

Network research on research networks

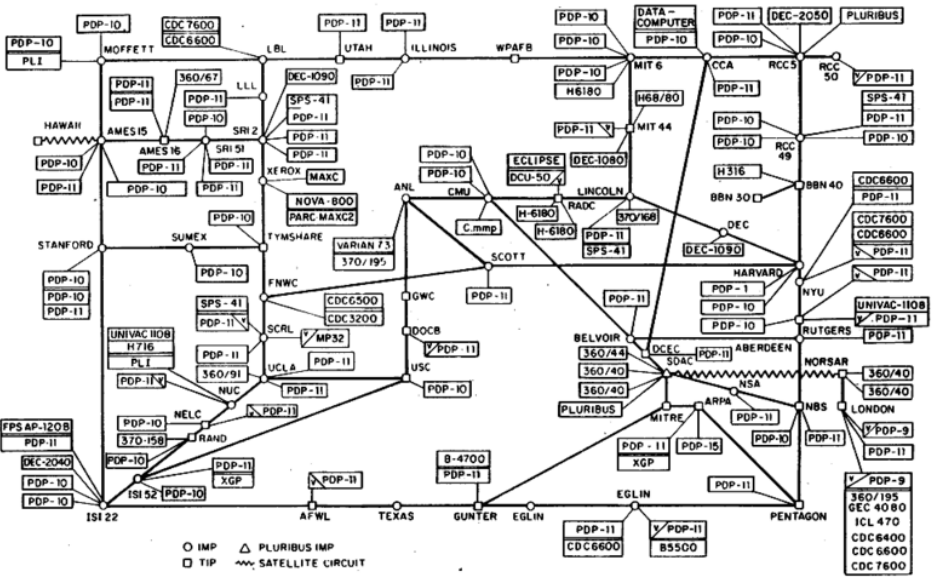
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Research Networks


- ▶ Purpose: infrastructure in support of research and teaching
- ▶ How?
 - ▶ Over-provisioning as a rule.
 - ▶ Keep pipes dumb as customers require.
 - ▶ Provide value-add: glue for collaboration.

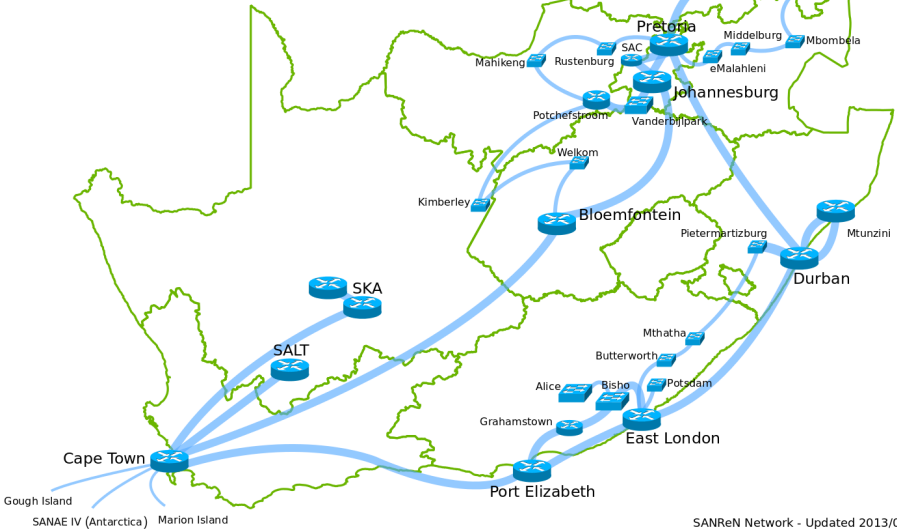
ARPANET LOGICAL MAP, MARCH 1977



(PLEASE NOTE THAT WHILE THIS MAP SHOWS THE MOST POPULATION OF THE NETWORK ACCORDING TO THE BEST INFORMATION OBTAINABLE, NO CLAIM CAN BE MADE FOR ITS ACCURACY)

NAMES SHOWN ARE IMP NAMES, NOT NECESSARILY HOST NAMES

 Existing / Completed



Networks Research

- ▶ Task of CS and EE departments.
- ▶ Low-level: better/faster data transmission.
- ▶ Mid-level: novel network switching designs.
- ▶ High-level: social, legal, commercial considerations.

