Multicast Tools Demonstration

Most Common, Freely-Available MBone Applications

- session directory — sdr
- interactive audio — vat
- interactive video — vic
- shared whiteboard — wb or wbd
- network text editor — nte

can be obtained from:

http://www-nrg.ee.lbl.gov/ (original home for vat, vic, wb)

http://www-mice.cs.ucl.ac.uk/multimedia/software/

Other Multicast Tools

- Real Network's G2 (audio/video)
  - http://www.real.com/
- Precept/Cisco IPTV (audio/video)
  - http://www.cisco.com/iptv/
- Microsoft's Real Media (audio/video)
  - http://www.microsoft.com/windows/mediaplayer/
- MP3 software
  - FreeAMP: http://www.freeamp.org/
  - Live.com http://www.live.com/ (player and server)

sdr — Session Directory

- session creation
  - multicast address assignment
  - group scoping
  - identification of relevant applications
- session advertisement
  - periodic session messages
  - scoping and encryption of advertisements
- application launching

How Things All Fit Together

Conferece setup and discovery (SDR)		
SDP		
SAP	SIP	HTTP
UDP		TCP
IP and IP Multicast		

Session Description Protocol (SDP)

- a standard way to describe multimedia sessions.
  - text-based description format
  - can then be used in different contexts:
    - Session Announcements using SAP
    - Session Invitations using SIP
    - (RTSP stream descriptions, H.332 announcements ,,,)

Session Description Protocol (cont)

- intended for announcing the existence of sessions.
- It conveys
  - information to decide whether to join the session.
  - Session timing information
  - Information on resources required to participate.
  - Sufficient information to allow you to join the session
    - protocols and codec formats
    - multicast addresses and ports
    - encryption keys

Session Announcement Protocol (SAP)

- effectively provides a TV-Guide style session directory, conveying information about sessions to potential listeners
  - Receivers simply listen to a well known multicast group
  - Senders periodically send announcements to that group
- The rate of transmission depends on the number of announcements
  - Typically each announcement will be repeated every few minutes.
  - have local caches so a session directory tool starting up doesn't have to wait for many minutes.

Session Invitation Protocol (SIP)

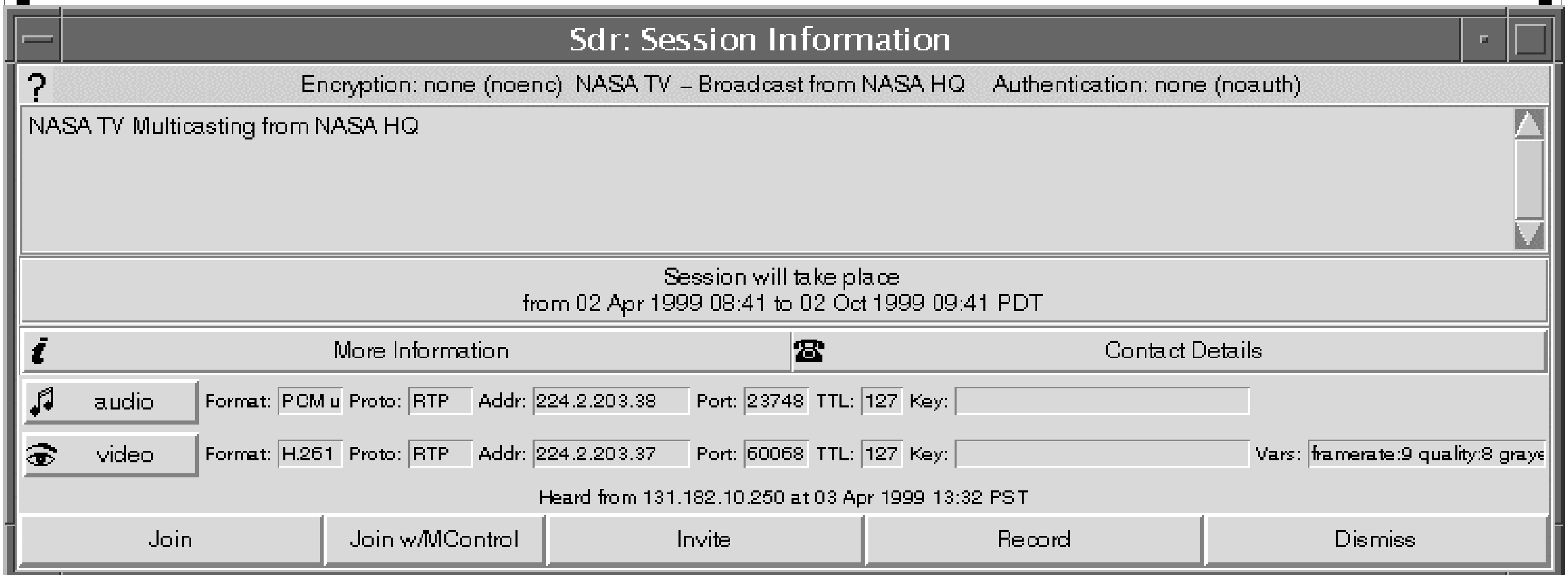
SIP History

- Early session initiation protocols:ivsd , mmcc
- SIPv1, initiate loosely coupled sessions.
  - SIP stopped when the session started
  - UDP based
- SCIP using RTSP designed around the same time
  - TCP based
  - Continued during the call
- Eventually merged SIPv1 and SCIP into SIPv2

Session Invitation Protocol (cont)

