

Low-latency HD: Shared Spaces and Undersea Window

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Low-latency



Videoconferencing: The Future?

Zack Snyder's "Online Jam", October 2001



For those with DSL at home...

yeah, right!



"Playing Together" experiment

New York-Ottawa, Remote Masters class, Dec. 8, 2000



**Pinchas
Zuckerman,**
Columbia U, NYC

Wu Ji,
Canarie ARDNOC,
Ottawa

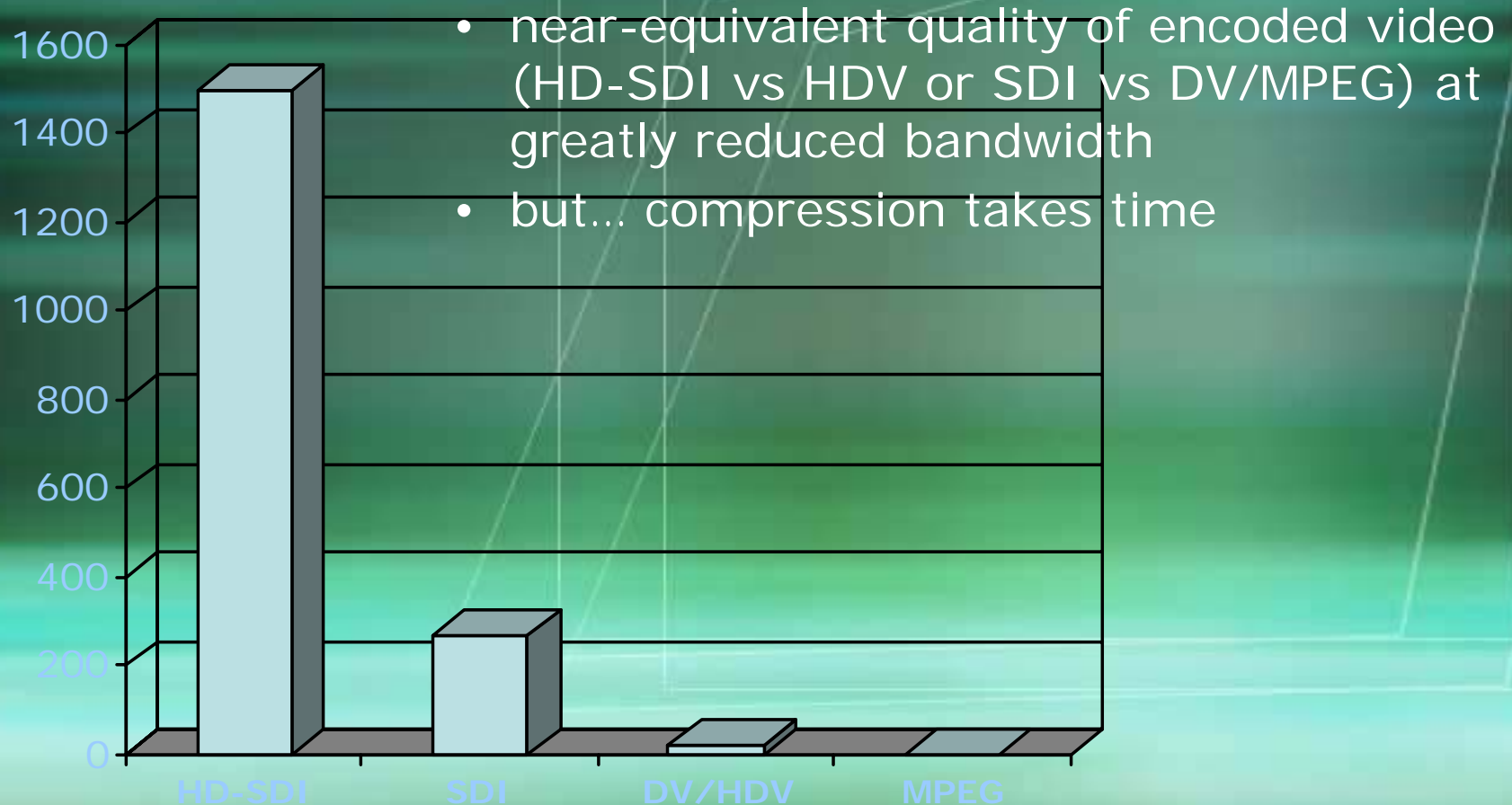
Latency: The Interaction-Killer

or put another way...

