



Where do we start?

A Videoconference Primer

An introduction to videoconferencing, videoconferencing terminologies and videoconference technologies.

Robert Gusnowski
January 2006

What is videoconferencing?

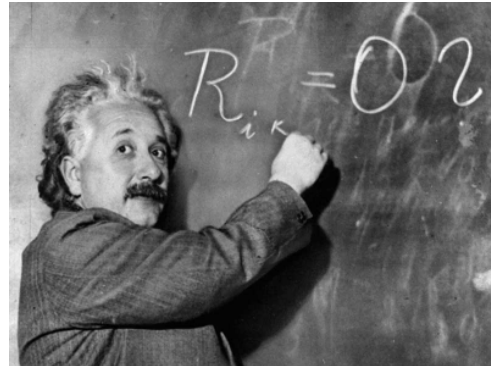
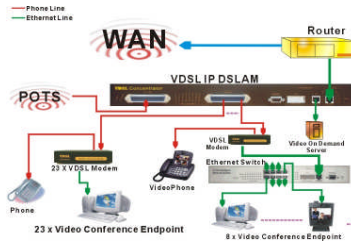
Videoconferencing technology allows two or more people at different locations to see and hear each other at the same time. In addition, it is often possible to share computer applications such as Internet pages, library catalogs, documents, or software. This rich communications technology offers new possibilities for schools, colleges, and libraries including formal instruction (courses, lessons, and tutoring), connection with guest speakers and experts, multi-school project collaboration, professional activities such as meetings and interviews, and community events.

Placing a video call is a lot like placing a telephone call. After you connect, you see the other person in color video and may be able to transfer files or collaborate via options such as document sharing or whiteboarding. The video frame rate varies from 5-30 frames per second, depending on the connection, hardware, and software. Regular broadcast TV is 30 frames per second (fps).

Source: <http://www.kn.pacbell.com/wired/vidconf/intro.html>

How complex is this?

Is it rocket science?



Videoconferencing for the end user does not have to be complex. One of the design targets in setting a good videoconference network is to put together a system that is easy and intuitive for the end user.

Just as with POTS (**p**lain **o**ld telephone **s**ystem) there are a lot of complex technologies working in the background and keeping the system up and running does require technical expertise. However for the end user the videoconference system should be viewed in a similar manner as operating or working with a business class, multiple-line phone system. Like a typical business phone system things are bit more complicated than just a regular phone but once you use the system a few times it operation becomes fairly simple once you gain a level of familiarity of with the system.



First the good news

- For the end user videoconferencing is not rocket science – it is actually fairly easy to use
- Being in a videoconference the first time is sometimes a bit uncomfortable but after a few sessions the actual technology tends to fade in to the background



Now the bad news

- At a technical level it can get very complicated
- Using videoconference technologies is easy only if the technologies work
- A high level of network engineering skill is a must to design a reliable network infrastructure



Where do we start?

- This presentation will focus on identifying the videoconference technologies that are in use today and it will present and define some of the basic terminology you will need to know as you move forward to the next steps
- This presentation will NOT present the high level technical side of the discussion
- The presentation is targeted to people just starting out with these new and exciting multi-media technologies



What is videoconferencing?

- A videoconference (also known as a videoteleconference) is a set of interactive telecommunication technologies which allow two or more locations to interact via two-way video and audio transmissions simultaneously. It has also been called visual collaboration and is a type of groupware.
- Groupware – generally speaking- is any technology that integrates work on a single project by several concurrent users

[From Wikipedia, the free encyclopedia](#)



The key pieces

All videoconferencing systems have a few key pieces that make up the system

The components required for a videoconference system include:

- **video input:** video camera or webcam
- **video output:** computer monitor or television
- **audio input:** microphones
- **audio output:** usually loudspeakers associated with the display device or telephone
- **data transfer:** analog or digital telephone network, LAN or Internet

Basic Equipment Components

Codec: In simple terms, a codec is any technology for compressing and decompressing data. Codecs can be implemented in software, hardware, or a combination of both. The codec takes the analog video signal and codes (digitizes and compresses) it. The codec also has to decode (decompress and un-digitize) the received transmission. You can imagine that this kind of processing can take its toll on the video and sound quality. The most obvious consequence of a slow codec or low-bandwidth connection is a "jerky" picture and an audio time delay. We discuss how to deal with compressed video features in our Working With Compressed Video section. For more technical information about codecs, try this site: IP Video Endpoint (Codec) from the Indiana Higher Education Telecommunication System (IHETS).

Monitor: Desktop systems display video in a small window on the computer monitor much like the movies and other media that we are used to playing on our computers. Portable and fixed systems have one or two large video monitors and usually display the local audience as well as the remote audience. In conference-type settings, large movie or presentation screens can be used and the video is projected onto the screen. Strings of monitors are also used in conference-type settings.

Camera: The camera can be anything from a tiny desktop camera that sits on top of a computer monitor (desktop system) to a high-quality model with remote control pan and zoom features (room system). High-end systems often come with a variety of input sockets allowing for connections to other peripherals such as a document camera, a second video input connection, and other auxiliary equipment. When you expect to do a question and answer session, using two cameras is especially desirable. That way, the facilitator or main speaker has one dedicated camera and another can be used to pan the audience or pull in tight on a person asking a question. The second camera doesn't even need to be fully functional -- all it has to do is pass the input to the system!

Audio: Most high-quality systems come with a microphone designed for use with a small group of people. In many cases, an additional microphone can be connected as well, making your setup more versatile for larger groups or to add mobility. Most systems offer sophisticated diagnostics and processing as a built-in feature to cancel out background noise and echo.

Control: Controls allow users to place calls, adjust volume, and sometimes even pan and zoom the camera. Desktop systems display controls and tools on the computer monitor window. Room systems come with remote control or console devices.

