International videoconferencing and streaming services and research

Issues

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

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SURFnet

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/whereever 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

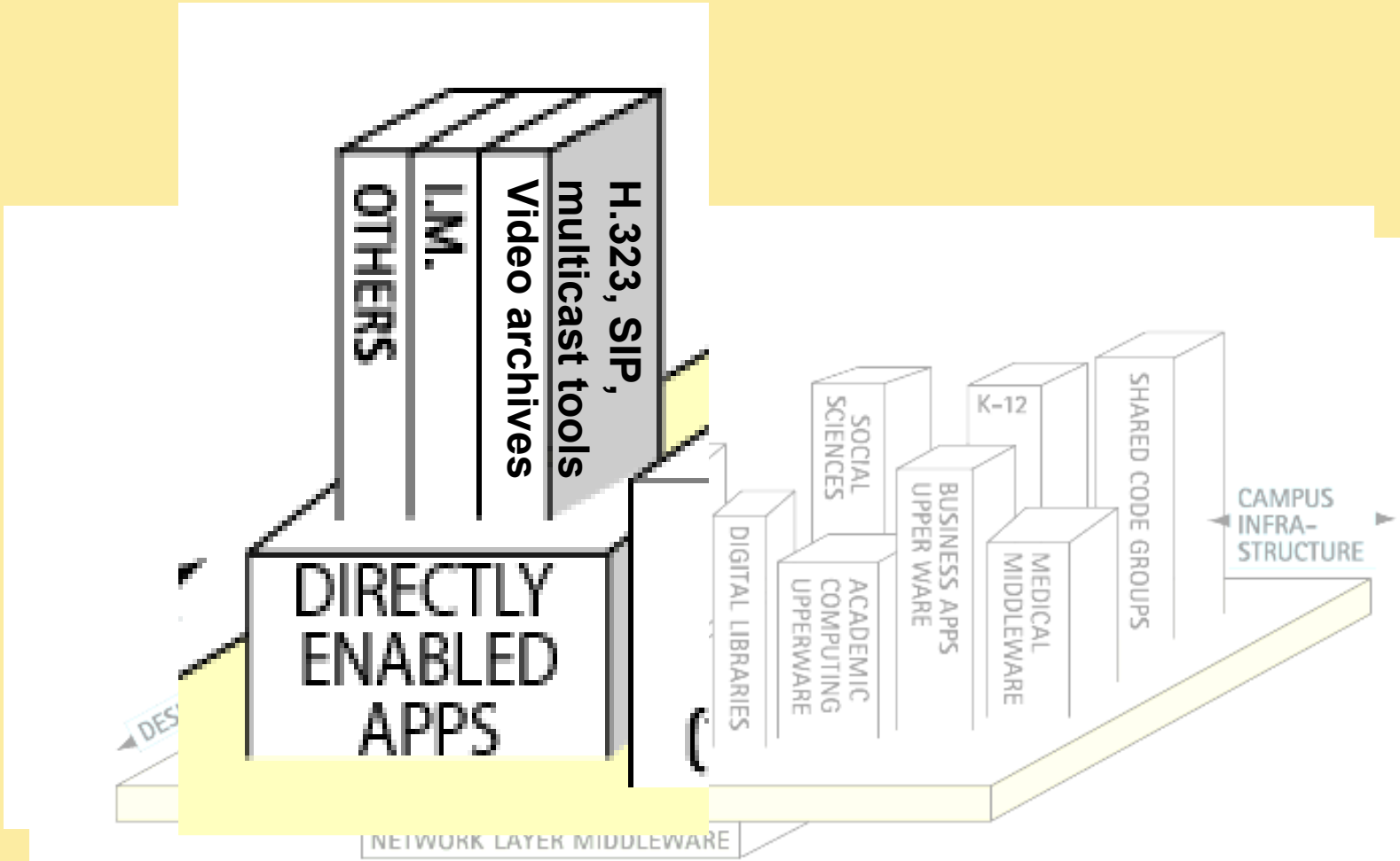
- Videoconferencing
  - Gateway development (I2 Commons)
    - VRVS, AccessGrid (see next pres), MPEG-2, MJPEG
  - SIP & VoIP (many, vidmid, TERENA?)
  - Integration alternative media streams (I2, AccessGrid)
    - e.g. MPEG-4 & HDTV & MJPEG)
  - Data collaboration tools (ViDe, AccessGrid)
  - (Semi)Automated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

