

RESEARCH

**Global Platform for Rich Media  
Conferencing and Collaboration  
VRVS 3.0**

Philippe Galvez

California Institute of Technology

June 12th, 2003

HTASC



# Outlines



- ❖ **VRVS General information**
- ❖ **VRVS 3.0: New version in production since February 2003**
- ❖ **Worldwide VRVS Deployment**
- ❖ **VRVS Statistics**
- ❖ **VRVS On going and Future developments**



# VRVS Web Service Design



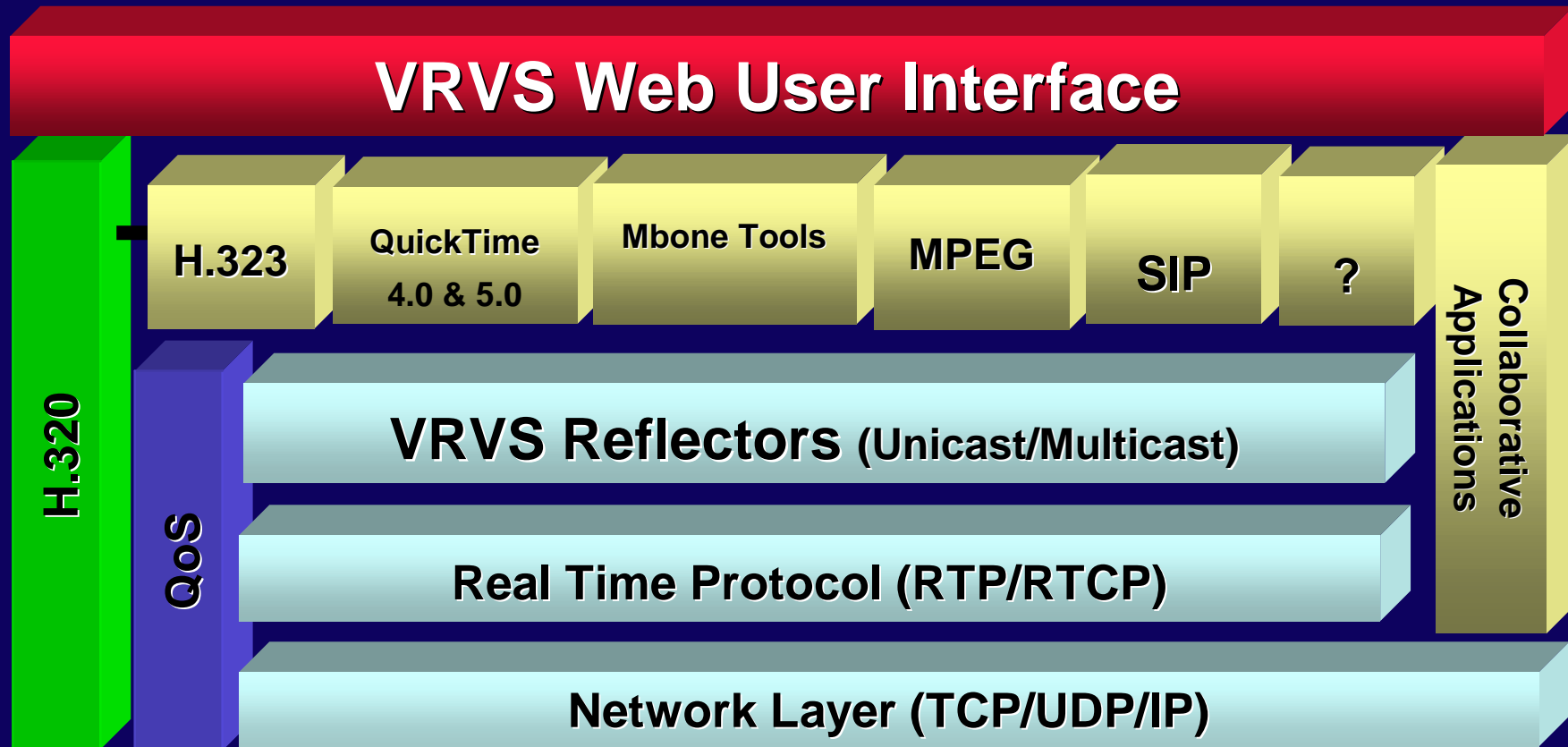
- ❖ **Unified Web User Interface** to schedule and join/leave a meeting independently of the application.
- ❖ **Multi-platform:** Windows, Linux, Unix and Mac.
- ❖ **Easy to use:** Everybody (from 4 to 77 years old) knows how to click on a web page today. Not true for running a VCR
- ❖ **Virtual Room Concept, Scheduling;** Create a virtual space where people can exchange real-time information
- ❖ **Join or Leave** a Collaborative session **anytime**. *Do not need to know in advance how many participants and booked ports capacity. Just announce the meeting and people will join from anywhere.*
- ❖ **Full Documentation and Tutorial**
- ❖ **Self service:** Don't need a technician or expert to organize and join a conference



# VRVS Core Architecture



- ❖ VRVS combined the **best of all standards** and products in **one unique architecture**
- ❖ **Multi-platform** and **multi-protocol** architecture







