Optimising performance of networked applications

Community Hub - TNC25 - 12 June 2025

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Welcome to our community hub!

Our plan for this session:

- The rationale for our hub
- A quick “lie of the land” poll via Mentimeter
- A brief set of pointers to resources
- Open discussion

Rationale

Our National Research and Education Network (NREN) and campus operators have built a global infrastructure to support a wide range of R&E use cases and traffic.

- Includes large-scale science data movement and latency-sensitive applications

But how do science communities and users make optimal use of that infrastructure?

- Established communities do well; the CERN experiments are a great example.
- Many emerging communities less so; there's a long tail facing challenges.

In this hub, we hope to provoke discussion of challenges you've experienced, and what might be the considerations and best solutions for you and your community.

- Please ask questions as we go!

Mentimeter

Some quick questions to get lie of the room

- Your background
- The challenges you face
- The applications and monitoring tools you use

Use the QR code to join

menti.com code 4742 2541

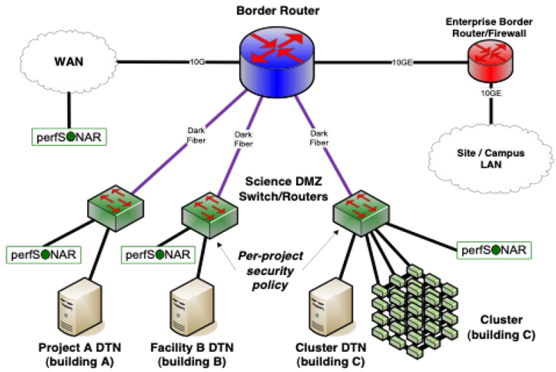
https://www.menti.com/almrarjs8b6c

A quick tour of some tools and techniques

Quick topic tasters to prime our discussion:

- Architectures - Tim
- perfSONAR - Lætitia
- NetSage - Jen
- iperf2 and RPM tests - Simon
- Jisc netperf tools - Chris
- Examining High Performance Networking - JZ

Architectures



It's important to build on solid, established principles

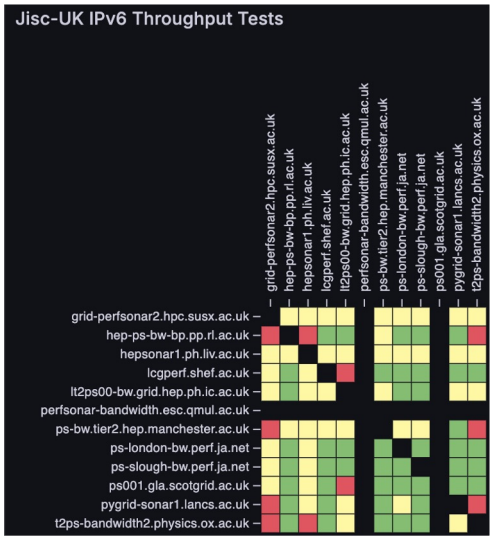
The ESnet Science DMZ model is a great example;
similar principles were evolved over time by the WLCG (CERN) community

- A local network designed for high-performance applications where the science network is distinct from the general 'business' network
- Dedicated, well-tuned data transfer nodes (DTNs) with performant data transfer applications (e.g., Globus not scp)
- Efficient implementation of security policy (e.g., stateless ACLs)
- Persistent network monitoring (e.g., with perfSONAR)

Note: low-latency applications (like LoLa) benefit from the same principles

perfSONAR 5.2.0

- **Open source network monitoring**
  - Throughput, latency, loss, path, …
  - Results archiver and grafana viewer
  - Version 5.2 just released on our 20th anniversary
- **No major new features**
  - Some component updates (Grafana, OpenSearch)
- **New OS Support: Ubuntu 24**
  - Debian 11 & 12 and Ubuntu 20, 22 and 24
  - Alma Linux 9 or Rocky Linux 9
- **Docker image for ARM64**
- **Install it with our installer script**



20 years of collaboration

perf20NAR years

Put yourself (or your organisation) on the map!
https://forms.gle/vsYmetjvyQRWwKUJ8

You will then show up at
https://stats.perfsonar.net

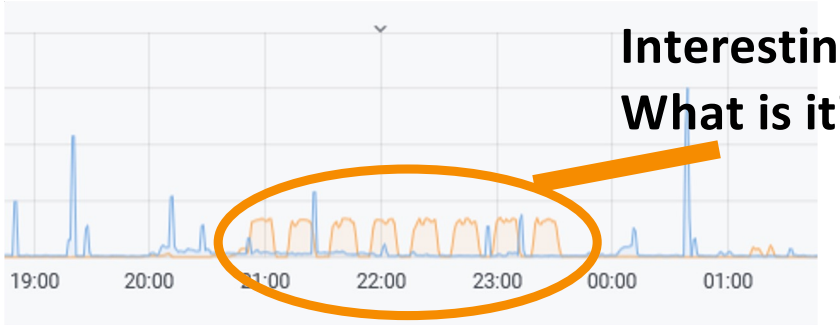
NetSage

An open privacy-aware network measurement, analysis and visualisation service

- Collect flow, snmp, and Globus data
- View by public grafana dashboards
- Finds patterns, answers questions
- Newer version in US, but IN@IU supports https://ana.netsage.global