Source: <http://www.kn.pacbell.com/wired/vidconf/equipment.html>



Warning – Terminology Ahead

- The following eight slides contain common videoconference terminology
- Despite the risk of being boring, understanding these terms will help end users learn the meaning of various *geek speak* terms related to the use of videoconference technologies



!!!! Boring Alert !!!!!



It is very easy to get caught up in the technical jargon that is common with all technology related subjects. That being said, however it is important that we have a common language to describe what we are doing, the parts of a typical videoconference system and the knowledge to accurately describe the problems that may be experienced.

These next eight slides can be a bit to get through but these basic terms should at least be something the end user is remotely familiar with.



Basic Videoconferencing Terminology

Bandwidth: In casual use, the amount of information that can be transmitted in an information channel. High bandwidth videoconferencing means that the picture and the sound will be clear.

Bandwidth - The transmission capacity of an electronic medium, such as network wiring, fiberoptic cable, or microwave links; also the range of signal frequencies where a piece of audio or video gear can operate, or the difference between high and low limiting frequencies.

Bridge ([see also router](#)) - a networking device that connects several video sites into one videoconference. It can route multiple protocols, such as TCP/IP and XNS, while bridging other traffic.

CODEC - Coder - Decoder. This may be either a software-only, or a hardware assisted scheme that is used to process digital video and/or audio files. The amount of data required to represent moving pictures with sound is reduced by a CODEC, which normally discards redundant data on compression. Some of the more widely used CODECs are Indeo, MPEG, and CinePak.

Compression - The conversion of digital data, typically video and audio, into a more compact form by using complicated algorithms. The data is decompressed at the receiving end.

Decoder ([see also CODEC](#))- A hardware or software system that translates data streams into video or audio information.

Source: <http://www.netc.org/digitalbridges/glossary/>



Basic Videoconferencing Terminology

Codec, Coder-Decoder: Videoconferencing hardware that codes the outgoing video and audio signals and decodes them incoming signals. Prior to transmission, the codec converts analog-signals to digital signals and compresses the digital signals. Incoming audio and video must be decompressed and converted from digital back to analog.

The key difference between digital and analog is that digital means that the information is encoded as data – ones and zeros – and analog means that the information is stored in its natural state.

Think of an old vinyl audio record – this is truly analog. Drag a needle across the surface and it reproduces the sound.

A CD on the other hand is truly digital – there is no way to decode the sound without the use of a computer to interpret the ones and zeros – data – stored on the disk.

Desktop Video ([see also room-size video](#)) - This system is based on a desktop computer on which a small camera is mounted on top of the monitor. Software to allow image display, voice transmission, and other functions of the system resides in the computer. These systems are designed for one-on-one interaction, but can accommodate two or three people on each station if necessary. Desktop systems also include software for sharing control of programs, documents and other files, and are designed to facilitate collaboration.

Distance Learning - Educational instruction carried out at a site other than the classroom where an instructor is located, typically via satellite or cable television and in real time.

ELMO - Electric Light Machine Organization, maker of visual presenters for teleconferencing and distance learning applications; the camera used to send document images over videoconferencing systems to remote sites.

Interface - A device that connects two pieces of hardware, such as the link between a computer processor and peripherals. Also, the means by which a computer user gives instructions and receives information from a computer.

Source: <http://www.kn.pacbell.com/wired/vidconf/vidconf.html>

Analog at a glance

As a technology, analog is the process of taking an audio or video signal (in most cases, the human voice) and translating it into electronic pulses. Digital on the other hand is breaking the signal into a binary format where the audio or video data is represented by a series of "1"s and "0"s. Simple enough when it's the device— analog or digital phone, fax, modem, or likewise—that does all the converting for



Basic Videoconferencing Terminology

Document sharing: A feature supported by many desktop videoconferencing systems that allows participants at both ends of a videoconference to view and edit the same computer document.

Echo-cancellation: Process of eliminating acoustic echo in a videoconferencing room.

Frame Rate: Frequency in which video frames are displayed on a monitor, typically described in frames-per-second (fps). Higher frame rates improve the appearance of video motion. Broadcast TV (full motion video) is 30 frames-per-second.

ISDN - Integrated Services Digital Network; an international digital telecommunications standard that accommodates voice, data, and signaling and brings high bandwidth to the microcomputer desktop.

Multiplexing - sending more than one modulated signal within a bandwidth, permitting better use of the carrier signal bandwidth. More than one simple signal can thus be transmitted as part of a single complex signal and separated out at the receiving end.

Room-Size Video ([see also desktop video](#)) - This system is also based on a microcomputer, with the video display projected through one or two large (27" or larger) monitors, or through a digital video projector for screen or wall display. These systems are designed for visibility and interaction of larger groups of people, such as a classroom of 30 students or a meeting of 12 people. Often, such a system includes microphones set in the middle of a table designed to pick up voices from anywhere around the table. In a classroom setting, demonstration and presentation tools, such as overhead projectors and electronic blackboards are used to support typical instructional settings, and may include a microphone for each participating student. **Router** ([see also bridge](#)) - A protocol-dependent device that connects networks. It is useful in breaking down a large network into smaller subnetworks. Routers introduce longer delays and have lower throughput rates than bridges. Like a bridge, a router restricts local area network (LAN) traffic.

Source: <http://www.netc.org/digitalbridges/glossary/>



Basic Videoconferencing Terminology

Full Duplex Audio: 2-way audio simultaneously transmitted and received without any interference or "clipping." A common feature of room-base videoconferencing systems. Contrast with half duplex audio – like a walkie talkie – where only one person at a time can speak.

Full Motion Video: Full motion video is equivalent to broadcast television video with a frame rate of 30fps. Images are sent in real time and motion is continuous.

Full Duplex Audio: 2-way audio simultaneously transmitted and received without any interference or "clipping." A common feature of room-based videoconferencing systems.