# VRVS 3.0

**Released on Feb. 22, 2003 after one year's  
development and testing!**



# VRVS 3.0 New Features



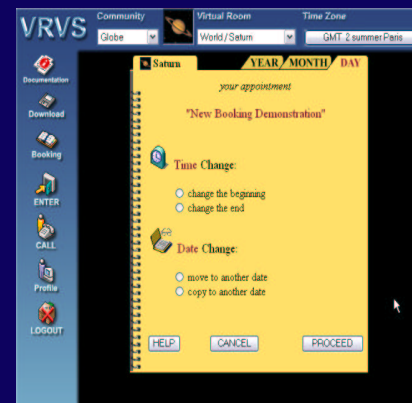
- ❖ Optimized web access and user intuitive interface design
- ❖ Improved **Global scheduling system** transparent to local time zone
- ❖ **Community** concept with dedicated Virtual Rooms (VRs)
- ❖ World wide VR increased from 10 to potentially unlimited.
- ❖ **J2EE secure** web admin interface
- ❖ **SQL DB** server to manage VRVS booking, users profile, reflector configuration and monitoring, statistics..
- ❖ **User-oriented login** with improved identification and **IP detection** (e.g. DHCP, NAT,..)
- ❖ Redesign and improved **sharing** service
- ❖ **Mac OS X** support
- ❖ **OpenMash** Mbone support
- ❖ Solution for host behind **Firewall and NAT**



# VRVS 3.0 Global Scheduling System



- ❖ **Booking Wizard**, with auto selection of the Virtual Room
- ❖ **Date/Time** shown in the selected time zone
- ❖ **Quota** management
- ❖ **Password protected** secure meeting
- ❖ **Mailing list** feature to keep all the participant in touch of creation and modification or cancellation of booking
- ❖ Choice among **different bandwidth ranges**





# VRVS on Linux



The screenshot displays the VRVS Saturn interface within a Netscape browser window. The main content area shows a grid of virtual rooms, each represented by a small icon and a name. The rooms include Cern (137.136.81.114), Philippe Galvez, Gregory DENIS, Internet2 (Lucy Lynch), Monitor Internet2, Cernet (Petr Holub), Internet2 (207.75.164.207), and Cern (David Collados (VRVS)). Other rooms listed include ID-NewYork (vrc1.advanced.org), Cern (Olivier MARTIN), Internet2 (207.75.164.205), and Bnl (David V.). The interface also features a sidebar with navigation options like 'DOC', 'Download', 'Schedule', 'JOIN', 'Call Someone', and 'My Profile'. At the bottom, there are buttons for 'NONE', 'CRAT', 'QTIME', 'SHARING', and 'IL323'. To the right, there are several smaller windows: a 'SATURN Virtual Room' window showing a video feed of a woman, a 'CRAT v4.2.20' window showing a list of participants, and a '137.136.24.228' window showing another video feed. The system tray at the bottom shows various icons and active windows like 'xload', 'emacs@vrvs01.caltech', and 'SATURN\_Virtual\_Room'.



# VRVS on Windows

The screenshot displays a Windows desktop environment running the VRVS (Virtual Room Videoconferencing System) application. The interface is composed of several overlapping windows:

- SATURN\_virtual\_Room**: The main control window on the left, listing participants and their status (muted, color, info). Participants listed include Polyspan-ITCS, DFNAE (UERJ), VRVS-CALTECH, Administrator@RICHNT, SLAC3, Dean Karlen, Hiroshi Toudou, and Dr Arshad.
- Chat service for the SATURN Virtual Room**: A window showing a list of participants and a message history.
- Participants**: A list of names including Brooks Collins, Dave - Caltech, Dean Karlen, Harvey Newman, Heidi Alvarez, Julian Bunn, KEK terminal2, and KEK terminal3.
- Video Windows**: Multiple windows showing individual participants in their virtual environments. Visible participants include a man with a beard, a man with glasses, a man in a red jacket, a group of people around a table, a man with a beard, a man in a patterned sweater, a man in a grey jacket, a man on a phone, and a man with a headset.
- System Tray**: Located at the bottom right, showing the time (4:35 PM), a network icon, and a sound icon with a volume level of 101.7 dB(F) 0.
- Taskbar**: The Windows taskbar at the bottom shows the Start button and several open applications including Microsoft Word, Internet Explorer, and the VRVS application.



# VRVS on Mac OS X



Grab File Edit Capture Window Help (Plugged In) Thu 10:23 PM

VRVS version 3.0 (Virtual Rooms Videoconferencing) Mozilla Desert Virtual Room - Mozilla

http://dhcp-126-205.caltech.edu

Home Bookmarks Mozilla Latest Builds

Community Virtual Room

vic: Desert\_Virtual\_Room

h261VideoCapability 137.136.24.228/h261 12 f/s 212 kb/s (2.3%) mute color info...

h261VideoCapability 137.136.24.228/h261 16 f/s 212 kb/s (2.1%) mute color info...

Caltech 137.136.24.228/h261 20 f/s 31 kb/s (1.6%) mute color info...

VRVS gregory 137.136.24.228/h261 16 f/s 197 kb/s (2.2%) mute color info...

vic v5.2.1 Settings Help Quit

vat: Desert\_Virtual\_Room

Caltech listen talk

g711Ulaw64k

g711Ulaw64k

Gregory Denis (VRVS)

Kun Wei (VRVS)