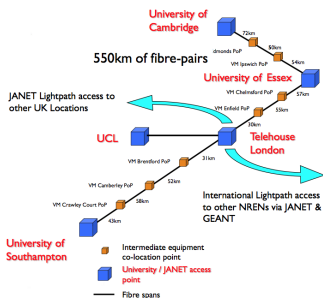
Network research on an NREN?

- ▶ The network is a production infrastructure, not a toy.
- ▶ Compare campus power utility...
- ▶ Making it safe to experiment:
 - ▶ Partition the physical network.
 - ▶ Logical separation (overlays).
 - ▶ Controlled access to production network.

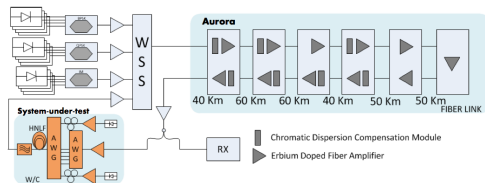
Examples

Janet AURORA

- ▶ Research: all-optical wavelength conversion (signal-independent).
- ▶ JANET provides dark fibre test-bed interconnecting university labs.

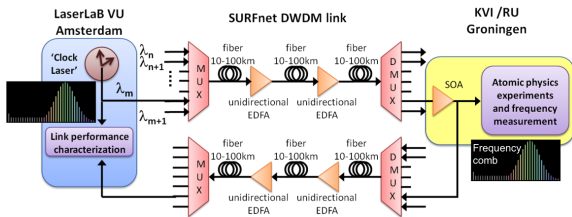


Black-box wavelength conversion of WDM signals tested on the Aurora testbed

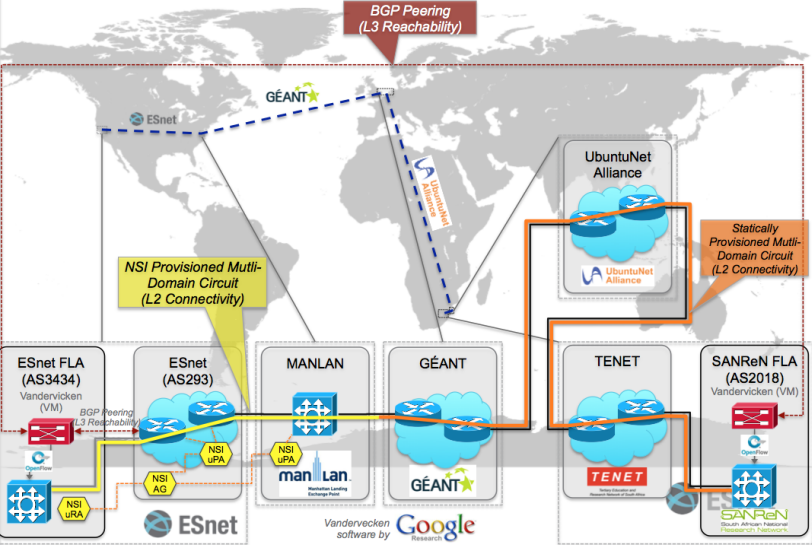


Clock signal transport on SURFNet

- ▶ Research: timing and frequency transfer over optical fibre.
- ▶ SURFNet providing a "channel" on WDM network.
- ▶ Applications: astronomy, geodesy, telecoms, power, finance...



Treehouse

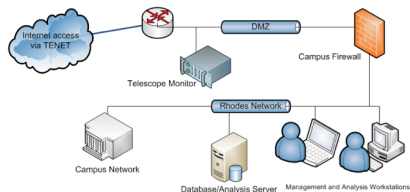


RU Network telescope

A Baseline Study of Potentially Malicious Activity Across Five Network Telescopes

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Sample Network Telescope Setup

- ▶ Research: study malware-related network traffic.
- ▶ TENET routed un-used network addresses to RU probe.
- ▶ Applications: network telescopes for cyber-defence.

Conclusion

- ▶ NRENs are suitable platforms for network research.
- ▶ Real network research is being supported by NRENs.
- ▶ Thanks for listening!
- ▶ Questions/comments: smiteff@csir.co.za

Attribution:

- ▶ David Salmon (JANET) - Aurora2 test-bed [CEF2014]
- ▶ Jeroen Koelemeij (LaserLaB VU University) - Optical Fibre Frequency Links (TNC2012)
- ▶ Chin Guok (ESNet) - NSI presentation [GLIF2014]
- ▶ Barry Irwin (RU) - A Baseline Study of Potentially Malicious Activity Across Five Network Telescopes [2013 5th International Conference on Cyber Conflict]