Full Motion Video: Video that plays back at the full resolution and frame rate in which it was encoded, resulting in a smooth, continuous display. Following broadcast video standards, this is usually considered 30 frames per second.

Basic Videoconferencing Terminology

H.320 standard: An older but widely used video compression standard that allows a wide variety of videoconferencing systems to communicate using ISDN – dialup – phone lines

H:323 standard: A newer video compression standard that that allows a wide variety of videoconferencing systems to communicate over (TCP/IP based) local area networks or the internet.

H:264 standard: A refinement of the H:323 standard that allows for higher quality sound and picture with less bandwidth than the H:323 standard.

Standards

H.320 Narrow-band Visual Telephone Systems and Terminal Equipment This is a popular videoconferencing standard in use today. It requires a digital network to provide the electronic transportation path between the videoconferencing endpoints. **ISDN** is the transport mechanism used most often with H.320 systems.

H.323 runs over Local Area Networks (LAN's). H.320 and H.323 use many of the same protocols and both support H.261 and H.263 video algorithms. H.323 is the standard for visual telephone systems and equipment for local area networks (LAN's) that provide an unguaranteed quality of service (QOS).

T1 (also T-1) - A digital transmission link that can pass data at a rate of 1.544 megabits per second over normal twisted-pair wiring. It can handle 24 voice channels at 64 kilobytes per second and is a North American telecommunications standard.

ISDN - Integrated Services Digital Network; an international digital telecommunications standard that accommodates voice, data, and signaling and brings high bandwidth to the microcomputer desktop.

Videoconference - A conference during which participants at two or more locations are linked by fast telecommunication lines and are able to see and hear one another in real time.

Source: <http://www.netc.org/digitalbridges/glossary/>

H.320 is a umbrella recommendation by the ITU-T for running Multimedia (Audio/Video/Data) over ISDN based networks. The main protocols in this suite are H.221, H.230, H.242, audio codecs such as G.711 and G.723, and video codecs such as H.261 and H.263.

Source: <http://en.wikipedia.org/wiki/H.320>

H.323 is an umbrella recommendation from the ITU-T, that defines the protocols to provide audio-visual communication sessions on any packet network. It is currently implemented by various Internet real-time applications such as NetMeeting and GnomeMeeting (the latter using the OpenH323 implementation). It is a part of the H.32x series of protocols which also address communications over ISDN, PSTN or SS7. H.323 is commonly used in Voice over IP (VoIP, Internet Telephony, or IP Telephony) and IP-based videoconferencing. The main alternative to H.323 is IETF's SIP.

H.323 was originally created to provide a mechanism for transporting multimedia applications over LANs but it has rapidly evolved to address the growing needs of VoIP networks.

One strength of H.323 was the relatively early availability of a set of standards, not only defining the basic call model, but in addition the supplementary services, needed to address business communication expectations. H.323 was the first VoIP standard to adopt the IETF standard RTP to transport audio and video over IP networks.

H.323 is based on the ISDN Q.931 protocol and is suited for interworking scenarios between IP and ISDN, respectively between IP and QSIG. A call model, similar to the ISDN call model, eases the introduction of IP Telephony into existing networks of ISDN based PBX systems. A smooth migration towards IP based PBX systems becomes plannable.

Within the context of H.323, an IP based PBX is, simply speaking, a Gatekeeper plus supplementary services.

Source: <http://en.wikipedia.org/wiki/H.323>

H.264, or MPEG-4 Part 10, is a digital video codec standard, which is noted for achieving very high data compression. It was written by the ITU-T Video Coding Experts Group (VCEG) together with the ISO/IEC Moving Picture Experts Group (MPEG) as the product of a collective partnership effort known as the Joint Video Team (JVT). The ITU-T H.264 standard and the



Basic Videoconferencing Terminology

ISDN: Integrated Services Digital Network: ISDN is essentially a digital network that will provide seamless communications of voice, video, and text between individual desktop videoconferencing systems and group videoconferencing systems. ISDN is slowly being replaced by newer internet (TCP/IP) based technologies.

Multipoint Videoconference: Videoconference with more than two sites. The sites must connect via a video bridge.
(Compare with point-to-point videoconference)

Point-to-point Videoconference: Videoconference between two sites. *(Compare with multipoint videoconference)*



Basic Videoconferencing Terminology

QoS: Quality of Service (QoS) refers to the capability of a network to provide better service to selected network traffic. The primary goal of QoS is to provide priority including dedicated bandwidth, controlled jitter and latency (required by some real-time and interactive traffic), and improved loss characteristics. Also important is making sure that providing priority for one or more flows does not make other flows fail.

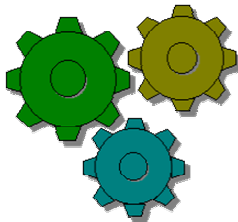
The key point here is that a computer network is like a congested highway. The first piece of data on to the network is generally the first piece of data to arrive at its destination (latency). The problem is that videoconference data **must** arrive in a specific order and within a consistent time period (jitter).

QoS is a general term that incorporates bandwidth, latency, and jitter to describe a network's ability to customize the treatment of specific classes of data. For example, QoS can be used to prioritize video transmissions over Web-browsing traffic. Advanced networks can offer greater control over how data traffic is classified into classes and greater flexibility as to how the treatment of that traffic is differentiated from other traffic.

Source: http://newsroom.cisco.com/dlls/2004/hd_051904c.html

Basic Videoconferencing Terminology


Video Bridge or MCU: Computerized switching system which allows multipoint videoconferencing.



These few terms are just the basics. There is a lot more that could be added but these should be enough to get the gears turning.....

Computerized switching system (also known as MCU – Multipoint Control Unit), which allows more than two sites to communicate using videoconferencing. Many companies now offer bridging services for a set fee. Videoconferencing Interactive communication using video and audio to communicate over long distances. It combines the interactivity of the telephone with the visual stimulation of the television. Videoconferencing may also include graphics and data exchange.

http://picturephone.com/products/learn_glossary.htm



Finally – break time!

