Advanced Tools for Future Instruction

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#IStayAtHome
#YoMeQuedoEnCasa
#JoEmQuedoACasa
#Restecheztoi
#IoRestoACasa
The latency, the delay with which the sound of the other reached each one, made it impossible for both to sing and play at the same time, and songs alternated

Shall we play together?

https://youtu.be/TpekWgmlD4k
Background


The Key to Success in High Quality Performances: Networks and Tools

Network with packet loss, high definition tool
Network without packet loss, standard videoconferencing tool.
The Right Network with the Right Tools

"Near in the distance 2" with Konic Thtr: Vienna (mdw), Judenburg, Prague, New York, Ljubljana and Barcelona (MACBA), ACOnet 25th & University of Viena 650th anniversary celebrations. Traversing Aconet, Gaeant, RedIRIS & Anella Cientifica (dancing, Victoria Macarte and Dominik Grünbühl).
Polycom Hardware Platforms (Now Poly)

✓ https://www.polycom.co.uk/
✓ Commercial solution.
✓ Able to send good quality music with MusicMode™ to avoid Echo cancellation (the requirements are not the same as for a conversation).
✓ Relatively low bandwidth usage (from 128 kbps to 6 Mbps) with compression.
✓ Also available as a desktop App, Real Presence Desktop (RPD).
✓ Suitable for dance performances.
✓ Not suitable to play music simultaneously.

Examples:
• Longing for the Impossible for the moment it is real: Copenhagen calling London & Barcelona, Studio Biscoe
• The Infinite Bridge, the Royal College of Music
The Infinite Bridge, created by the Royal College of Music students: London (RCM), Helsinki (SibA) and Barcelona (MACBA), with Handmadedance. Dance traversing Jisc, Géant, RedIRIS and Anella Científica (NPAPW2015) (dancing. Neus Ledesma, Andrea Just)
✓ Developed by
✓ High quality & low latency video (http://www.ultragrid.cz/).
✓ Available on GitHub: https://github.com/CESNET/UltraGrid
✓ It requires a powerful hardware.
✓ Resolutions range through HD (1920x1080) up to 4K (4096x2160) video with up to 60 frames per second.
✓ Compressed/uncompressed streams (10 Gbps interface needed).
✓ BW: from 12 Mbps (H.265 codec, 1080p@30) to nearly 8 Gbps (uncompressed 4k@60fps).
✓ As low as 40 ms end-to-end latency
✓ Suitable for interactive dance and music.

Examples:
• Near in the distance 1, 2 and 3, Aconet
• A Short Journey into Folded Space, Studio Biscoe
• I Wish I would Dance Well under the Stars, CESNET
When the LoLa idea was born...

...during a viola Masterclass with New World Symphony, at the GARR Conference 2005, in Pisa...
Latency was 0.5 seconds!

The dream:
“To perform together, from distant locations...
as if distance has vanished
in a click of a computer mouse”
To play together you need...

- Latency (RTT) below ~45 milliseconds
- Eye Contact to synchronize
- Spatial Sound immersion for expression
- Room Reverbering
- Continuous Presence of all musicians
- Non distracting environment
- and art!
LoLa is NOT:

- a software/App that you download and install
- an online platform where you get an account
- a service you run into a browser
- a service which allows you to connect many sites
- an audio only system

LoLa is:

- a multi-component system that you install in all locations
- state of the art technology to optimize low latency in A/V
- a system which delivers studio quality multichannel audio
- tailored for music/art teaching and rehearsing, but you can also use it for performances and other scenarios
LoLa is made of 3 components

A highly optimized Software

Specialized Hardware (computer & A/V)

A very hi-end Network
LoLa is: good hardware

Hi-end gaming PCs
Multicore (8, 10, 12,...) i7, i9 CPUs
Good Server class NICs
Good GPUs
Fast monitors

Machine vision cameras (no webcam)

Professional audio setups
(microphones, mixers, audio monitors, ...)

LoLa is good hardware.
LoLa is: an excellent network

LoLa needs:

1 Gigabit (upload and download) clean, stable service (minimal 100 Megabit)

Research and Education Networks are ok, but not everywhere and not for everyone

Commercial providers are way back from the required service level

A few Smart “symmetric” GIG-City services are appearing!
Some features of LoLa

A/V Latency: <5ms
Audio: 44/48 Khz 10ch
Video: up to 60 fps HD
Sites: up to 3 locations
Up to 4 cameras

Network: 100 Mbps
1 Gbps (2.5 Gbps)
Distances: up to 3500km
So... not (yet) for everywhere use

But you don’t drive downtown with this!
Questions?

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