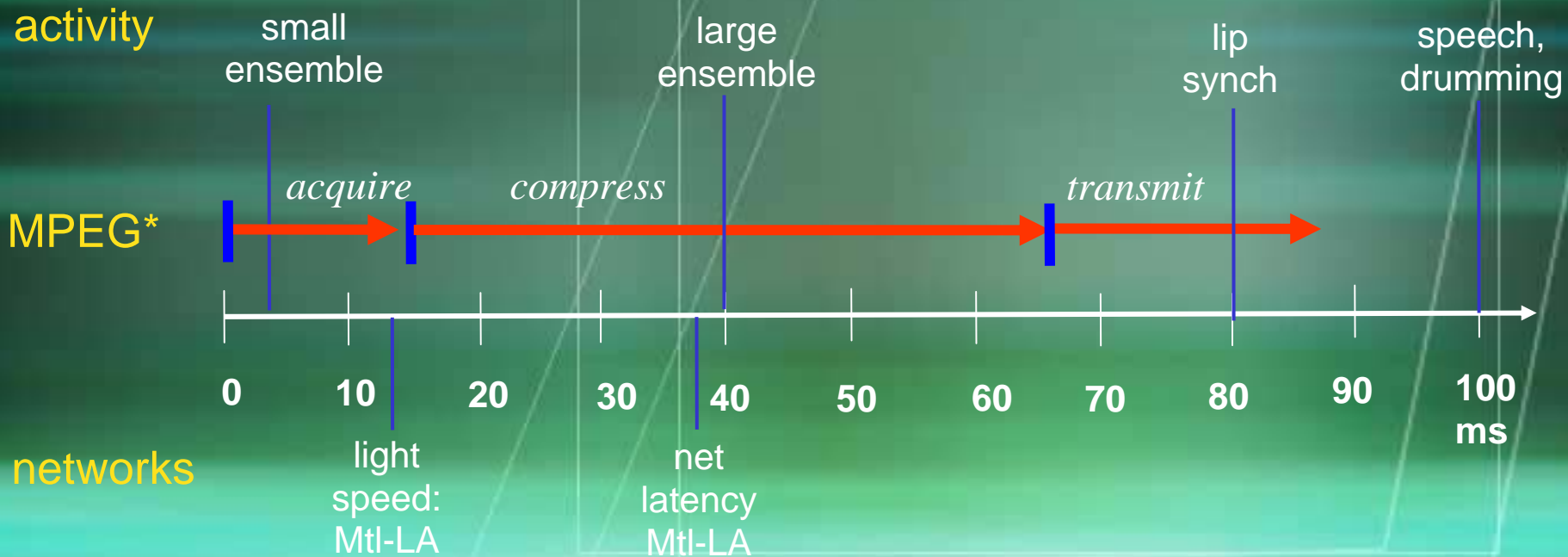


Bandwidth vs. Latency

Mbps



Tolerated Synchronicity



* This is a theoretical "best-case" scenario. Actual performance may vary. The manufacturer makes no warranties, either express or implied, and will not be held liable for damage resulting from use of the product. Certain restrictions may apply. Offer void where prohibited by law. Batteries not included.