- the user mobility problem
- two ways to do user location:
  - Have a distributed directory.
  - Lookup during call routing (SIP mechanism)
    - Lookup a well-known address for the user.
    - Route the call there. Let them do the lookup of user location. Either relay or redirect the call
  - Lookup during call routing allows heterogeneity of user-location mechanisms
- SIP message carries an SDP description as a payload to describe the session being initiated


sdr:almeroth@jackson.cs.ucsb.
New
Calendar
Prefs
Help
Quit
Public Sessions
Capitol Connection – GMU TV
IMJ –– Channel 1
IMJ –– Channel 2
KRVM Radio – 92V
KZLA FM
LDS Radio Network
NASA TV – Broadcast from NASA HQ
NIH WALS Lecture
Places All Over The World
Radio Free Vat – now MP3!
UO Presents KKNU New Country
UO Presents KMGE Magic 94 FM
UO Presents KWAX Classical Radio
UW CS&E Colloquium
UW CS&E Colloquium
UW CS&E Colloquium
UW CS&E Colloquium
Multicast Session Directory v2.6.1

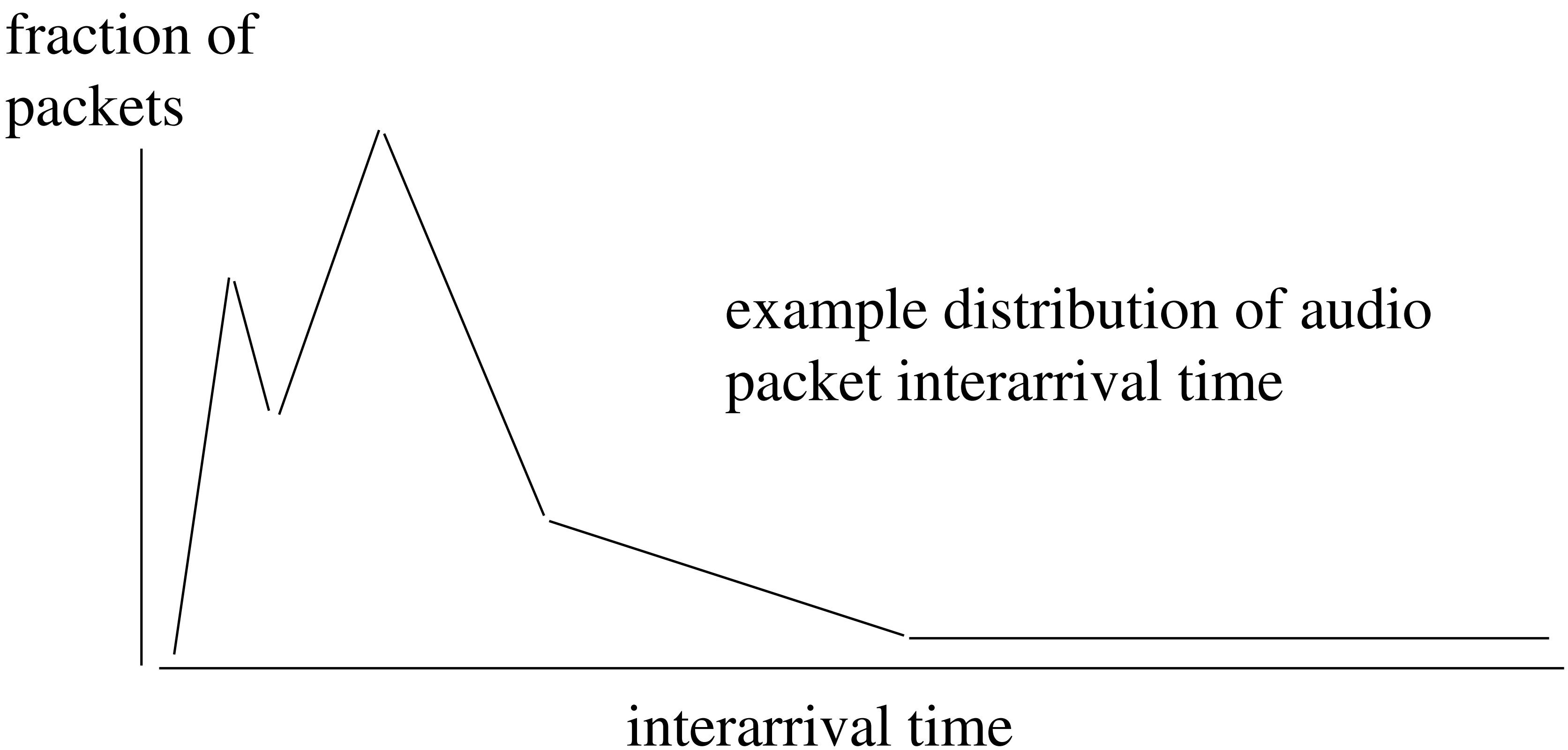

Sdr: Session Information
Encryption: none (noenc) NASA TV – Broadcast from NASA HQ Authentication: none (noauth)
NASA TV Multicasting from NASA HQ
Session will take place
from 02 Apr 1999 08:41 to 02 Oct 1999 09:41 PDT
More Information
Contact Details
audio Format: PCM u Proto: RTP Addr: 224.2.203.38 Port: 23748 TTL: 127 Key:
video Format: H.261 Proto: RTP Addr: 224.2.203.37 Port: 60068 TTL: 127 Key: Vars: framerate:9 quality:8 graye
Heard from 131.182.10.250 at 03 Apr 1999 13:32 PST
Join
Join w/MControl
Invite
Record
Dismiss

