



Collaborative Conferencing Options for LTER Network Scientists

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Video Teleconferencing

A technology whose time has finally come with the development of advanced video compression technologies and the ability to use these protocols over the internet, video teleconferencing, or VTC, is now close to routine. The traditional justification for the use of these units has been the savings in travel costs but what users are finding now is that the ability to have key decision makers and managers in place increases their effectiveness in the workplace as well. Anyone who has attempted to schedule a meeting in the LTER Network lately understands that available time has diminished while demands of interacting in collaborative groups has increased. VTC can help.

The LTER Network Office (LNO) and a number of LTER sites have been actively using video teleconferencing equipment to hold face-to-face meetings over the internet for several years 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. The newer hardware from Polycom supports better video compression (H.264) 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. The prices for standalone equipment with a display device range from \$1500 to \$10000 for most features. Other compatible configurations can be based on Polycom PVX, MAC Xmeeting, and other OpenH323 software on the user's desktop computer.

This 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. To have meetings between more than two participants requires the use of a bridge, or multipoint capabilities of the higher-end conference units. The LNO, in collaboration with Office of Research and Media Technology Services at the University of New Mexico, recently installed 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 3 additional endpoint connections plus a standard conference phone line tie-in. This feature is now available in the newer Polycom VSX7000 series.

One problem that can occur with multi-sessions 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 at low data rates to a larger conference.

Below are listed a range of endpoint systems in terms of price and application:

For Individuals:

- **Polycom PVX** – MSRP \$149.00 - PVX software along with a high resolution USB web camera with integrated microphone which produces an optimal quality desktop video system for PC users. PVX can be purchased bundled with a web camera or one can be purchased separately. 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 one to teleconference from one'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.
- **Polycom V500** – MSRP \$1999.00 - This unit uses the newer H.264 video compression protocol providing better data rates at lower bandwidths. However, it does not have the camera or video output quality of the VSX units but it is a suitable solution for a small conference room or office. Educational price from SKG: ~\$1,100.
- **Polycom V700** – MSRP \$2500.00 - This unit is ideal for an office or small conference room; it has a built-in 17" video screen that can double as a computer monitor. Its key features are good/average video quality and high quality stereo sound.
- **Polycom VSX 3000** – MSRP \$4999.00 - A pricier model but similar in function to V700 - this unit is ideal for an office or small conference room; it has a built-in 17" video screen that can double as a computer monitor. Its key features are good/average video quality and high quality stereo sound. This unit includes the ability to do multi-site ISDN conferences – a pricey feature not need by most educational users.

For Conference Rooms:

- **Polycom VSX 5000** – Integrated Electronic Pan/Tilt/Zoom (PTZ) camera - MSRP \$3999.00 - The system can be attached to any television or video projection system and provides a basic system for high quality conferencing.
- **Polycom VSX 6000** – High-end PTZ camera – MSRP \$4999.00 Designed for medium sized conference rooms and can be combined with a Polycom phone system.
- **Polycom VSX 7000, 8000, 9000** – MSRP \$6999.00 - \$11997.00 - These are high quality video conferencing unit that can host calls from 3 additional compatible units and can include a traditional telephone conference into the mix as well. These units feature a wealth of input and output possibilities plus remote PTZ camera. Call us if you need help sorting out these features.

Additional Requirements

Each VTC unit must be connected to at least one display device such as a television, plasma display, LCD projector, etc. 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 your VTC unit will provide faster and easier communication with your colleagues. It is important to specify IP only options to keep the price down unless you particularly need ISDN. 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.

Installation and setup requires about 1 hour and is straightforward – note that entering the network information can be a bit tedious through the remote control and onscreen keyboard. We can work with sites to resolve problems locally.

A starting place for Polycom equipment is their website at <http://www.polycom.com/> , VTEL equipment is their website at <http://www.vtel.com/> , and Tandberg at <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. System can also be put together with a camera microphone and speakers on Linux systems using OpenH323 (<http://www.openh323.org/>). For Polycom equipment we have received heavily discounted prices for education from the reseller SKG Communication Products, Shawnee Mission, Kansas 66227, 800.882.7799, but have also purchased equipment from other suppliers such as WireOne and on the Internet from CDW.

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’s like a telephone switchboard, routing users to appropriate conferences based on a dial-in string. We do not have all the configuration details worked out so this process should not be considered fully deployed. We have, 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 effect 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.

We can set up meeting rooms for regular meetings as needed. Most large conferences, greater than 6, will need to be scheduled at 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 this may be a better solution since not all systems can support these features. We are in the process of testing various approaches and options in sharing presentations over VTC.

Firewall ports

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) - Signalling and control for audio, call, video, and data/FECC
3603 (TCP) - Web interface for standalone units
5060 (TCP/UDP) - for SIP

Access Grid

The Access Grid™ is a collection of software resources and high-performance equipment to create an interactive presentation environment for video-teleconferencing. It represents a very high-end VTC system consisting of one to three or more video projectors, high-quality cameras and microphones, all of which are controlled by a local computer supporting the local Access Grid point-of-presence (POP). The system essentially creates an environment where the whole room is part of the conferencing environment, linked to one or more other similar systems on the Internet. The systems have been set up as nodes by a large number of institutions including the National Science Foundation. Unfortunately, the Access Grid is not H.323 compliant and requires a dedicated space to operate in. More information is available on the Access Grid website: <http://www.accessgrid.org/index.html>

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 and we are testing dimdim, and Merratech.

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. 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.

Successful Conferencing Hints

Some general guidelines for making a VTC more effective. Some of these are very general.

- Always come into 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@ltnet.edu