International videoconferencing and streaming services and research

Issues

• Areas for collaboration
• Middleware
  • Vidmid (VC&VoD)
• Int.l dialling scheme
• Metadata & DRM

Dr.ir. Egon Verharen
Innovation management
SURFnet bv
Egon.Verharen@SURFnet.NL
International Coordination

• Why
  – Collaboration does not know boundaries
  – Present and upcoming (inter)national videoconferencing and streaming services
    • Interoperability & Connectivity
  – Task-forces, R & D programmes, training material
    • TF-STREAM (European research nets), ViDe, Internet2
  – Shared interest/issues
    • Middleware issues
      – Numbering schemes
        » Identical dialing (whoever/wherever you are)

• How
  – Shared member- & leadership
  – Interconnection of vc core components (gk, gw,...)
Areas for Joint R&D

– Networking
  • QoS for digvid applications (TF-NGN, I2 QoS)
  • Network analysis and simulation tools (TF-NGN, VideNet Scout, I2 e2e)
  • High-reliability architectures (TF-STREAM)
  • Multicast address space management (Geant)
  • IPv6 (6net wp’s)

– Middleware
  • Globally-scaleable H.323 number/dial plan & update (TF-STREAM, ViDe NASM)
  • Inter-gatekeeper communication (ViDeNet)
  • Security and authentication (I2 vidmid)
  • Directory services (I2 vidmid, ViDeNet, TF-LSD)
    – Creation of video teleconferencing schema extensions (I2 vidmid)
Areas for Joint R&D

– Videoconferencing
  • Gateway development (I2 Commons)
    – VRVS, AccessGrid (see next pres), MPEG-2, MJPEG
  • SIP & VoIP (many, vidmid, TERENA?)
  • Integration alternative media streams (I2, AccessGrid)
    – e.g. MPEG-4 & HDTV & MJPEG
  • Data collaboration tools (ViDe, AccessGrid)
  • (Semi)Automated scheduling (VRVS, AccessGrid, …)

– Streaming
  • MPEG-4 (ViDe)
  • Metadata (TERENA, ViDe)
  • Digital Rights Management (vidmid vod)
  • “HE Television” (ResearchChannel, Europe???)
Vidmid

- Internet2 Middleware working group
  - Middleware for digital video
  - Subgroups: videoconferencing, Video-on-demand
  - NSF middleware initiative project

- Activities
  - Develop scenarios
  - Work out architectural issues
    - Identifiers, Authentication, Directories (structures, objectclasses, metadirectories), resource discovery, Authorization (access control mechanisms), PKI (for encryption, authentication, signing)
      - Both intra- and interrealm
Where are we?

- H.323, SIP
- Multicast tools
- Video archives

DI DIRECTLY Enabled APPS

H.323, SIP

Multicast tools

Video archives

SURF.net

Nordunet 2002, April 16
Vidmid in id-world

- Objectclass standards (e.g. eduperson, gridperson)
- Content Portals
- Shibboleth exchange of attributes
- Future PKI
- DoDHE et al.
- Grids et al.

- Learning Management Systems
- Web services and servers
- WebISO
- Personal Portals
- Campus authentication
- Enterprise directory
- Future PKI
Vidmid VC status

- Workplan
- Deliverables:
  - Scenario’s
  - Directory services/Object Classes
    - Video-app directory
    - Implementation, directory of video-directories
    - ITU standard
  - Authn/z flows
    - Whitepaper NMI r.1
  - Resource discovery
    - Whitepaper NMI r.1
- Testbeds
  - Clients, gateways, directory servers
Figure 1. Relationship of H323 LDAP components
A&A call setup

1. EP
2. reg.
3. auth
5. media
6. autz
8. 8:OK
9. 1a & 2a

GK/proxy server

Shibb?
Vidmid VoD status

- VoD scenarios
- White paper on role of directories in VoD
  - Including authnz flows
  - Part of NMI r.1
- Exploring use of middleware in Digital Rights Management
  - effective and judicious DRM for use in HE
International VC service activities

• European research networks
  • operational: DFN (Germany), HEAnet (Ireland), UKERNA (UK), Funet (Finland), SURFnet (Netherlands), SWITCH (Switzerland)
  • Preparation: Uninett (Norway), RedIris (Spain), CARnet (Croatia), GARR/Cineca (Italy), GRnet (Greece), UNI-C (Denmark)

• North America
  • ViDeNet, Internet2 Commons
  • CANARIE (Canada) (in preparation)