Current Projects



Going deep under... to 2000m

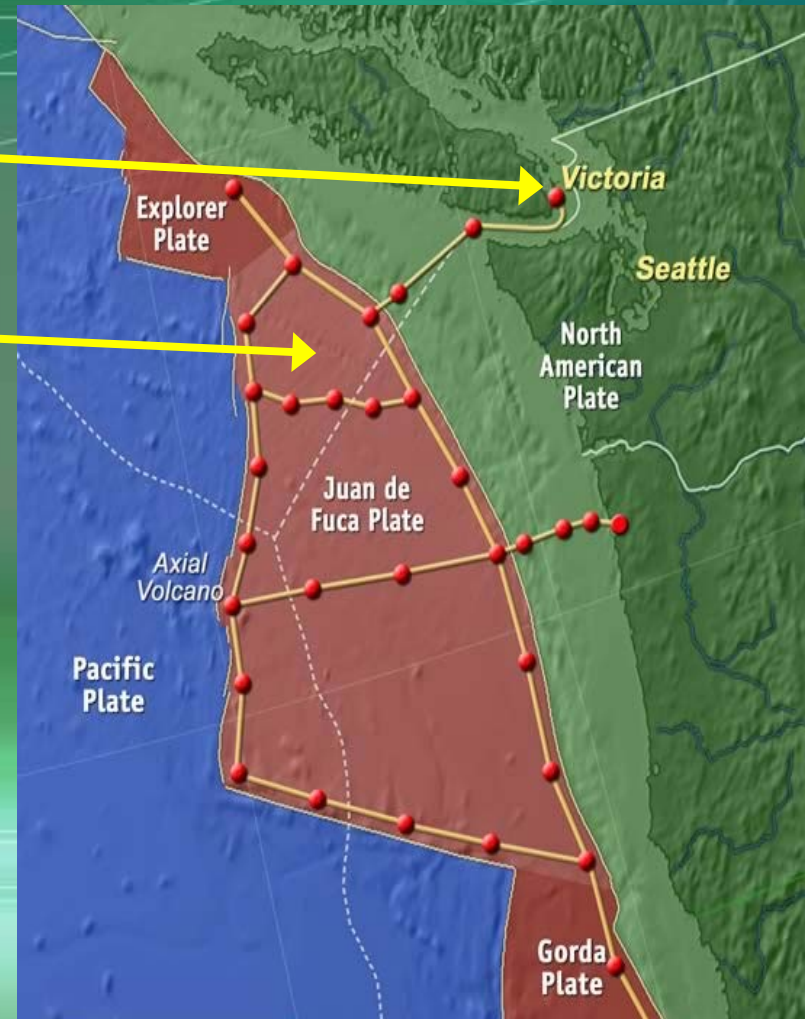
HD video over new undersea networks –
VENUS and NEPTUNE



