



Welcome



Enabling Virtual Organizations

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September 3rd, 2007

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EVO.CALTECH.EDU



EVO

- Why EVO?
- Concept
- Components
- Features
- Interoperability/integration



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Why EVO?

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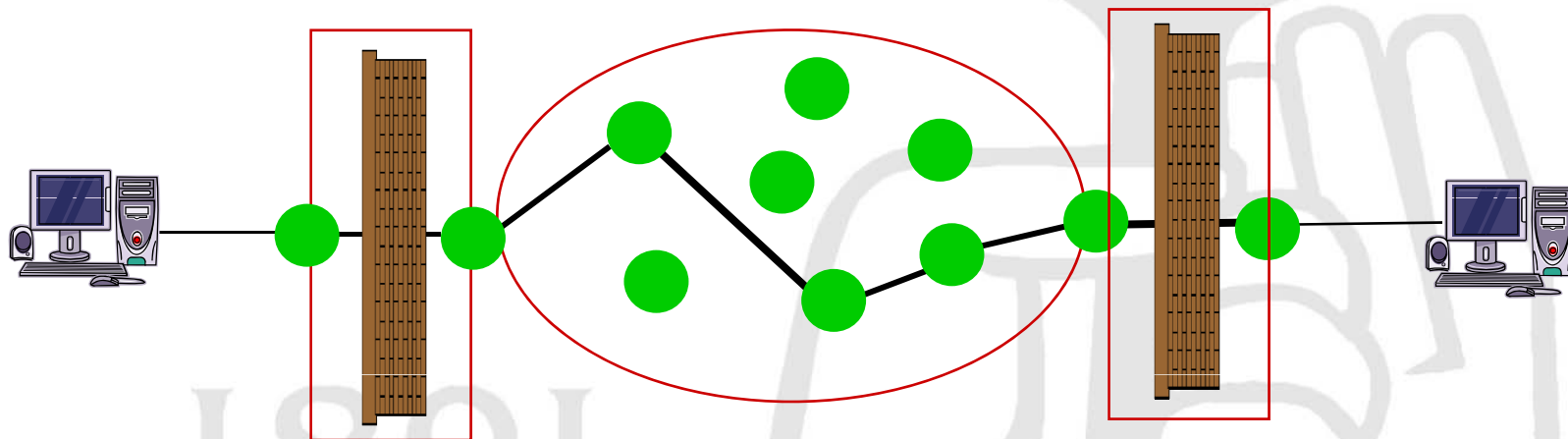
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1891

Why?

Why it is so difficult to achieve total reliability/robustness when deploying a RTC Infrastructure?

- The Real-Time Collaborative environment is a living environment: constantly changing, evolving
- In addition, devices/domains/nodes are managed by several independent technical and administrative entities.



Solution ?

Solutions ?



By creating a "living" RTC Infrastructure capable to **react/adapt** to the change of the environment in **real-time transparently** to the end-user.

EVO Methodology

Required Steps to create such infrastructure:

- 1. Monitor the environment**
- 2. Detect any changes**
- 3. Add intelligence into all infrastructure components to react to real-time changes**
- 4. Spread the information and status to the network to obtain a global real-time view of the infrastructure**
- 5. Remove all single point of failure**



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EVO Concept

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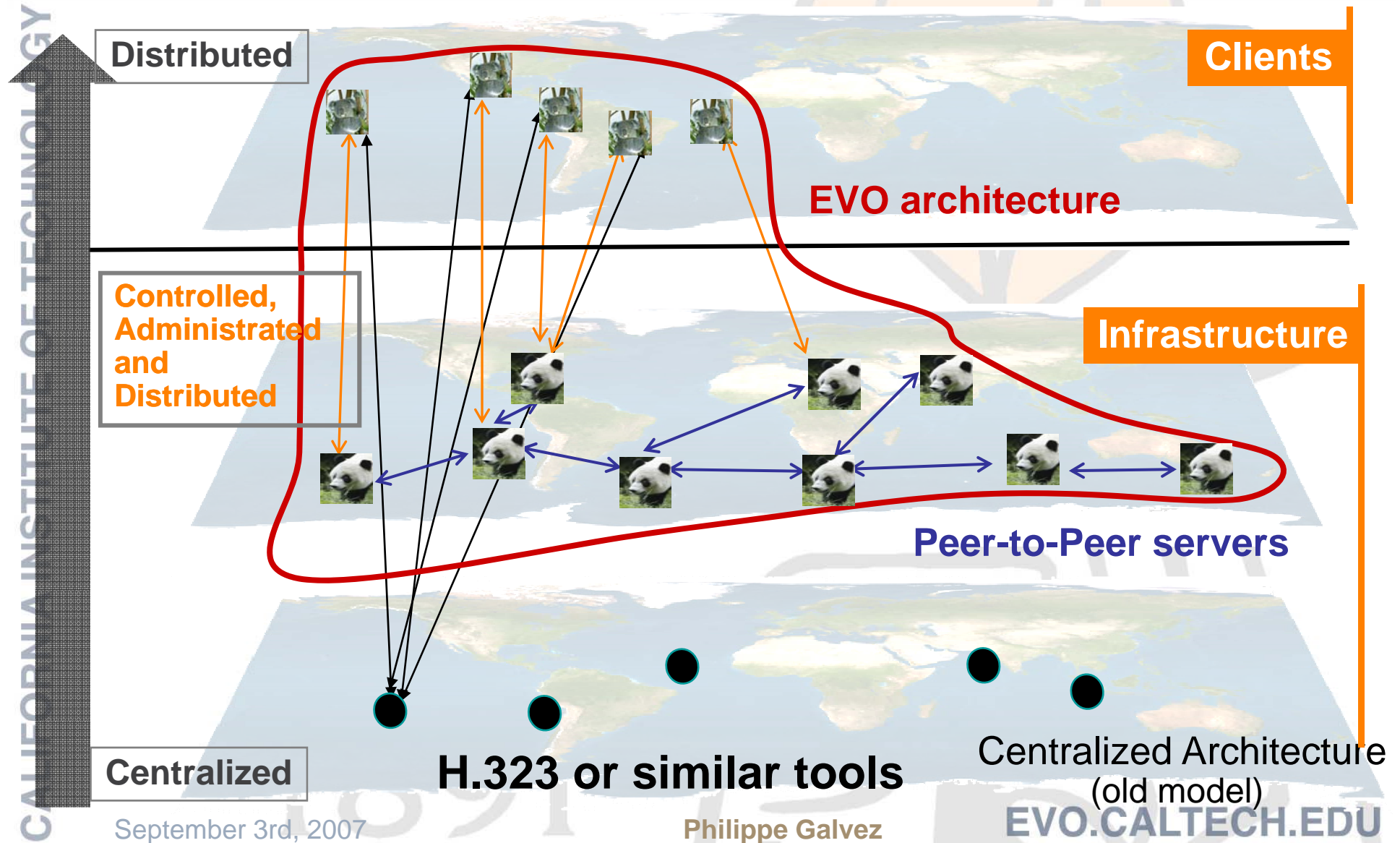
EVO Components

Each EVO components have the name of an **animal**.
They have their **own intelligence and are autonomous**.