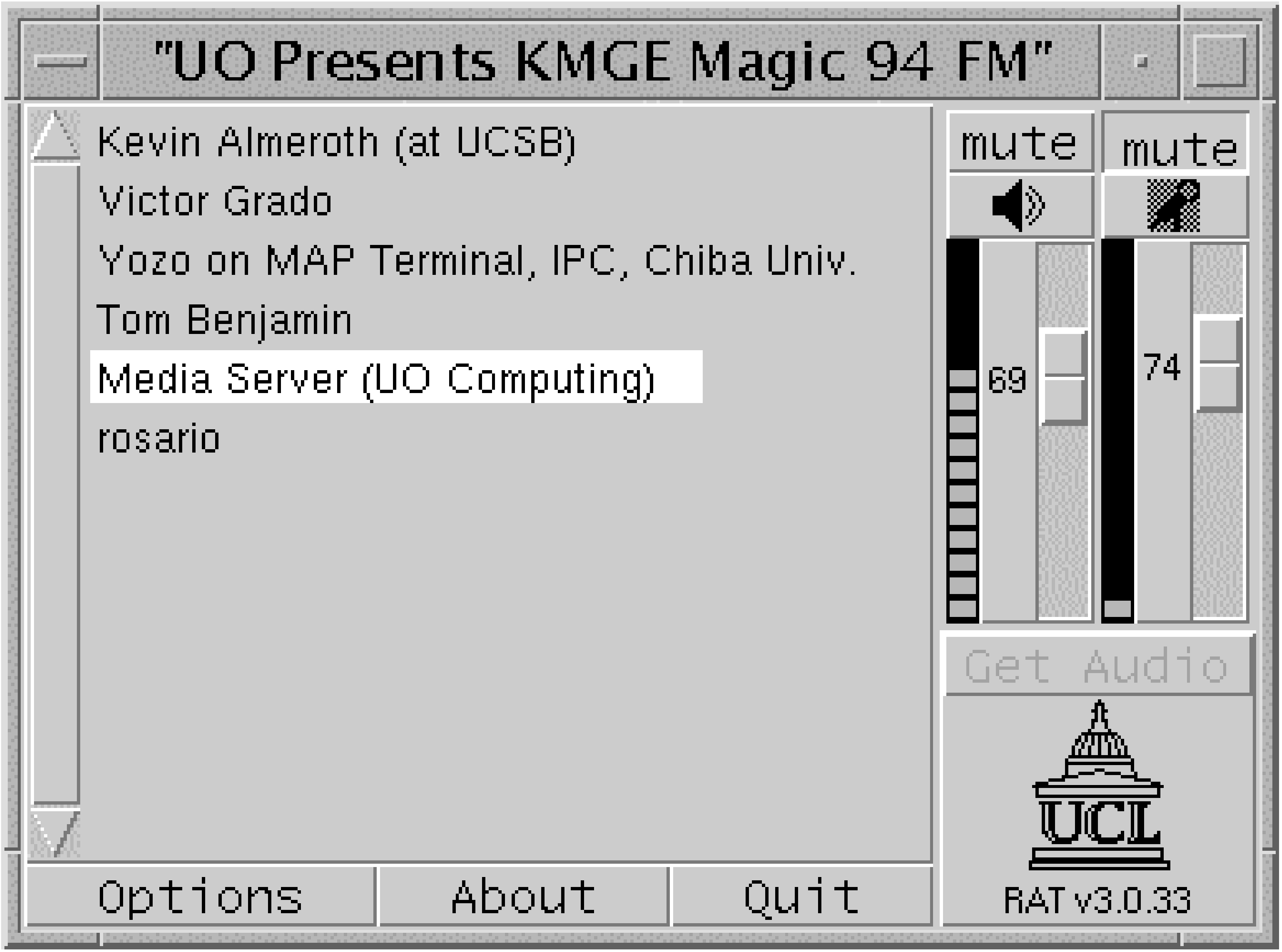
vat — Audio Tool

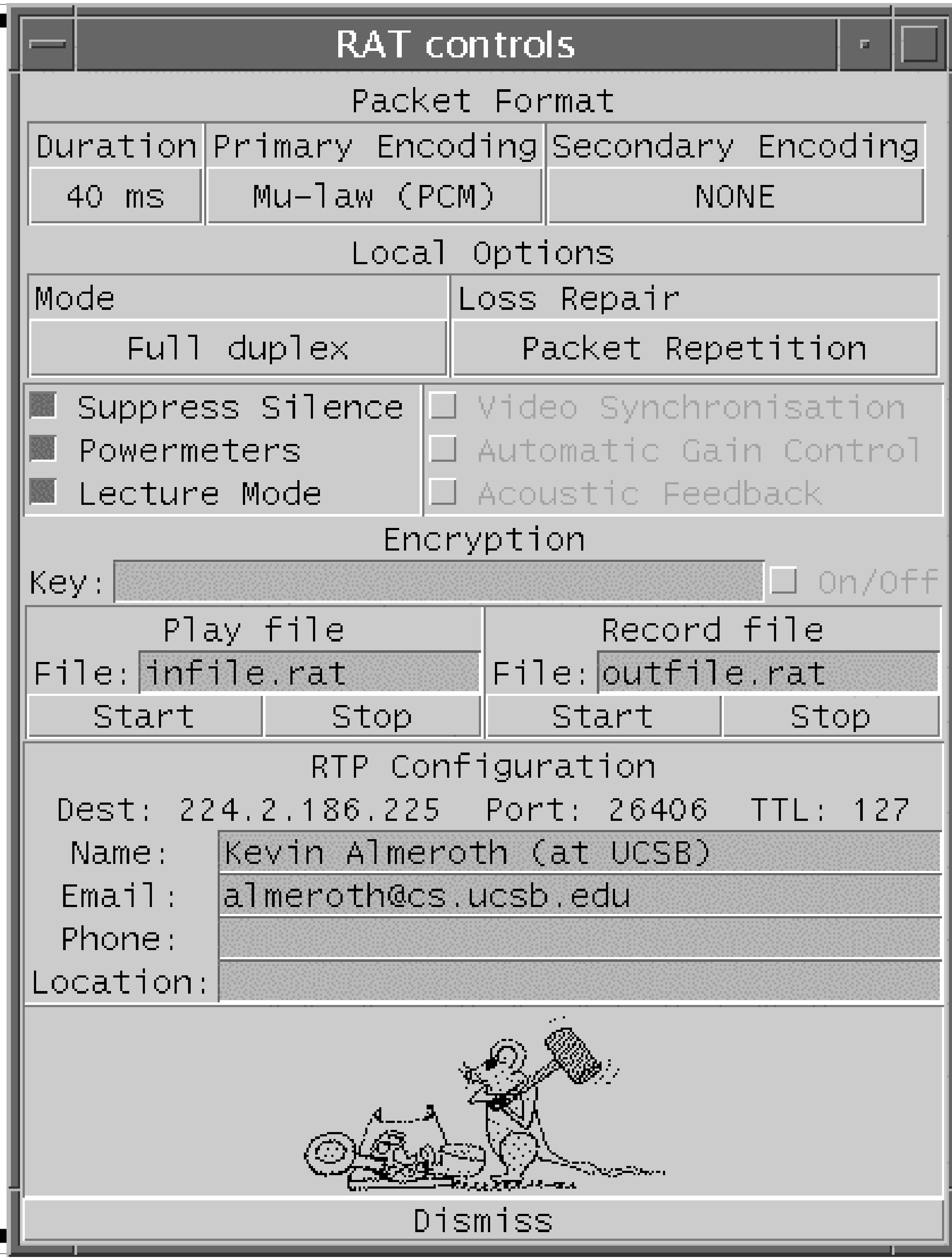
- each vat sender delivers packetized audio with explicit timestamps
  - uses Real-Time Transport Protocol (RTP)
  - runs over UDP over IP multicast
- each vat receiver buffers packets and adjusts playback point to absorb varying delays
- session messages (RTCP) used to monitor participant status