- There was a lot of information in the last few slides
- While there is no need to memorize everything it is helpful to know some of the working terminologies



There was a lot of information presented in the previous eight slides. If using this document as a an actual presentation this would be a natural place to insert a brief break to re-focus the audience back to the presentation.



Videoconference technologies

- The two most common videoconference technologies have already been defined
- H:320 is important but its role in the market place is slowly declining
- H:323 and its companion – H:264 – is slowly becoming the predominant standard in the market place

H.320: Narrow-band visual telephone systems and terminal equipment (intended for use with Integrated Services Digital Network (ISDN) and Public Switched Telephone Network (PSTN) systems at data rates from 64-1,920 Kbps).

H.321: Adaptation of H.320 visual telephone terminals to B-ISDN environments (intended for use with Broadband ISDN systems, such as Asynchronous Transfer Mode (ATM) terminals).

H.322: Visual telephone systems and terminal equipment for local area networks which provide a guaranteed quality of service (intended for use with LANs such as those complying with the IEEE 802.9 standard).

H.323: Packet-based multimedia communications systems (intended for use with LANs that do not provide a guaranteed quality of service, such as most LANs in service today.)

H.324: Terminal for low bit-rate multimedia communication (intended for use with V.34 modems operating over the General Switched Telephone Network (GSTN), or what is called the PSTN here in the United States.)

In order to support such a variety of media types, an H.323 system may consist of several different components:

Terminals: a network endpoint which may provide audio only, audio and video, audio and data, or audio, video, and data communications with another H.323 terminal.

Gateways: a network function that provides access to terminals on a circuit switched network (such as the PSTN) or another H.323 network.

Gatekeepers: a network function that provides address translation, access control, bandwidth management, and possibly other management operations for the network.

Multipoint Control Units: a network function that allows three or more terminals to participate in a multipoint conference.

These components could be implemented individually or incorporated as a group within a single product. For example, a PC running an H.323 application, such as Microsoft's *NetMeeting* would be categorized simply as a terminal. Another device, such as a video conferencing system, could include the functions of the Terminal, Gateway, Gatekeeper and Multipoint Control Unit in a single box, which would be considerably more complex.

And since H.323 attempts to support such a wide variety of communications media, there are a number of protocols that are required to support all of the possible voice, video and data combinations. As such, H.323 has been described as an *umbrella* standard, under which a number of other protocols, supporting call setup and disconnect, audio encoding/decoding, video encoding/decoding, fit under. These protocols include the ITU-T H.225, H.245 protocols, plus the IETF's Real-Time Transport Protocol (RTP), and others. We will examine the details of these protocols in the next tutorial.

Source: <http://www.voipplanet.com/backgrounders/article.php/3498736>



What are the first steps to take?

- To really get a grip on what videoconference technologies can do the first step is to purchase two videoconference units and begin exploring
- Videoconferencing can be described but it really best experienced

A videoconference meeting is similar to other meetings in that you talk, discuss topics, ask and answer questions, negotiate, make decisions and act the way you would in any other face-to-face meeting. However, a few things are a little different.

When you arrive for your meeting, you'll notice the TV monitor in front and the camera below or to the side of the monitor. There may or may not be a second camera in the room. There is also some equipment in the room to help you with the meeting. PCTV will provide a computer and document camera to display graphics. These two items will require some prior adjustment for you to use during the meeting. The obvious is that you are each at different locations and everyone must arrive to their meeting room, find a seat and get comfortable. While you are adjusting your seat and papers, the videoconference site operator will adjust the video camera establishing camera presets for a good view of the people in the room. A site operator at the other locations will be setting up and adjusting their camera presets. The operator will also adjust the microphone location in the room and adjust the speaker volume to get the best sound possible. The site operator may ask you to speak a few sentences to help the other site adjust their room volume. If you're using any visual graphics, you will be asked to provide them before the meeting so that the operator can test each graphic to ensure the best possible picture. He or she will ask how you plan to use the graphic and the order you want them displayed. The site operator will also provide a sign-in sheet and a survey for you to fill out at the end of the videoconference. Because there are a few things that may be new to you in this meeting environment, it's imperative that you arrive at the meeting room 20 - 30 minutes before the start time.

Another obvious difference -- you are looking at people and they are looking at you through the eye of a camera. At first, you may not be comfortable seeing yourself on camera and therefore may be reluctant to participate. Hopefully, as the meeting progresses, you forget the camera is in the room and proceed with the discussion as you would with any other meeting.

In a videoconference, the picture is not smooth and is most apparent when persons at the distant site move from side to side or move their arms and hands. The live video takes a second or two to be transmitted. What you see actually took place a second earlier, while the audio you hear is virtually real time. At first, the delay will distract you. After a while, you adjust to it.

You may also notice extra sounds in a videoconference than you would in a normal face-to-face meeting. Microphones in a videoconference pick up small noises, such as side conversations, finger tapping, paper shuffles, pen clicking, keypad buttons being punched, persons chewing gum, room ventilation, doors opening and closing, seat adjustments, room ambience and so on. It's like being in a quiet reading area of a library and hearing a pen drop on the floor. It is very important to remember and to assume the microphone is always on and, when necessary, mute the microphone.

Source: <http://www.palomar.edu/pctv/vidConf/whatToExpect.shtml>

After you make the decision but before you buy

- A couple of items need to be considered before you buy
- Where are you planning to place the equipment?
 - The room's environment (lighting, acoustics, ambient noise, etc.) makes a huge difference
- Evaluate your network to ensure that you have sufficient quality and quantity to ensure the system will work

Important Videoconferencing Specifications

System type. One of the first decisions you'll make, in considering videoconferencing systems, is whether to buy a PC-based, portable, rollabout or installed system. These systems can be mixed on a network, and your choices will be determined largely by the size of the group participating at a given location. While any can be used by one or two people, the PC-based systems are meant for one; portables for two to eight; rollabouts for three or four to perhaps 15; and installed systems for five or six on up to 20 - 30 or more.

