involvement

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- Users
  - NEXPReS
    - E-VLBI, Jodrell Bank to Metsähovi (Finland)
    - Involves Janet, GEANT, NORDUnet and Funet
    - Static config
  - BonFIRE
    - Cloud services – uses Autobahn API
    - EPCC (Edinburgh) to PSNC (Poland)
    - Involves Janet, GEANT and PIONEER

Trials with BonFIRE Project

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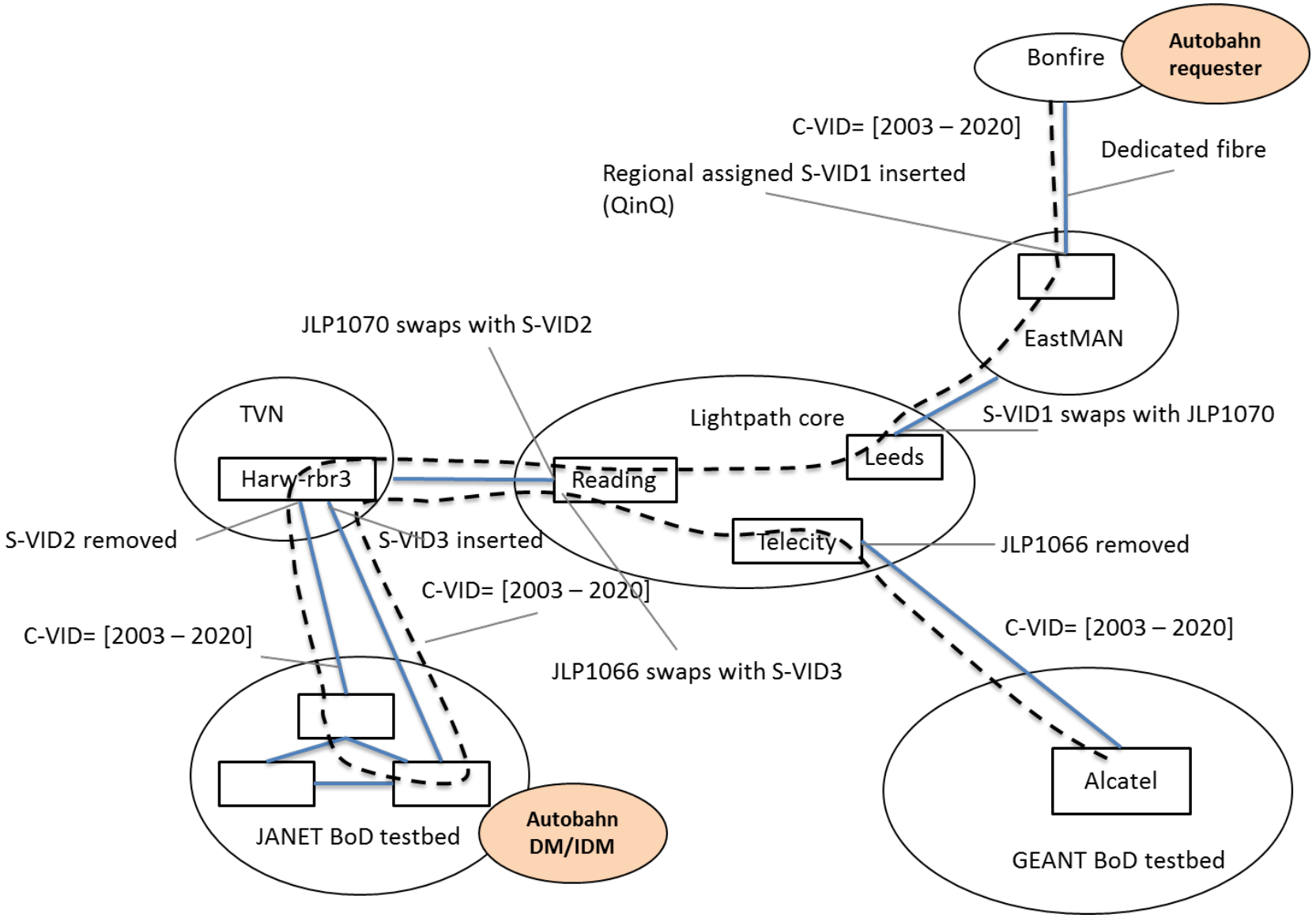

Future Plans

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- Autobahn TP for Juniper not aligned with NOC practices…
- Develop our own Juniper TP using Junos Space
- Support NSI (Network Service Interface)
  - OpenGridForum standard
  - API for specifying network services
  - Supported by Autobahn software

Future Plans

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- Expand technology trials
  - Expand current 3 switch testbed
  - More users

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Other Areas

New Transmission Capabilities

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- Janet6 will have 100Gb/s DWDM channels
  - 100GE client presentation
- 400Gb/s within lifetime of Janet6
  - Possibly 1Tb/s ?
- RENATER 400G trials with Alcatel-Lucent
  - Now operational between Paris and Lyon

New Transmission Capabilities

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- No planned 400G trials in Janet
  - As and when needed
    - New Capacity Planning Tool will help!

- Alien waves
  - Janet6 will be able to support alien waves
  - Use cases under discussion

Software Defined Networking

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- Separate control (and management) plane from data plane
  - Provide some API
  - Openflow most well known
  - Vendor-specific e.g. Cisco ONE (Open Networking Environment)

Software Defined Networking

Birds of a Feather (BoF) meeting at Networkshop
Tuesday 9th April, 17:45 – 18:45

- Various flavours of SDN and vendor offerings
- What people are doing
  - Industry deployments
  - Academic deployments
  - Projects e.g. OFELA
  - Academic courses
- Practical Issues
- Community Issues

- Gauge interest/demand for activities

Future Routing and Addressing

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- Future challenges
  - Site Multihoming
  - Mobility
  - Network Virtualisation

- LISP
  - Locator ID Separation Protocol
  - RFC 6830 through RFC 6836 (January 2013)

Future Routing and Addressing

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- ILNP
  - Identifier Locator Network Protocol
  - RFC 6740 through RFC 6748 (November 2012)
- Others
  - HIP, SHIM6, GSE 8+8, etc.
- Facilitate Technology Trials
  - Possible UK testbed for interested parties

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Questions