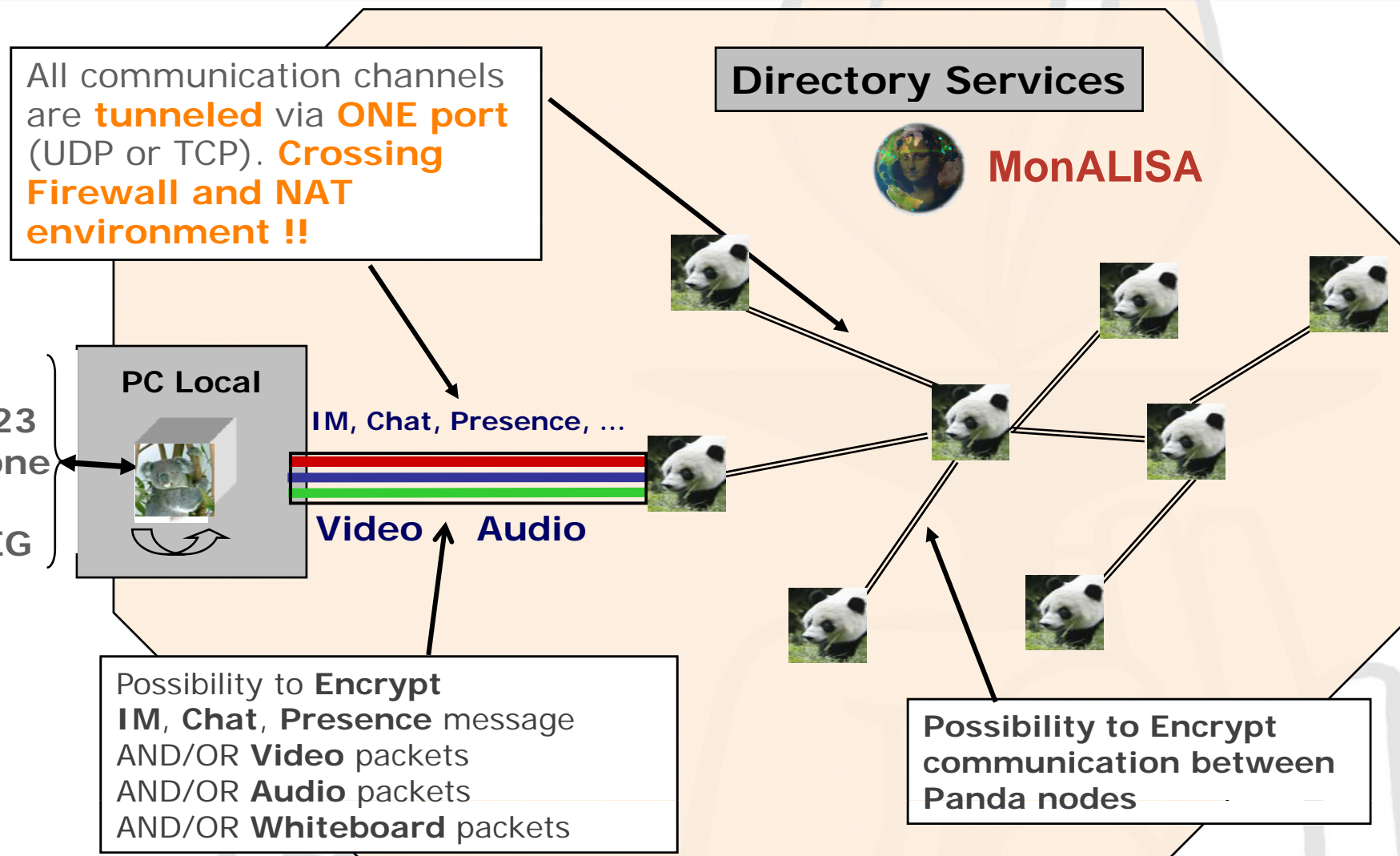


- **Kangaroo**: Gateway to connect any available EVO database servers (redundant).
- **Panda**: EVO server component that manage all the EVO real-time traffic. Several Panda create an EVO overlay network
- **Koala**: EVO client component. Starts and runs on the user machine and allow connection to the EVO service and functionalities.

EVO Advanced Architecture



Secure Infrastructure





EVO Components

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Panda: one EVO server



Some functionalities:

- **Dynamic registration** to high level directory services to provide global infrastructure view.
- **Automatic re-activation** of components and services.
- **Automatic** and secure **code update**.
- **Continuous monitoring** of network quality (packet loss, jitter, latency) between its peers and its possible peers.

Some functionalities (part 2):

- **Automatic rerouting** to obtain the best performance/quality.
- **Encryption** between central nodes and between node and clients.
- Automatic **Alarm notifications** when monitored parameters (system or network) go beyond a **preset threshold**.
- **Dynamically provides services** (video, audio, data,..) that matches the current resources/capabilities to the end users/applications.
- Access to **real-time and historical data**.



Koala : EVO Client

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Some functionalities:

- Our **Client** is platform independent: Java based
- Automatic **Detection** of:
 - **systems parameters** (CPU, Memory,...)
 - **hardware** components (audio card, video card, ...)
 - **capabilities** in term of service (video, audio, ...)
 - **network environment and capabilities** (wireless environment, DSL, available bandwidth, ...).

Some Functionalities (part 2):

- **Dynamically** get services (video, audio, data,...) that matches the current resources/capabilities to end users/applications.
- **Continuous monitoring** of network quality (packets loss, jitter, latency), and automatic **rerouting of packets**.
- **Automatic Alarm notifications** a when monitored parameters (system or network) go beyond a **preset threshold**.
- **Adaptive configuration** of client applications to fit the current hardware and network capabilities.



EVO features

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Overall System Capabilities(1)

- UDP et TCP tunneling in one Port. **Network Address Translation** and **Firewall** transversal.
- **Encrypt** Video and/or Audio and/or Whiteboard and/or IM/Chat and/or data.
- **IPv6** world is connected to the EVO IPv4 network via our dedicated servers.
- **Plug-in concept:** communication system and interface is provided to allow additional functionalities (authentication, booking, agenda...).
 - **API** to allow external development.