The size of the monitor or projector you will use relates closely to group size. Though most videoconferences today take place using portable setups with 20" - 35" monitors, an economical, installed system using an LCD projector will be a much better solution for larger groups.

Bandwidth. In any teleconference, the video and audio signals must be compressed to move through telephone lines in real time. The quality of the image and sound you end up with are determined by the size, or bandwidth, of the telephone connection and the quality of the codec (or compression/decompression device) and the compression algorithm it employs. Most videoconferences today travel over two 64K ISDN lines, which moves data at 128 kilobytes per second (or 128K). At this bandwidth, decompressing to 15 frames per second video, you should expect a clean picture, but noticeable blurring of any person or object in motion. 384K is generally considered the minimum in applications where motion is critical, and 384K or higher at 30 frames per second is what you need if you will transmit videotape.

More and more videoconferences are being held over wide-area computer networks using T1 or other digital lines. Bandwidths vary with the networks' capabilities, but it's not unusual to see transmissions at 768K or even 1.5 megabytes per second.

Compression algorithms are the software schemes that determine a codec's ability to fit what would be a huge amount of data into the relatively small capacity of an ISDN line. At one time, each codec manufacturer had its own **proprietary standard** and one brand of equipment could not talk to another. Today, however, the industry has come together to set **standard algorithms**, which allow smooth communication between systems. Some vendors, notably PictureTel, offer proprietary algorithms that operate in addition to the standard. Their codecs are set up to sense what systems they are linked to and choose the highest quality algorithm available to all.

The algorithms your new system will recognize are an important consideration. Current systems all recognize the H.320 standard, but within that standard, H.261, H.263 AND H.263+ video compression standards may be recognized.

Audio quality. Research suggests that participants in a videoconference will perceive identical video pictures as of higher or lower quality, depending on the audio quality. Perceptions aside, in a lower-bandwidth transmission, in an acoustically imperfect room, or in a situation where one or two participants is connecting via a PC or telephone, audio quality can drop to the point where participants are just plain incomprehensible.

To avoid these problems, you will want to be sure that your system includes full-duplex audio and digital echo cancellation (as do all of the systems in our on-line catalog). A critical specification for judging audio quality is frequency response, although, to a large degree, you'll need to judge a system's quality by hearing it during a demonstration.

Useful features

Multiple monitors or projectors. Generally speaking, you will want to be able to see two pictures at all times during your conference: one, the image of far-end participants and the second, a preview of what you're sending them. That way, you'll be able to maintain eye contact with the people you're conferencing with and be able to see how they see you or any documents you're sending. A single-monitor system will accomplish this with a picture-in-picture feature, putting the far end on the main image and the preview on the inset image. A two monitor setup separates the images onto separate monitors. That gives you larger images, which is always nice but especially useful as groups get larger.

In multiple location calls, you have two options. You can use a voice-activated switching device that will automatically show you the location where someone is speaking, or you can use "continuous presence" to split your screen and show a continuous image of each location in the conference. These choices are not a function of your system, but of the bridging system you'll use. Note, however, that if you expect to use the continuous presence option often, you'll want to plan for a larger than usual monitor or projected image, or the multi-screen images may get too small to be useful.

Multiple cameras can also be helpful, particularly if you have a situation (such as a distance learning classroom) where a



Videoconference etiquette

- Etiquette is extremely important during a videoconference
- There are some ground rules everyone should be aware before starting any videoconference
- Just as *Robert's Rules of Order* keep meetings from descending in to chaos Videoconference Etiquette is important to ensure videoconferences are effective, controlled and productive
- Just like in a meeting the more people – *or sites* – that are connected in a videoconference the more important etiquette is for everyone

Videoconferencing presents its own challenges with its own set of manners and etiquette. The camera and microphone can magnify poor clothing choices, makeup, gestures, and bad manners. We hope this site will help you towards preparing for and conducting a successful videoconference.

Before the meeting

Prepare and distribute an agenda in advance. Verify its arrival at the other sites. Have the agenda arranged so the first topics relate to everyone at all sites. Then people can leave as their topic is covered. Appoint a chairperson to help stick to the agenda. Arrive early to orient yourself and become familiar with the keypad and peripherals.

Camera settings

You can use the keypad to preset up to four views to focus on different people. Follow the elbows and wrist rule - when you stretch out your arms, the edge of the screen should fall between your elbows and wrists. Ten percent of the picture area should be left above the heads. Try to fill the screen as much as possible with people rather than the table, chairs, walls, floor, or ceiling. Especially avoid having the ceiling lights on the screen.

Clothing to avoid

Try to stay away from very intense colors - red tends to bleed on screen, white may glare, and black absorbs the light. Bright colors can show even more intensely. Avoid bold, complex or busy patterns like small checks or narrow stripes in clothing, scarves, or neckties - they can affect the camera's ability to focus and might lower picture clarity. Bulky or baggy clothing can make you look larger. All-light or all-dark clothing can trick the camera's automatic brightness control. Fabric that shimmers and is iridescent or reflective can reflect the light. You also need to consider your accessories. Bright, shiny jewelry such as bracelets and tie clasps can also reflect light. Charm bracelets, bangle bracelets, and long necklaces can be noisy. A large brooch or lots of ruffles can distract the eye. Tinted lenses in eyeglasses can make the eyes appear dark.

Clothing to use

Neutral and muted colors, such as medium blues or pastels, help the camera focus more easily. Simple tailored clothing in solid dark blue or gray, paired with a pale blue shirt or simple blouse is a good choice. Royal blue and purple are good for women's suits or dresses. To look your best on screen, choose light pastels and muted colors. Carefully apply cosmetics subtly. The wall behind you should be darker than you to avoid back lighting.

