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interuniversitario
per le telecomunicazioni



***The Mythos Project:
a distance learning experience
in the field of lyric music***

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**TERENA Networking Conference
(TNC 2003)**

Zagreb
CROATIA

19 - 22 May 2003

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Some facts about the "Mythos" project

Partnership

FONDAZIONE ARTURO TOSCANINI

cnit consorzio nazionale
interuniversitario
per le telecomunicazioni

SINFORM
sinergie per la formazione



Funding

€ 400.000
(CNIT budget)

Funding body

 **Regione Emilia-Romagna**

Project duration

July 2000 – Dec. 2002

**Project Objective: distance learning for theater actors
chorus singers, orchestra professors and conductors**

Goals of the project

- **Distance learning & remote teaching**

- Live and recorded individual lectures
- Live and recorded orchestra lectures
- Web based training

available:

- In the primary project nodes with QoS (thanks to CNIT network)
- Through the Internet as a best effort fruition (from any Internet host)

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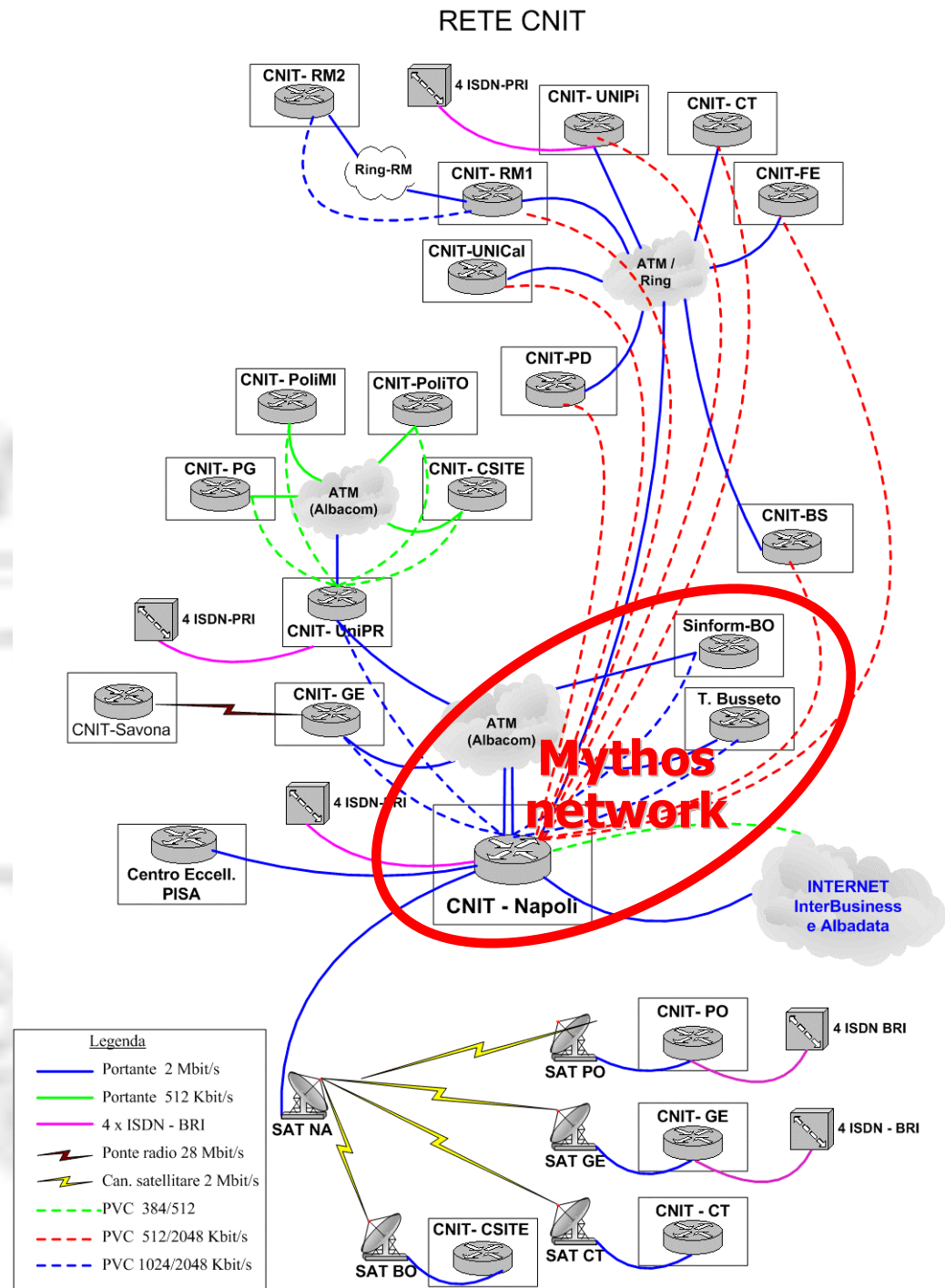
Subnetwork of CNIT network