Overall System Capabilities(2)

- **Multilanguage** support (currently 10 languages supported)
- Support any type of **video client/protocols**: H.323, SIP, Mbone, etc...
- **Administration of meetings**: Become a **meeting moderator**; Mute/Unmute video/audio of a participant, kick-out a participant, add a new participant as moderator.
- **Sharing of computer screens** between participants of the same meeting.

Koala Main Interface

Multi language Support

Communities

Presence

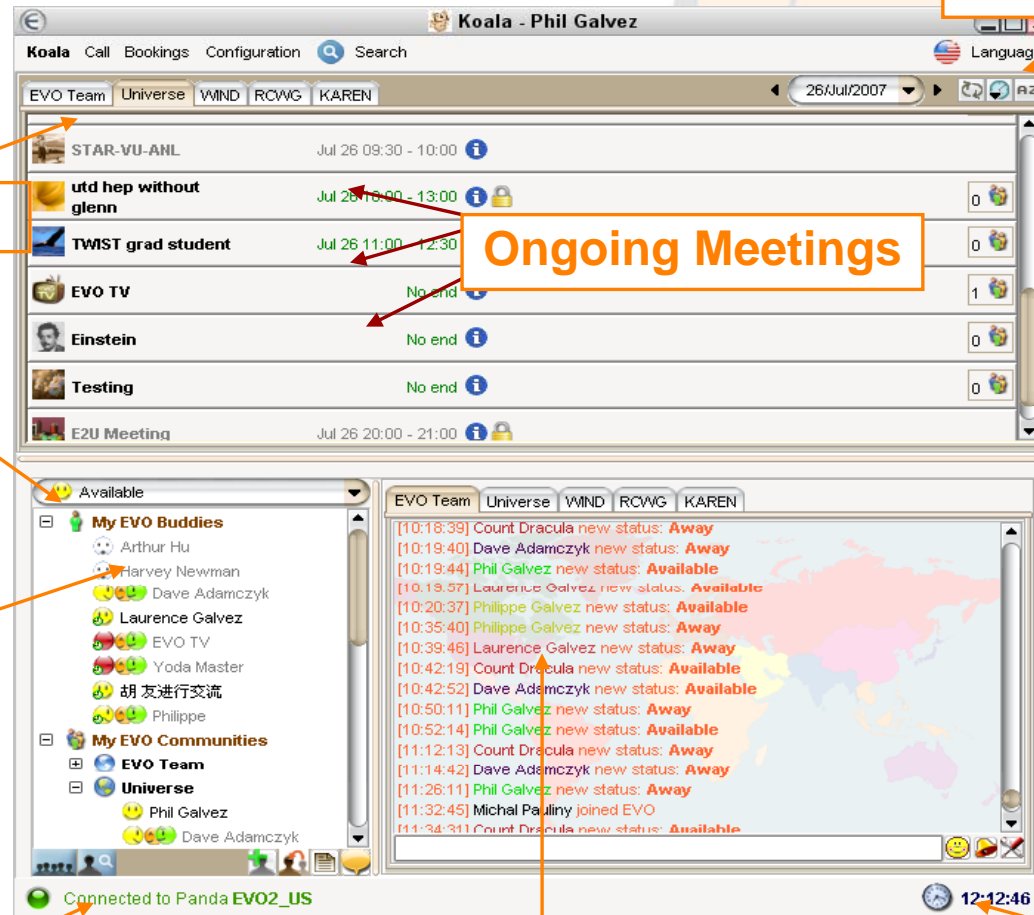
Buddy

Ongoing Meetings

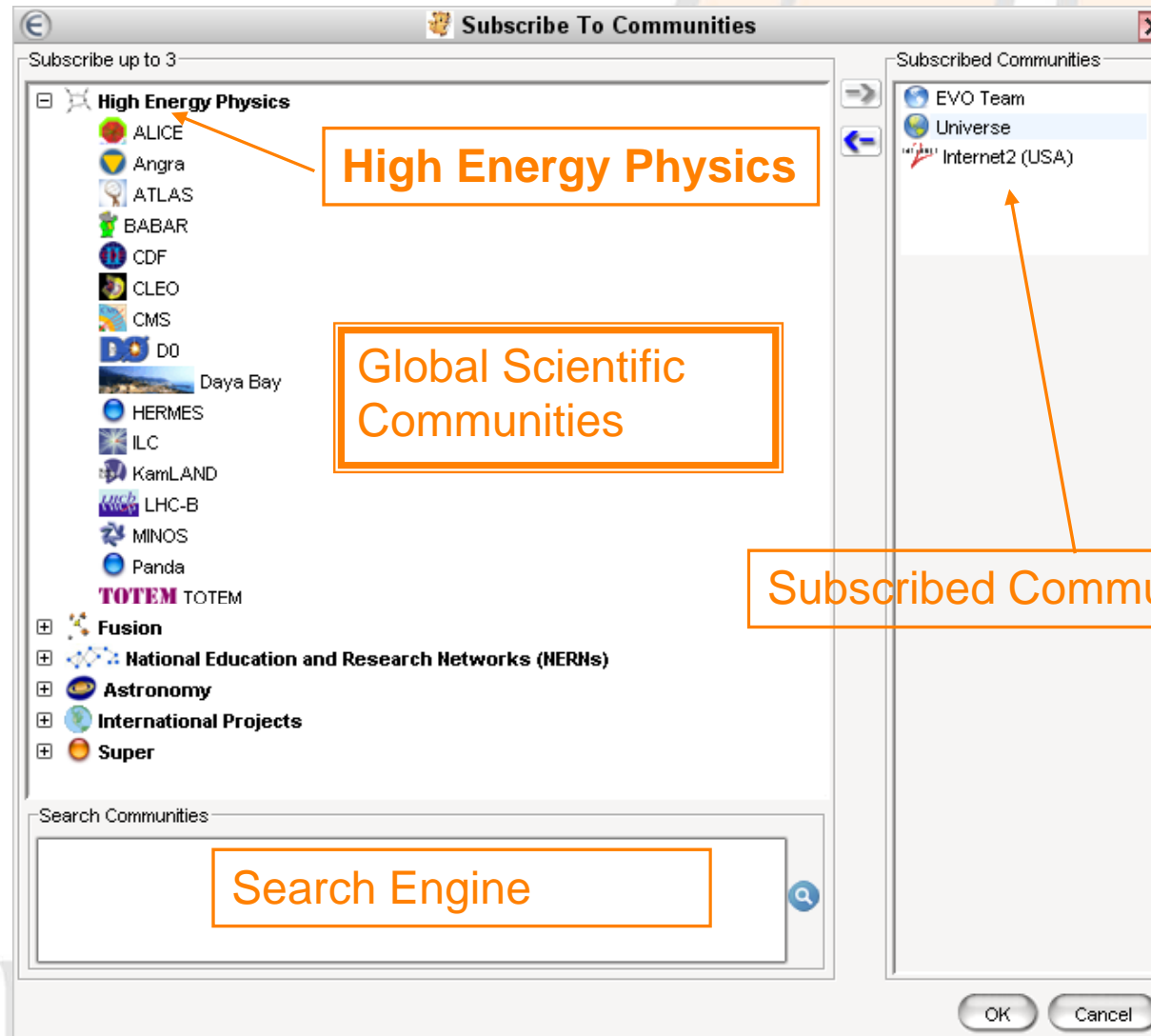
Connection to the Panda

Chat

Automatic Time Zone Adjustment



Global Communities Management



Booking

- Book a **schedule meeting**
- Start an **Ad-hoc** meeting
- Invite a buddy to a **private meeting**
- Have **permanent** meeting room
- Restrict access by a **password**