Speaking

As you begin your videoconference, ask the other site(s) if they can hear you. Have them introduce themselves to be sure you can hear them. Because of the one second audio delay, use a brief pause between speakers to assure the full audio signal has been transmitted. Two people cannot speak at the same time, and you should avoid interrupting other speakers. Also use a pause to allow time for others to answer or make comments. Use your normal voice, but note that it does help to speak more slowly, especially with a strong accent. As with any meeting, try to limit side conversations.

Audio

The microphone can magnify sounds that are normal for a meeting. Be aware of the microphone placement and be careful not to put papers or other objects on them. Do not rustle papers or tap on the microphone or table. Eating might not be appropriate. Listen for other environmental noise such as fans, open windows, pens clicking, and papers shuffling that might disturb your audio quality.



Before the meeting

Prepare and distribute an agenda in advance. Verify its arrival at the other sites. Have the agenda arranged so the first topics relate to everyone at all sites. Then people can leave as their topic is covered. Appoint a chairperson to help stick to the agenda. Arrive early to orient yourself and become familiar with the keypad and peripherals.

Just as with a traditional meeting or classroom the more planning and preparation that happens before the actual class or meeting the greater the probability of success.

In preparing for battle I have always found that plans are useless, but planning is indispensable.

Dwight D. Eisenhower (1890 - 1969)

One hour of planning saves three in execution

Anonymous

Bad planning on your part does not constitute an emergency on my part

Anonymous

“Good fortune is what happens when opportunity meets with planning.

Thomas Edison (1847-1931)



Camera settings

You can use the keypad to preset views to focus on different people. Follow the elbows and wrist rule - when you stretch out your arms, the edge of the screen should fall between your elbows and wrists. Ten percent of the picture area should be left above the heads. Try to fill the screen as much as possible with people rather than the table, chairs, walls, floor, or ceiling. Especially avoid having the ceiling lights on the screen.

The Video Environment

Reading facial expressions and body language are the next most important parts of a conversation. As stated by Trowt-Bayard in "Videoconferencing, the Whole Picture", most of us are children of the television. We were born around or after the time that TV was "invented". Being such, our expectations on video quality are very high.

For those who remember, early television required much adjustment or fiddling with vertical and horizontal holds, adjusting the rabbit ears for better reception and sound, adjusting the contrast. Thanks to things like cable TV, digital video, and much higher bandwidths, there is no need to fuss with reception in this manner.

Source:

http://www.videnet.gatech.edu/cookbook.en/list_page.php?topic=6&url=best-prac.html&level=1&sequence=1&name=Best%20Practices%20for%20the%20Video%20and%20Audio%20Environment



Clothing to avoid

Try to stay away from very intense colors - red tends to bleed on screen, white may glare, and black absorbs the light. Bright colors can show even more intensely. Avoid bold, complex or busy patterns like small checks or narrow stripes in clothing, scarves, or neckties - they can affect the camera's ability to focus and might lower picture clarity. Bulky or baggy clothing can make you look larger. All-light or all-dark clothing can trick the camera's automatic brightness control. Fabric that shimmers and is iridescent or reflective can reflect the light. You also need to consider your accessories. Bright, shiny jewelry such as bracelets and tie clasps can also reflect light. Charm bracelets, bangle bracelets, and long necklaces can be noisy. A large brooch or lots of ruffles can distract the eye. Tinted lenses in eyeglasses can make the eyes appear dark.

Clothing

- Avoid busy or boldly patterned clothing
- Avoid bold colors, especially red and black
- Avoid jewelry that may brush against microphones or tabletops and cause feedback
- Solid pastel colors are recommended

Etiquette

- Be on time
- Listen to the ground rules regarding your videoconference as outlined by the presenter/facilitator
- Allow for a two-second transmission delay when speaking; pause after the end of your comments to allow time for remote sites to respond to a question or comment
- Direct questions or comments to a particular person or site (especially important in multipoint conferences)
- If participating in a large multipoint meeting, it is advised that you say your name and location each time you speak
- Avoid side conversations
- Avoid unnecessary speaking to show that you are listening – try to nod your head to indicate that you are hearing someone instead
- Announce actions to the far end when possible -- let them know when you plan to mute your microphones, leave the room, or when someone has entered the room but is not visible on screen
- Expect some technical issues – have patience when technical issues arise

Source: <http://www.tsl.state.tx.us/distancelearning/videoconferencing/tips.html>



Clothing to use

Neutral and muted colors, such as medium blues or pastels, help the camera focus more easily. Simple tailored clothing in solid dark blue or gray, paired with a pale blue shirt or simple blouse is a good choice. Royal blue and purple are good for women's suits or dresses. To look your best on screen, choose light pastels and muted colors. Carefully apply cosmetics subtly. The wall behind you should be darker than you to avoid back lighting.

Videoconferencing Tips

IVC wants you to have the best possible videoconferencing experience, so here are some tips for you next videoconference

Clothing

- Wear neutral or pastel colors, avoiding stronger colors like red or yellow.
- Avoid wearing too much white or black, it can cause the camera to adjust the contrast wrong, or it might cause visual static
- Try not to wear "active" clothes; plaids, stripes, or busy clothes can have undesired effects on the video quality.

Movement

•Most videoconferences are done with high enough bandwidth that motion is not an issue. Natural motions and gestures are fine, but we do not recommend being overly active in front of the camera.

Sound

- There is no need to scream into the microphone, as our microphones have a great pickup range
- However you should still speak loud and clear while in the conference
- Speak slowly and firmly, this helps your voice transmit better
- Avoid any background noise such as music or background noise (paper shuffling, finger tapping, etc.)