- layer 2 transparency
- ATM and Frame Relay links
- multicast and IPv6 support
- CISCO routers in each node
- Autonomous system since May 2001

- Tree topology
- Naples is primary star center
- Parma is a secondary star center

Long distance carriers involved:

- Telecom Italia
- Albacom

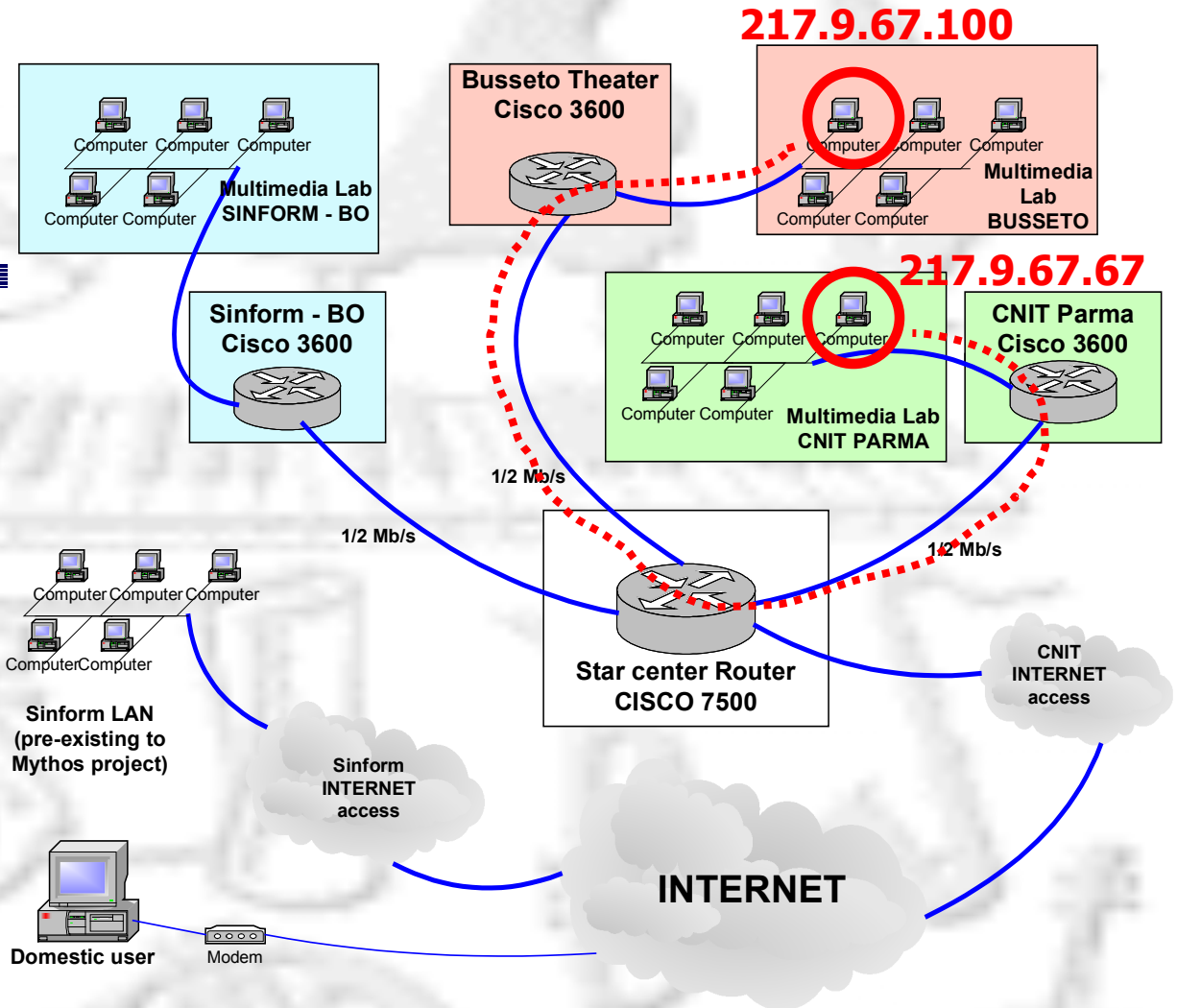


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The Mythos network and the Internet (1)

