SURFnet network developments

10th E-VLBI workshop – 15 Nov 2011

Wouter Huisman – SURFnet
Engine for Innovation

Mission
To improve higher education and research by promoting, developing and operating a trusted, connecting infrastructure that facilitates optimum use of the possibilities offered by ICT.

Vision
We make a unique contribution by ensuring that researchers, instructors, and students can work together simply and effectively by linking individuals and teams seamlessly together and by giving them access to services, data, and tools and by encouraging and developing new ICT applications.

Network infrastructure
A hybrid fixed-wireless network as the basis for all collaboration, providing efficient, unlimited data transport.

Collaboration infrastructure
A pioneering collaboration environment that seamlessly connects systems, services, tools, and people.
Network users
e-VLBI, a global radio telescope

Status of the e-EVN
- Dutch National Research & Education Network (NREN)
  - Network, services and innovation partner for research institutes, universities, colleges, academic hospitals, cultural institutions...

- Not for profit organisation, approx 80 employees

- 180 connected institutions, 1M end-users

- Business model:
  - Innovation through project subsidies
  - Revenue through tariffs from institutions
SURFnet6 highlights

- World’s first NREN with a nationwide “hybrid” network, truly collapsed IP backbone (routers at 2 locations only)

- IPv4 and IPv6, unicast and multicast, plus lightpath provisioning, over a single DWDM transmission infrastructure

- Dynamic Lightpath services in production in 2008
  - www.opendrac.org

- Professional (outsourced) NOC: 7x24hrs active monitoring
Lightpaths:
- Point-to-point connection
- Within SURFnet6 based on SDH
- SURFnet7 offers NGE

Lightpaths offer:
- Exclusive network connection
- Guaranteed bandwidth
- Minimal latency (in NL < 10 ms)
- Minimal jitter
- Minimal packet-loss
- Secure (separated from the routed Internet)
Dynamic lightpaths

Request (Web GUI, API)

More information OpenDRAC: http://www.opendrac.org
- 11,000+ km dark fiber
- Cross Border Fibers

NORDUnet and PSNC, Hamburg
LOFAR and Onsala

Aachen, LOFAR and Effelsberg
LHC, Geneva
What’s in place for Jive?

- IP
- GLIF
- GEANT
- CBF

**SURFnet Core router**
- Amsterdam
- 5Gb/s

**NetherLight**
- 6x 1Gb/s
- 1x 10Gb/s
- 1x 10Gb/s for NEXPReS pilot

**Jive Correlator**
- Dwingeloo

**Surfnet Core router** in Amsterdam connects to **NetherLight**, providing a link to **Jive Correlator** in Dwingeloo. The network includes IP, GLIF, GEANT, and CBF.
- Open Lightpath Exchange
  - www.glif.is
  - No policy for connecting to NetherLight
- Supporting Ethernet Layer 2 and Sonet Layer 1 lightpath services transparently
- Co-located with AMSIX
European GLIF map
NetherLight connectivity

NetherLight topology - November 2011

ACE Supplies connection
SURFnet Controls usage of connection

More info: admin@netherlight.net
Automated GOLE Project
Creating dynamic lightpaths

Partners:
- University of Amsterdam
- Internet2
- StarLight
- JGN2
- CERN
- NORDUnet
- CESNET
- PSNC
- SURFnet
- ESnet
Network Services Interface (NSI)

- Standardized by NSI working group in OGF

Intend to define 3 protocols:
- Service Connection protocol
  - Allows reserve, delete, query services
  - R1.0 is due for ratification → demo’ed at SC’11
  - R2.0 includes modify services
- Topology Exchange protocol
  - Needed to automatically discover other networks
- Event protocol
  - State change and event
NSI requestor and provider interface
NEXPReS connectivity
Current network services: SURFnet6

- IP routed services
  - IPv4
    - unicast
    - multicast
  - IPv6
    - unicast
    - multicast
- Lightpath services
  - dynamic
  - static
    - single lightpath
    - OPN
SURFnet7: the scalable hybrid network

Institution

40/100GE 1G/10G

SURFnet

Layer 3 service (IP)
Layer 2 service (Ethernet)
Layer 0/1 service (Lambda)
SURFnet7 network

- All network services (IP and lightpaths) on a converged Carrier Ethernet platform
  - IP: improved aggregation layer
  - Lightpaths: guaranteed bandwidth services, minimal delay and jitter, 50ms restoration time (1:1 protection), simple (point and click provisioning), transparent, scalable and flexible

- 1G, 10G and 40/100G (future) client connections

- Chosen Vendor: Ciena
Multiple Services per Port

- Single client port aggregating IP, E-LINE, E-LAN and Dynamic lightpaths as long as line BW allows.
- 1G/10G client or line speed
- Services distinction by VLAN on UNI
  - All services on client port are tagged
- Flexibility with service activation (no installation work)
- Bundeling services, price per port model
Bandwidth on Demand evolution for SN7

Reuse of existing functions of CIENA NMS
Thank you!

Wouter Huisman
wouter.huisman@surfnet.nl