• Asian-Pacific research networks
  • AARNet (Australia)
  • Plans for all APAN exchange points

• South America/Africa
  • Known sites, but no services identified yet
TERENA NRN VC service status
International dialling scheme

- **Principles:**
  - International
  - Freedom of choice for local situation
  - E.164/tel.no. integration
  - Implementable now (present gatekeeper technology)
  - Compatible with existing network (ViDeNet)

- **Proposal** (by UKERNA, HEAnet, SURFnet)
  - ViDeNet support

- **Numeric**
  
  ```
  [〈EZ〉]<world gk><cc.><org. ><client no>[<suffix>]  
  00  ITU cc + local no.  ???
  ```

- **Alphanumeric**
  
  `<userID>@<fully qualified domain name>`
ViDeNet Gatekeeper Hierarchy Management

Showing Global Details, US and UK Country GKs and Sample Leaves at UNC and Edinburgh

ViDeNet Root level Architecture
Access to Digital Materials

• Streaming services
  – Few, isolated
    • but come to BoF Wednesday !!, see Dan Mønster, UNI-C
  – See TF-STREAM final report

• Metadata
  – Technology: qualified Dublin Core, MPEG-7, RDF (XML): is there
  – Challenge:
    • Common model
    • Indexing
    • Exchange
Access to Digital Materials

• Digital Rights Management is about content control
• Several ways to use digital materials:
  • personal use
    – typically purchased by individuals on a subscription or per-use basis.
  • professional use
    – typically acquired (for fee or legal agreement) by an organization or university on a bulk basis, with access redistributed freely to members of the organization.
  • public use
    – as a citizen, entitled to an information commons, and other basic information rights, such as Fair Use and Freedom of Information
Digital rights technologies

• The different uses of on-line materials have different requirements
  – they will likely require different technologies.

• Requirements vary about the needs and controls for privacy, the economic recovery model, the needs and controls for security, etc.
  – e.g. ability to snip fair use clips

• Who is developing the digital rights technologies for professional and public use?

• Technology: MPEG-21 (& MPEG-7)

• Late summer workshop CNI, EDUCAUSE, I2 and SURA
Technology and services development

- AccessGrid Nodes & Virtual Presence conferencing
  - Other (multicast based) conf. systems:
    - VRVS, Isabel, Marratech,…
- SIP-based conferencing
  - VoIP, video, presence
- Codecs
  - DV, MPEG-4, MJPEG
- Directory and authnz support
- caching & replication
- IPv6
  - Research & products
- QoS/Classes of Service
Conclusion

• International collaboration ongoing and it’s coming your way (so you’d better prepare):
  – VC services
  – Middleware
  – International dialing scheme
  – Streaming metadata & DRM

• JOIN !
  – Let us learn
    • About your work, your solutions
    – Participate and influence
Background info

- Vidmid  http://middleware.internet2.edu/video/
- Numberplan  http://www.wvn.ac.uk/support/h323address.htm
- TF-STREAM  http://www.terena.nl/task-forces/tf-stream/
- TF-STREAM mailinglist  streaming@terena.nl
- ViDeNet  http://www.unc.edu/cavner/videnet/
- VideNet Scout
- I2 Commons  http://www.internet2.edu/html/commons.html
- Megaconference  http://www.mega-net.net/megaconference/
- ViDe NASM  http://www.vide.net/……..
- VRVS  http://www.vrvs.org/
- TF-NGN  http://www.terena.nl/task-forces/tf-ngn
- TF-LSD  http://www.terena.nl/task-forces/tf-lsd
- 6net  http://www.6net.org/
Vidmid Background

• Formed in spring 2001
• Critical insight and momentum from ViDe & Mace & Shibb leaders
• Focus on videoconferencing and video-on-demand for their middleware requirements
• Component of NSF Middleware Initiative (NMI)
Vidmid VC

- VidMid VideoConferencing
- Chair, Egon Verharen, SURFnet
- Goals:
  - To develop set of simple, authenticated desktop vc clients, along with the associated directory and authentication components
    - To identify network-based infrastructure to support *interrealm* community video
      - H.323, SIP, VRVS/AG (multicast)
    - To foster interoperability at the identifier, security and video stream levels
    - Enable authenticated and authorized call setup
    - Engage industry players
Vidmid VC status, deliverables