Traceroute analysis

from 217.9.67.67 to 217.9.67.100



TraceRoute (portatile-piero - 217.9.67.67)

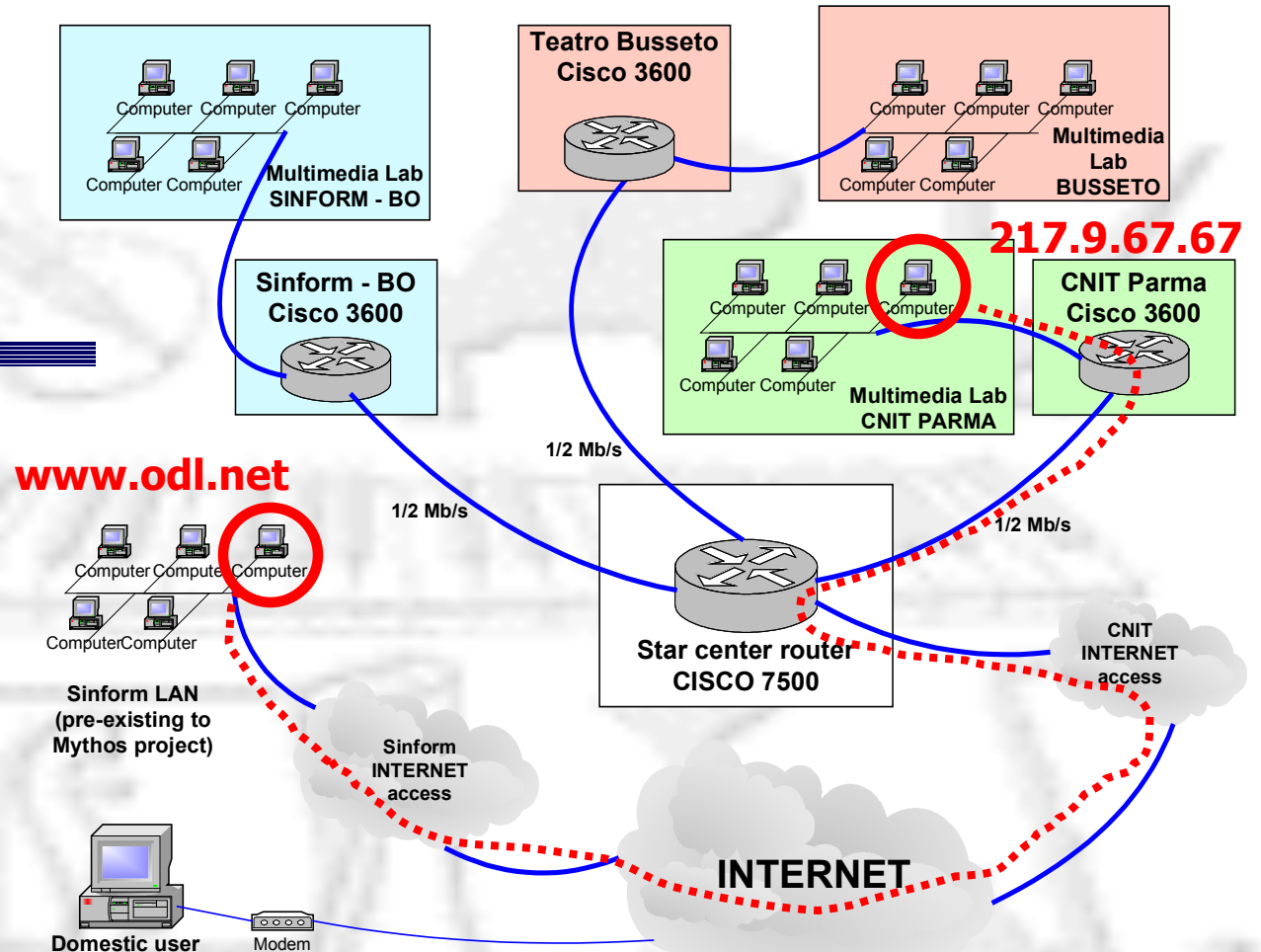
#	Address	Host Name	Msg Type	TTL	Time
1	217.9.67.65	gw-cnit-pr.cnit.it	TTL Exceeded	255	10
2	217.9.66.25	gw-cnit-na-pr.cnit.it	TTL Exceeded	254	30
3	217.9.66.34	gw-cnit-bu-na.cnit.it	TTL Exceeded	253	60
4	217.9.67.100	Unavailable	Echo Reply	125	60