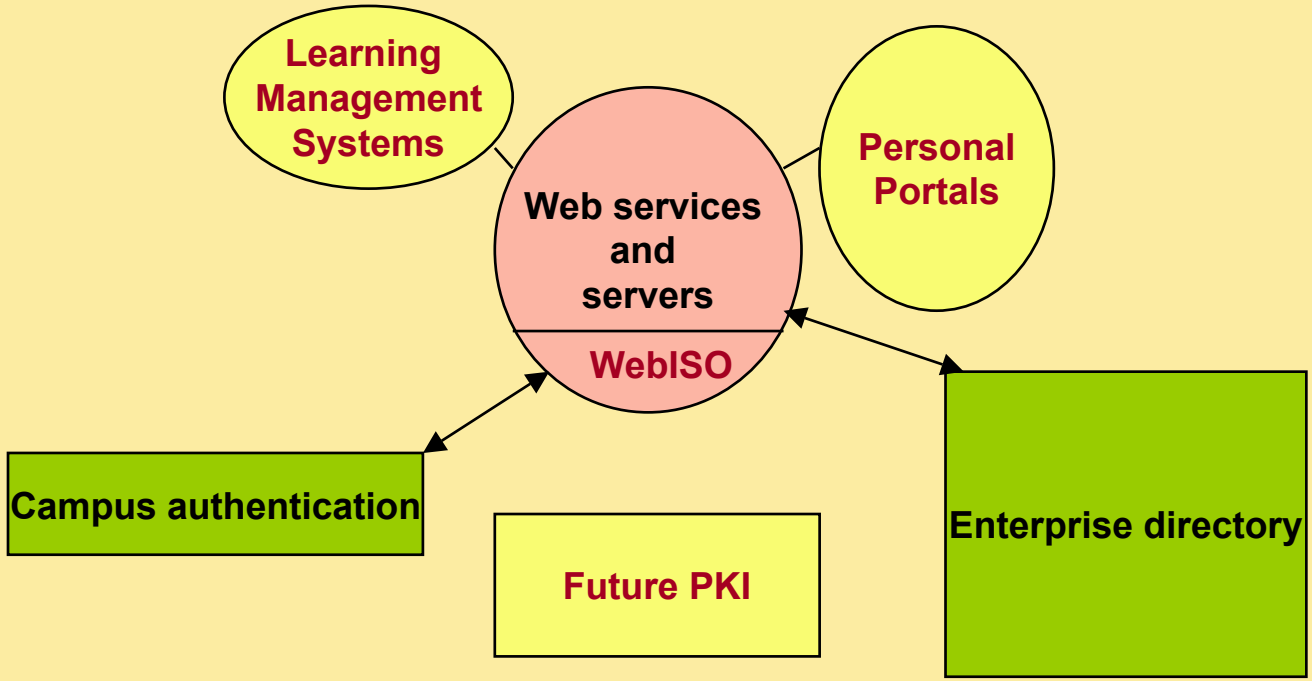

H.323, SIP, multicast tools
Video archives
I.M.
OTHERS
DIRECTLY ENABLED APPS
SOCIAL SCIENCES
K-12
SHARED CODE GROUPS
BUSINESS APPS UPPER WARE
MEDICAL MIDDLEWARE
ACADEMIC COMPUTING UPPERWARE
DIGITAL LIBRARIES
CAMPUS INFRA-STRUCTURE
NETWORK LAYER MIDDLEWARE

