Research activities on (Optical) networking and Internet Standards
Cees de Laat

University of Amsterdam
Multi Kingdom Problems

FOM-Rijhuizen to IPP-FZJ => 7 kingdoms

- Netherlands
  - Science dept
  - Campus net
  - SURFnet
- Europe
  - TEN 155
- Germany
  - WINS/DFN
  - Jülich, Campus
  - Plasma Physics dept
The need for AAA

See IRTF AAA-ARCH
www.aaaarch.org
Policy based networking example

Experiment

Camera

Pc

Macintosh

Policy based networking switch with > layer 4 AAA functionality

AAA
Generic AAA Architecture

1. Generic AAA server
   Rule based engine

2. API

3. Policy
   Data

4. Service

5. Accounting
   Metering

www.aaaarch.org

PDP

PEP

Acct Data
Hempoint
POS framing at 10 Gbit/s
Telfort’s DWDM network: always two different routes

SURFnet5: Pre-production network

Concentrator (15x)
POS framing at 10 Gbit/s

Hempoint
SARA

4a of 5
GIGAcluster

Concentrator (15x)

Hempoint

SARA

6 * Linux PC
1 * SUN
3 * 1 Gbit/s uplink
This diagram subject to change

Courtesy Bill St.Arnaud
Possible STAR LIGHT configuration

- **10 Gbps (8 x GbE)**
- **2.5 Gbps (2 x GbE)**
- **1 GbE**
- **STS mapped to GbE**

I-wire: 4 x GbE CWDM

- **GbE transceivers**
- **Optical Mux/Demux**
- **10 GbE transceivers**

**DTF:** 4 x 10 Gbps SONET DWDM

- **10Gbps SONET to GbE Demux**
- **STS to GbE Demux**

**SURFnet 5:** 1 x 2.5 Gbps SDH DWDM

**CA*net 4:** 8 x 10 GbE DWDM

- **10GbE to GbE Demux**
- **Layer 3 Router to connect to smaller networks**

Courtesy Bill St.Arnaud
Consider one fiber

- Current technology allows for 160 $\lambda$ in one of the two frequency bands
- Each $\lambda$ has a bandwidth of 40 Gbit/s
- Transport: $160 \times 40 \times 10^9$ Gbit/s / 8 bit/Byte = 800 GByte/s
- Take a truck with a capacity of 10 metric ton
- One DLT contains 50 Gbyte, weights 200 gr
- Truck contains (10000 kg / 0.200 kg) * 50 Gbyte = 2.5 PByte
- Truck / fiber = 2500000 GByte / 800 GByte/s = 3125 s ≈ one hour
- For distances further away than a truck drives in one hour (50 km) minus loading and handling 50000 tapes the fiber wins!!!
Research topics

• Optical networking infrastructure for grid applications

• Metering, monitoring, features and performance analysis for grid apps

• Directory enabled networking for ASP functionality

• Standardization research on AAA (IRTF)

• http://www.science.uva.nl/~delaat