Create Meeting

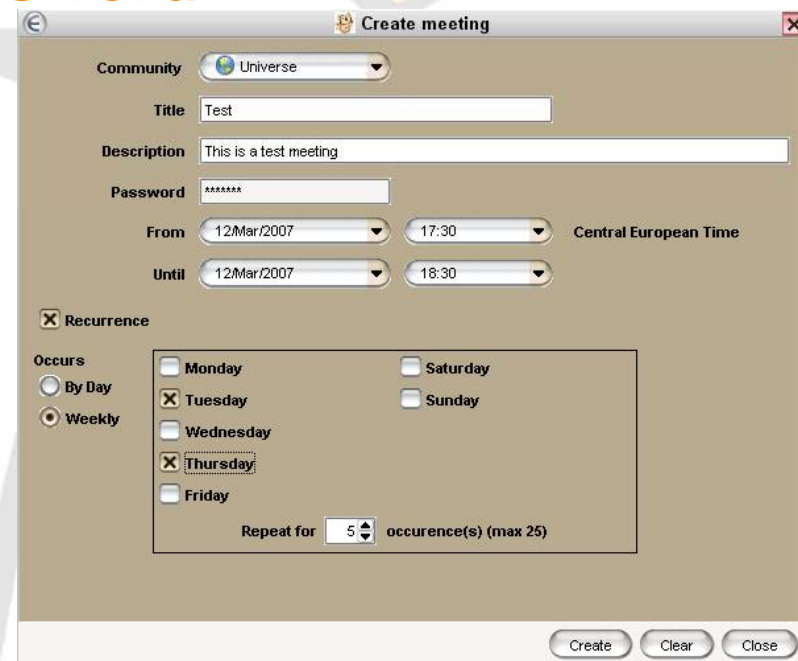
Meeting Title

Meeting Description

Meeting Password (Optional)

Community: Universe

OK Cancel



Create meeting

Community: Universe

Title: Test

Description: This is a test meeting

Password: AAAAAA

From: 12/Mar/2007 17:30 Central European Time

Until: 12/Mar/2007 18:30

☒ Recurrence

Occurs: ☐ By Day ☒ Weekly

Monday ☐ Tuesday ☒ Wednesday ☐ Thursday ☒ Friday ☐ Saturday ☐ Sunday

Repeat for: 5 occurrence(s) (max 25)

Create Clear Close

Instance Messaging / Chat



- **IM Presence** information of each user is available.
- Ability to force your presence status
- Each user can **add** EVO users to his **buddy list**.



- Possibility to initiate a **private Chat session** with any EVO user even if you are not in meeting with them.
- A global **Chat session** exists for each **community**.
- A public **Chat session** is opened at each **meeting**.

Koala in Meeting Interface



Exchange/Share files

Participants
of the
current
meeting

Open/Close
Recorder &
Playback

Control Audio, Video and Whiteboard

EVO Audio Application

JRAT : Java Robust Audio Tool



- Platform independent (Java Code)
- Better **audio quality** : 16Khz
- 3 possible choice in quality/bandwidth
- Ability to choose **different devices** for playing audio and recording audio.
- Automatic **Silence Suppression**
- **Automatic Gain Control** of the input level
- Higher range of volume
- **Mixing** all audio streams



EVO Video Application (1/7)

(VRVS/EVO Slovak team)

ViEVO:

- 3 possible **sources**:
 - Video Camera (USB, Firewire)
 - Current Computer Desktop (or part of)
 - A Still Image
- 2 possible **codecs**:
 - H.261 fully compatible with all H.323 hardware clients
 - H.263 from QCIF to XGA resolution
 -
- 3 possible **platforms**:
 - Microsoft Windows
 - Linux
 - Mac OS X

H.263 codec in ViEVO (2/7)

**H.263 XGA
(1024 x 768)**

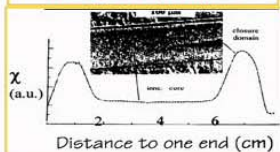
**H.261 CIF
(352 x 288)**

**H.261 CIF
(352 x 288)**

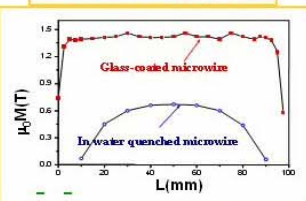
**H.263 VGA
(640 x 480)**

Bistable Loops

Susceptibility Profile

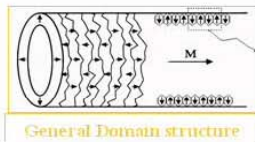


Remanence Profile

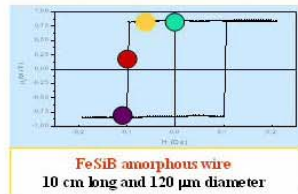


Schematic Domain structure at Remanence

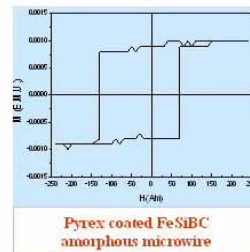
Amorphous Microwires FeSiB (Large and Positive Magnetostriction)



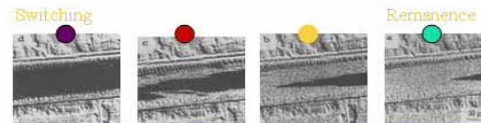
General Domain structure



FeSiB amorphous wire
10 cm long and 120 μm diameter



**Tiny Dimensions:
2 mm long
5 μm diameter**



Magnetization Reversal in a single Barkhausen jump

Summary:
Vázquez, Physica B, 2001

Windows Taskbar and ViEVO interface showing participants: Pavel Farkas (VRVS), Viktor Michalcin (VRVS-SK), Michal Pauliny, and Marek Domarack (VRVS Tea). The interface includes a 'Transmit' button and a status bar at the bottom showing the time as 9:51.