Vidmid in id-world

Interrealm

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

Security Domain



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

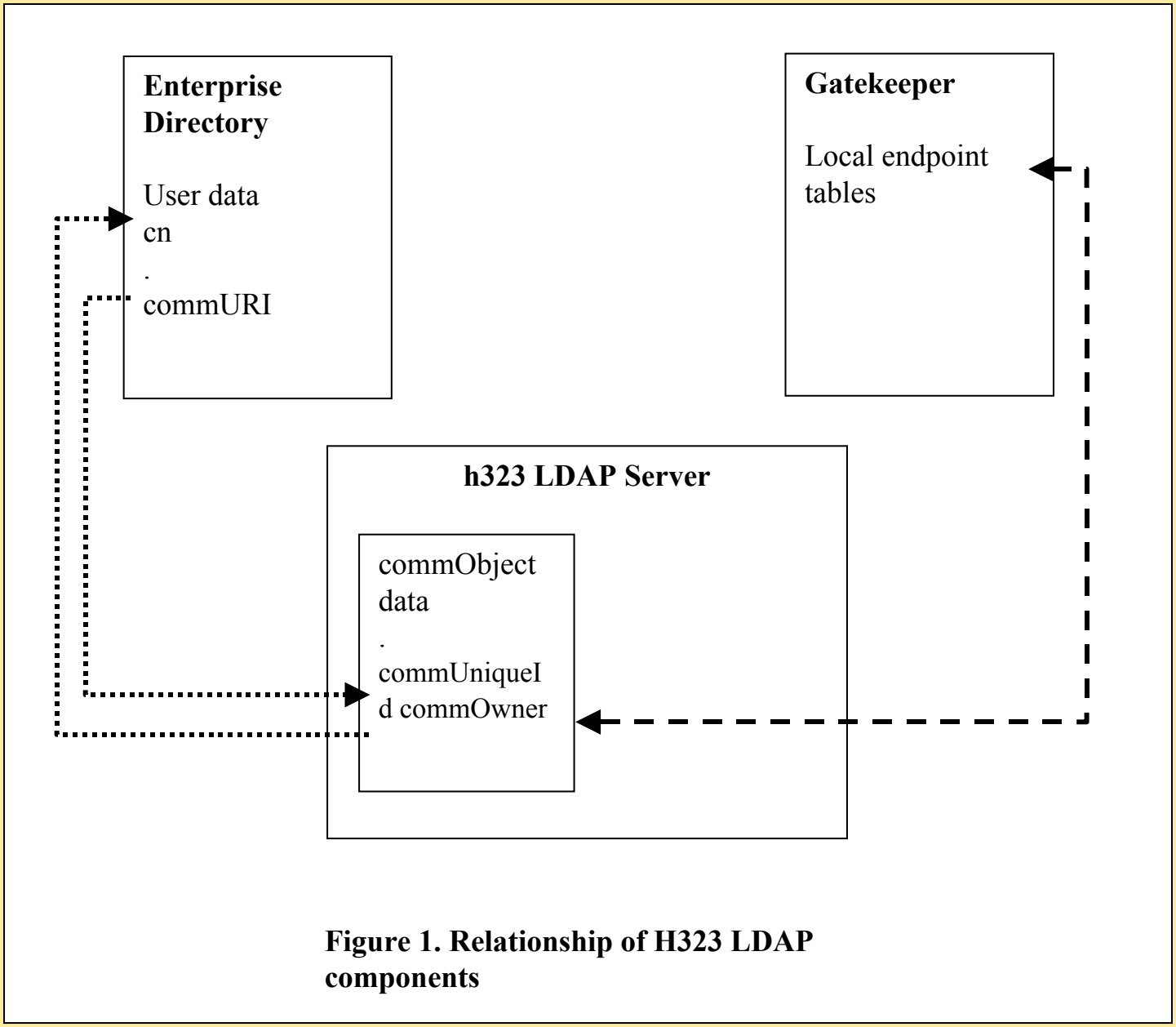
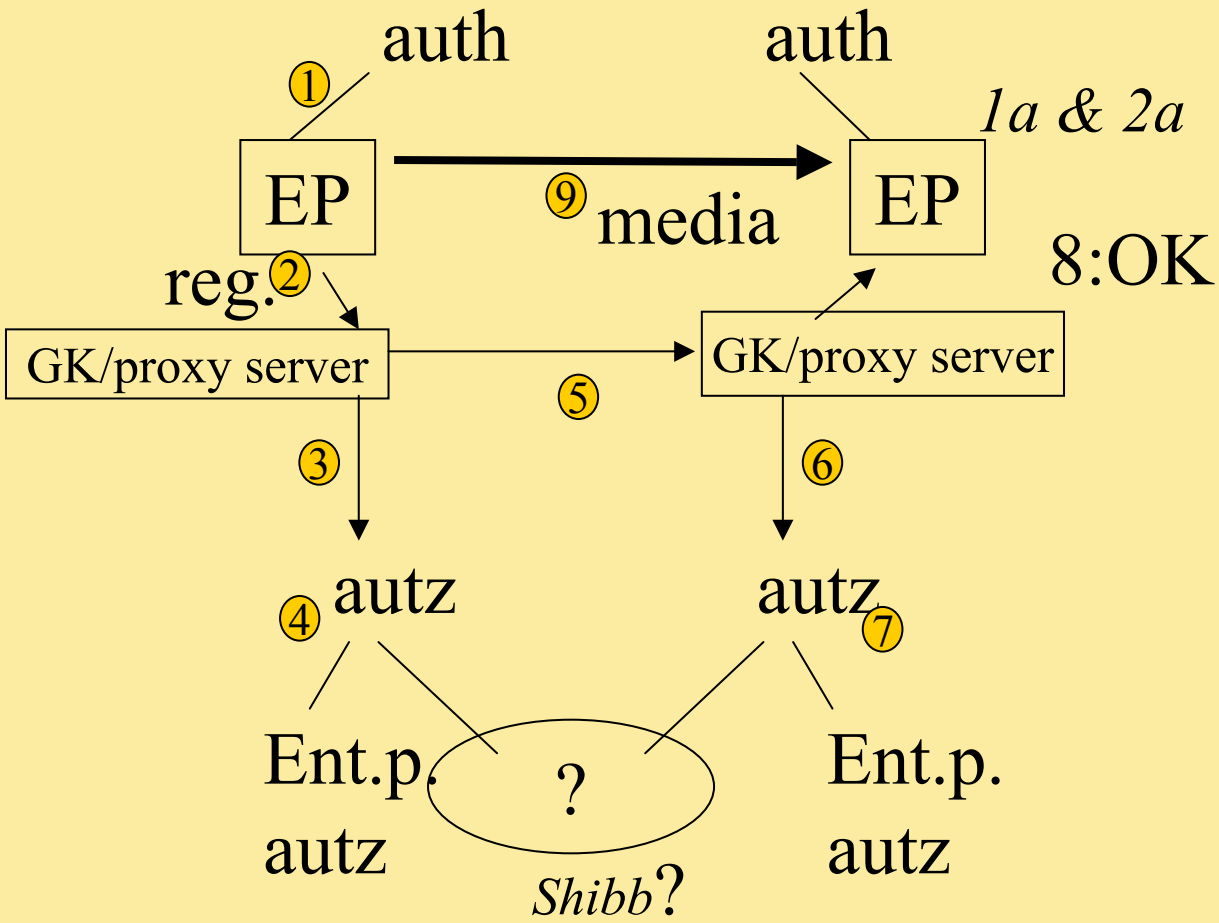