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The Mythos network and the Internet (2)

Traceroute analysis

from 217.9.67.67
to www.odl.net
(195.250.224.18)



TraceRoute (portatile-piero - 217.9.67.67)

#	Address	Host Name	Msg Type	TTL	Time
1	217.9.67.65	gw-cnit-pr.cnit.it	TTL Exceeded	255	10
2	217.9.66.25	gw-cnit-na-pr.cnit.it	TTL Exceeded	254	30
3	213.213.69.153	Unavailable	TTL Exceeded	253	60
4	213.213.64.225	core1-fa4-0-0.RM2.albacom.net	TTL Exceeded	252	50
5	212.17.192.177	core3-a6-1-101.MI2.albacom.net	TTL Exceeded	251	60
6	212.17.192.161	core1-fa1-1-0.MI2.albacom.net	TTL Exceeded	250	60
7	212.17.192.154	MIX1-albacom-a1-0-0-90100.MI2.albacom.net	TTL Exceeded	249	60
8	217.29.66.45	cablewireless-mix.mix-it.net	TTL Exceeded	248	71
9	213.233.14.65	f2-0.cr1.mi3.cwitaly.net	TTL Exceeded	247	80
10	213.233.31.217	s5-0.cr2.bo1.cwitaly.net	TTL Exceeded	246	70
11	195.250.233.230	rialto.dsnet.it	TTL Exceeded	245	80
12	195.250.224.30	FREE	TTL Exceeded	244	110
13	195.250.224.18	www.odl.net	Echo Reply	116	110