Receivers Absorb Delay

- trade off smoothness for delay/interactivity

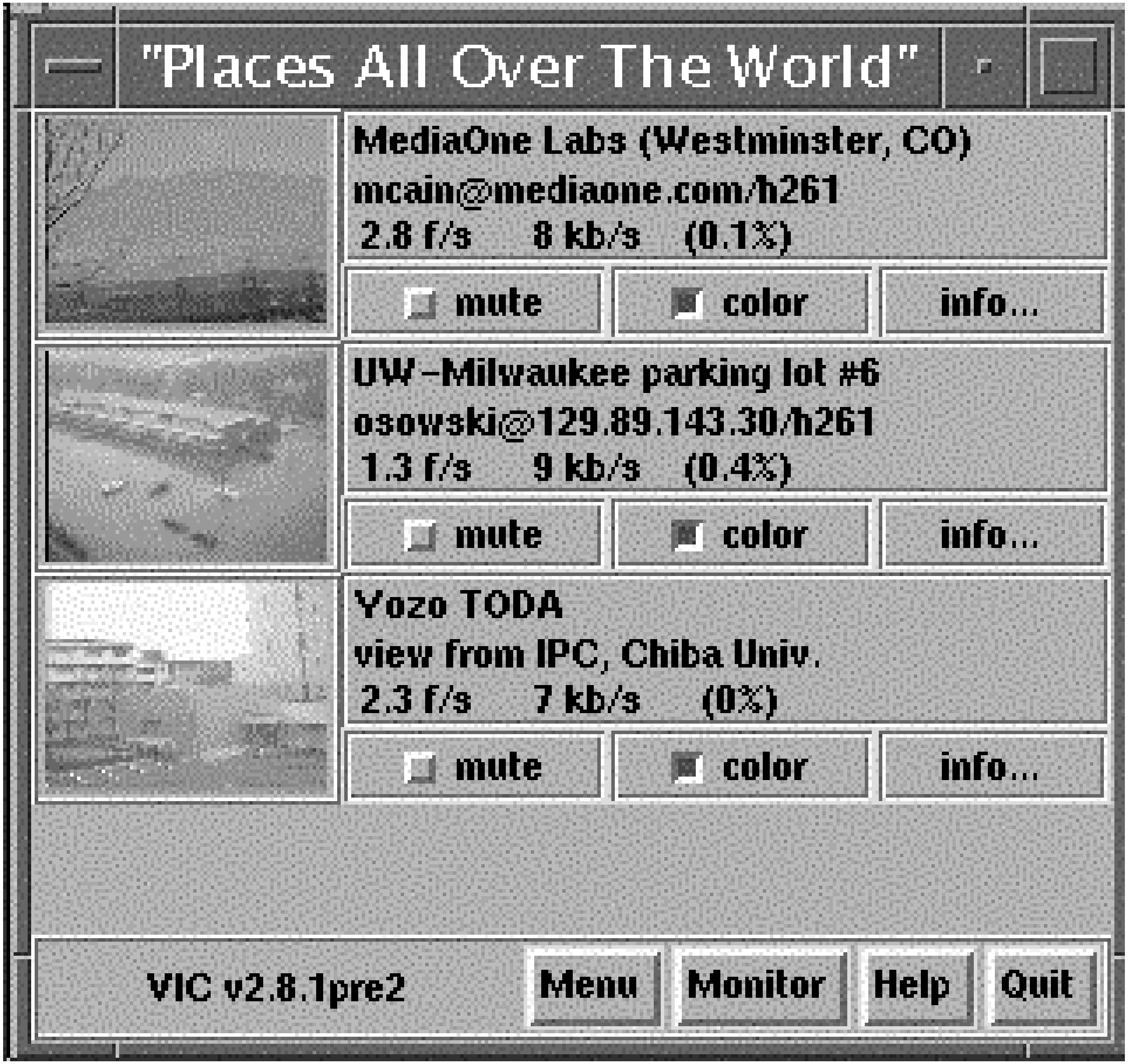


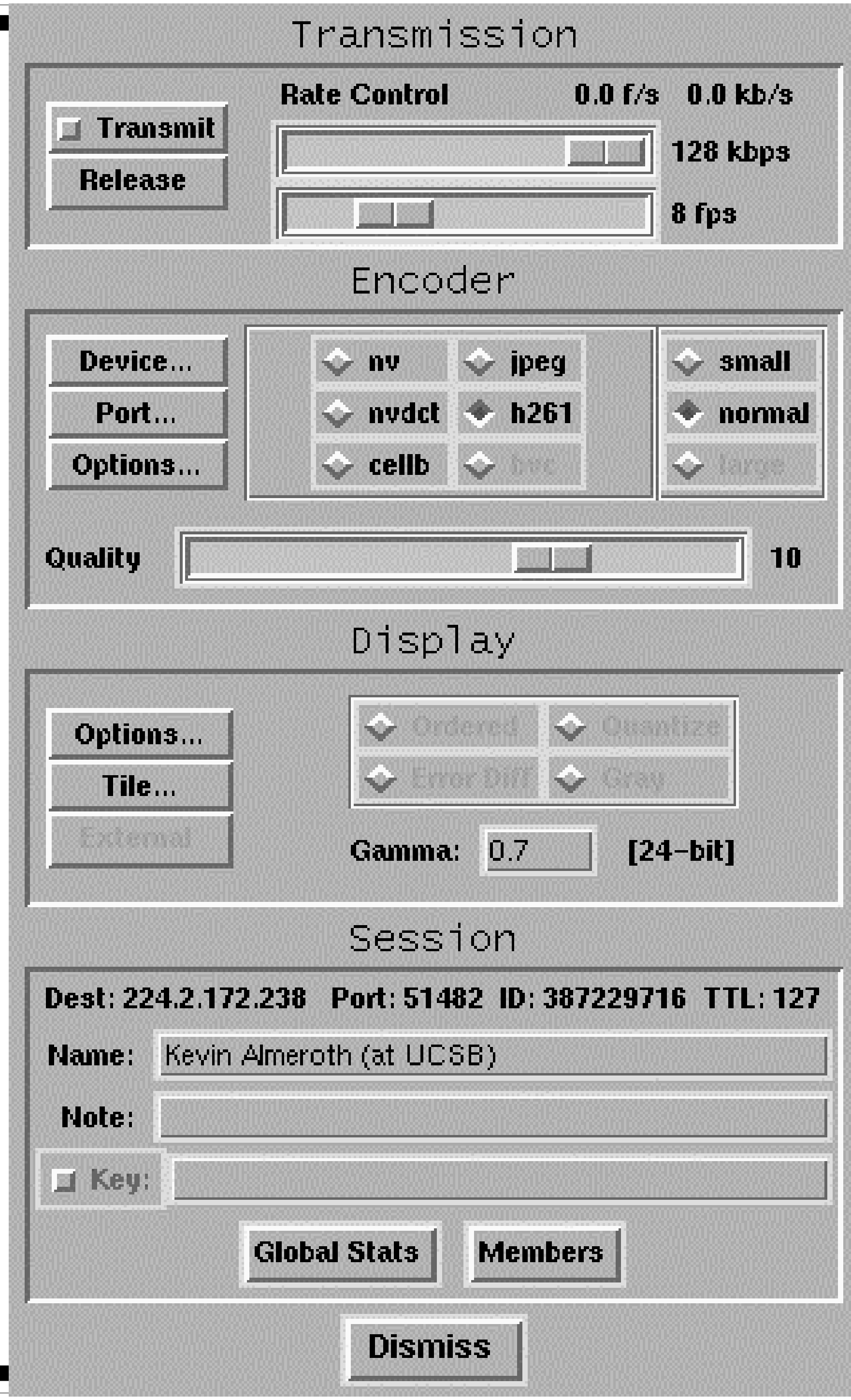

"UO Presents KMGE Magic 94 FM"
Kevin Almeroth (at UCSB)
Victor Grado
Yozo on MAP Terminal, IPC, Chiba Univ.
Tom Benjamin
Media Server (UO Computing)
rosario
mute
mute
69
74
Get Audio
UCL
RAT v3.0.33
Options
About
Quit


RAT controls
Packet Format
Duration
Primary Encoding
Secondary Encoding
40 ms
Mu-law (PCM)
NONE
Local Options
Mode
Loss Repair
Full duplex
Packet Repetition
Suppress Silence
Powermeters
Lecture Mode
Video Synchronisation
Automatic Gain Control
Acoustic Feedback
Encryption
Key:
On/Off
Play file
File: infile.rat
Start
Stop
Record file
File: outfile.rat
Start
Stop
RTP Configuration
Dest: 224.2.186.225 Port: 26406 TTL: 127
Name: Kevin Almeroth (at UCSB)
Email: almeroth@cs.ucsb.edu
Phone:
Location:
Dismiss