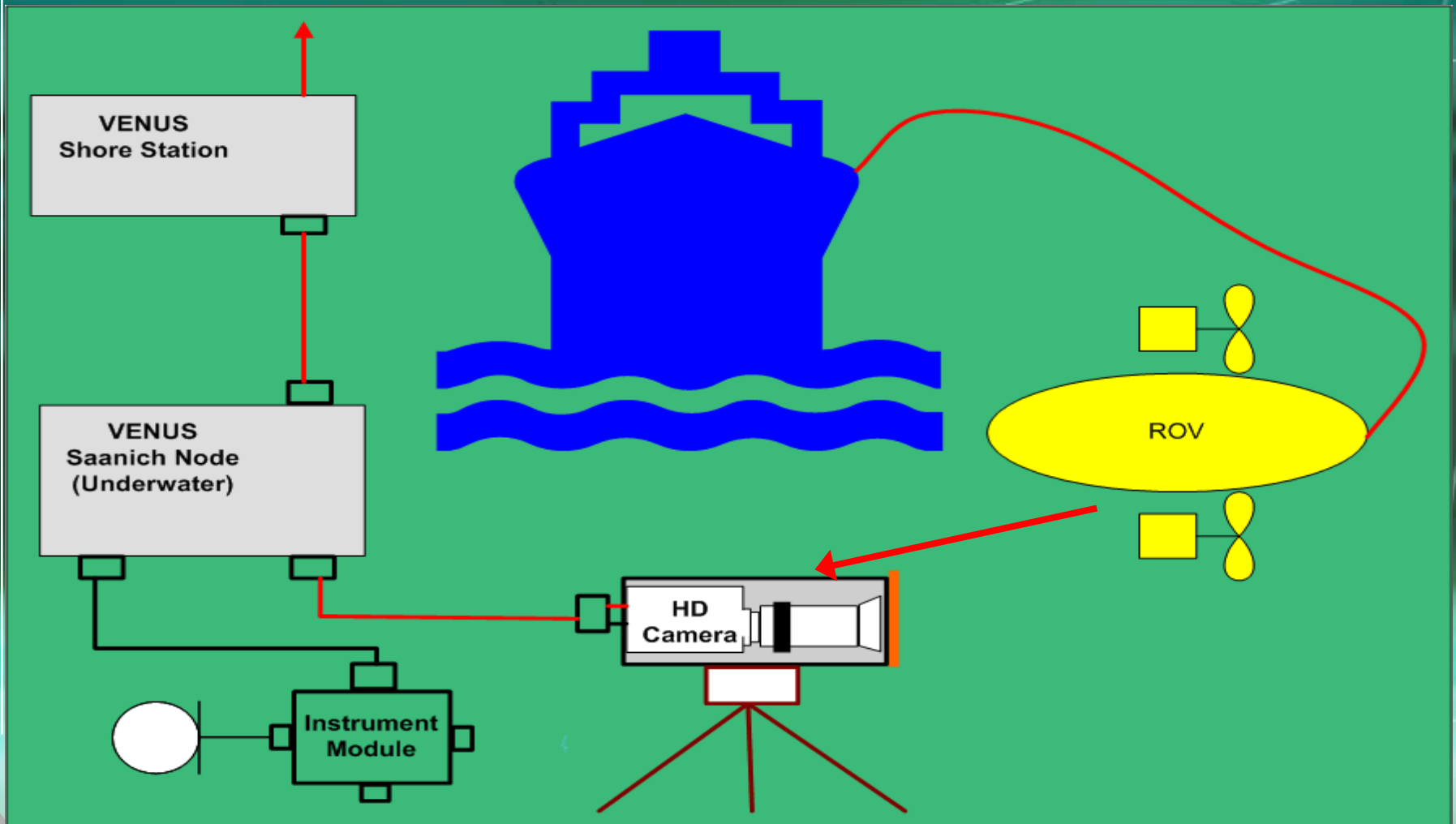
“Undersea Window” Project

VENUS – Test Camera 100m

NEPTUNE – Cameras 2,000m



System Architecture



Shared Spaces: Panoramic High-Def

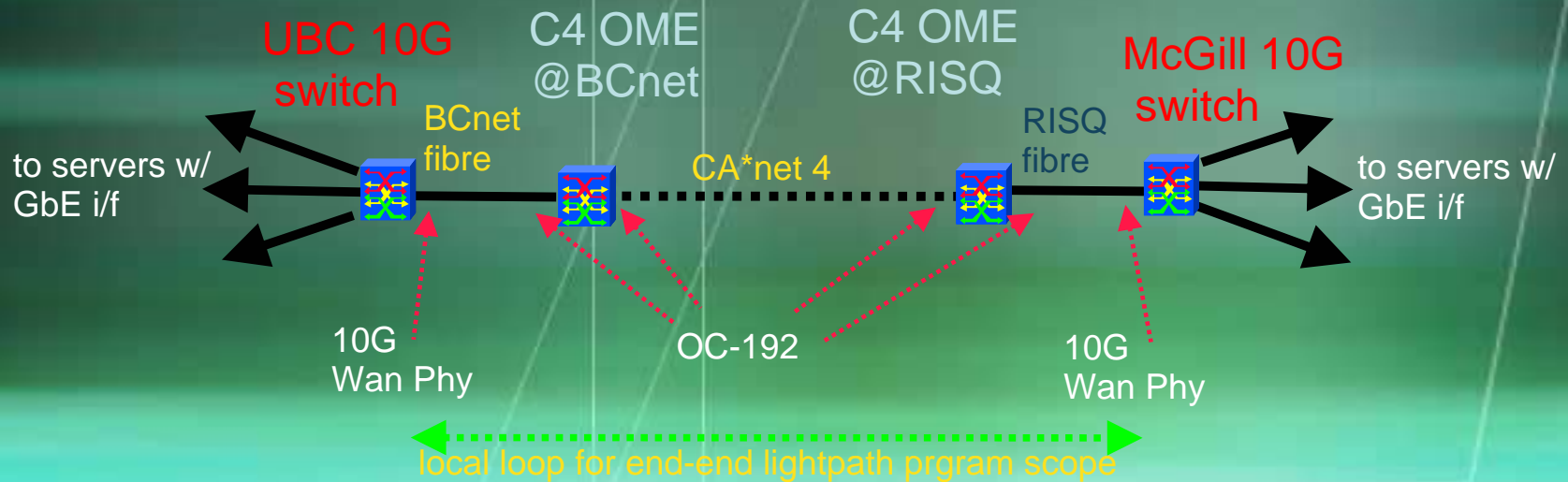
See everything - no camera panning



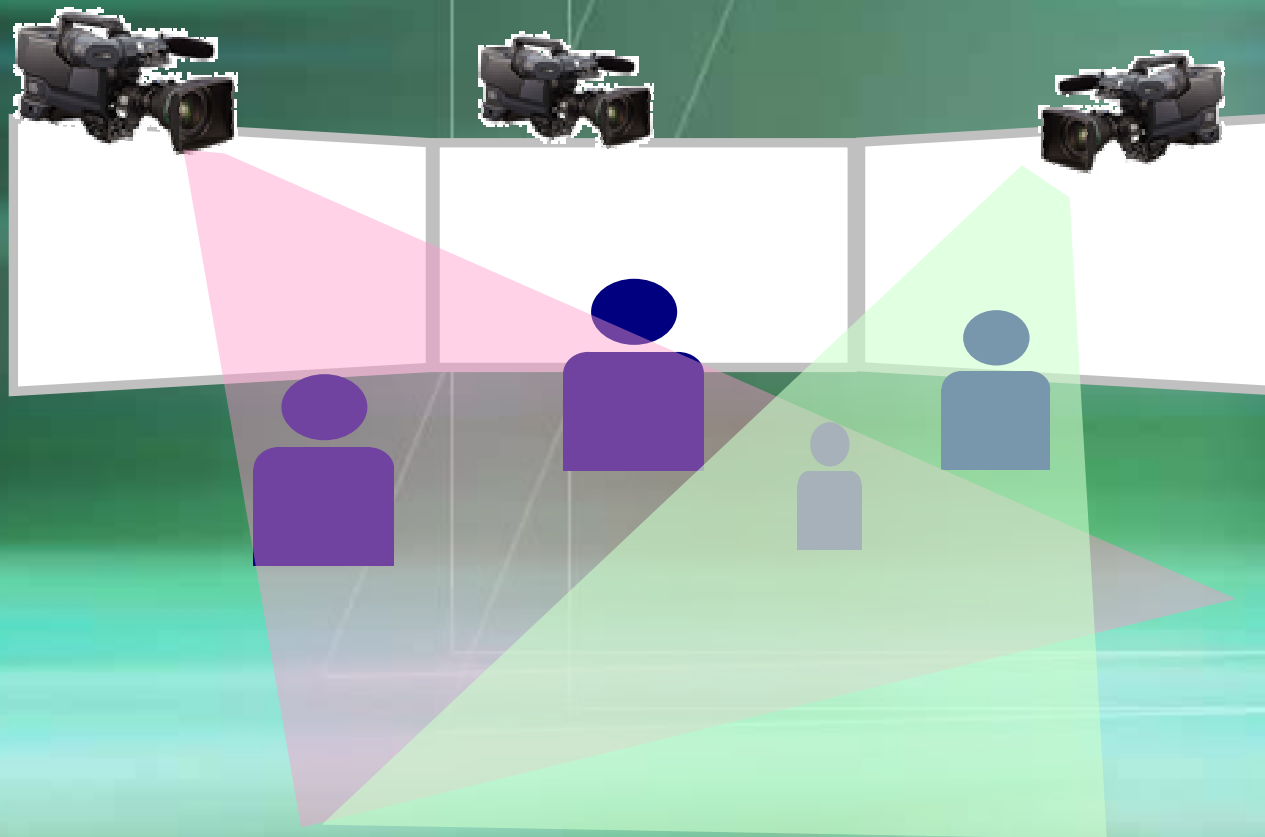
Conference Room Configuration



Network Architecture

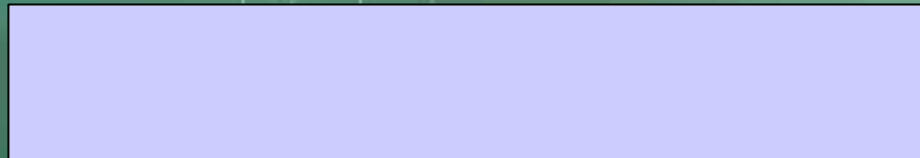


New challenge: Real-time mosaicing



Sample Result

Can your camera do this?



Previous Projects



