



www.internet2.edu

Digital video is the area that represents the potentially largest aggregate use of Internet2 high-performance networks, and the area that derives the widest benefit from that high-bandwidth capacity. Video applications encompass everything from Internet-based videoconferencing to on-demand content to remote control of microscopes and other instrumentation. The Internet2 Digital Video Initiative (<http://dv.internet2.edu/>) is one effort involved in developing a wide range of advanced digital video capabilities for the national research community. These efforts are enabling a new generation of digital video applications that take full advantage of the potential of high-performance networks.

Videoconferencing and Collaboration

Virtual Rooms Videoconferencing System
Caltech and CERN

<http://www.vrvs.org/>

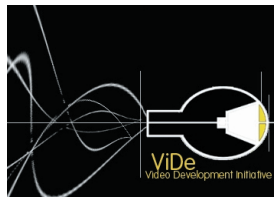


The Virtual Rooms Videoconferencing System (VRVS) provides a worldwide videoconferencing service and collaborative environment to the research and education

communities. VRVS uses the Internet2 high-performance network infrastructure to deploy its Web-based system, which now includes more than 4000 registered hosts running VRVS software in more than 50 different countries. VRVS hosts an average of 100-multipoint videoconference and collaborative sessions worldwide every month. First implemented in 1997, VRVS continues to expand and implement new digital video technologies, including H.323 ITU standard integration, MPEG-2 videoconferencing integration, shared environments, and Quality of Service.

ViDeNet
The Video Development Initiative

<http://www.vide.net/>



The Video Development Initiative (ViDe) is a collaboration of 13 universities and other members of the international advanced networking community working together to advance the state of networked digital video. ViDeNet, a major ViDe initiative, is a video

and voice-over-IP environment that allows users to communicate with other ViDeNet sites around the globe using any combination of IP telephone, wireless IP phone, desktop videoconferencing, or teleclassroom systems. ViDe sponsors working groups, who are exploring such areas as video-on-demand and the MPEG-4 video standard, and provides a popular videoconferencing "Cookbook."

Megaconference
Internet2 Digital Video Conferencing Group

<http://www.mega-net.net/megaconference/>



Megaconference II, the world's largest videoconference, used H.323 videoconferencing to bring together participants from locations all over the world, including Antarctica. Held on 31 October 2000, in conjunction with the Fall 2000 Internet2 Member Meeting, Megaconference participants discussed how to use H.323 videoconferencing to enhance distance learning and collaboration. Megaconference II utilized a system of distributed H.323 multipoint control units, located around the world, which were cascaded together to create this global videoconference. Megaconference III is being planned for fall 2001.

On-Demand Video

iCAIR
Northwestern University

<http://www.icair.org/>



International Center for Advanced Internet Research

The International Center for Advanced Internet Research (iCAIR) at Northwestern University has established a wide range of advanced Internet technology projects, including digital media applications involving on-demand digital video, video conferencing and live transmission. One project features a joint partnership with C-SPAN and Internet2, allowing for live transmission and video-on-demand of C-SPAN content over Internet2 networks. This initiative with C-SPAN is the latest step in an effort by Internet2 and iCAIR to develop a national Digital Video Network (I2-DVN), which will provide a variety of digital services initially focused on higher education.

Content Streaming

ResearchChannel
ResearchChannel Consortium

<http://www.researchchannel.com/>



ResearchChannel is pioneering new methods of Internet-based demand and streaming distribution of HDTV

and better-than-broadcast-quality video through on-going collaborative technology experiments. ResearchChannel is a non-profit consortium of leading research institutions dedicated to building high-quality Internet, cable, and satellite-based channels to facilitate the communication of research information.

Public Television: Next Generation Interconnection Pilot
University of Wisconsin and Washington State University

<http://ra.doit.wisc.edu:8888/vid.html>



Public television (PTV) stations are currently connected by a one-way satellite system. The PBS stations at University of Wisconsin and Washington State University, along with a consortium of other university PTV stations, have been using

Internet2 networks to begin developing new applications for the next-generation interconnection system. Using broadband IP video connections from their host universities, the PTV-Internet2 Project members are testing station-to-station, broadcast-quality (MPEG-2) video streaming, server-based broadcast video-on-demand, video segment search and fulfillment at MPEG-2 levels, and collaborative program editing.

Remote Instrumentation

Real-Time Tele-Operation of Remote Equipment
North Carolina State University

<http://CARL.ce.ncsu.edu/>



Tele-vator is a computerized excavation backhoe that can be remotely operated over Internet2 high-performance networks. Because of its size and potential criticality of operation (e.g., in hazardous

rescue situations), Tele-vator requires a high-level of sophisticated two-way feedback, including adequate depth of vision provided via high-definition stereovision. Guaranteed Quality of Service (QoS)—such as network bandwidth, latency (delay) control, and jitter (variability in delay) control—are essential to ensure the quality of the 3D image, audio, and equipment control channels required by Tele-vator's remote operators.

Tele-Immersion

Realistic, Life-Sized, 3D Tele-Immersion
Advanced Network & Services, Brown University, University of North Carolina, University of Pennsylvania

<http://www.cs.unc.edu/Research/stc/office/>



The Tele-Immersion Project is working to bring together geographically distant participants in a realistic, tele-immersive recreation of their real environments. Project collaborators envision an

Office of the Future where computer vision, networking, and computer graphics techniques are used to capture a dynamic 3D model of one office—including walls, furniture, objects, and people—and then re-create a virtual representation in a similarly-equipped remote office. The Internet2 networks offer a high-performance testbed for this research, which demands high bandwidth and low latency to support real-time interaction between remote users and shared virtual objects.