vic — Video Tool

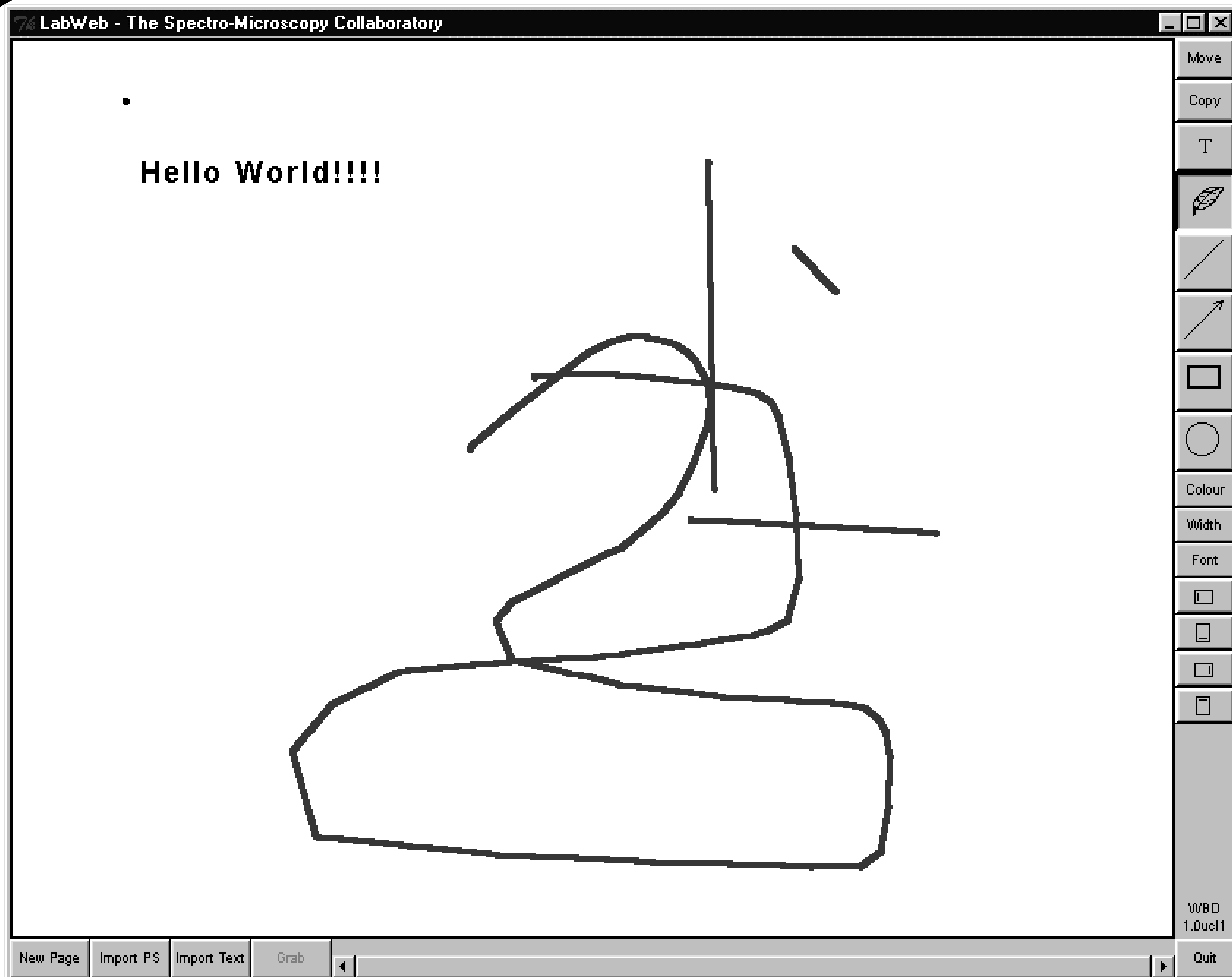
- vic senders deliver compressed, packetized video with explicit timestamps
- uses RTP over UDP over IP multicast
- unlike audio, often multiple senders at any time.
- receivers adapt to source encoding, using multiple software-based decoders


"Places All Over The World"
MediaOne Labs (Westminster, CO)
mcain@mediaone.com/h261
2.8 f/s 8 kb/s (0.1%)
mute
color
info...
UW-Milwaukee parking lot #6
osovski@129.89.143.30/h261
1.3 f/s 9 kb/s (0.4%)
mute
color
info...
Yozo TODA
view from IPC, Chiba Univ.
2.3 f/s 7 kb/s (0%)
mute
color
info...
VIC v2.8.1pre2
Menu
Monitor
Help
Quit


Transmission
Rate Control 0.0 f/s 0.0 kb/s
Transmit
Release
128 kbps
8 fps
Encoder
Device...
Port...
Options...
nv
jpeg
nvdct
h261
cellb
small
normal
large
Quality
10
Display
Options...
Tile...
External
Ordered
Quantize
Error Diff
Gray
Gamma: 0.7 [24-bit]
Session
Dest: 224.2.172.238 Port: 51482 ID: 387229716 TTL: 127
Name: Kevin Almeroth (at UCSB)
Note:
Key:
Global Stats
Members
Dismiss

wb — Shared Whiteboard

- shared presentation and drawing surface
- unlike sdr, vic, and vat, this application requires <u>reliable</u> multicast delivery
  - uses SRM (Scalable Reliable Multicast) protocol over UDP over IP
- has been used with hundreds of concurrent participants


LabWeb - The Spectro-Microscopy Collaboratory
Hello World!!!!
Move
Copy
T
Colour
Width
Font
WBD
1.0ucl1
Quit
New Page
Import PS
Import Text
Grab