VRVS gregory

Keep Audio

vat v5.2.1 Settings Help Quit

VRVS Desert Virtual Room refresh

CERN-US Dave Adamczyk Pasadena

Caltech Dave Adamczyk Pasadena

CERN-INT Luke Skywalker Los Angeles

CERN-INT Gregory Denis Bern

Caltech Kun WEI Los Angeles

Internet2 Kun WEI Los Angeles

CERN-INT Luke Skywalker Los Angeles

refresh

Main Participants Video Modes Sharing H.323 Client Other Clients

Use These Clients

VAT Audio Application Start

VIC Video Application Start





# Enhanced VRVS Reflector



- ❖ Possibility of **tunneling (TCP or UDP)** between reflector servers. All communications use only **ONE** port !
- ❖ Peer-to-peer design with **high scalability and flexibility**
- ❖ Solution for **Firewall and NAT**
- ❖ Better design to **accommodate H.323 clients**
- ❖ Fully support **H.263** video codec
- ❖ Perform **audio mixing**
- ❖ Perform some **packet recovery**
- ❖ **Aggregate dynamically bandwidth** for H.323 multipoint conference between End Points to an overall maximum conference bandwidth
- ❖ **Fix incompatibility** between several H.323 end points
- ❖ Remotely **mute/unmute** video or/and audio
- ❖ Optimized network **bandwidth utilization**
- ❖ Real-time **packet loss monitoring**
- ❖ Support up to **16,000** Virtual Rooms



# VRVS 3.0 Web Admin Interface



- ❖ Pure Java **J2EE + XML**
- ❖ **HTTPS/SSL** secure web interface
- ❖ **Monitoring reflectors** and users in ongoing conference
- ❖ **Full control** on database

The screenshot displays the VRVS 3.0 Web Admin Interface. On the left is a navigation menu with sections: Database (with links for Cities, Communities, Machines, Reflectors, Tables, Timezones, Users' Profiles, Virtual Rooms, World Regions), Monitoring (with links for Reflectors, Users in V. Room), and Statistics (with links for Reflectors, Users). A LOGOUT button is at the bottom of the menu. The main content area is titled 'Reflectors' and includes an 'ADD NEW' button and a scrollable list of reflector names: JET, JINR, JLAB, KEK, KFKI, LIP, NSYSU, NTUA, PUB, RedIRIS, RedIRIS-ES, RNP-BR, RUTHERFORD, SINICA, SLAC, Sonata, SWANSEA, Tokyo, TRIUMF, UERJ, UFL, UFRGS, ULAVE, UPJS, and UQUEBEC. Below the list is a detailed configuration form for a selected reflector (ID: 184, Label: VRVS-DEM02, Hostname: DHCP-112-211.catech.edu, IP: 131.215.112.211). The form includes fields for Location (Catech), City, State/Province (Pasadena, California), Country (United States), Topology (Universe), Backup Reflector (VRVS-DEM04), Type Of Reflector (Default), Version (4.3.0), Port Number (46011), Behind Firewall (No), Inside NAT (No), IP inside NAT, Selectable (No), To Survey (No), RGB Color (D3FFC1), and Background File. It also has fields for Admin1 (First Name: VRVS, Last Name: Team, Email: developers@vrvs.org, Phone) and Admin2 (First Name, Last Name, Email, Phone). At the bottom of the form, there are fields for Enabled (Yes), License Key, Creation Date (2003-02-10 09:13:15), and an Action button labeled 'Submit this Info'. A 'Show Me More Info' button is located below the form.





# VRVS Worldwide Deployment (June 12, 2003)



# VRVS Reflectors Deployment



## 73 reflectors Deployment World wide

USA	26
Spain	5
Brazil	5
Switzerland	4
UK	4
France	2
Canada	2
Taiwan	2
Greece	2
Portugal	2
Israel	2
Japan	2
Poland	1
Italy	1

Finland	1
Chile	1
Pakistan	1
Venezuela	1
Hungary	1
China	1
Slovakia	1
Ireland	1
Russia	1
Czech Republic	1
Belgium	1
Romania	1
Germany	1



# VRVS Network Servers Deployment for High Energy and Nuclear Physics





# VRVS Statistics



## VRVS registered users (up to June 12, 2003)



Registration started from Feb 20<sup>th</sup>, 2003  
(Previous database has been deleted)

USA	920
Spain	753
Italy	208
Switzerland	280
Germany	190
France	183
UK	166
Brazil	165
Japan	83
Canada	72

Number of Registered Users:

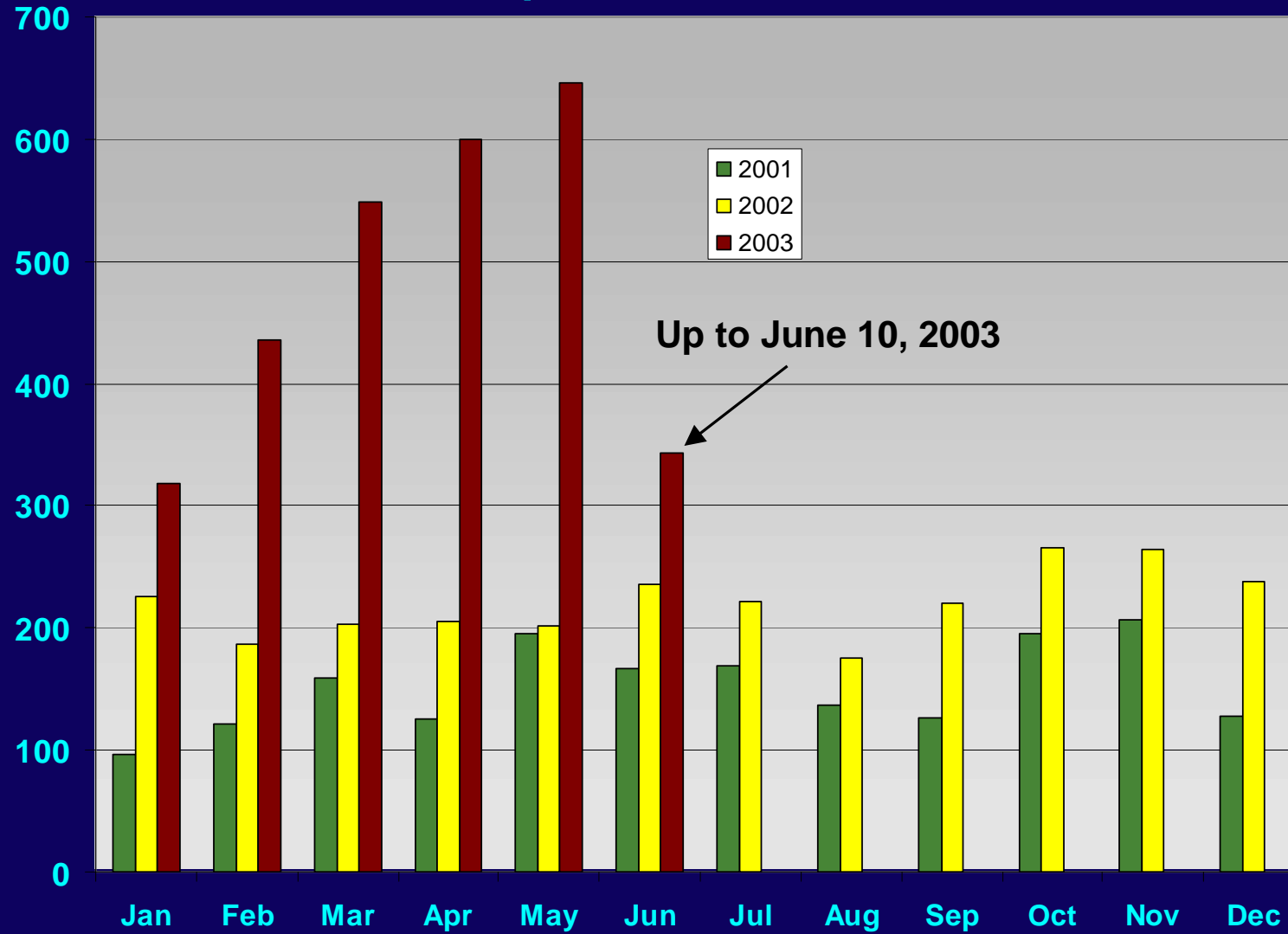
3981

From

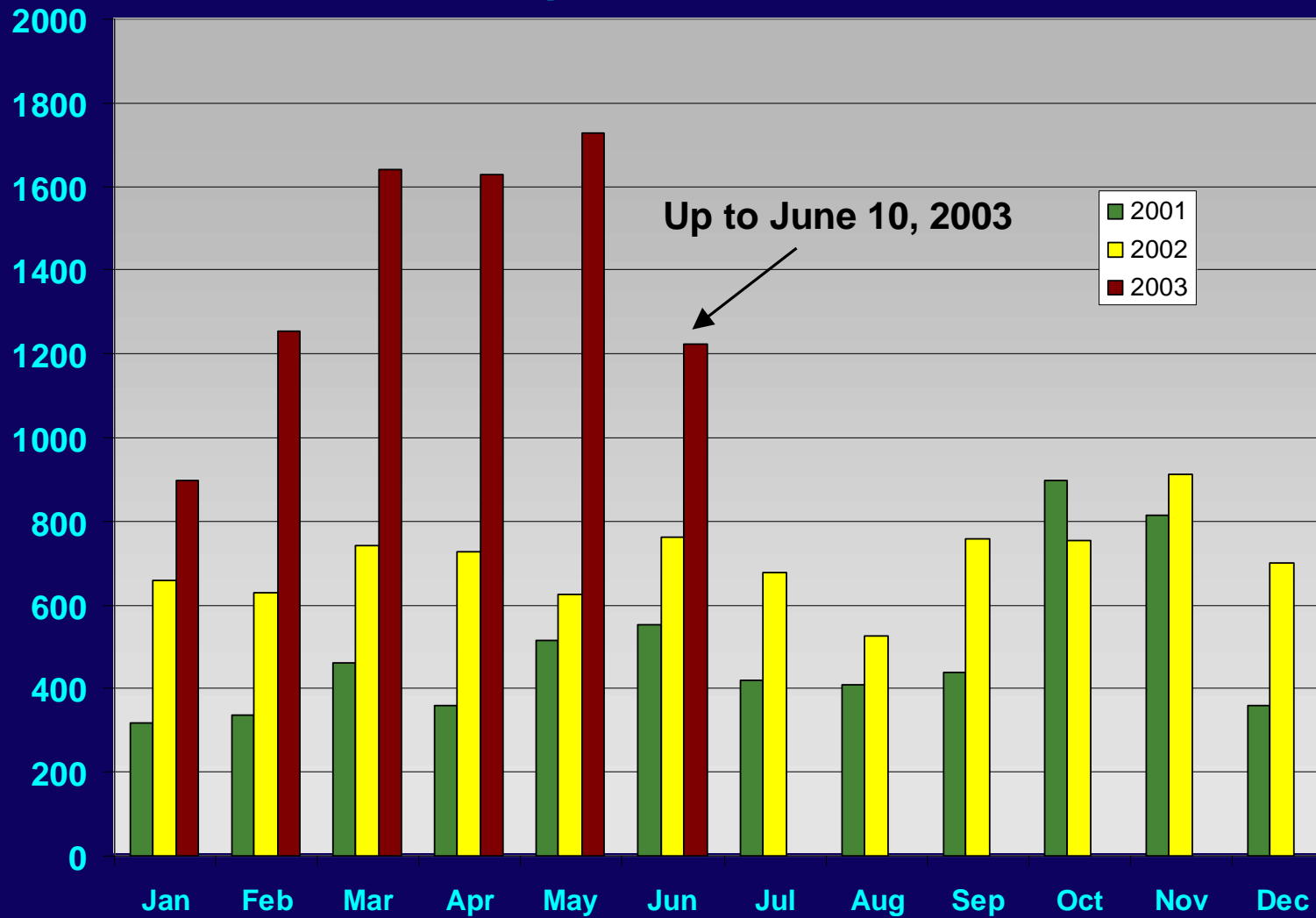
81 Countries

Taiwan, Greece, Argentina, Russia, etc...