ViEVO Application (3/7)

OpenGL version

use of 3D technologies for 2D videos

- **OpenGL technology is available in all platforms.** So far only the Windows version has been released.
- **Display all the selected videos into a single window.**
- **Real time** resizing of all videos when the window is **stretched**.
- **Increase the quality** of the video displayed (filters).
- Videos are **rendered** and displayed by the **GPU**.
- **Decrease** the CPU usage.

Dwaj Rycerze



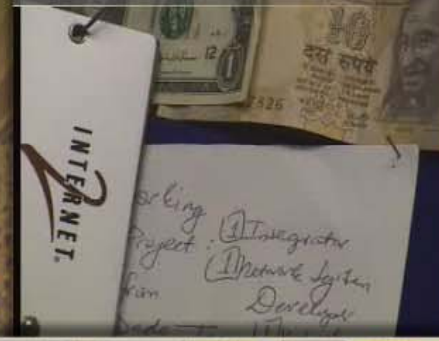
Dave Adamczyk



Viktor Michalcin



Pavel Farkas



Rasto Adamek



Martin Harcar



Abdul Kakacenko



Marek Domaracky (VRVS SK)



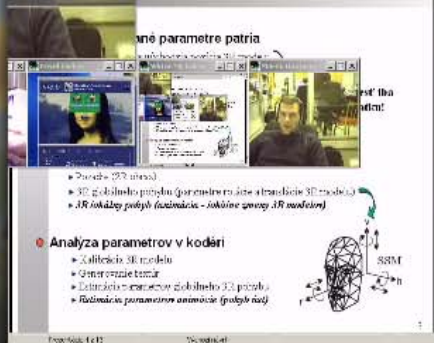
Pavel Farkas



Viktor Michalcin



Viktor Michalcin



Pavel Farkas





ViEVO Application (5/7)

OpenGL version

- Real time:
 - Transparency
 - Shadows
 - Text over video
 - Rotation in 3D space
 - 2D and 3D special effects
 - Bitmap background
 - Title of the meeting



ViEVO Application (6/7)

MonALISA

File View Discovery Groups Security Help

Nodes: No. of audio clients 0 7 Links: Internet RTT time Quality 0.48, 11 0.25 Show Peer Mean quality / 2h 0 100 % Show

3D Map Select layout: E... Stiffness: Repulsion: Only Layout-handled nodes

Groups

GMap

TabPan

Load

Clients

BeSTORID_NZ

Count Drax Phil Galvez

James T. Kirk

Joseph Spaccavento

Heather Kelly

Francis van Lingen

Dave Adamczyk in Rochester

Joao Fernandes

Marek Domaracki

UPJS_SK

John McClane

Martin Harcar

Yoda Master

UKERNA1_UK

TSUKUBA_JP

WIND_IT

ZILINA_SK

EDU_SK

Rasto Adan

Helene Boyer

Prova 2 Wind

Stefan Zavoda

STUBA_SK

UPJS01_SK

Viktor Michalcin

CERNNext_CH

DESY_DE

Koala - Michal Pauliny in Team Meeting

Call Bookings Configuration Search

Current Meeting AV Controls Shared Files

Team Meeting

Michal Pauliny

Dave Adamczyk

Phil Galvez

Viktor Michalcin

Pavel Farkas

Martin Harcar

John McClane

Yoda Master

Marek Domaracki

Joao Fernandes

Video Audio Whiteboard Leave this meeting

Available

Alexander Dittmer

Martin Domaracki

Rasto Adamek

EVO TV

Phil Galvez

James T. Kirk

Viktor Michalcin

EVO Team Universe Team Meeting

[17:58:27] Andrea Lionetto joined EVO

[17:59:37] Miroslav Sedivy joined EVO

[17:59:52] Yan Zheng joined EVO

[18:00:41] Miroslav Sedivy left EVO

[18:00:42] Miroslav Sedivy joined EVO

[18:06:11] Rasto Adamek joined EVO

[18:11:12] ODF FMFI UK joined EVO

viewo: Team Meeting

CAMERA DESKTOP PICTURE

SIZE SHOW SETUP HELP

Michal Pauliny Vista CAM 24 f/s 266 kb/s (CIF)

Dave Adamczyk CAM 27 f/s 733 kb/s (CIF)

Yoda Master CAM 25 f/s 55 kb/s (CIF)

Pavel Farkas CAM 20 f/s 316 kb/s (CIF)

Stefan Zavoda CAM 24 f/s 180 kb/s (CIF)

ViewoDisplay

Team Meeting

Viktor Michalcin

Yoda Master

Marek Domaracki

Phil Galvez

Pavel Farkas

Dave Adamczyk

Joao Fernandes

Martin Harcar

Stefan Zavoda

Michal Pauliny

Windows taskbar: MonALISA Java Console - Koala Koala - Michal Pauli... viewo: Team Meeting ViewoDisplay miting5 - Skicár 19:05



ViEVO Application (7/7)

The image displays a screenshot of the ViEVO application interface, showing a network diagram, a team meeting window, and a video display window.

MonALISA Network Diagram: The top-left window shows a network diagram with nodes representing users and their connections. The diagram includes a menu bar (File, View, Discovery, Groups, Security, Help) and a status bar indicating 22 users, 24 reflectors, 357 nodes, and 3824 params. The network is visualized with nodes like EDU_SK, Rasto Adamek, Helene Boyer, ZILINA, WIND_IT, UKERNA1_UK, TSUKUBA_JP, Count Drax, Phil Galvez, EVO TV, James T. Kirk, Joseph Spasawento, Yoda Master, UKERNA_UK, Heather Kelly, Francisous van Lingem, Dave Adamczyk, Joao Fernandes, CERNnext_CH, DESY_DE, and others. The diagram also shows a 3D Map, Groups, GMap, TabPan, and Load sections.

Koala - Team Meeting: The top-right window shows a team meeting interface. It includes a menu bar (Call, Bookings, Configuration, Search) and a status bar. The main area displays a grid of video feeds for participants: Michal Pauliny, Dave Adamczyk, Phil Galvez, Viktor Michalcin, Pavel Farkas, Martin Harcar, John McClane, Yoda Master, Marek Domaracki, Joao Fernandes, and others. The interface also includes a Video, Audio, Whiteboard, and Leave this meeting button. A list of available participants is shown on the left, and a log of events is on the right.

ViewoDisplay Team Meeting: The bottom window shows a large video display area with multiple video feeds of participants. The feeds are arranged in a grid, showing participants like Viktor Michalcin, Yoda Master, Marek Domaracki, Phil Galvez, Pavel Farkas, Rasto Adamek, Dave Adamczyk, Joao Fernandes, Martin Harcar, Stefan Zavoda, and others. The interface includes a menu bar (Team Meeting) and a status bar.

