The significance of the new Internet standards for experimental physics and education.

Cees de Laat

Utrecht University
• This space is intentionally left blank
• Located in Minnaert Building 3th floor
  – 1 Professor
  – 3 staff
  – 1 secr
  – ± 6 on project
  – ± 10 stud
  – 3 stag
  – 2 industry
• 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)
• Networking
  – Focus on applications for Physics
  – QoS networks for computing, collaboratories and telelearning
  – Distributed systems topics:
    » Modeling
    » Optimization
    » Simulation
    » Emulation
• 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
Physics-UU to IPP-FZJ => 7 kingdoms

- Netherlands
  » Physics dept
  » Campus net
  » SURFnet

- Europe
  » TEN 155

- Germany
  » WINS/DFN
  » Juelich, Campus
  » Plasma Physics dept

Map showing connections between different regions with delays:
- USA line: 3 ms
- 2.5 ms
- 17 ms • Jülich
The need for AAA

End user

Kingdom N

Remote service

Kingdom N+1

See IRTF AAA-ARCH Research group
Policy based networking example

Experiment

Pc

Policy based networking switch with > layer 4 AAA functionality

Macintosh

AAA

Camera

BBI
Applications

• Network Access
  – Bandwidth Broker
  – Authorization of resources living in many administrative domains
  – Budget system
  – Library system
  – Computer based education system
  – E-Commerce
  – Micro-payments
  – Car Rental
  – Daily life
Authentication Authorisation and Accounting ARCHitecture Research Group

chairs: C. de Laat, J. Vollbrecht
Specific goals of the RG are:

- develop generic AAA model by specifically including Authentication and Accounting
- develop auditability framework specification that allows the AAA system functions to be checked in a multi-organization environment
- develop a model that supports management of a "mesh" of interconnected AAA Servers
- define distributed policy framework, coordinate with policy framework WG and others
- develop an accounting model that allows authorization to define the type of accounting processing required for each session
Specific goals of the RG are:

- implement a simulation model that allows experimentation with the proposed architectural models (also work on an emulation)
- describe interdomain issues using generic model
- work with AAA WG to align short term AAA protocol requirements with long term requirements as much as possible
- complete the work in Q4 - 2000 (ambitious)
Research Group Name: AAAARCH - RG

Chair(s)
- John Vollbrecht -- jrv@merit.edu
- Cees de Laat -- delaat@phys.uu.nl

Web page
- www.irtf.org
- www.phys.uu.nl/~wwwfi/aaaarch

Mailing list(s)
- aaaarch@fokus.gmd.de
- For subscription to the mailing list, send e-mail to majordomo@fokus.gmd.de with content of message subscribe aaaarch end
- will be archived, retrieval with frames and in plain ascii:
  » http://www.fokus.gmd.de/glone/research/aaaarch/
  » http://www.fokus.gmd.de/glone/research/mail-archive/aaaarch-current
  » ftp://ftp.fokus.gmd.de/pub/glone/mail-archive/aaaarch-current
Example application: bandwidth brokerage at Enterprise/Service Provider boundary
Roaming “Pull” Authorization Model

Example applications: Mobile IP, PPP dial-in to NAS
Example application: Internet printing, where file and print servers are in different admin domains
AAA Server building block

Rule example: Auth_A = (B>9) .or. C .and. D

Types of communication:
1: “The” AAA protocol
2: interface (API) to app specific module (addressing!)
3: interface (API or connection) to repositories (e.g. LDAP)
Types of communication:
5: Towards service (f.e. COPS, CLI, SNMPv3)
Types of communication:
4: Legacy protocols (Radius, Diameter, …)
AAA Server with Accounting as Separate Service

Generic AAA server
Rule based engine

Policy

Events

Acct Data

Application Specific Module

Accounting Module

Service

Metering

1

2

3

1

2

2

3

3

4

5

6
Roles

Content
- University
- Hogeschool
- Library
- NOB

Portals Brokers
- SURFnet

Customers

The three scenario's

• **Bureaucracy**
  - Do the advanced applications by hand
  - Long turnaround (rtt ≈ days)

• **Complexity**
  - Automatic application setup
  - Need advanced middleware and probably also bureaucracy

• **Throw Bandwidth at the problem**
  - Might go wrong at bottlenecks
  - Easiest solution
  - Do it yourself services
Stretching the OSI model

- Diensten
- Applications
- Middleware
- Netwerk

Graphs showing complexity and bandwidth over time (t).
Gespannen verhouding

• 90% of the University network is an ordinary production network

• 90% of the advanced applications is used only by 10% of the university community

• 90% of the usage of the network by students is not mentioned in the goals of the many "fiber to the student dormitories" proposals

• Research -> production
  • ATM videoconference
  • Multicasting
  • Policy based networking