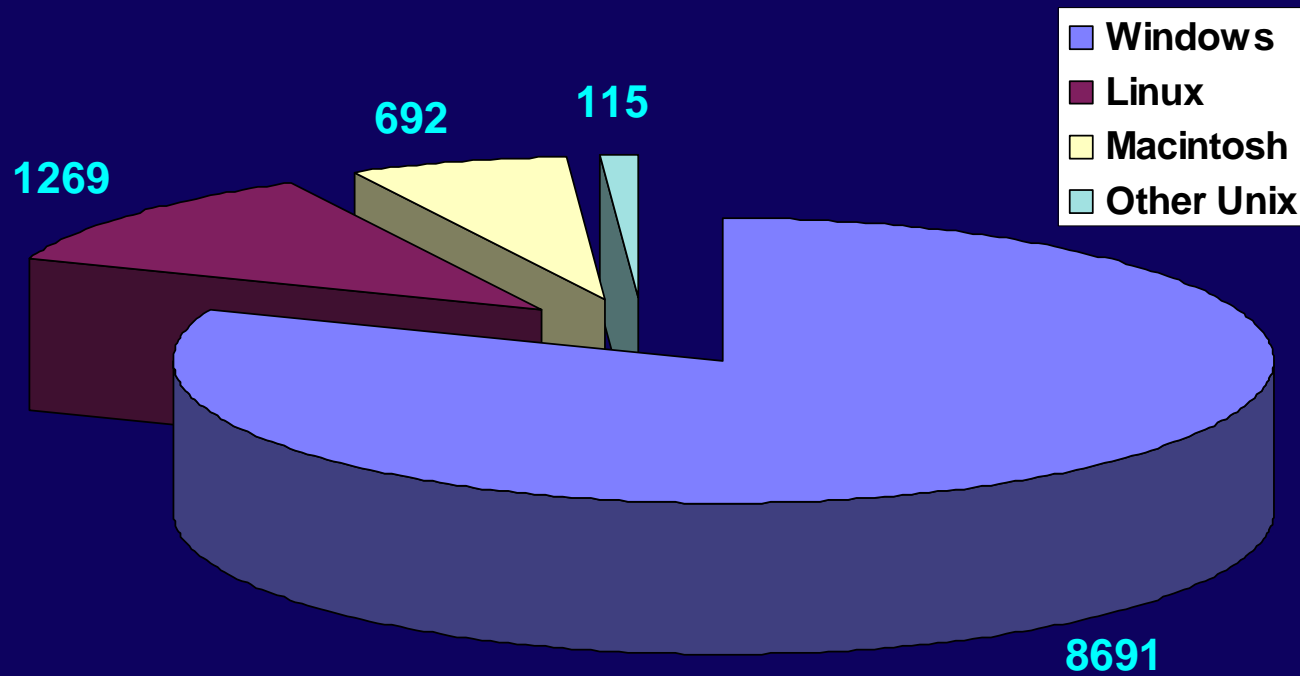
## Scheduled Multipoint Videoconferences Sessions



