

## A Federated Approach to Distributed, Video-Enabled Meetings

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This paper describes the approach for interactive netcasting of the Internet2 Monthly Briefings and invites both comments on the architecture and participation in the efforts. We will cover the goals of Internet2's virtual briefings and the technical underpinnings, which are described as being "Powered by the Internet2 Commons", the community effort to establish production services and R&D efforts around collaboration technologies. The presentation will provide details of the software and hardware in use, which stresses using multiple technologies with gateways; share statistics on user participation and network utilization; describe challenges and experiences; and suggest future research efforts that will facilitate enhanced and expanded use of video-enabled collaboration environments.

The in-person Fall 2002 Internet2 Member Meeting was cancelled after the events of 11 September. In its place we used videoconferencing and streaming technologies to present two-thirds of the plenary and track sessions---attracting several hundred participants over four days. For the plenary sessions we built a temporary television studio and distributed the content over satellite for broadcast quality delivery; IP/TV, Windows Media, and Real for streaming; and Access Grid, H.323, and MPEG-2 for videoconferencing. For the track sessions we relied primarily on H.323, Access Grid, and Real streams. For all track and plenary sessions, speakers and audience members were distributed around the world.

Since December 2001, we have run monthly virtual member briefings, 90 minute presentations with interactive audience participation and multiple speakers (distributed across five time zones at times). We typically schedule the sessions to start between 1100 and 1230 U.S. Eastern Time to allow participation from both Europe and all U.S. mainland time zones.

The technical objective is to find the optimal mix of quality and reach with the technologies we use. It is our plan to do more each time with collaboration technology in both the production and exploration arenas. We support individuals at their desktops and groups gathered in meeting rooms or lecture halls. We have audience members who just observe and audience members who interact with the presenters and other audience members. These goals mean that we must use a mix of technologies to support these events, rather than just one solution.

Our intention is to have, by the end of 2002, an environment that supports people interacting with each other regardless of the underlying videoconferencing technology

each uses. We will do this without dropping down to the lowest common denominator of audio and video encoding.

This paper focuses on audio/video conferencing and audio/video streaming. In addition we provide downloadable and web-based slides/graphics, interactive chat, and emailed questions.

For the observe-only audience we will always distribute a Real stream. We will add a Windows Media stream and a QuickTime stream. We stream at 256 and 512 kbps. We always provide IP/TV multicast streams (MPEG-1 at 1.5 mbps). Observers can also use VRVS <[www.vrvs.org](http://www.vrvs.org)> to connect. We have deployed several VRVS reflectors around the Internet2 community to help handle the load.

For the interactive audience we provide H.323 access via the Commons Accord and Radvision multi-point control units (MCUs). VRVS is another option as well. We will occasionally provide a dial-in audio conference service, depending on the desire of the session organizer, and are developing a Voice over IP conferencing solution.

For the presenters we will accept feeds from H.323, MPEG-1, MPEG-2, VRVS, and RTPtv (MJPEG). We have established a “director’s console” in our Ann Arbor, Michigan offices to accept the feeds, introduce titling and other services, and handle the transcoding and other gateway services. We are working to automate this technology-neutral capability to offer a 24 hour/day network-accessible service. Some of the open issues are floor control among participants and the use of audio levels to determine which speakers are automatically brought to the forefront. The architecture and features of this service will be presented for review to the TERENA community.

Our biggest challenges are in providing gateways among technologies, particularly for supporting interactive sessions between different endpoint technologies. To ensure that those with access to broadcast quality clients see high quality streams where available, we provide the presenter's feed in its highest quality format and gateway it to others. One focus is supporting gateways to and from the Access Grid. We will report on any results coming from proposals made in this area at the Access Grid retreat occurring in March.

We support MJPEG using RTPtv <<http://bmrc.berkeley.edu/~delco/rtptv/>> for both speakers and audience members. RTPtv has built-in support for PAL to NTSC translations. For MPEG-2 we support hardware from Amnis (Optivision), Vbrick, Ncast, and Litton for speakers. Both RTPtv and MPEG-2 rely on multicast distribution.

Middleware is another research area for the Commons, working jointly with the Internet2 Middleware Initiative. During Spring/Summer 2002 we begin working on integrating the Session Initiation Protocol (SIP) into the Commons infrastructure, starting with modest interoperability tests. During the second half of 2002 we will also begin investigating authenticated access to Commons events using deliverables from the Shibboleth Project <<http://middleware.internet2.edu/shibboleth/>>.