

Video Conferencing at INTEGRIS

Terminology:

H.320 and H.323 are transport protocols that describe how the data is sent and received. H.323 is also known as IP or Internet Protocol.

H.263 and H.264 are compression protocols that describe how the video is encoded and decoded. H.264 is also known as mpeg4.

Where we came from:

Our previous video bridge was the old H.320 standard where every connection was hardwired from a room to a port on the bridge and required specialized equipment to extend the distance beyond the ability of the interface. Bandwidth was dedicated also. Each connection to a rural site split out 384k for video into a dedicated connection that could not be used by other services when a video conference was not taking place. We disconnected the last H.320 connection this year.

Our old endpoints were PC based Windows 95 systems made by VTEL that operated only on H.320 connections.

Where we are currently:

We are now using a Polycom MGC video bridge (formerly made by Accord) to manage all of our video conferences. It has the following connections:

1. One IP port connecting all Integris facilities across our WAN
2. One IP port to OneNet - All schools, hospitals, government offices. We have 2 T1 lines on this interface which can handle up to 8 video conferences. The bridge shares this resource with our speech therapy program which connects direct to schools rather than going through the bridge.
3. One AT&T ISDN T1 line that will go anywhere in the world that has ISDN dial up. Conferences generally bond 6 lines to give 384k speed with dedicated bandwidth. Line charges for this are at ISDN rates times 6 for long distance calls.

We are using H.323 (IP) protocol across our system using our WAN connectivity to carry all video conferences. We share bandwidth with all other applications which frees up the previously dedicated 384k for video only connections. Using the network gives us great flexibility and speed in deploying new units or opening new rooms.

Our current workstations are Polycom set top units that have both H.320 and H.323 interfaces. This allowed us to migrate from the old bridge and infrastructure over to a totally IP based solution as our WAN infrastructure was upgraded in the rural facilities

and in the metro. All of our equipment has external video connections that allow exam cameras and other clinical devices to be connected for tele-medicine applications.

We currently run most of our connections at 384k. There are some practical reasons for this. Bandwidth to the rural facilities has a lot of demands on it and 384k is a reasonable trade off for video. This is the current standard for business video conferences. We could run at a higher rate but that would take away some of the bandwidth for clinical and financial applications. It happens to be convenient that you can get 4 connections at 384k out of a T1 line which maximizes the bandwidth utilization of those lines.

Internet conferencing

Interest in video conferencing over the public Internet continues to grow. The primary benefit is cost reduction. The alternative is a dial up ISDN line which has some compatibility issues when crossing carriers (AT&T, Sprint, SWB, etc). The cost of conferencing on ISDN adds the cost of long distance charges for 6 lines which must be bonded together to get the desired bandwidth.

The Internet offers a free connection over your ISP connection. However as you are aware, Internet bandwidth varies with traffic patterns and is not consistent. Your video and audio may freeze or become jumpy if the traffic is too heavy. Your video is competing with downloads, web browsing, streaming content and voice over IP. This is the same issue when connecting over broadband to a home over the public Internet. That is why ISDN dial up is still the standard for connecting to remote locations not on our WAN.

Oklahoma OneNet

We have 2 T1 lines to OneNet which is run by the State of Oklahoma. It provides web access and video conferencing / distance learning services to schools, hospitals, and government offices. They maintain some bandwidth surplus to keep video more consistent. We use OneNet in all of our school speech therapy connections and it works very well. We also use OneNet to connect to OU, OSU, OK County Health, several Vo-Techs, and several hospitals outside our system.

Polycom MGC Bridge

Our bridge is only a few years old and is very robust. Primary connections are over our IP infrastructure which gives us access to almost every building and office. Video units are mostly Polycom ViewStations which are now one generation old and use H.263 compression. The newest equipment available uses the H.264 compression standard which we have not implemented. That standard gives you much greater video resolution at the same bandwidth or the same resolution we have now at about half the bandwidth. All newer systems are compatible with older H.263 units and automatically negotiate the best protocol available. Our bridge will support H.264 compression between end points if they are ALL on that standard. It cannot currently mix H.263 and H.264 standards in a

single call. An upgrade is available which will allow the bridge to transcode and mix different standards.

Currently we can connect 24 endpoints at 384k in any combination of conferences. Or you can use the same bandwidth to connect 12 endpoints at 768k. The bridge is able to connect 12 endpoints on our LAN, 12 endpoints on OneNet / Internet and up to 4 ISDN dial up connections.

Polycom endpoints

We have deployed Polycom View Station set top units in the following locations:

- All rural hospitals (8)
- ISMC auditorium
- ISMC cancer center
- IBMC TV studio
- IBMC auditorium
- IBMC conference rooms / portable system
- IBMC HR department
- Tele-speech / four units in 5400
- TCP in network services
- DLO labs
- Brookline Mental Health

The View Station is a reliable, simple and easy to operate unit that requires little training and can be managed or operated remotely allowing us to assist new users. The View Station is no longer available and we are now buying VSX 7000 set top units as new systems are required or old systems need to be upgraded.

Where we can go from here:

New equipment includes some PC based systems with a camera mounted on the monitor. These are much better than the web-cam applications. The PC based equipment uses a codec built into the camera rather than using the PC CPU to do the processing. There are also some nice desk top systems that are very small and well integrated. They have a screen, camera, microphone and speakers all built in to a single panel. Brain Saving Technologies have selected these for physician desktop devices. Most of the newer systems offer H.264 as standard while others have it as optional.

As we replace or add to our video units we will incorporate H.264 standards into our system. End points are currently in the \$4k to \$5k price range. Our bridge will connect these new units but to mix the old and new would require adding 2 updated video cards in the bridge at a cost of \$38,000. An alternative would be to just replace all endpoints with H.264 units.

Main points;

1. New technology is mostly in the area of video quality with the newer H.264 standard. We can meet that quality currently but at the cost of additional bandwidth. We can upgrade to maintain quality at half of our current bandwidth or improve quality at the same bandwidth.
2. We have already made the move to an all IP based system that takes advantage of our infrastructure upgrades.
3. The other area of technology is use of the public Internet which is available but has some issues in consistency and quality of service.