Videoconferencing on an IP network

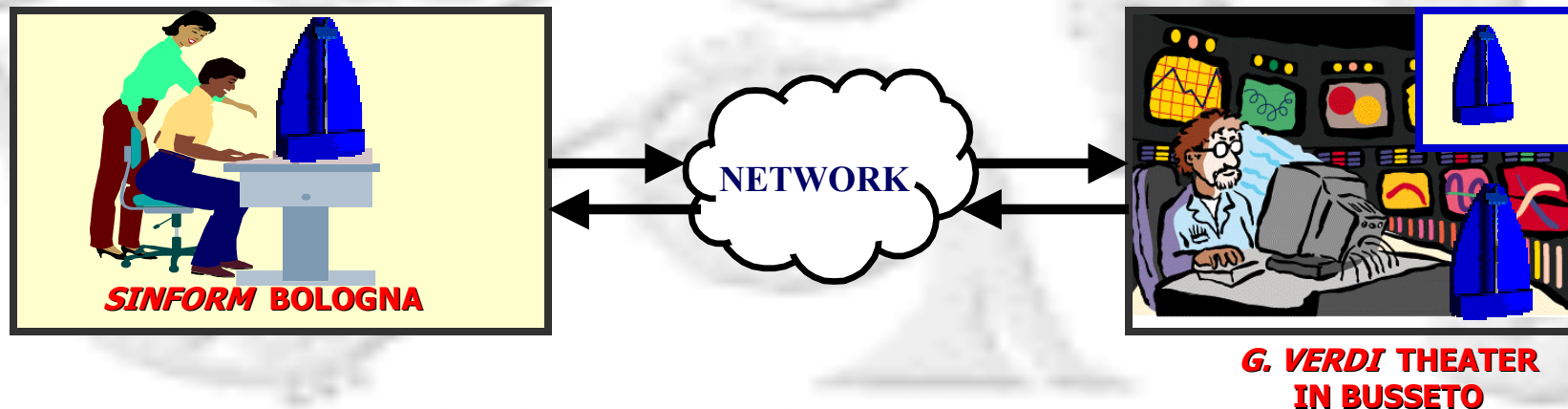
The delay problem for music signals

The delay in a videoconferencing system is due to two effects:

1. Signal propagation delay from source to destination (cannot be eliminated)
2. Coding delay of the video signal (still dominant but can be reduced)

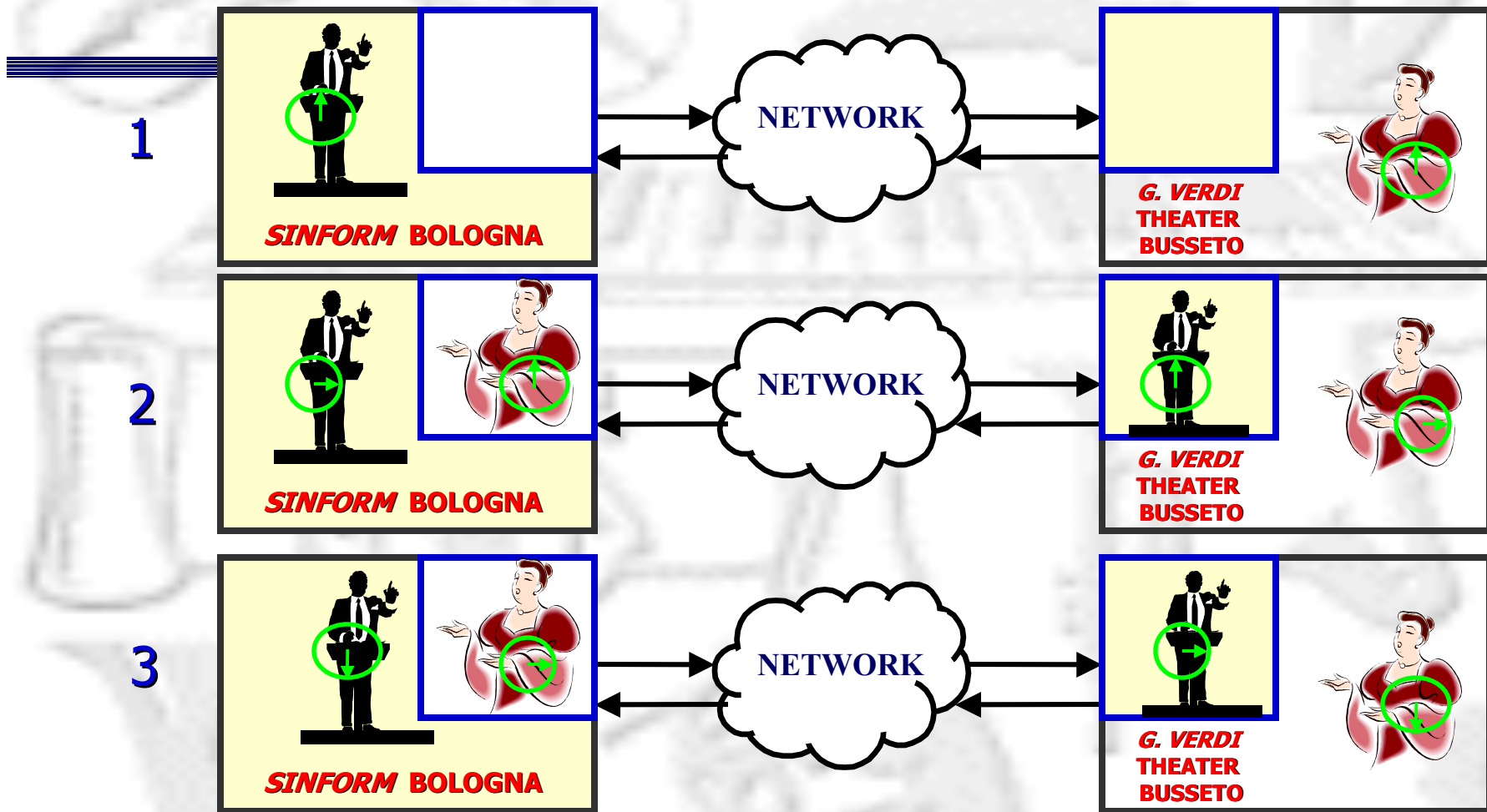
Tedious phenomena due to delay:

1. Absolute delay that causes asynchronicity between time of the actual event and projection of the event on the remote screen
2. Small delay variations ("jitter") cause sudden acceleration and deceleration of the video motion



Delay in live videoconferencing

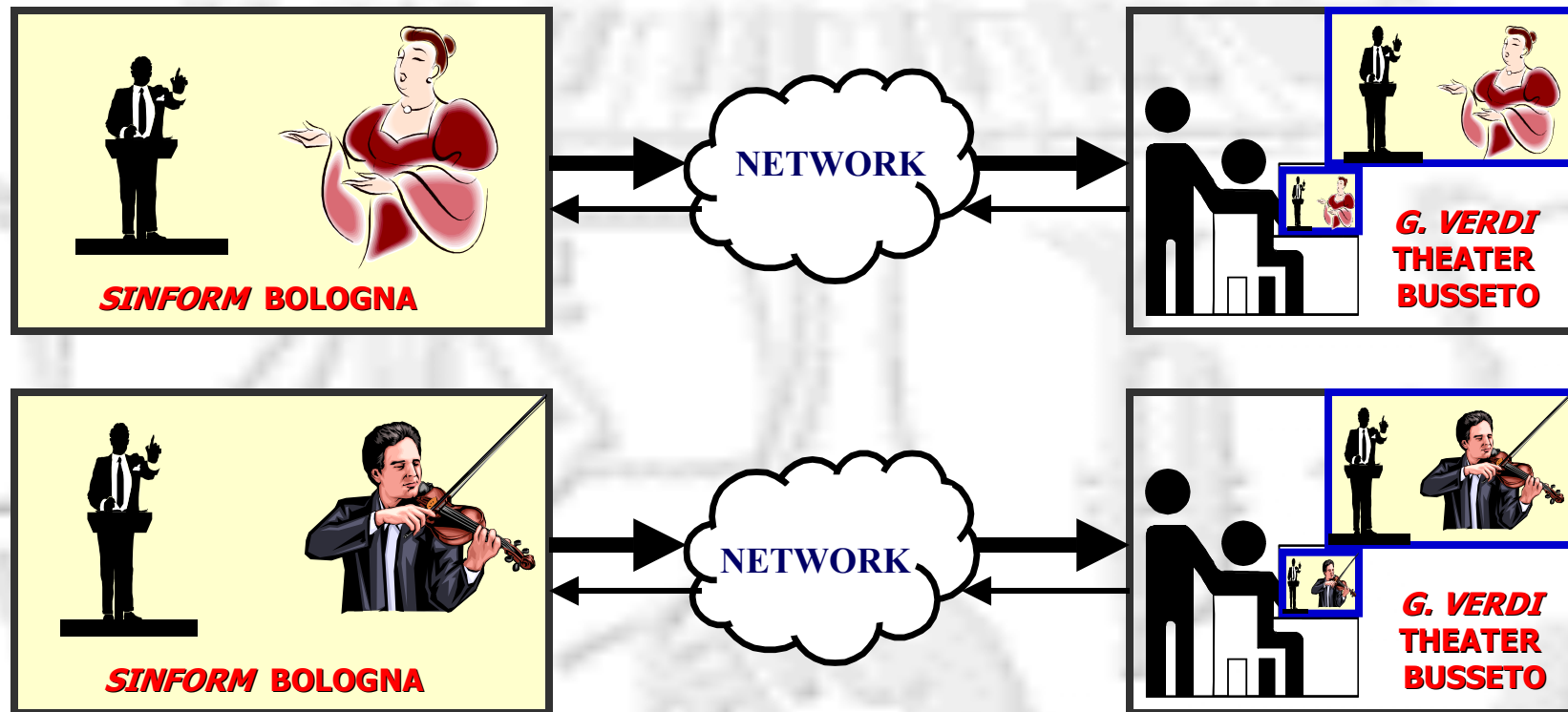
Teacher and remote student



- Absolute delay between live scene and projected remote scene