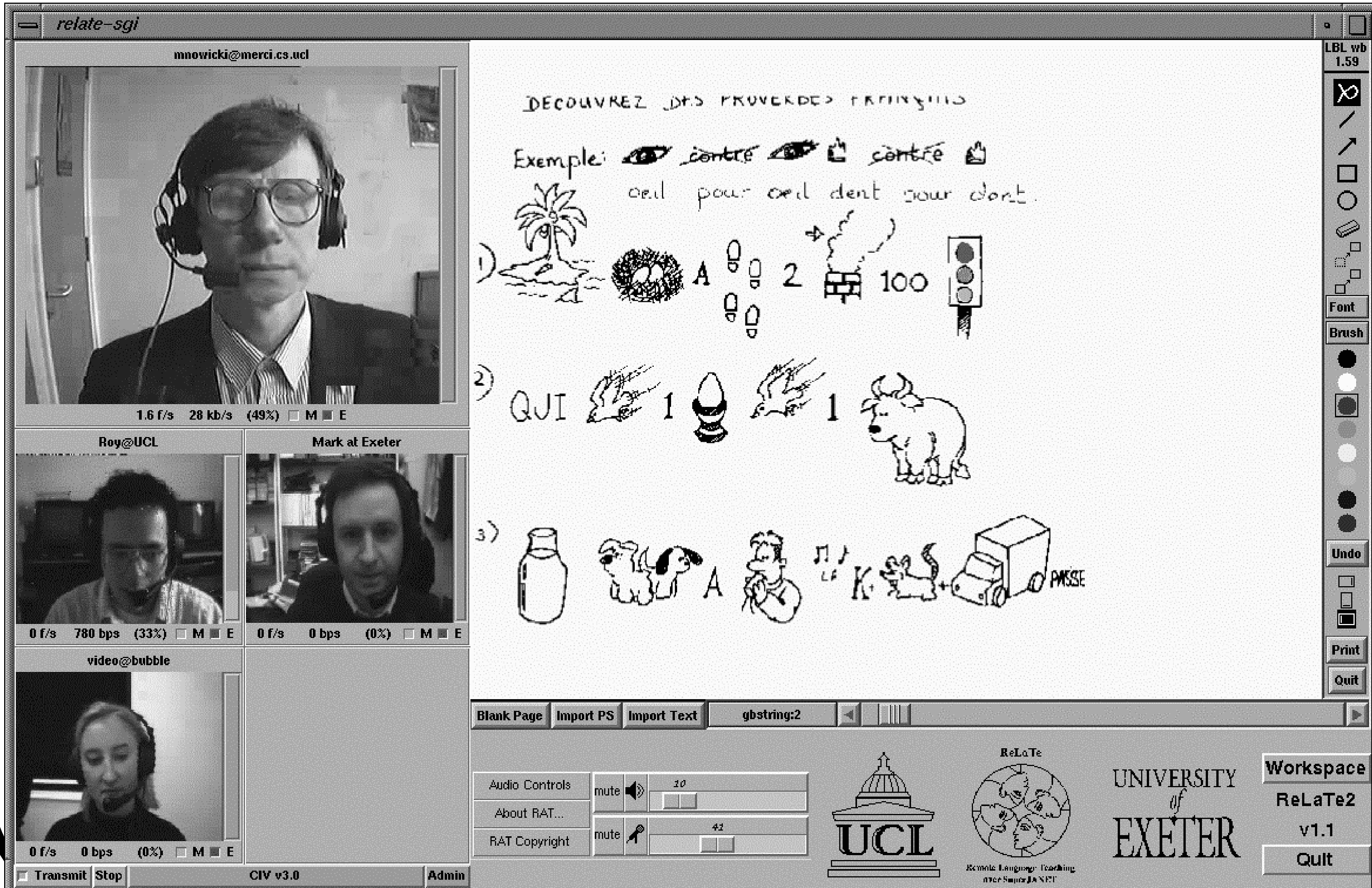
Example Data Rates

- bandwidth requirements
  - vat can compress 64 Kb/s digitized audio to 32 Kb/s, 13 Kb/s, or 4 Kb/s
  - vic can compress (320x240 pixels, 8 or 24 bits) 20:1 and send 2 to 10 frames/second in under 128 Kb/s
- audio + video source fits in 150-200 Kb/s
  - long session duration makes per-source data rate significant relative to current Internet link capacities
- vat, vic support variable encodings for heterogeneous receivers and network capacities

Common Characteristics of these MBone Applications

- receiver-based
  - joining
  - adaptation
- loose coordination using periodic session status messages
  - report packet loss and interarrival time variation
  - multicasting and suppression used for scaling
- end-to-end design philosophy
  - minimal low-level function

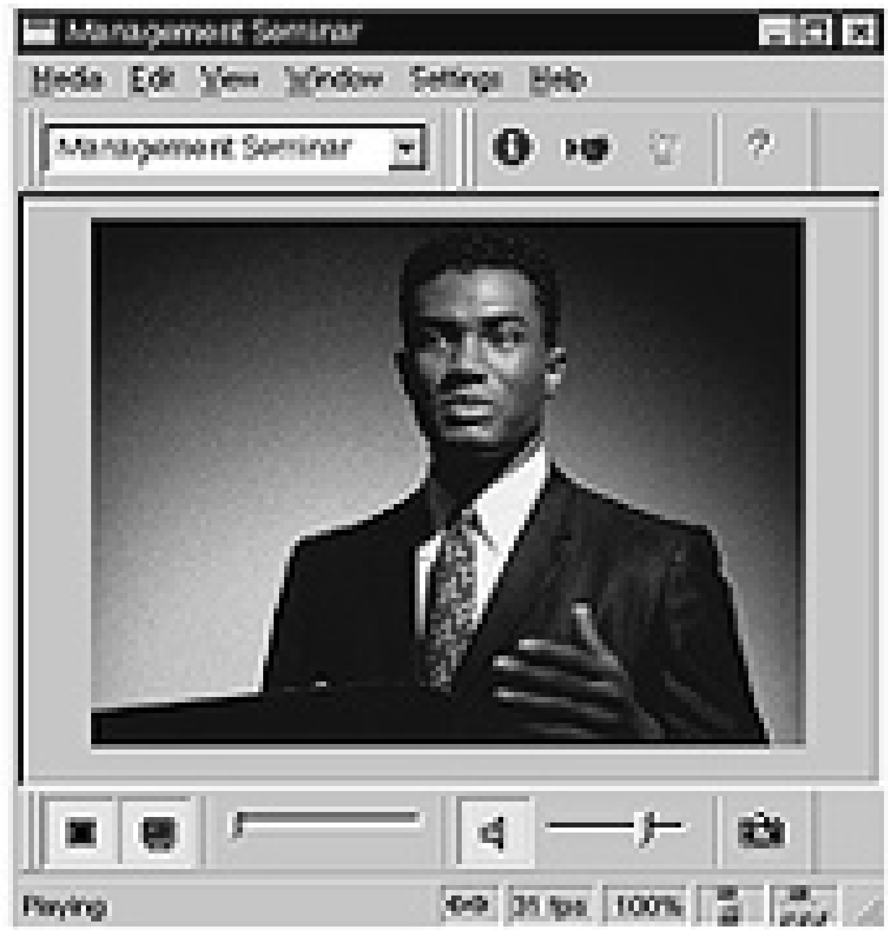
Remote Teaching Language (ReLaTe)