- More info: https://netsage.io

- Contact: jms@tacc.utexas.edu



Timestamp	Sensor	5-Tuple Hash
2021-07-15 03:20:53	SingAREN Los Angeles, United States	c9cef62cde44cadab1d15

Source Information

Field	Data
Organization	Nanyang Technological University
Country	Singapore
ASN	9419
Subnet	155.69.240.x
Port	443

Singapore to Taiwan via LA?

iperf2 and RPM tests

RPM: “revolutions per minute”

- New metric proposed to reflect *responsiveness under load,* implemented in
  - Apple networkQuality
  - goresponsiveness
  - iperf2 (note: under active development, possibly more so than iperf3)
- Community with weekly informal VC, Slack group
  - See https://github.com/network-quality/community/wiki for pointers
  - Space for general performance-related discussion (anything but throughput ;-)

Jisc’s netperf tools

A Jisc, we provide a suite of performance test tools for our Janet members and collaborators

- Hosted at Janet PoPs, 10G and 100G instances, all supporting IPv4 and IPv6
- iperf2, iperf3, ethr
- perfSONAR, with archive and grafana hosting for community meshes
- RIPE Atlas anchor
- Current development: web-based speed test, SciTags, streaming telemetry
- https://www.jisc.ac.uk/guides/using-the-janet-network-performance-test-facilities

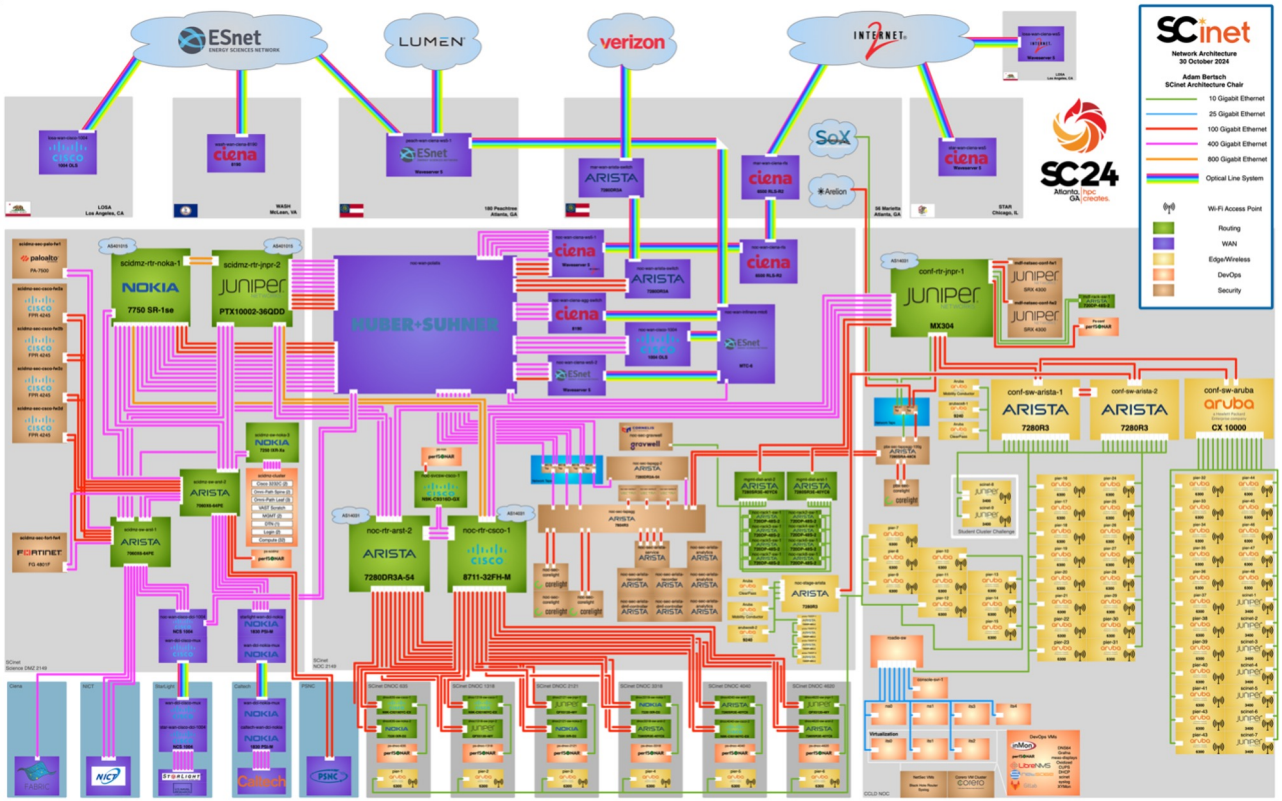
We also run a Research Network Engineering community:

- Presentations and discussion on communities as well as tools
- https://www.jisc.ac.uk/get-involved/research-network-engineering-rne-community-group

Email: netperf@jisc.ac.uk

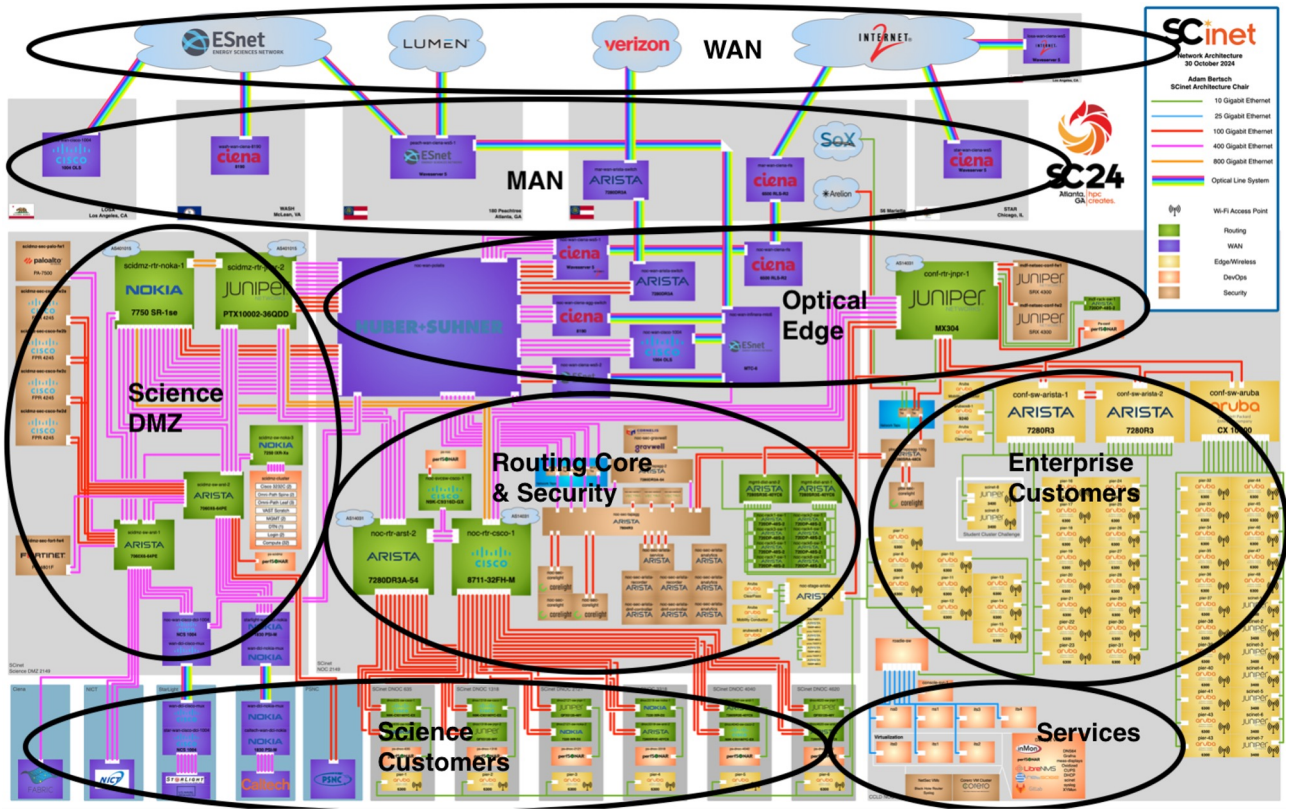
Examining High Performance Networking (1)

- Provocative (?) statements:
  - Network design is stable/risk averse
  - Lots of protection (security, extra capacity, backups)
  - Meant to prevent complaints
- Example: SC24 SCinet Network
  - Is this different than anyone's campus?



Examining High Performance Networking (2)

- Segmented design, everything has its place
- ‘Easy’
- Charge questions
  - Where is the workforce development opportunity
  - How can we showcase what R&E and industry want to do differently?
  - Burn it down/break things = bad. What alternatives are there?



Discussion time

Over to you…

What would you like to discuss?

- Challenges you face?
- Research engagement? (see also SIG-RED on Friday)
- Previous cases or examples?
- How to select and use the right monitoring tools?
- Other…?

Continuing the discussion…

We suggest using the NREN Slack workspace

See https://nren.slack.com/

Channel: #networkperformance

Lots of other useful channels there too, including #tnc25