## Scheduled Multipoint Videoconferences Sessions



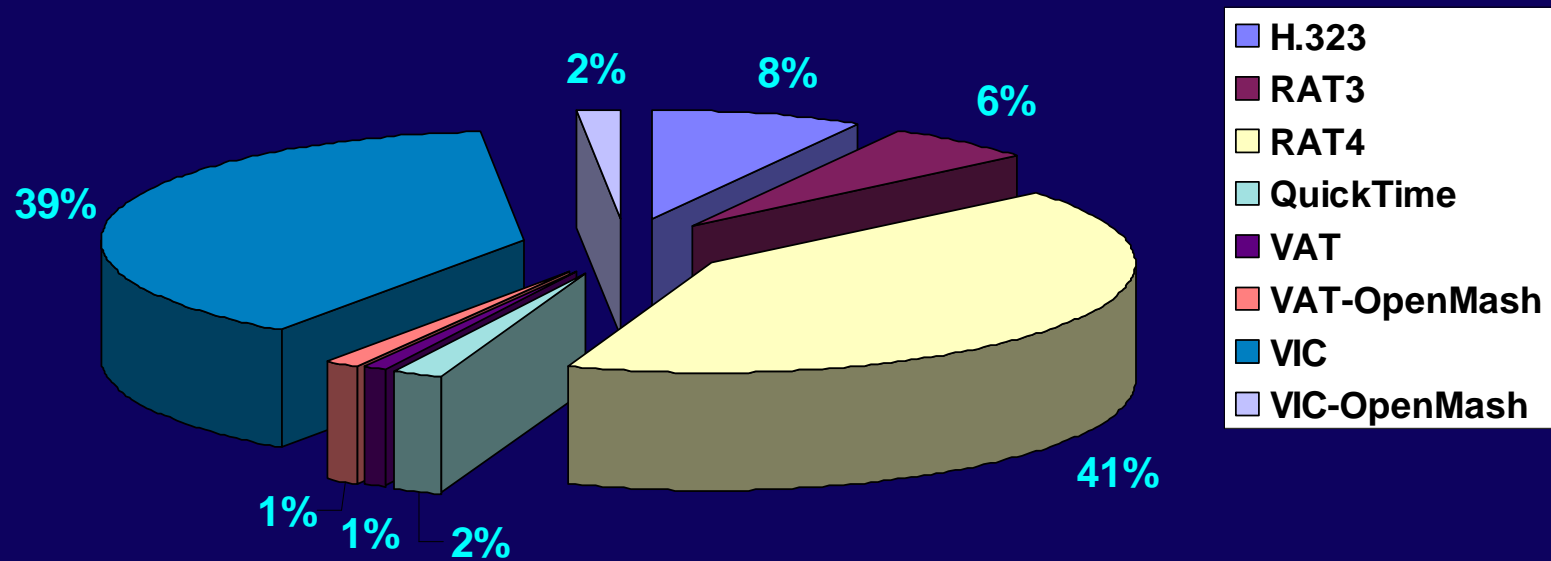
## VRVS Machines O/S distribution







## Videoconferencing Tools used with VRVS (June, 12th 2003) (Total 125076 connections)





# VRVS connection per communities



**A community hosts a dedicated set of Virtual Rooms**

<b>Universe</b>	<b>97132</b>
<b>RedIRIS</b>	<b>27883</b>
<b>Astro</b>	<b>4419</b>
<b>Fusion</b>	<b>4714</b>
<b>CMS-Control Room</b>	<b>673</b>
<b>AccessGrid</b>	<b>5647</b>



# VAG and using VRVS as a personal AG node



# Virtual Access Grid

- ❖ User can connect to either **unicast or multicast** videoconferencing with full supported features
- ❖ User can create his/her own virtual AG node and virtual venues and **integrated into VRVS**
- ❖ Different Video modes possible:
  - ☞ **Voice switched** : default mode for H.323 client. one video stream at a time
  - ☞ **Timer switched** : browse through all the video based on preset timer. one video stream at a time.
  - ☞ **Selected Streams**: Click among the video participants to view selected video streams (one or several streams available).
  - ☞ **All Streams**



# When to use VAG?



	<b>AG</b>	<b>VRVS</b>	<b>VAG</b>
<b>Multi-cast</b>	😊	😊	😊
<b>Unicast</b>		😊	😊
<b>On-Site AG Node</b>	😊	😊	😊
<b>Without AG Node</b>		😊	😊
<b>High Quality Video</b>	😊	😊	😊
<b>High Quality Audio</b>	😊	😊	😊
<b>H.323</b>		😊	😊
<b>High (&gt; 20Mbps) Bandwidth</b>	😊	😊	😊
<b>Normal (10Mbps) / Low (&lt;1Mbps) Bandwidth Network</b>		😊	😊



# Connect to AG virtual venues with Mbone



**VRVS Lobby Virtual Room**

I2-AG Kun Wei Los Angeles	I2-AG NCAR Vislab AUDIENCE	I2-AG AIST.D@Japan	I2-AG CHPC_UTAH AUDIENCE	I2-AG CHPC_UTAH MAIN
I2-AG CHPC_UTAH PRESENTER	I2-AG CHPC_UTAH OUTERSPACE	I2-AG NCAR Vislab MAIN	I2-AG UALR VRC/AG MAIN	I2-AG NCAR Vislab PRESENTER
I2-AG AARNet/NASA	I2-AG UALR VRC/AG	I2-AG UALR VRC/AG	I2-AG CHL-HPVC	I2-AG UALR VRC/AG

Main | Participants | Video Modes | Sharing | H.323 Client | Other Clients

"Lobby Room" Current Time: 16:48:20

CONNECT VIC & RAT4

Audio Only | Loopback

Exit | Support

**Lobby Virtual Room**

AIST, Japan AUDIENCE	AIST, Japan AUDIENCE	AIST, Japan AUDIENCE
ANL Workshop AUDIENCE	ANL Workshop AUDIENCE	ANL Workshop MAIN
ANL Workshop PRESENTER	CHL-HPVC AUDIENCE	CHL-HPVC AUDIENCE
CHL-HPVC AUDIENCE	CHL-HPVC PRESENTER	CHPC_UTAH AUDIENCE
CHPC_UTAH MAIN	CHPC_UTAH OUTERSPACE	CHPC_UTAH PRESENTER
CNU_PIG MAIN	ICL-AG MAIN	ICL-AG PRESENTER
INTEL AUDIENCE	INTEL MAIN	INTEL PRESENTER
NCAR Vislab AUDIENCE	NCAR Vislab MAIN	Phonoth/LBNL PRESENTER

VIC v2.9.1 by VRVS

**RAT v4.3.2: Lobby\_Virtual\_Room**

Listen 234.1 kb/s  Talk 0.0 b/s

Speaker Vol 84 Microphone Gain 68

- Kun Wei (VRVS)
- J&J atmcs-evo6
- AIST, Japan
- CNU\_PIG
- CHL Node Operator
- Administrator
- root

"Lobby\_Virtual\_Room"  
Address: 207.75.164.66 Port: 51086 TTL: 15

RAT v4.3.2 by VRVS Options... About... Quit



# On Going and Future Developments



# VRVS Next Development (1/3)



- Adaptation to emerging standard: **IPv6, SIP**
- Integration of new hardware/software **for high-end interactivity.**
  - ✓ Already developed an **MPEG2 MCU** (using Minerva codec). Will port to other codec if demand.
  - ✓ Developed a multipoint videoconferencing system based on **MPEG4 compression standard.**
  - ✓ Developed a system using **HDTV standard** if affordable hardware devices available.
- Improved Security
  - Easy support of **Firewall and NAT.**
  - Conference **access control, user authentication and authorization**