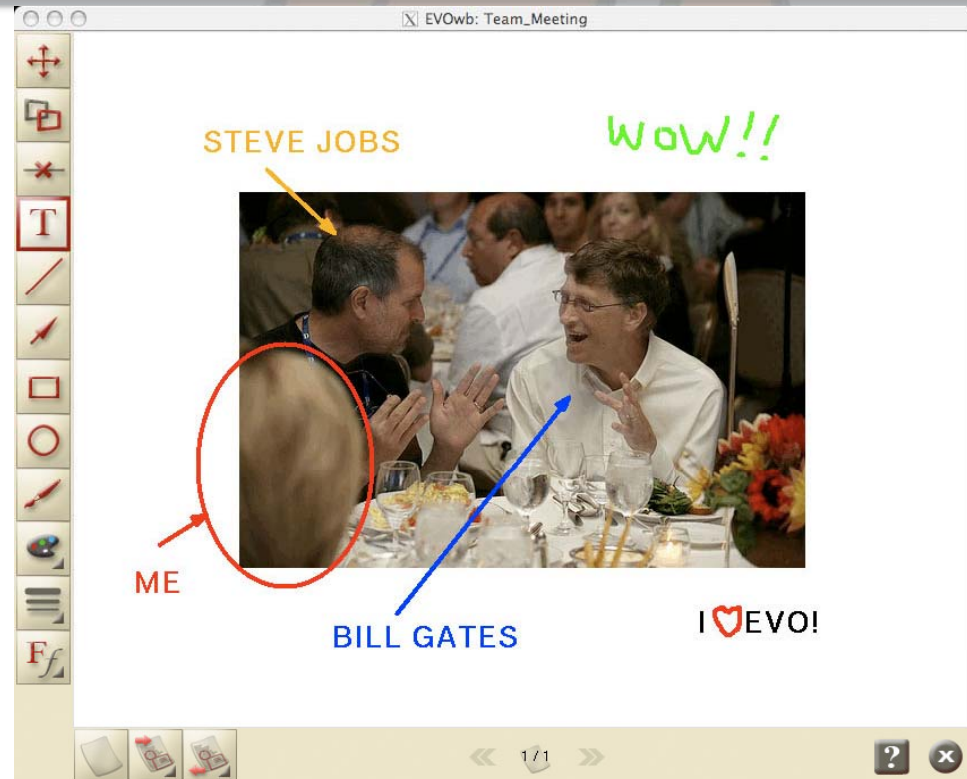
The bottom of the screen shows a Windows taskbar with various application icons and a system clock indicating 19:04.

EVO Whiteboard Application

(VRVS/EVO Slovak team)

Whiteboard

- Works on **3 Platforms**
- Multiple pages capability
- You can **import** Image and Text files
- Each component in the page can be:
 - ✓ moved
 - ✓ duplicated
 - ✓ deleted





Meeting Recorder

Record a **full EVO meeting** into your local disk.



- Possible to **PAUSE** the recording
- You can add **Marks** during the recording
- Possible to record:
 - Audio
 - Video
 - Whiteboard
 - Chat
 - Participants

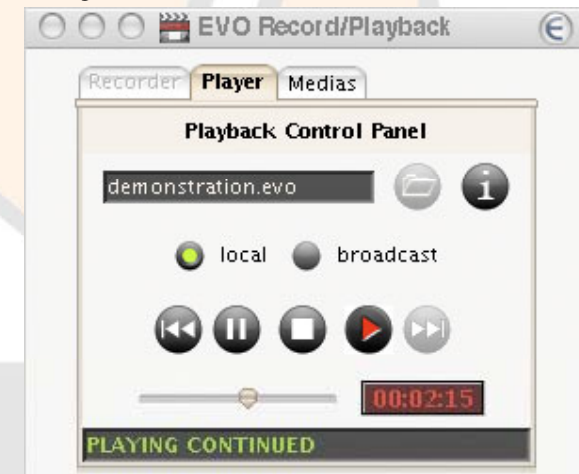




Meeting Player

Playback a **full EVO meeting** from your local disk.

- The playback could be:
 - Local (*for your eyes only*)
 - Broadcasted
- Possible to **PAUSE** the playback
- You can go to the previous/next pre-recorded **marks**
- Possible to play:
 - Audio
 - Video
 - Whiteboard
 - Chat
 - Participants



Aparté (private audio discussion)

Aparté allows **during an ongoing meeting** to initiate a private audio discussion with a selected participant of the current meeting.



The private discussion starts as soon as the selected participant **accept your request**.

You can mute or not the audio from the meeting.



File exchange

- Exchange any files **between EVO users** even if they are not in a meeting (or not in the same meeting).
- **In a meeting a shared space** allows to upload and download files (during the meeting duration).



- **No limit** in file size and in number of files.



EVO Integration / Interoperability

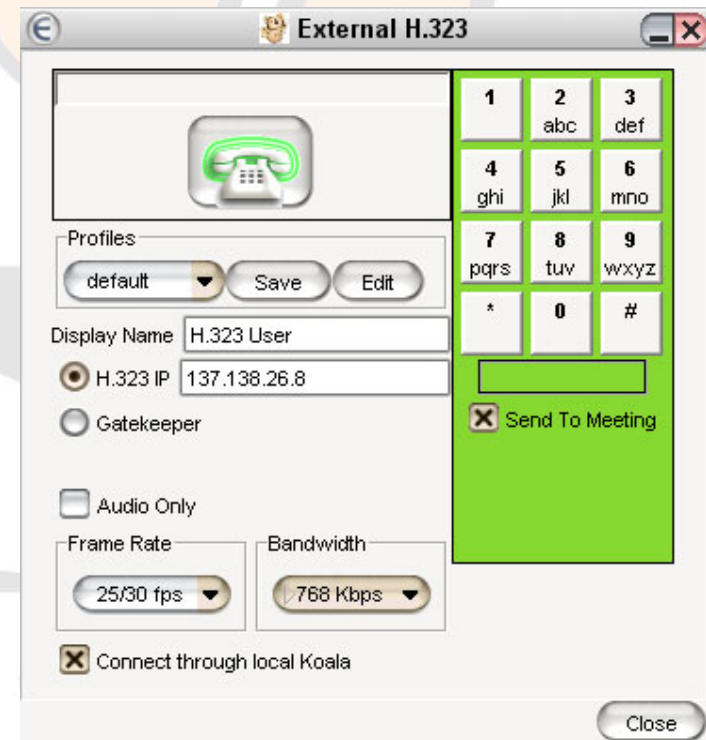
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H.323 Integration

- Allow to connect:
 - Local software H.323 client
 - External H.323 client
 - H.323 MCU
 - H.323 Telephone
- **Mixing** of Audio
- **Transcoding** of videos:
 - Can reduce bandwidth
 - 4 videos into 1 CIF
- Compatible **Gatekeepers**
- Avoid Firewall restrictions





Video Transcoder (VRVS/EVO Slovak team)

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The screenshot displays a VievoDisplay video conference window titled "Team Meeting". The window is divided into a grid of 12 video feeds, each showing a participant. The participants are: Ching LEE, Philippe Galvez, Pavel Farkas (SPEAKER), Abdul Kakacenko, Gregory Denis, Rasto Adamek, Dave Adamczyk, and EVO-SK Team. The bottom right corner of the window shows a Koala chat window with a list of participants and a chat log. The bottom of the screen shows a Windows taskbar with the start button and several open applications including "EVO, the future of...", "Java(TM) 2 Pla...", "vievo: Team Meeting", and "VievoDisplay".