Figure 1. Relationship of H323 LDAP components

A&A call setup



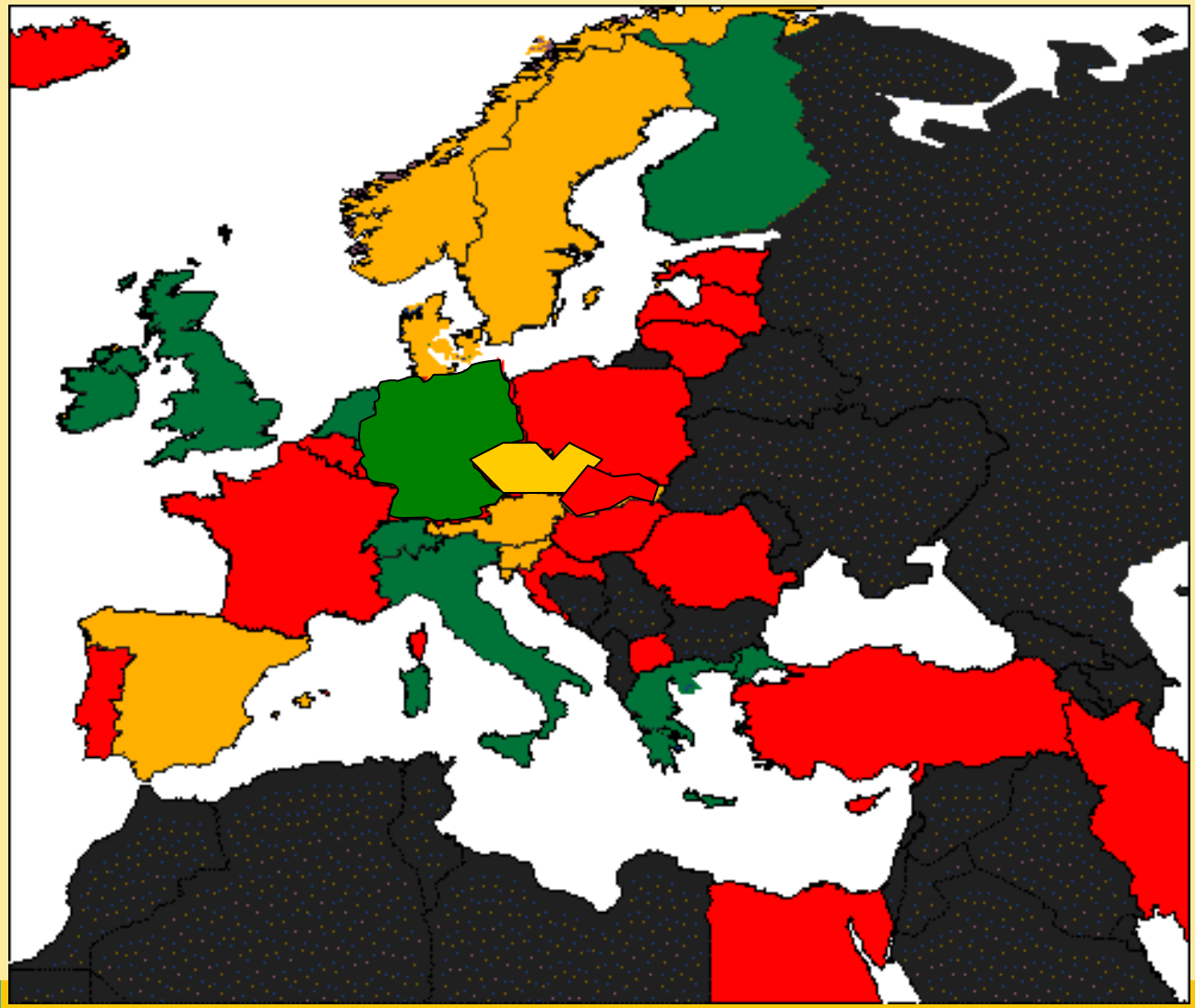
Vidmid VoD status

- 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



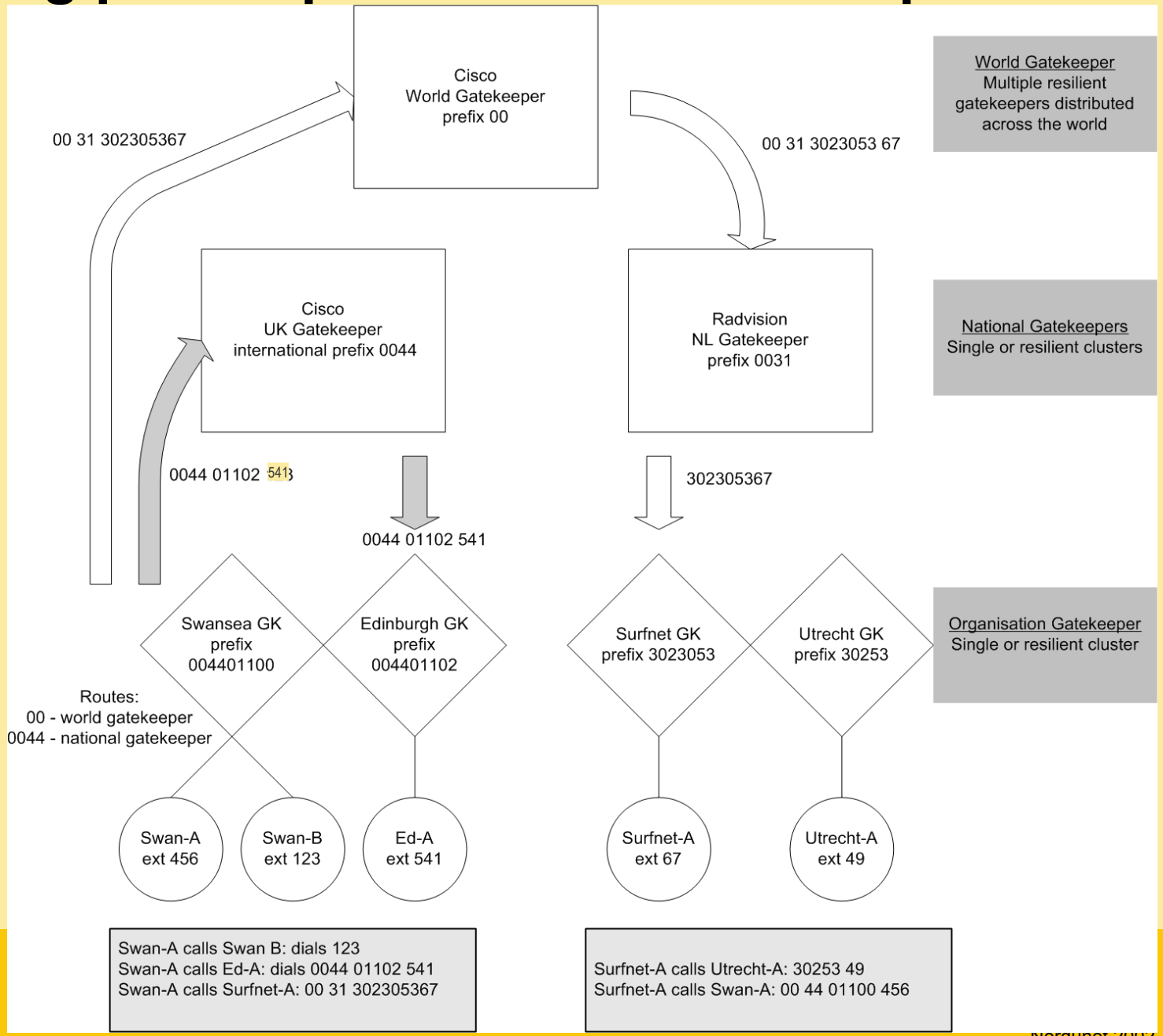
