The significance of the new internet standards for collaboratories.


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For the DYNACORE collaboration.
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The need for QoS

• Collaboratory has soft real-time requirements
  – Data connections
    » Certain minimum bandwidth, rtt not important
  – control connections
    » Low bandwidth, low rtt is important, high availability
  – Audio/video
    » Constant bandwidth, rtt, no jitter, multicast

• Distributed Computing
  – Message passing
    » Medium bandwidth, low rtt

• IP-telephony
  – Voice over IP
    » Low bandwidth, low rtt, low jitter

• Other requirements
  – Authentication, Authorisation, Accounting
  – Encryption, security, VPN
The fate of ATM

Why not ATM

–Complex
  » AAL, ABR, ATM, AvCR, BUS, CAC, CBR, CDV, CLP, CLR, CLR0, CRM, CTD, DSP, DTL, EPD, ES, ESI, GCAC, IAS, ICR, IISP, ILMI, LANE, LEC, LECS, LGS, LGN, MIB, NSAP, NSP, PPD, PTSE, PTSP, PNNI, PVC, PVCC, PVPC, QoS, RCC, SVC, SVCC, UBR, UNI, VBR, VCC, VCI, VP, VPC, VPI, ...

–Did not make it to the desktop
  » Plug and play switched ethernet works

–Speed advantage overtaken by packet networks (Ethernet, POS, POF, DWDM)

–Overhead counts
  » ATM overhead 10%

–That’s called progress!
- Physics-UU to IPP-FZJ => 7 kingdoms
  - Physics department
  - Compute Center, Campus network
  - SURFnet, NRN-Netherlands
  - Dante - ten 155
  - WINS/DFN, NRN-Germany
  - FZJ-ZAM, Campus network
  - FZJ-IPP, Institute of Plasma Physics
USA line
Jülich
6 of 10
17 ms
Maastricht
17 ms
Eindhoven
2.5 ms
Delft
3 ms
Leeuwarden
Groningen
Marknesse
Wageningen
Nijmegen
Tilburg
Breda
Rotterdam
Den Haag
Leiden
Amsterdam
NMI (user entered MacsBug on purpose)

17-Jun-1999 11:51:26 PM (since boot = 28 minutes)

Current application is “Microsoft PowerPoint”
Machine = 312 (PowerBookG3Series), System $0860, sysu = $01008000
ROM version $077D, $41F6, $0002 (ROMBase $FFC00000)
VM is on; paging is currently safe
NIL^ = $FFC10000
Stack space used = -8018882
Address FFC0693A is in the ROM at _PutIcon+0378C

68020 Registers
D0 = 00000000      A0 = FEE00000       USP  = 0B25F3D8
D1 = 0000003C      A1 = 0028B9A4       MSP  = 00000000
D2 = 008D49B0      A2 = 00019570       ISP  = 0BA055E4
D3 = 0B25FAF0      A3 = 00000000       VBR  = 0016D494
D4 = 746FFF00      A4 = 0B25F754       CACR = 00000001     SFC = 0
D5 = 0000FFFE      A5 = 0B9F3790       CAAR = 00000000     DFC = 0
D6 = 6C204301      A6 = 0B25F42C       PC   = FFC0693A
D7 = 00010000      A7 = 0BA055E4       SR   = SmxnzvC      Int = 0

Calling chain using A6/R1 links
Back chain  ISA  Caller
0B25F8FF    PPC  002FD83C  EmToNatEndMoveParams+00014
0B25F880    PPC  1B5C67F8
0B25F848    PPC  1B5C68A8
0B25F7D8    PPC  1B249B30
0B25F780    PPC  1B2905DC
0B25F710    PPC  1AE7BE98  AfxWaitNextEvent+00050

Just kidding
• Networks are expensive resources
• Borrow from supercomputer era
• New unit: megabit/s kilometer second (mks)
  – Actually bit/s meter seconds (bps.ms => bm)
  – SURFnet has: $20 \times 155 \times 200 \times 31536000 \approx 1.9E13$ mks
  – Dynacore needs: $1 \times 20 \times 400 \times 80 \times 8 \times 3600 \approx 1.8E10$ mks
  – DAS needs: $24 \times 10 \times 100 \times 50 \times 24 \times 3600 \approx 1.0E11$ mks
• Establish a program advisory commission
• Use ecash on virtual bank to account
• Use chipcards with certificates to do CAC
The need for policy control

Remote service

End user

Kingdom N

Kingdom N+1

SSR

SSR

SSR

SSR

LDAP

ECASH

POLICY
Generic Service Access Model

Management

Trust Authorities

Usage Entity
Identity
Environment Attributes
Authorization Attributes
Request

Authentication
Challenge
Integrity knowledge

Authorization Attributes

Policy Engine
SLA=>
Rules Actions

Point Authorization

Service Entity
Admission Logging
Configuration, Statistics, Accounting, Audit

Service Interaction
Current work in the IETF

• Differentiated Services
  – IETF workgroup as part of transport area workgroup.
  – Per Hop Behaviors (PHB), codepoints
  – AF - Assured forwarding = looks like ABR
    4 classes with each 3 different levels of drop priority
  – EF - Expedited forwarding = leased line behavior
  – Core on aggregated flows, shaping, metering, policing at boundaries

• Bandwidth Broker
  – A bandwidth broker (BB) manages network resources for IP QoS services
    supported in the network and used by customers of the network services.

• AAA
  – Authentication
  – Authorization
  – Accounting
The three scenarios

• Bureaucracy
  – Long turnaround (rtt ≈ days)
  – Expensive rented lines system
  – Connection oriented service

• Complexity
  – Automatic call setup
  – Needs probably also bureaucracy
  – Connection less/oriented mix service

• Throw Bandwidth at the problem
  – Might go wrong at bottlenecks
  – Easiest solution (UBR)
  – Connection less service
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QUESTIONS?