Live lecture broadcasting

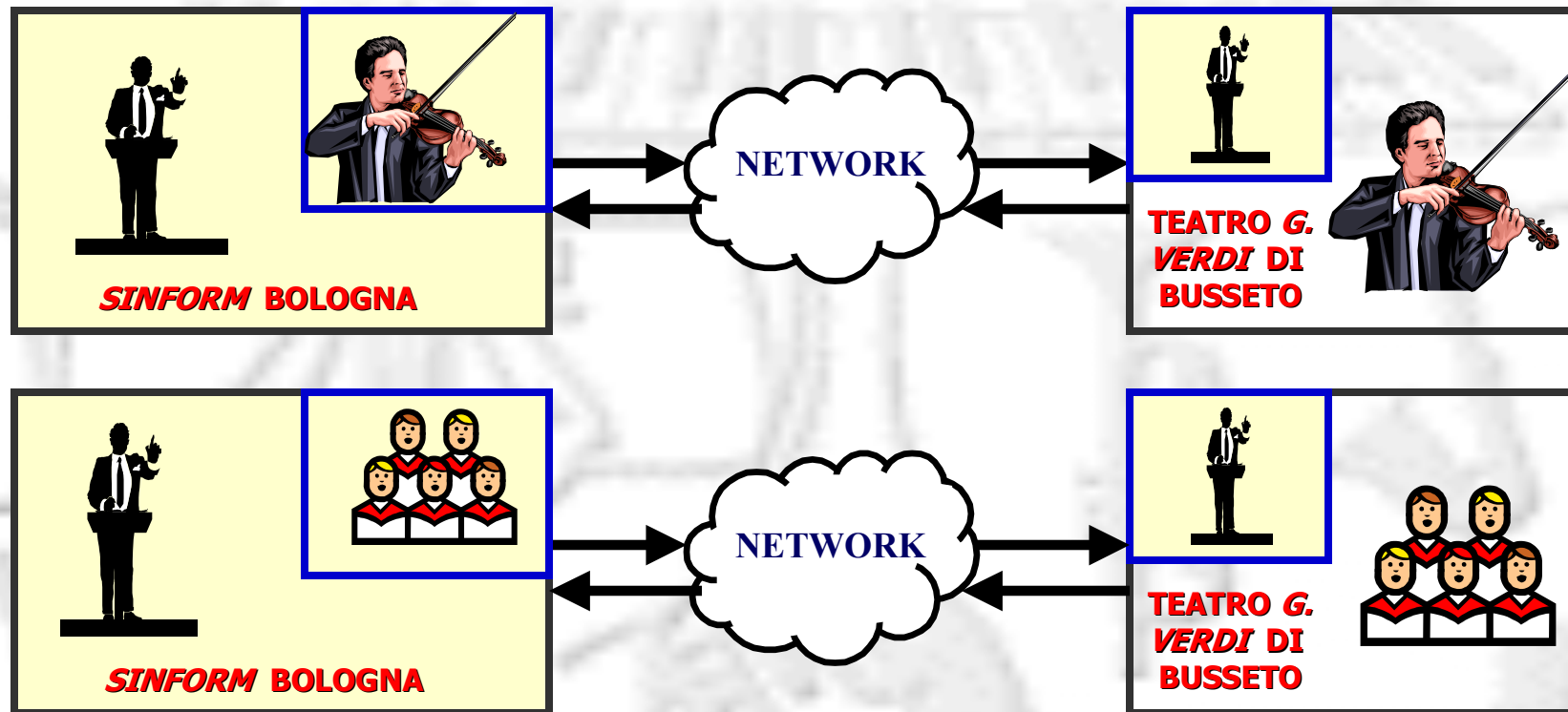
FACE TO FACE LIVE LECTURE BROADCASTED TO A REMOTE AUDIENCE



- Education service similar to a plain TV program
- Added value with respect to a plain broadcast TV service: possibility of interaction from the audience side
- The delay problem is not significant: the *logical* interaction is bidirectional but one-way alternate