- Derive flows and develop architecture for inter-realm authentication and authorization in a federated model
  - Expert groups starts now
  - Conferencing attributes, endpoint authentication, datastream protection
- Construct a model for resource discovery between security domains (Art Vandenberg, GSU)
- Adapted clients
  - H.323: vendors, Alt. openH.323
  - SIP: Samir Chatterjee (CGU), Doug Sicker (UoC Boulder)
  - Multicast clients: VRVS (Caltech), AG
    - Secure multicast needed
- Testbeds
  - SURA CfP for SURA members
CommObject classes

- CommObject
  - holds information that describes an endpoint such as a video conferencing system or an IP telephone.
  - can be associated with a user, so that one can contact a specific user’s IP telephone or video endpoint

- Subclasses:
  - H323Identity
    - describes attributes specific to an h.323 endpoint
  - H323Zone
    - describes an h.323 network. Purpose is to represent general information about the zone: name, URL, contact information and available resources
  - SIPIdentity
  - VrvsIdentity

- Presence & IM class
H.323 authenticated call setup

- H.323:
  - Terminals register with gatekeeper (H.225.0 RAS: registration, admission, status)
  - Terminals call each other (H.225.0 Call signaling)
  - audio/video traffic exchange (RTP)
  - For authn: H.235 annex D (username/passwd), annex E (cert, PKI)
Vidmid VoD

- VidMid Video-on-Demand
- Chair, Mairead Martin, The University of Tennessee

- Goals:
  - Enable effective and secure access to digital video resources
  - Ensure judicious use of digital video resources
  - Coordinate with international metadata efforts
  - Engage industry players
TF-STREAM

- TERENA (European NRN society) Task Force on Realtime Multimedia Applications
  - with emphasis on network video
- Objectives
  - a forum for exchanging experiences and knowledge
  - determine the suitability of audio/video streaming and conferencing for the research community in Europe
  - to assist and validate high-bandwidth pilot projects.
    - E.g. EC-funded project on scalable video conf.
    - ...
- Counterpart of Internet2 DigitalVideo initiative Steering Committee (I2DV SC)
ViDeNet

• Goal
  – Int.l. virtual network, providing video tele-conferencing, telephone and collaboration services over Internet, Internet2 and related advanced networks.

• ViDeNet offers
  – Research environment
  – Connected community (listserv, conferences, ..)
  – Dialing directory, web-based registration
  – Dial Plan
  – Public Zone resources
  – Network analysis (Scout)
Megaconference

• What
  – Worlds largest IP (H.323) videoconference

• When
  – during I2 meetings

• Who
  – Participants: I: 50 (15 countries) – III: 150+ (37 countries, all continents)

• How
  – H.323 hardware codecs, 384 kb/s, 9-18 cascaded MCUs

• Virtual conference
  – Incl. Informal meetings
The Internet2 Commons

• A large-scale, Distributed Collaborative Environment for the R&E Community

• Started by Internet2, *but* international service
  – international coordination: TF-STREAM chair

• based on
  – ViDeNet (H.323), VRVS (scheduling & gateway service), mbone tools (multicast), Access grid nodes (multicast)

• Activities
  – Research & development efforts to support other videoconferencing and collaborative technologies
  – Outreach & communications
  – Workshop/training
I2 Commons vision & service

• Vision:
  – enabling one-to-one, one-to-group, group-to-group collaboration
  – supporting personal communications, meetings, conferences, and teaching and learning
  – for Internet2 members and their international counterparts

• Service
  – A “best effort” service
  – Site coordinator point-of-contact
  – Use email for support
  – Distributed pools of equipment (e.g. MCUs)
  – Training, workshops, tutorials, docs, …
Basic scenario

- Person A, working on a conferencing capable device, that is registered at organisation X’s ‘gatekeeper’ and directory server, looks up contact information in an authoritative directory to set up a (video)conference connection with person B, registered elsewhere. With a simple click on the presented information and after checking user A’s credentials a call request is send to person B. Person B can check the incoming request on validity and answers if satisfied, after which a conference is initiated, securely if desired. The systems negotiate the best quality available to them.
Architectural issues

• Authentication of users happens to their own security domains, i.e. the client authenticates to their home service.
• Authorization decisions are usually made at the target. The target requests attributes from the source to make the authorization decision.
• How to authenticate
  – through web interface
  – direct access from client
  – use of existing credentials (cookies, K tickets, certs)
• What identifier to authenticate against?
  What identifier to pass to target for authorization decision?
• Interrealm resource discovery