International dialling scheme

- 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

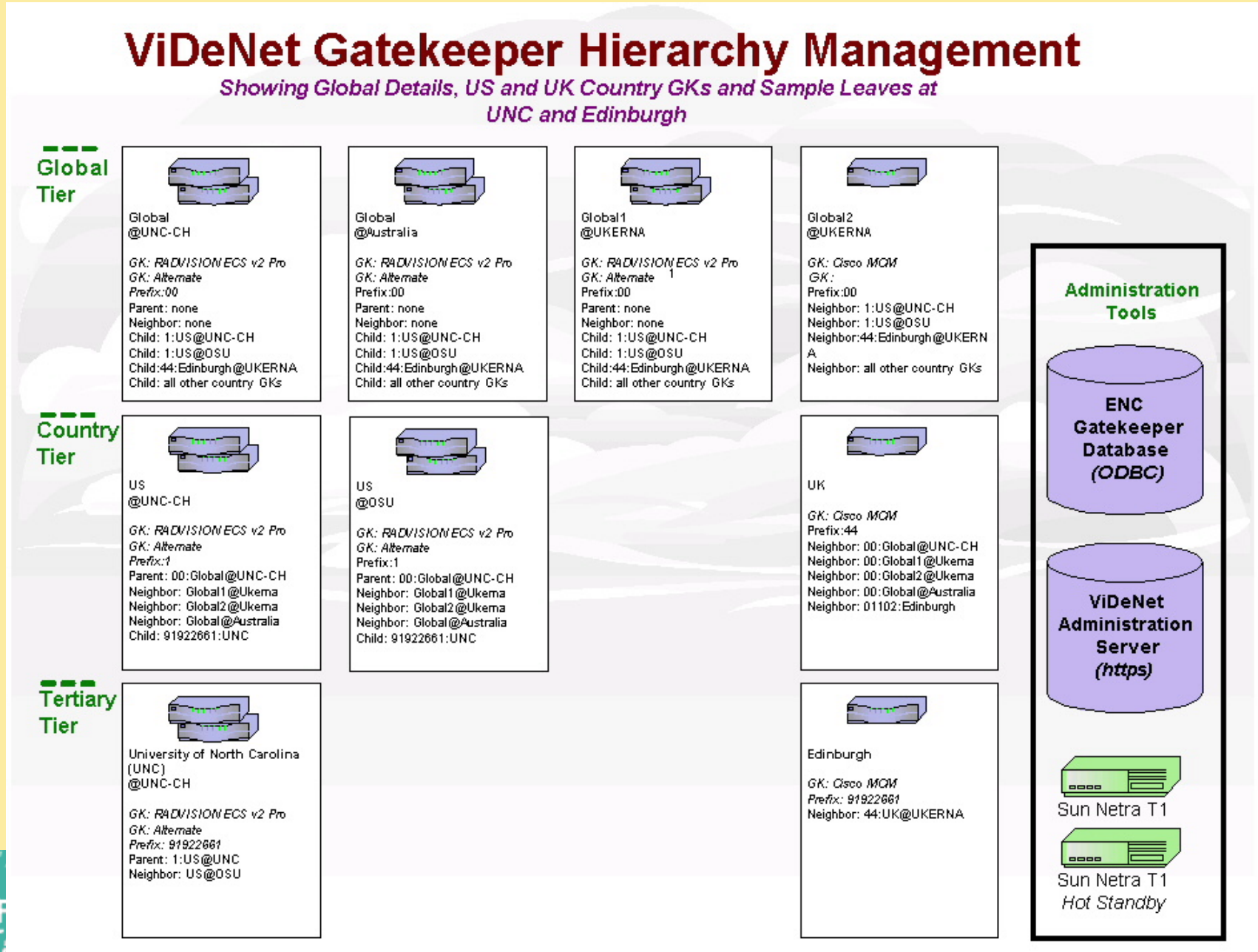
- Numeric
  [<EZ>]<world gk><cc.><org. ><client no>[<suffix>]
  00 ITU cc + local no. ???