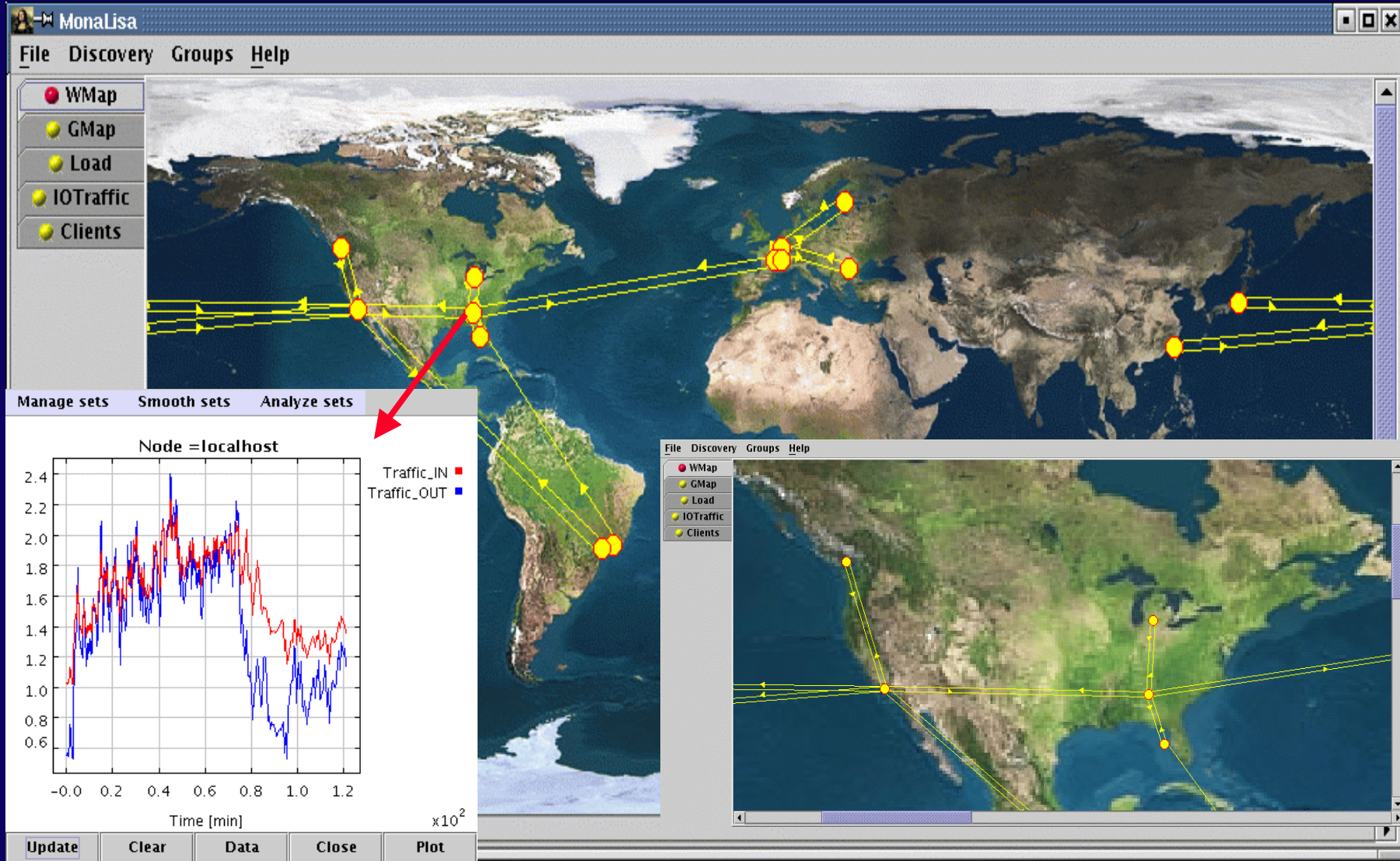


# VRVS Next Development (2/3)

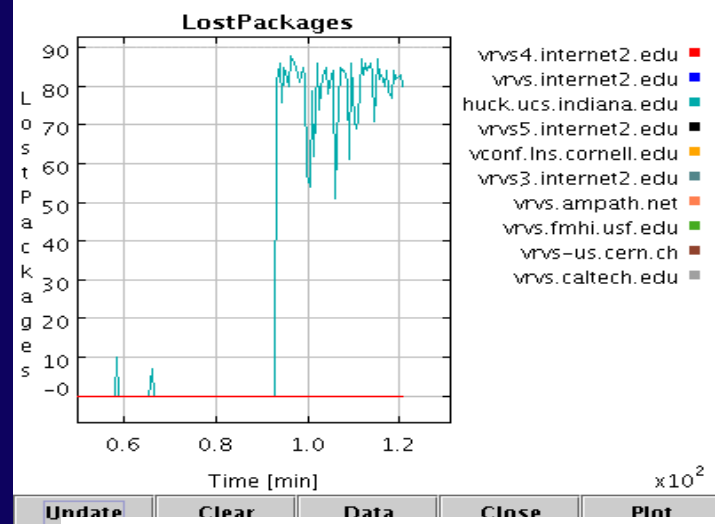
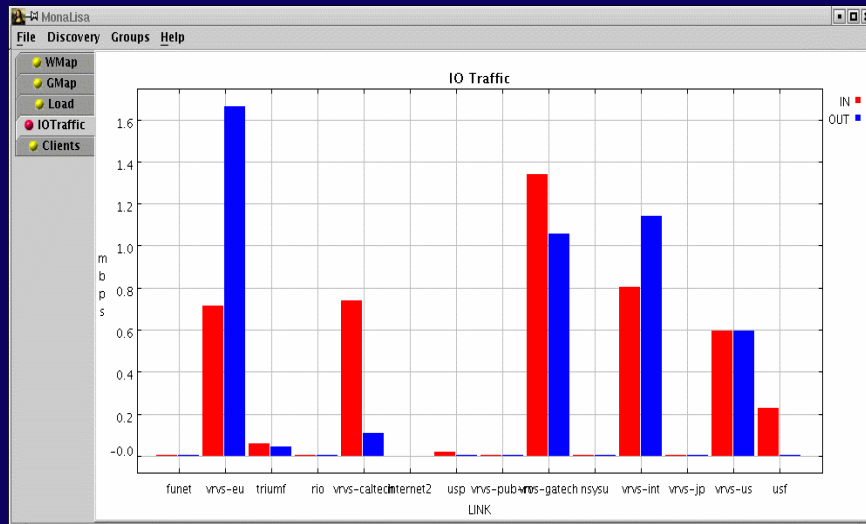
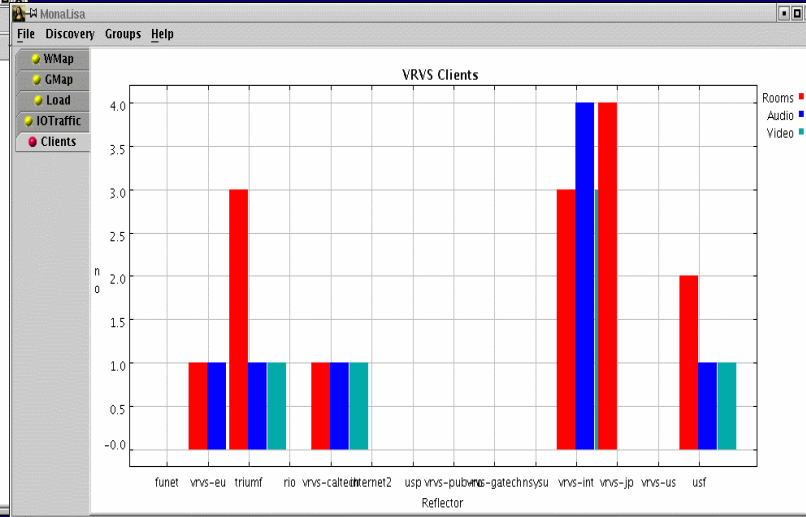
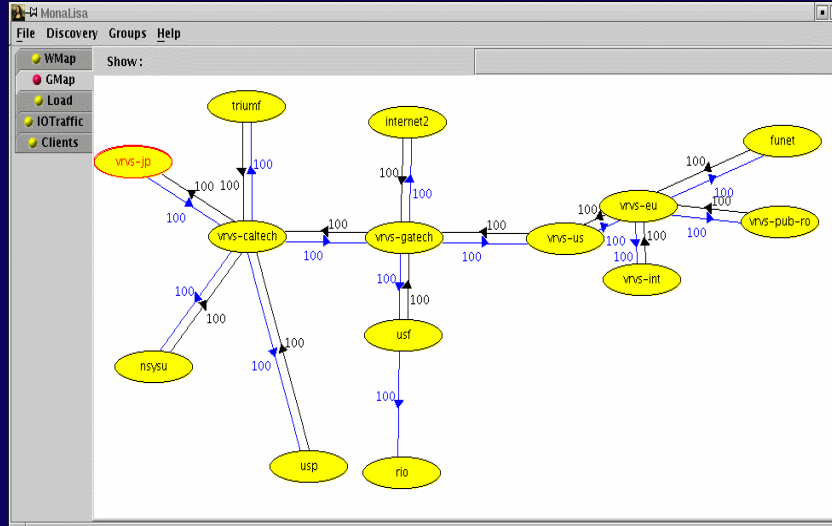


- Develop **advanced monitoring and tracking** tools for ad-hoc conference as well as scheduled multi-site conferences
- Develop a pure peer-to-peer VRVS Network servers network to be able to **handle thousands of parallel sessions.**
- Develop **advanced network monitoring agents** (based on Java and web services) to run on each network servers.
  - ✓ We will know **in real time**, packet loss ration between server, jitter, bandwidth available, VRVS Network servers system information (CPU, memory, ..)
  - ✓ Possibility to **automatic rerouting** between VRVS network servers to find a **better network path.**

# Monitoring VRVS Reflectors



# Monitoring VRVS Reflectors (2)



# Next Developments (3/3)

## ❖ **Wireless/Mobile Client Integration:**

- ☞ **User Interface dedicated for small screens**
- ☞ **Integration of low end client:**
  - **Provide dedicated software clients (VVP, JMF)**
  - **Transcode streams to lower bandwidth**
  - **Support MPEG4**







# VRVS Virtual Space Setup





# VRVS Team



**Philippe Galvez (Caltech, Pasadena, CA)**

**Gregory Denis (Caltech, Pasadena, CA)**

**David Collados (Caltech, Pasadena, CA)**

**Kun Wei (Caltech, Pasadena, CA)**

**Dave Adamczyk (Caltech, Pasadena, CA)**

**Joao Correia Fernandes (Caltech/CERN,  
Pasadena/Switzerland)**



# Further references



- ❖ <http://www.vrvs.org>
- ❖ [support@vrvs.org](mailto:support@vrvs.org)