Live lecture to a remote class

FACE TO FACE LIVE LECTURE WITH STUDENT(S) AND TEACHER REMOTE ONE ON OTHER



- Interactive individual lecture or tele-direction of a remote orchestra or chorus
- There is absolute synchronicity of screen video and live performance only on the opposite side with respect to the conductor.
- The return signal towards the director is more or less asynchronous depending on the rhythm

76 RAT v4.2.19: MYTHOS

Listen 255.6 kb/s Talk 0.0 b/s

▶ Speaker ◀ Vol 40 ▶ lume microfo ◀ Gain 100

- ▶ Piero Castoldi - Parma
- ▶ mythos-bo_vc2
- ▶ mythos-bo@cnic.it
- ▶ Teatro di Busseto
- ▶ remotecontrol@mythos.bo.org

"MYTHOS"

Address: 239.255.239.50 Port: 21000 TTL: 15

Options... About... Quit

76 MYTHOS

 Teatro di Busseto
Administrator@217.9.67.105/h26
24 f/s 558 kb/s (1.1%)

mute color info...

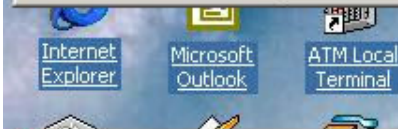
 Myhtos (Sinform s.r.l.)
Administrator@217.9.67.50/h261
30 f/s 61 kb/s (1.6%)

mute color info...

VIC v2.8ucl-1.1.3 Menu Help Quit

76 Reception quality matrix

Piero Castoldi - Parma					
mythos-bo_vc2					
mythos-bo@cnic.it	0%	0%	0%	0%	0%
Teatro di Busseto	0%	0%	0%	0%	0%
remotecontrol@mythos.bo.org					



76 Myhtos (Sinform s.r.l.)



Decoder... Size... Modes... Dismiss

76 Teatro di Busseto



Decoder... Size... Modes... Dismiss

76 sdr:Administrator@70...

New Calendar Prefs Help Quit

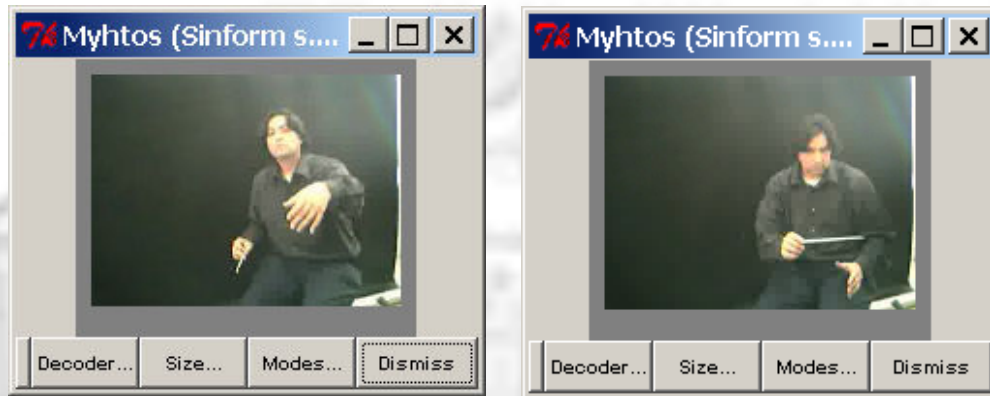
Public Sessions

- ▶ MYTHOS

Multicast Session Directory v3.0

Tele-direction session

Projected full-screen



Thumbnails



Conclusions

■ Technical issues

- Delay does not appear to be a primary problem
- Network links speed can be increased from 2/1 Mb/s to 2/2 Mb/s, CBR instead of VBR?

■ Towards Mythos II ?

- It will involve other Italian regions and agreements among them
- We have to spend more time to educate orchestra conductors to the use of live videoconference