- Alphanumeric
  <userID>@<fully qualified domain name>

Dialing plan implementation & Example



ViDeNet Root level Architecture



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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/
- Access Grid http://www-fp.mcs.anl.gov/fl/accessgrid/
- 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)
  - NMI-EDIT http://www.nmi-edit.org/

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

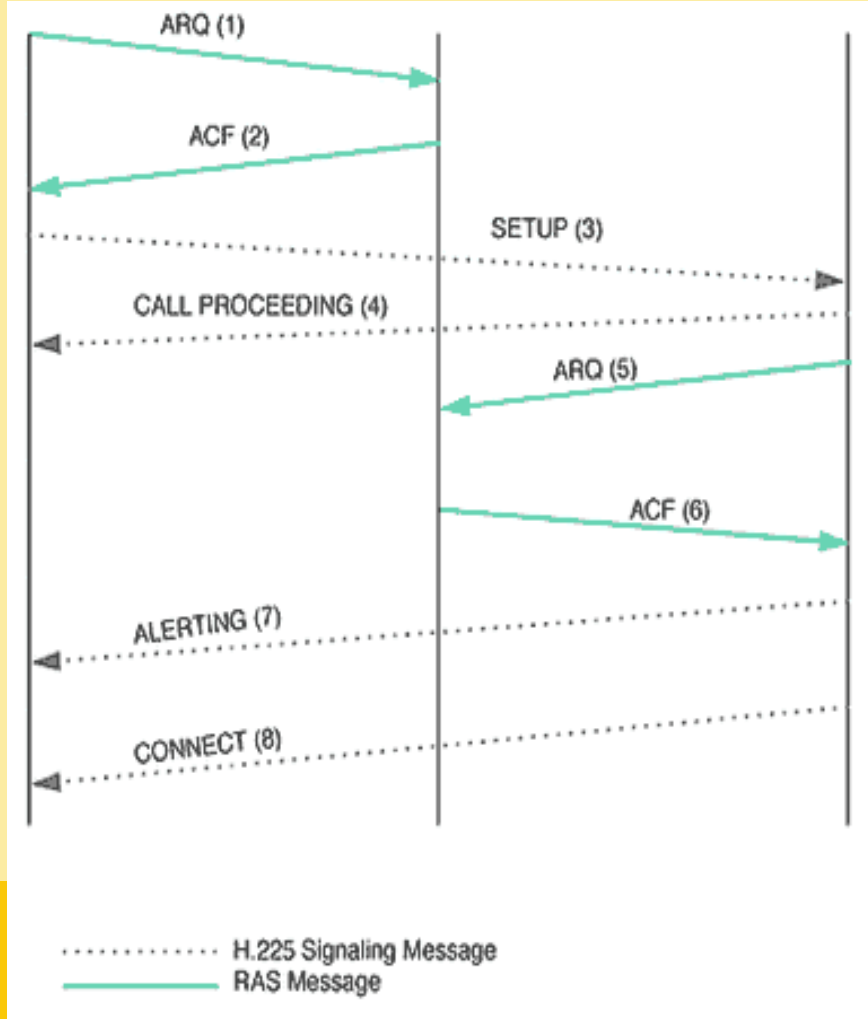
CommObject classes

- 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 digitalvideo 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
  - I: 1999, II: 2000, III: 2001
  - 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