Distributed Violin Duet

McGill-Université de Montréal demo, Nov. 21, 2001

- IP over 1 Gbps fiber link
- < 30ms latency



McLuhan: "The medium is the message"

Cooperstock's Corollary:

"The medium must be faster than the message." *

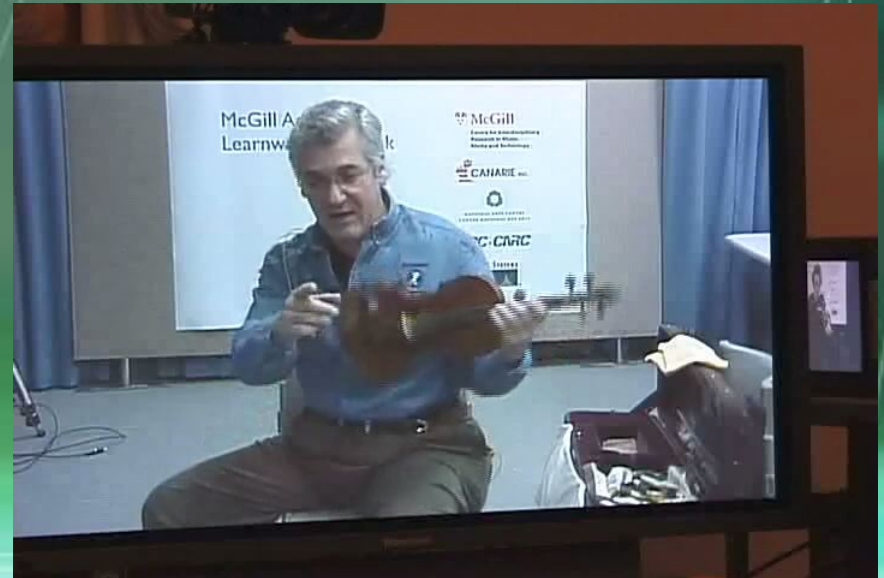
* but between protocol deficiencies (TCP, UDP), competing data flows, process scheduling on a budget, ARO (retransmission management) without QoS, interface HW/SW "uncooperativeness", aggressive router policies, multi-format support, echo suppression, and interface complexity... it's much more than just the medium

Violin Masters Class

Montreal-Ottawa Trial with Pinchas Zuckerman, Feb. 20, 2002



Size *does* matter



Distributed Jazz Jam

Montreal-Stanford (CCRMA), Research Demo, Oct. 24, 2002



The "Sweet Spot" Problem



Vibrosensory Transmission

VRQ demo, March 8, 2004



... and another application



Thank you.

Further information available:
<http://ultravideo.mcgill.edu>