Presentation Materials

- Large bold fonts are recommended for any presentation material
- Also, use highly readable fonts. Arial or Times transmits better than any cursive or script
- Occasionally the camera should shift to the presenter. Long periods of time showing the document can create an impersonal feel in the conference
- If showing video, keep it short and to the point
- Have the materials ready to present, so you are not rushing to get them ready
- Follow copyright rules and regulations

Setup

- Close any shades or blinds over windows. The natural light can overpower the room's lighting
- Have your presentation materials ready, that way you are not scrambling during the conference
- Have the room set up and prepared with the microphones and camera in place before the conference starts
- At the beginning of the conference make sure that the sites can hear and see each other, avoid adjusting settings (volume, camera location, etc) during the conference
- Have the camera focused in balance with the room and the individual. Too close and it looks unprofessional, too far and it is unrecognizable

Etiquette

- Be polite and courteous to the people with whom you are meeting.
- Try not to interrupt the other people, although this can be tough sometimes
- Begin and end the meeting on time, show up a few minutes early so the technicians can show you the ins and outs of their system
- Have your cell-phones and pagers turned off, having a videoconference interrupted by a sudden call can be distracting and unprofessional
- Make eye contact with the camera and with other participants in your room.
- Use names to direct questions to specific people



Speaking

As you begin your videoconference, ask the other site(s) if they can hear you. Have them introduce themselves to be sure you can hear them. Because of the one second audio delay, use a brief pause between speakers to assure the full audio signal has been transmitted. Two people cannot speak at the same time, and you should avoid interrupting other speakers. Also use a pause to allow time for others to answer or make comments. Use your normal voice, but note that it does help to speak more slowly, especially with a strong accent. As with any meeting, try to limit side conversations.

Videoconferencing Etiquette: General Guidelines for Participants & Speakers

Speaking:

1. **The most important rule of video conferencing: Keep your system on mute when you are not speaking.**
2. Project your voice toward the nearest microphone.
3. Make eye contact with remote sites by looking at the camera/monitor.
4. Be yourself. Act naturally and speak to remote participants as if they were sitting in your location. Assume you can be heard and refrain from asking "Can you hear me?" The intent in video conferencing is to create a contiguous real and virtual space.
5. Be aware there is a delay when using video over network connections. Give each person plenty of time to answer your questions or to make a comment. Allow at least two seconds for a speaker to finish. You may even ask, "Are you done?" before continuing.

Multipoint Conferences :

1. When participating in a multi-point conference, identify yourself and your location before speaking.
2. If you have a banner or backdrop indicating your location be sure it is clearly visible.
3. Direct questions to individuals by name and/or location to avoid confusion

Sound:

1. The microphones are very sensitive and will easily pick up most noises. During times of silence, if gain is active, the sensitivity of the microphone automatically increases until it can pick up the sound of the air conditioning. On some systems, this can be enough for the video conferencing system to switch its attention to your site and your image will replace that of the speaker.
2. Try to avoid side conversations, dropping things, coughing, shuffling papers, or making other extraneous sounds - the boundary microphones we use amplifies any vibrations and transmits them.
3. Mute your system when you are not speaking. If you are unsure how to do this, ask the operator where the mute function is and how to use it.

General Considerations:

1. Assume you are always on camera, even when you are not speaking.
2. Because the entire room is not usually visible to the other locations, it is good form to announce who is entering or leaving the room.
3. Be aware of what is being transmitted to the remote locations. Use the local window as a guide to what is being transmitted to the far end.
4. Don't get so wrapped up involving the remote audience that you ignore the local one!
5. Avoid wearing white or black, plaids, stripes or prints as they may interfere with contrast levels and transmission compression.

Source: http://belle.netera.ca/infra_vid_con.htm



Audio

The microphone can magnify sounds that are normal for a meeting. Be aware of the microphone placement and be careful not to put papers or other objects on them. Do not rustle papers or tap on the microphone or table. Eating might not be appropriate. Listen for other environmental noise such as fans, open windows, pens clicking, and papers shuffling that might disturb your audio quality.

Videoconferencing Audio Quality

The human visual system will tolerate much interference. A video image that is grainy, has untrue colors, or that is jerky can still be comprehended. An audio signal, however, must be high quality in order for a human to be able to perceive the words. A speech signal can tolerate some peak clipping (loss of amplitude above a certain threshold), which is perceived as pops or clicks in the signal. The "picket fence" effect (50 to 100 ms. gaps in the signal) can cause loss of an entire phoneme or syllable, leading to lack of comprehension. Even a time lag, although the quality of the signal is otherwise good, is intolerable to human listeners during conversation. The worst form of audio signal degradation, in terms of speech intelligibility, is reduction of the frequency range. The speech signal is composed of frequencies ranging between 500 and 4000 Hz. When the bandwidth is reduced, which is heard as a "muffled" quality, suprasegmental aspects such as speaker identity and affect are impacted. Further reduction impacts intelligibility. Female speakers are affected more drastically than male speakers since their voices are composed of higher frequencies.

These factors make audio quality an extremely important component of a video conference. The old ISDN-based video conferencing software from PictureTel, for example, devoted a full 64 kilobytes of the 128 kilobyte connection to the audio signal by default. The application could be configured to use progressively smaller amounts of the bandwidth at the user's discretion, however.

Video conferencing sessions conducted over a LAN can devote a significant amount of bandwidth to the audio signal so long as the bandwidth is available. If the bandwidth is not available, two different actions can be taken. The ProShare application, for example, drops both the video and audio signals in order to provide a data-only conference if the bandwidth of the connection will not support a minimal frame rate. NetMeeting does not control the frame rate programmatically, but if the user decides that the video signal is unusable, he can opt to turn off the video signal and maintain the audio signal. If that becomes unusable, he can turn off the audio and maintain a data-only conference.