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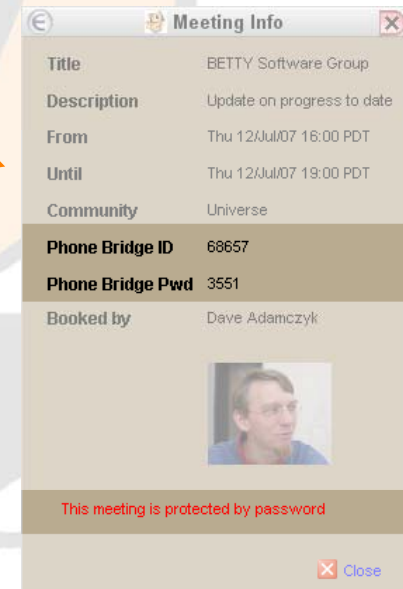
SIP Integration

- Allow to connect:
 - Local software SIP client
 - External SIP client
 - SIP Gateway
 - SIP Telephone
- Mixing of Audio
- Transcoding of videos:
 - Can reduce bandwidth
 - 4 videos into 1 CIF
- Avoid Firewall restrictions



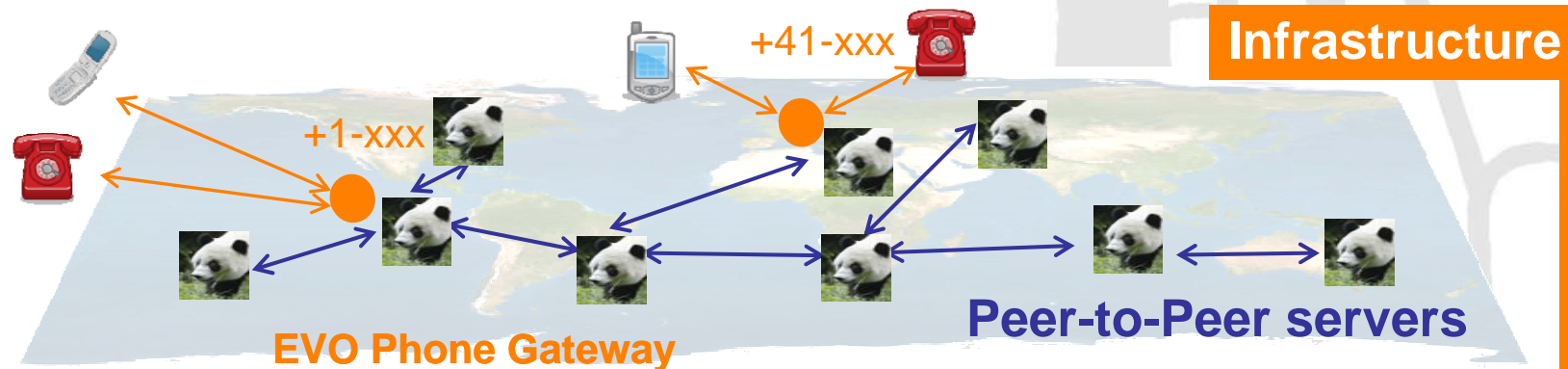
Phone (POTS) Integration

- Meeting conference ID (and password if setup are automatically created for all EVO meeting
- All EVO users connected by Phone are visible and the meeting moderators is capably to mute/unmute/kick-out any phone users



EVO Distributed Phone Conference Infrastructure

- Install a EVO Phone Gateway to major sites and HEP institutes so the cost of the phone line to participant to the same meeting is **only national/local**
- Currently, gateway are running at **Caltech, CERN and several others** are in process to be installed. Anyone interested ??
- Cost to install a EVO Phone Gateway hardware (US\$300 for 8 ports)
- If only **10 institutes set-up 100 ports each**, it will provide a pool of **1,000 phone connections** for the HEP community worldwide



