



Collaborative Conferencing Options for LTER Network Scientists

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Video Teleconferencing

Video teleconferencing, or VTC, has become routine today due to the development of advanced video compression technologies and the ability to use these protocols over the internet. The traditional justification for the use of VTC has been the savings in travel costs but what users are now finding is that their effectiveness in the workplace is increased by having key colleagues more readily available.

Anyone who has attempted to schedule a meeting in the LTER Network lately understands that available time has diminished while the demands of interacting in collaborative groups have increased. VTC can help.

The LTER Network Office (LNO) and a number of LTER sites have been actively using video teleconferencing to hold face-to-face meetings over the internet for a decade now with great success. LNO and these other LTER sites have invested in Polycom software and/or equipment which use industry standard video-over-internet protocols. However, recently, some high quality web-hosted solutions have been introduced and will be highlighted in this version of the document.

Web-hosted Solutions

Skype is a commercial internet-based conferencing solution that has recently added multi-point conferences for up to 10 participants. It includes audio, video, desktop, and chat. The Skype solution does require at least one participant be a premium (paying) Skype member. Skype offers a substantial amount of help in getting audio and video set up properly and working. Skype can bridge to traditional phone systems for a small fee.

The most recent arrival on the scene is **Google Hangout**. Google Hangout is the implementation of Google's video/voice chat infrastructure as a component of the Google+ social network. Up to 10 Google+ members can "hangout" together with audio, video, desktop sharing, document sharing, and chat for no charge.

Hangouts can also be recorded. Set up is similar to Skype but bridging traditional phone systems and non-Google+ participants is unavailable.

The LTER Information managers and LNO NIS (Network Information System) development group have been successfully using an NSF-funded web-based conferencing system called **EVO**.

EVO was designed and built to support the Hadron Super Collider researchers and seems a potentially good match for LTER in terms of features and cost (free). There is a bit of a learning curve involved in working with EVO and a few atypical hurdles in getting the EVO software set up on some platforms. Once operational it offers audio, video, desktop sharing, whiteboard, and chat for an "unlimited" number of participants. It also has bridges to Skype and traditional phone

service.

Hardware Solutions

Polycom or similar equipment allows a user to connect to any other user or conference room (point-to-point) directly over the internet using the party's IP address or fully-qualified domain name.

The newer hardware from Polycom supports HD video and uses more state of the art components for better picture quality and sound. Systems from other vendors such as VTEL and Tandberg offer similar functionality and comparable prices to those of Polycom.

Other H.323 compatible configurations are based on software that runs on the user's computer (e.g., Polycom PVX, MAC Xmeeting, and other OpenH323 software).

To have meetings between more than two participants requires the use of a bridge, or the multipoint capabilities of the higher-end conference units. The LNO, in collaboration with the Office of Research and Media Technology Services at the University of New Mexico operate a Polycom MGC-50 video-teleconferencing bridge that can host multiple, simultaneous meetings up to a maximum of 48 endpoint connections. In addition, the LTER Network Office and several of the LTER sites have older Polycom Viewstation FX equipment which can support three additional endpoint connections plus a standard conference phone line tie-in.

One problem that can occur with multi-session conferences is the degradation of conference call quality as systems attempt to match characteristics of different connections. The Polycom MGC-50 bridge at LNO intelligently links individual conference sessions in a multi-channel system that gets around these problems by essentially giving each session its own channel so that others are not degraded to the lowest quality connection. This reduces problems such as low audio or video quality from conference sessions connecting to a larger conference at low data rates.

Endpoint systems by price and application:

For Individuals:

- **Polycom Telepresence m100** – \$75.00 - This is Polycom's newest offering in the desktop and mobile conferencing line. It is basically a redesign of the PVX software (see description below) and is currently only available for Windows OS. It features a cleaner Skype-like interface and support for HD video.
- **Polycom PVX** – (No longer available for sale) – LNO has a limited site license for Polycom PVX software. PVX software along with a high resolution USB web camera with integrated microphone produces a quality desktop video system for PC users – adding a high-quality headset optimizes this solution. Computer performance requirements are quite high and the audio/video input/output settings can require careful attention and optimizing. However, the use of the PC allows the user to teleconference from the user's office eliminating the need to move to a special room for a conference. The software also allows for application sharing such as white boards, PowerPoint and

desktop sharing not found in some lower end conference room configurations.

For Conference Rooms:

Polycom offers a variety of room-based solutions in their HDX line that range in price from \$7000-\$25,000. These offer a variety of feature brackets that can be compared here on the [Polycom website](http://www.polycom.com/). Each vendor website provides a good starting point for evaluating the various setups: Polycom - <http://www.polycom.com/>; VTEL - <http://www.vtel.com/>; and Tandberg - <http://www.tandberg.net/>.

Since all of these units use the standard H.323 audio-visual communications protocols, they are interoperable. Some units implement parts of the protocols within the standard differently, such as different video compression standards, but these systems are able to communicate without problems.