The quality of speech transmitted over a LAN is impacted by the way that the information is divided into packets upon origin and then reassembled at the destination. Compression and decompression of the data may also be used. For this reason, the audio signal may suffer in quality and may lag. Decades of research by the telephone industry document how specific types of signal degradation affect perception. This research has been used to produce a telephone network that is optimized for transmission of high quality human speech. LANs are not optimized for this activity.

Another dimension of the audio signal to be considered is whether it is transmitted in full or half duplex mode. In half duplex mode, the signal from only one source at a time is transmitted. This is efficient because the same channel can be used for both participants in the conversation. However, the two speakers must be willing to speak in discrete turns. If both participants speak at the same time, which is a common occurrence in human conversation, the electronics may switch the transmission back and forth between the two speakers in such a way that neither is transmitted well enough for comprehension. Systems that attempt to prevent this may impose a lag or lose the first few phonemes during the interval when the electronics are "deciding" whether to commit to transmitting from that source. A full duplex signal allows both signals to be transmitted and received at the same time. This is optimal for human comprehension, but the electronics to support this must incorporate a way to separate the signal that originates from a human speaking into the microphone from the sound that is coming from the speakers into the microphone. If this is not done, the proximity of microphone and speakers causes a feedback loop that sounds like a squeal and that can even be painful to the listener.

The best use of available technologies to conduct a useful videoconference could well be to use an actual, full duplex voice telephone circuit to carry the audio portion of the conference. This independent channel can also be helpful for troubleshooting if the participants experience difficulty with the LAN or with their collaboration application during the meeting.



Body movements

Keep body movements to a minimum. Avoid distracting movements like swaying, rocking, or pacing. Try to limit turning back and forth in your chair, wiggling your foot, and playing with your hair or earrings. Move and gesture in a fluid, natural way.

Otherwise known as Netiquette in the networking world, these e-rules for behavior simply take common sense and modeling of appropriate behavior in all settings. These are a few guidelines to follow to make sure that all students are aware of the extra care that needs to be taken in a videoconferencing setting.

Voice: Be sure that your speech is clear, loud enough to be heard in a regular situation (adjust volume if need be), and slow enough to be easily understood. Take a moment to test this out at the beginning and make adjustments. Be aware of possible voice delays across the system and accommodate for the delays. Look at the camera and your present audience when talking to ensure that you are interacting with your far-end audience as well as the participants in the same room. If you are wearing a microphone, be sure the volume is properly adjusted. If you are using a fixed microphone, be sure that you are in range to pick up your voice.

Noise: Be aware that regular classroom noise must be kept at a minimum to insure that the far-end site can hear. If there is a noisy activity planned during the videoconference, the choices can be to disconnect and reconnect, or mute the audio during the activity.

Interruptions: Plan ahead for interruptions and have a plan for how to handle them. Students should be given the opportunity to take care of personal needs before and after the videoconferencing schedule time. Also, fire drills do come unannounced and a pre-plan with the principal can alleviate this kind of interruption. Also let the office know that you would appreciate it if there were no announcements to your room during the videoconference session.

Student Call-outs: Students should be aware that verbal calling out that might be ok in a regular classroom setting may not be workable in a videoconferencing session. Plans for this type of interaction could be handled with cue cards or a simple raise of hands.

Body presence on camera: Be aware of camera placement and image you are projecting. Plan ahead for whether you want to be standing or sitting and whether you want the camera focused on the teacher or students. Camera movement and adjustments can be made if you have technical help (or have enlisted a student to control the camera), but generally the camera is set in a fixed position. The camera should be directed toward the person speaking to ensure clear understanding by the far-end audience. It may be necessary to mark off the camera presence area with tape to remind the speaker of where to stand to best engage both audiences.

Presentation styles: Adapt your presentation style to fit the videoconferencing logistics. If you are a "walker" during your presentations in a regular classroom, you will have to adapt the classroom camera set-up (or your style) so that you do not disappear from the screen. If you like to engage your students in discussion, be sure that you are including students at your site as well as the far end site and that the camera focuses on them when they are speaking.

Dress: Professional dress is always recommended, and simple clothing provides less distraction in an on-camera experience.

Lighting: Be sure that all participants are able to be seen when on camera. If lighting in the room is an issue, you may need to choose a designated spot for presentation and provide lighting, so that the camera can effectively highlight the participants.

Source: <http://www.d261.k12.id.us/Vcing/classroom/behavior.htm>



Videoconferencing do's

- Do pre-plan
- Do speak clearly
- Do keep body movements minimal
- Do move and gesture naturally
- Do maintain eye contact
- Do dress appropriately
- Do apply cosmetics subtly
- Do be yourself!

In short – relax and keep it natural!



Videoconference don'ts

- Don't make distracting sounds
- Don't make distracting movements
- Don't cover the microphone
- Don't interrupt other speakers
- Don't carry on side conversations
- Don't wear noisy jewelry
- Don't arrive late

Remember that you are not the only person in the conference and what you do – or don't do – will affect everyone and every site.



Videoconference web links

- Videoconferencing Cookbook
 - <http://www.videnet.gatech.edu/cookbook.en/>
- Videoconferencing Glossary
 - <http://www.kn.pacbell.com/wired/vidconf/glossary.html>
- Videoconferencing for learning
 - <http://www.kn.pacbell.com/wired/vidconf/>
- Basic Videoconferencing Terminology
 - <http://www.vbisd.org/techserv/DistLearn/Terminology.htm>
- Glossary of Videoconferencing Terms & Links
 - <http://www.netc.org/digitalbridges/glossary/>
- Strategies for Using Videoconferencing Technology in the K-12 Classroom:A Teacher's Digital Handbook
 - <http://www.d261.k12.id.us/VCing/>

There are many more sites – these are but a few of a very long list.

Simply use Google to search for videoconferencing to find these and many more excellent resources!

3M Running a Videoconference

http://www.3m.com/meetingnetwork/readingroom/meetingguide_run_video.html