Multiple GIGAbit Networks for Research Applications

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Computational Physics department
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- Rise and Fall of ATM
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Computational Physics

Located in Minnaert Building 3th floor

- 1 Professor
- 3 staff
- 1 secr
- ± 6 on projects
- ± 10 stud
- 3 stag
- 2 industry
Research subjects - 1, 2

- Computational Physics
  - Ocean and weather modeling
  - Solid State physics
  - Supercomputing massive parallel system
  - Code distribution and optimization

- Computer based learning systems
  - SENS project
  - Computer and network based college
  - WEB based (Java, HTML, Db, Groupware)
EU project REMOT / DYNACORE
- Collaboratories, virtual control rooms
- Support science at the home institutes
- Groupware, Videoconference tools point to point and point to multipoint
- Corba services, distributed object db
- www.phys.uu.nl/~dynacore
Research Subjects - 4

- Networking
  - Focus on applications for Physics
  - QoS networks for computing, collaboratories and telelearning
  - Distributed systems topics:
    - Modeling
    - Optimization
    - Simulation
    - Emulation
SURFnet

- Network backbone for University's
- 4 cluster leaders, ~ 14 POP’s
- 155 Mbit/s to USA
- Services <-> research
- TF-Ten - Quantum project
- SURFnet 4 -> move to 155 Mbit/s ATM
- 1999 -> SURFnet 5, the gigaport project
History
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The train model

- ATM looks so simple
  - Fixed size cell’s with address information
  - Audio and video mixed with data
  - Seems very deterministic and predictable
Switches got complex
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- Leaky as the pest
The swamp

- AAL, ABR, ATM, AvCR, CAC, CBR, CDV, CLP, CLR, CLR0, CRM, CTD, DSP, DTL, EPD, ES, ESI, GCAC, IAS, ICR, IISP, ILMI, LGN, MIB, NNI, NSAP, PG, PGL, PPD, PTSE, PTSP, PNNI, PVC, PVCC, PVPC, QoS, RCC, SVC, SVCC, UBR, UNI, VBR, VCC, VCI, VP, VPC, VPI, ...
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  - Long turnaround (rtt \approx \text{days})
  - Expensive rented lines system
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- **Throw Bandwidth at the problem**
  - Might go wrong at bottlenecks
  - Easiest solution (UBR).
Positive remarks on ATM

- European PTT’s learned to talk \( (n^2) \)
- Using CBR makes it a flexible leased lines system
- Can indeed give guaranteed RTT’s and QoS
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  - TOS bits in IPv4 and IPv6, diffserv
The management domains
Physics-UU to IPP-FZJ => 8 kingdoms
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End user motivation

- End users don’t want to pay
  - Decentralization places bills at end user
  - Users have a different “core business”
  - Internet is perceived as free and it works

- We must move forward

- Applications are the key
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- Use chipcards with certificates to do CAC
Possible architecture

- POLICY
- LDAP
- ECASH
- SSR
- SSR
- SSR
- SSR
- Remote service
- End user
SURFnet5 - GIGAport
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- 80 gigabit backbone
SURFnet5 - GIGAport

- 80 gigabit backbone
- 20 gigabit pops
SURFnet5 - GIGAport

- 80 gigabit backbone
- 20 gigabit pops
- 2 megabit to every SURFnet user@home
  - Videostreaming
  - Telelearning
  - The usual app’s
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Playing ground: GIGAcluster

- SUN/Pc
- 1 Gb/s eth
- SSR L4 switch
- Workstations/Pc's
- ATM
- GIGANet
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Workstations/Pc's ATM GIGAnet
GIGAcluster applications

- REMOT/DYNACORE, collaboratory
- Objectivity, distributes db’s
- Corba, object and message passing
- Qbone, Quality of Service on WAN
- MCU’s, scalable video distribution
- SURFnet 5, GIGAbit producer/sink
- DAS - Computing
- LLT (LFAP, CAC, COPS, IPSEC, …)
Thanks

More info:
http://www.phys.uu.nl/~delaat
http://www.phys.uu.nl/~wwwfi
http://www.phys.uu.nl/~dynacore