Additional Requirements

Each VTC unit must be connected to at least one display device such as a television, plasma display, LCD projector, etc. An optional additional display on some units permits flexibility in local display or simultaneous display of whiteboard or presentations. The PVX software system uses a PC monitor for the display device.

All of these units work over standard internet protocols (TCP/IP) and will work best with a direct 100/1000 Mb/s network connection. Each unit requires an IP address – this can be dynamically assigned but a fixed IP number for the VTC unit will provide faster and easier communication. It is important to specify IP only options to keep the price down unless the user needs the ISDN option. Firewalls can interfere with the operation of these units through direct port blocking or restricting available bandwidth but this problem can usually be resolved with little difficulty (See Firewall Ports below).

Installation and setup requires about one hour and is straightforward – note that entering the network information can be a bit tedious through the remote control and onscreen keyboard. The LNO can work with sites to resolve problems locally.

Web Conferencing

Web conferencing is the shared use of tools such as whiteboards, desktop application sharing, and display of presentations, spreadsheets or documents via a centrally hosted web service. Web conferencing provides a low bandwidth approach that can be either with or without a VTC. All the user needs to participate is a web browser. Rates for web conferencing are similar to discounted teleconferencing rates. There are a large number of web-conferencing providers (e.g., WebEx).

Webinars

Conferencing tools can be used in various combinations to provide live or pre-recorded information to hundreds, even thousands of participants by directing audio, video, and simultaneous presentations over the web. The LNO can help arrange this type of streaming or

“webinar” event.

Collaboration Portals

Collaboration portals provide shared workspace, group management, scheduling, and more. A collaboration workspace can be extended to provide shared analytical tools and other advanced features to working groups using only a web browser. The LNO offers collaboration workspace for working groups as part of our Drupal based intranet. Please contact tech-support@ltnet.edu for more information.

Setting up and utilizing the varied Conference technologies

Connecting to Multipoint Conferences

The Polycom MGC-50 at LNO can call out to meeting participants to automatically establish multipoint conferences at requested times or on demand through an LNO operator initiated call. Multipoint conferences can also be attended in a ‘virtual meeting room’ by connecting through a gatekeeper computer that works like a telephone switchboard, routing users to appropriate conferences based on a dial-in string. The LNO has; however, established several virtual ‘meeting rooms’ for testing and they can be reached via the gatekeeper by making the following adjustments to your VTC system setup:

1. Specify a gatekeeper in your software configuration - in the PVX software you do this under Setup -> H.323 - select specify and enter: 129.24.137.14 - it should immediately attempt to register you with the gatekeeper. A few folks have reported firewall issues here. (see information below for firewall resolution). This will not affect the normal IP based dialing that you are accustomed to. For the larger Polycom units you'll need to go into admin settings - usually under 'network' - 'H.323' there are some variants in this depending on firmware versions.
2. Dial out to '999LTERTEST' (999 is known as the H.323 prefix for this MGC-50) and you should be connected to the meeting room ‘LTERTEST’. If you are the only participant you will see yourself in the far screen.

The LNO can set up meeting rooms for regular meetings as needed. Most large conferences with more than six participants will need to be scheduled first and have an LNO operator present to work through any connection idiosyncrasies.

All these units can support some level of presentation and application sharing but concurrent use of a separate web-based conferencing tool for application sharing may be a better solution since not all systems support these features. We are in the process of testing various approaches and options in sharing presentations over VTC.

Firewall ports

The following firewall ports should be open for Polycom-based video teleconferencing to function properly:

389 (TCP) - ILS Registration

1503 (TCP) - MS NetMeeting T.120 data sharing (for App sharing, Whiteboard)

1718 (UDP) - Gatekeeper discovery
1719 (UDP) - Gatekeeper RAS (must be bidirectional)
1720 (TCP) - H.323 call setup (must be bidirectional)
1731 (TCP) - Audio Call Control (must be bidirectional)
3230-3237 (TCP/UDP) - Signaling and control for audio, call, video, and data/FECC
3603 (TCP) - Web interface for standalone units
5060 (TCP/UDP) - for SIP

Successful Conferencing Hints

Some general guidelines for making a VTC more effective

- Always enter a meeting with your system muted.
- If you are involved with multiple sites, use the mute button to prevent hearing sites other than the ones who are speaking.
- Keep background conversations and other distractions to a minimum.
- After speaking, presenters should pause to allow for responses from other sites.
- Decide in advance a visual signal to be used for indication of wanting to speak.
- If you are alone in a conference room, zoom in - close-ups of speakers make for a more comfortable conference.
- Be careful with your amount and speed of movement.
- Adjust speech and movement for the time lag between sites.
- Speak and move a little more slowly and deliberately than normal.
- Check with the distance audience as to whether or not they understand you.
- Enunciate carefully and emphasize your consonants for good diction.
- Open your mouth and actively use articulators (lips, teeth, and tongue) as you speak.
- Project your voice forward in a normal voice without shouting.
- Stay within camera and microphone ranges.
- Look directly at your audience by maintaining eye contact with the camera.
- Do not speak or interrupt until other speakers have completed their thoughts.

LNO contact for more information: tech-support@lternet.edu