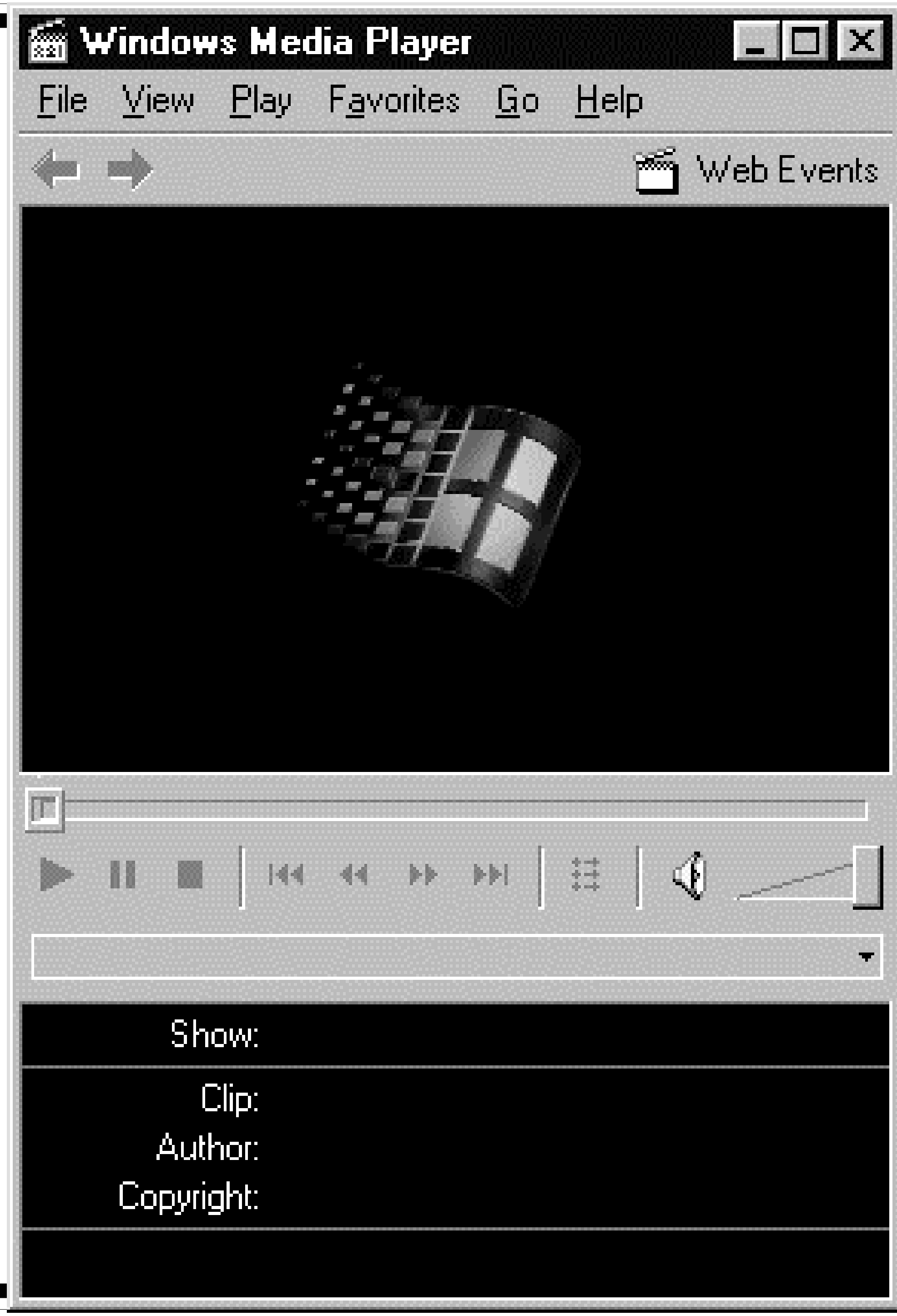



RealPlayer: Welcome!
File View Options Presets Sites Help
Channels
COMEDY CENTRAL
South Park, The Daily Show, & More!
DAILY BRIEFING
Discovery ONLINE
FOX NEWS HEADLINES
Updated 2/10
Update
real
excite
Enter your Audio/Video search here.
Search
32.1 Kbps
G2
00:00.0/00:00.0

IPTV


Management Seminar
Business Management Seminar
State University
Managing Technology
in a Global Marketplace
• Challenges Facing Businesses Today
• Changing Customer Requirements
• Maintaining a Competitive Edge
• Setting Objectives for Using Technology


Management Seminar
Media Edit View Window Settings Help
Management Seminar
Playing
100%


Windows Media Player
File View Play Favorites Go Help
Web Events
Show:
Clip:
Author:
Copyright:

MP3

- freeamp rtp://224.2.253.119:42418
- windows and Unix player
- free server (liveCaster) from http://www.live.com/