EVO: End-to-End Self Managed and Secure RTC Infrastructure

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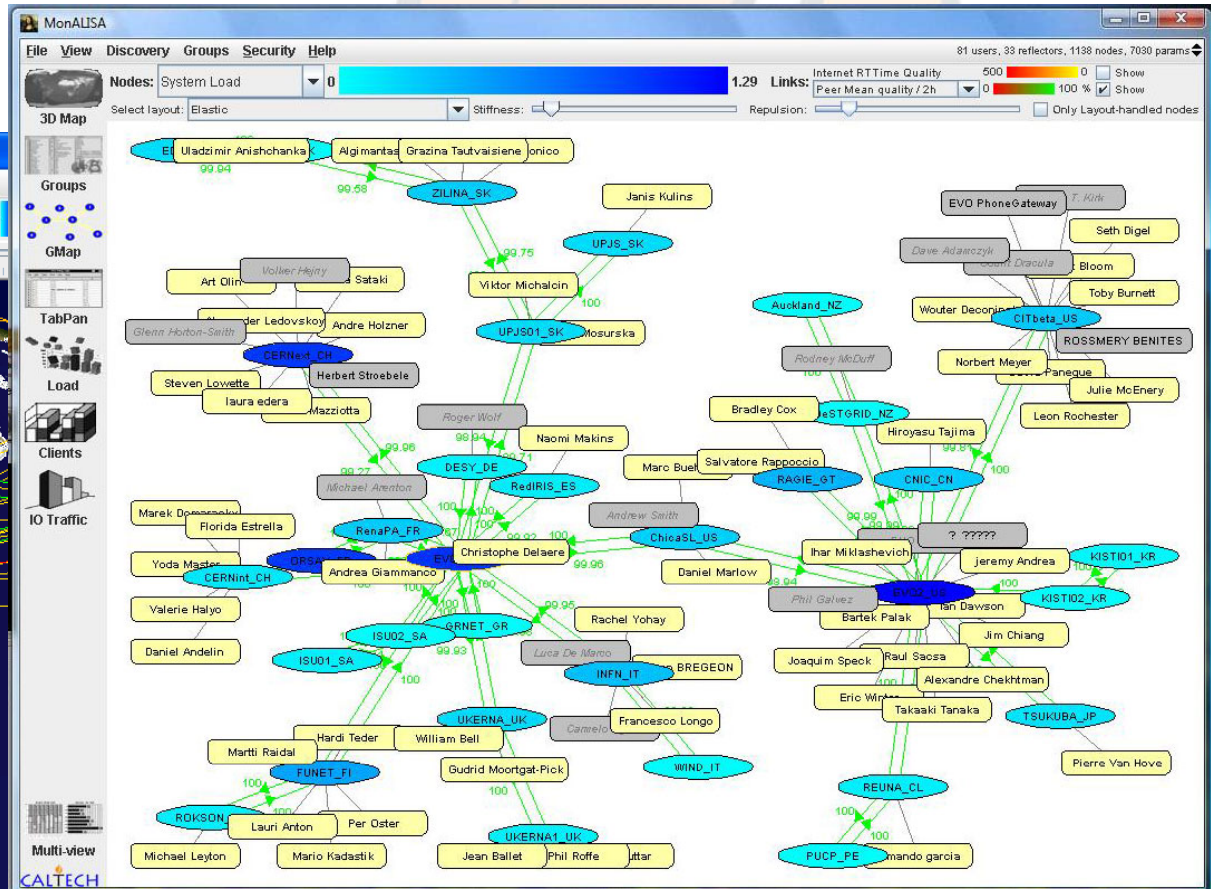
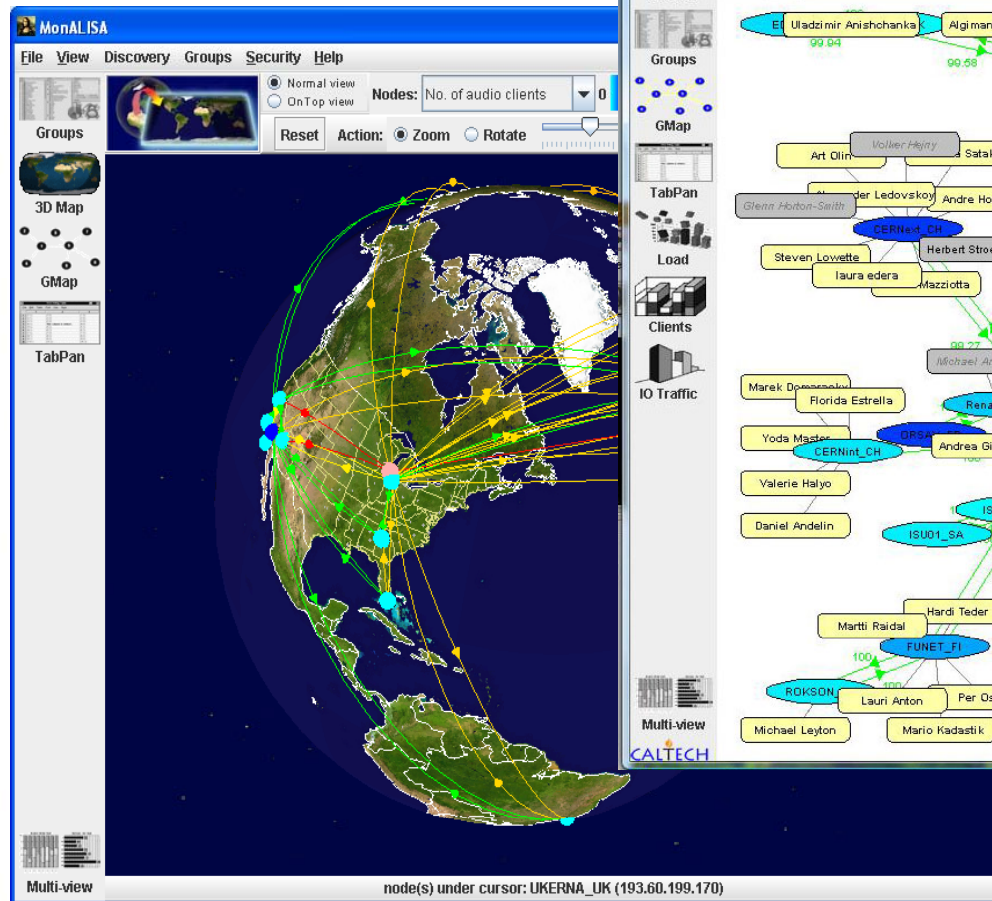
EVO APIs for Integration with other systems/portals

Our APIs development is currently focused in 3 main areas

- Be able to **book/read EVO meetings remotely**. It allows the integration with local calendaring/booking system such as IndiCo, etc
- Access to **EVO general information** (user's presence, status, on-going meetings, click to join, etc...). It will allow to integrate these information **into local web portal**.
- Plug-ins to be developed by external community to add in the Koala client to address some particular/local needs. We have all the real time **EVO mechanism/infrastructure** to transmit and receive any types of information between all the Koala clients.

It could be used to developed new applications, send physics information from the control rooms, broadcast information or alarms,...

MonALISA / EVO Integration: End-to-End Self Managed RTC Infrastructure



Particle Physics MasterClasses: March 2007

The screenshot displays a complex video conference interface. On the left, a window titled 'Einstein' shows a data table with columns for 'Sum of Events', 'Rate', 'Rate Error', 'Rate Ratio', and 'Rate Ratio Error'. The table lists various experiments and their results. In the center, several video feeds show students in lecture halls from different locations: 'INFN Padova Padova, Italy', 'Universita' Catania', 'INFN Pisa-Italy', and 'AUTH Thessaloniki-Greece'. On the right, a window titled 'Koala - Viktor Michalec in Einstein' shows a grid of smaller video feeds for individual participants. At the bottom right, a chat window displays a list of participants and a log of messages, including a discussion about audio feedback and a guess about quarks in Athens.

Experiment	Sum of Events	Rate	Rate Error	Rate Ratio	Rate Ratio Error
Sum of Events	770.0	200.0	10.0	1.00	0.05
Rate	200.0	200.0	10.0	1.00	0.05
Rate Error	10.0	10.0	1.0	1.00	0.05
Rate Ratio	1.00	1.00	0.05	1.00	0.05
Rate Ratio Error	0.05	0.05	0.01	1.00	0.05

4500 high-school students from some 70 institutes across Europe and the US spent two weeks working at the frontier of physics in the second International Masterclasses for High-School Students.

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EVO Session

With the India President, Dr A.P. J. Abdul Kalam





Thank you

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