Remote Media Immersion (RMI)

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concept (http://imsc.usc.edu/rmi/)
technology (http://idefix.usc.edu/project_rmi.html)
demonstration (http://dmrl.usc.edu/internet2_rmi.html)

National Science Foundation Engineering Research Center

Remote Media Immersion - Goals

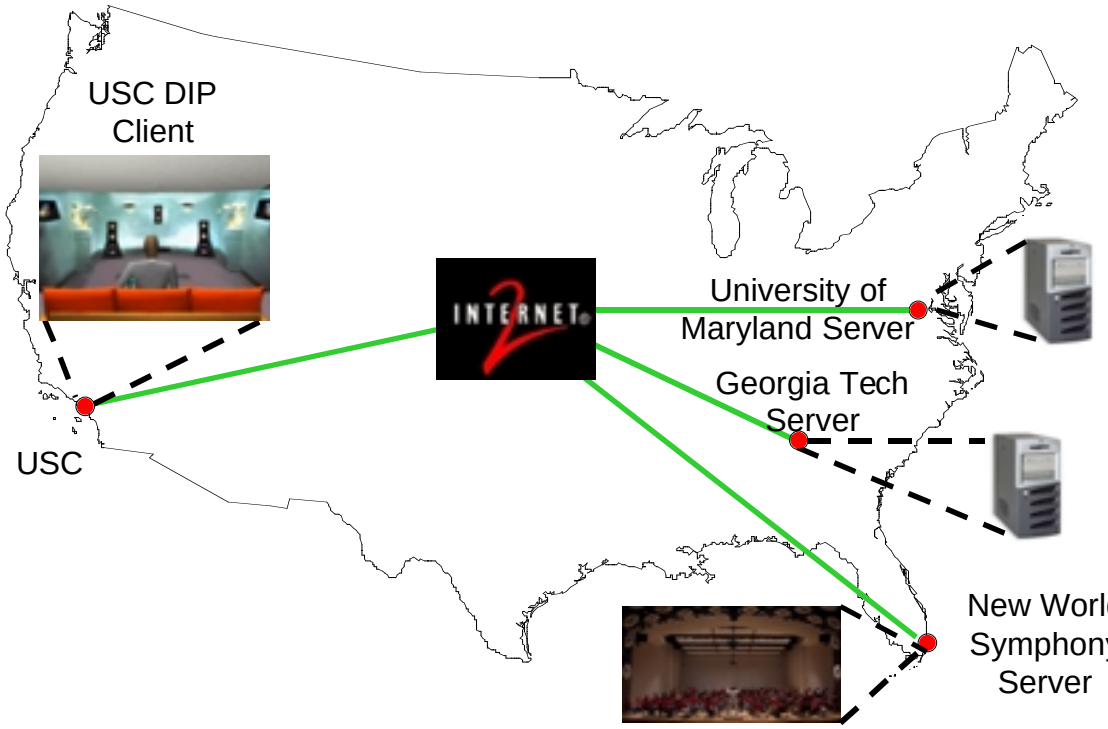
- *Reproduce the complete audio and video ambience placing people in a virtual space*
  - *Experience events occurring at remote site(s)*
  - *Natural communication, interaction and collaboration*

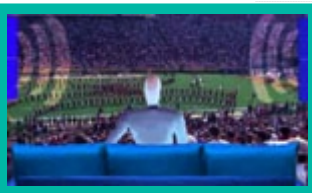
Remote Media Immersion - Applications

- Entertainment
- Gaming
- Simulation
- Tele-conferencing
- Social gatherings
- Medicine
- Education
- Performance events: music, theater, sports

Remote Media Immersion (RMI)

- Control of end-to-end process: capturing, network interface, transmission, rendering
- Internet browsing with streaming over the Internet on-demand to a mouse click
  - High Definition MPEG2 video (≈ 45 Mb/sec)
  - 10.2 channel Immersive audio (16 Mb/sec)





Immersed in a college football game

Doctors assisting in a remote procedure

Business people negotiating as if in the same room

Students visiting an aquarium a thousand miles away

Remote Media Immersion Demonstrations

- May 2002 (*New York Times*)
- October 2002 (Internet2 Conference)
  - Collaboration with the New World Symphony of Miami Beach
  - Performance in 550 seat USC Bing Theater

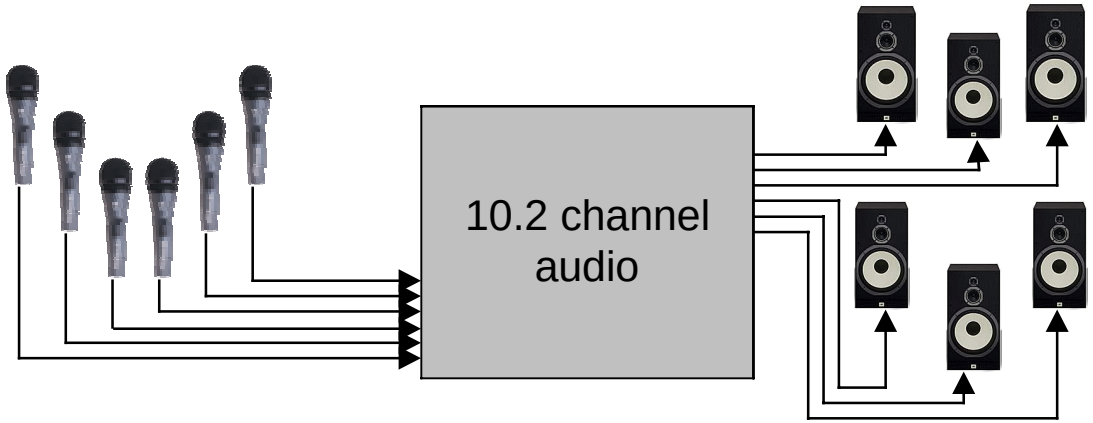

The New York Times

On Internet of the Future, Surfers May Almost Feel the Spray

Remote Media Immersion - Technology

- ***High-definition TV*** (HDTV) (or better) video acquisition and projection display (1080i and 720p (~45 Mb/sec))

- ***Immersive 10.2 channel audio*** acquisition and reproduction system (16 Mb/sec)
  - seamless, ***fully three-dimensional*** sound field that preserves the correct spatial location of audio sources and acoustical environment for participants



Remote Media Immersion - Technology

- ***Scalable servers (Yima project) for the many streams of synchronized audio and video data*** (immersidata)

- ***Protocols for seamless, synchronized real-time delivery*** of multiple streams
  - ***Use GPS clock*** for global synchronization

- ***Error correction*** of streams transmitted over shared networks via selective retransmission

Remote Master Class - New World Symphony

- LA Philharmonic cellist at USC
- Student at NWS in Miami Beach
- Three hour session with MPEG2 video and 10.2 immersive audio
- Teacher reports that student "was really there" with immersive audio
- Many psychophysical, perceptual and artistic tests to be done

RMI - Future Possibilities

- Distributed virtual social events

- Immersive gaming

- Large screen displays
- Multiple cameras and microphones; 3-D scene description
- Speech and gesture extraction
- Face and body tracking
- Wireless glasses or head-mounted displays
- Stereo display without glasses (autostereoscopic)

RMI - Conclusions

- Reducing latency is the key to interactive applications
- Many psychophysical, perceptual, engineering and artistic issues
- Technical challenges and results relevant to any human interaction scenario: entertainment, education, communications