BC Distributed Medical Program

Video-Conferencing Budgeting & Implementation Guidelines

To: UBC FoM/VCHA Departments

From: Mike Keating, Associate Director Technology, Distributed Medical Program

Date: August 30, 2007

Re: Videoconferencing Budgeting & implementation Guidelines, Version 1.3

Definition

Intended Audience

The intended audience for this document is academic staff and students within the Faculty of Medicine interested in utilizing video conferencing for academic or related purposes.

Sign-off Authority

Distributed MD Program Inter-site Operations Managers, Distributed MD program AV/IT Analysts, MED Network Team, UBC Media Group

History

Version	*Date*	*Author*	*Comments*
1.0	June 05, 2007	Marcel Schoenenberger	Initial Draft
1.1	June 12	Marcel Schoenenberger	Final Edition
1.2	Aug 21, 2007	Marcel Schoenenberger	Revised - Updated pricing information
1.3	**Aug 30, 2007**	Marcel Schoenenberger	Revised

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Room Environment Guidelines

Based on the established UBC, FoM, Distributed Medical Program AV & Videoconferencing requirements standards, this section outlines the basic parameters which are essential in optimizing the environment for functional AV technology in large and small seminar rooms as well as boardrooms. To create a usable environment in these rooms for local instruction and/or distributed education delivery purposes, a variety of critical parameters have to be set correctly, such as; room lighting, acoustical characteristics, the physical room layout, screen size and placement, sight lines, projection path, the colours of the walls, camera placement and sight lines.

The parameters are based on widely accepted industry standards and references (1, 2, 3)

Boardrooms and Dedicated Videoconferencing Seminar Rooms

These parameters apply to small to medium seat capacity boardrooms & seminar rooms designed for local presentation and videoconferencing capabilities

Interior Acoustics

1. Appropriate acoustical conditions are necessary to make the room functional for presentations and video conferencing. It is critical that ambient noise such as HVAC, ballast noise, etc. be controlled and that appropriate acoustical treatment be installed to control reverberation, minimize reflections, flutter echo and other acoustical issues that impair the microphone pickup.

2. Hard reflective wall or ceiling surfaces within 8’ or 2500mm of lectern or table top microphones should be avoided, and may require the addition of absorption or diffusion materials. The reflections from these surfaces will create audible artifacts or lower feedback thresholds.

3. In rooms with any length or width dimension less than 15’ or 5m, provide acoustical wall treatment between chair rail height and approximately 8’ or 2500mm AFF, on two adjacent walls to eliminate flutter echo.

4. Noise control measures must be undertaken to achieve a low background noise criteria (NC-25 to NC 30) to provide good speech intelligibility for both the local and remote listener. This includes noise from HVAC, lighting ballasts and exterior noise.

5. The reverberation time should not exceed 0.5 seconds (mid-band), to minimize artifacts in the conference audio.

Sound Isolation

6. To reduce the noise generated by the airflow of the HVAC system, we recommend a maximum of 1.52 metres per second or 300 feet per minute airflow velocity at the face of the diffusers, diffusers selected for low noise levels, and open diffusers with no dampers (or the dampers placed upstream of the diffuser by at least 10’ or 3m) and the downstream duct lined with fibreglass ductliner. Dampers should never be closed down more than 80% of maximum to prevent excess turbulence-generated noise.

7. Select noise rating of the HVAC diffusers based on the actual design airflow, don't presume that they will meet their noise rating at any airflow. Take into consideration the total number of diffusers understanding that each doubling of the number of diffusers increases the overall noise level by 3dB.

Lighting

8. Lighting Style and Colour Temperature must be carefully designed, such that the overhead lighting has an 45-degree angle of incidence; a colour temperature of 3500 K to eliminate "raccoon eyes" & and dark shadows under the chin/nose and achieve the proper reproduction of skin tones in the video images.

9. Ambient light level must be suited to videoconferencing. A level of 80 foot candles is required on the subjects covered by the cameras, in order to achieve a minimum of video noise. A uniform backlight will also be required on the front wall (cyclorama wall wash) behind the presenters to improve the 3-D representation of presenters in the 2-D format of video.

10. For conferencing, perception (visibility, intelligibility and comfort) becomes an important factor of the design. Instructors/presenters will not feel comfortable in an overly illuminated or glaring environment and where they cannot see easily. The two main aspects of lighting for video conferencing are control of lighting in terms of quantity, color and distribution to produce a well defined picture and the comfort of the participants.

11. The regular lighting system should be zoned on separate circuits and controls, from the video lighting. Dimming is also required.

12. For smaller rooms the use of specifically designed, compact, dimmable, fluorescent indirect video lighting system is recommended. These recessed video lighting type devices are designed to provide adequate illumination for the participants while keeping the light levels at the front wall low (location of monitors or projected image), and keep direct light off the camera.

13. The reflected light from the walls should be slightly less than that from the faces of the individuals on camera. This is to provide some contrast while not creating exposure level difficulties for the camera.

14. A uniform video lighting backlight will also be required on the wall (cyclorama wall wash) behind the presenters to help give some depth of field to the video image. These lights should be on a dimming circuit.

15. Fluorescent light ballasts should be remote mounted in an adjacent room to minimize noise in the room. If there are any low voltage lighting devices in the room with integral transformers, they should be potted to prevent airborne or structure borne transformer noise from being introduced.

16. Any lighting of the room and the video lighting systems that falls on the videoconferencing displays should be separately switched.

17. Energy efficient standards are usually exempted for video conferencing rooms due to their special purpose and low utilization application.

18. The increased light levels may require more light fixtures or higher power, producing an elevated HVAC load.

Interior Design

19. The colour of the walls should be either grey or solid blue to provide visual definition to the presenter relative to the background. The purpose of the solid colour is to avoid adding unnecessary bandwidth to the video conferencing signal, and to avoid the reflected light from the background affecting colour quality of the images.

20. The colour of the table or lectern surfaces should be either antique white or a light grey colour to allow the 45-degrees light to bounce off the surface and reflect light upward helping to illuminate the faces of the presenters and eliminate the dark shadows under the chin/nose. This also minimizes changes in light quality when the participants place paper in front of themselves on the desk.

21. The light from potential the exterior windows create problems for video conferencing and for video presentation. Blackout blinds will be required for these windows to make it possible to display video or use a video camera in this location.

22. The A/V equipment rack requires a suitable lockable storage room or lockable millwork within the room.

23. The A/V playback loudspeakers used for the incoming audio from live video-conferencing will require being located at the "Presentation" wall next to the videoconferencing displays. Loudspeaker positioning also has to be based on providing optimum uniformity and coverage.

24. The cameras require wall/ceiling positioning for appropriate image angles and complete visual coverage for all different educational usage scenarios. Specifically designated positions in the walls & ceilings are required to accommodate the cameras.

25. The room front wall width should be adequate to accommodate two displays or projection screens in a side by side layout. For a typical seminar room, each screen of the two side-by-side screens will require the width being equal to one fifth of the room depth (to the most distant viewer, typically the back row) in order to provide adequate legibility for all viewers.

26. The nominal optimum horizontal viewing angle is +/-45 degrees from the centre-line to provide good legibility for the audience, including the most distant viewer & the front row.

27. The vertical viewing angle should not exceed 30 degrees from any of the audience seating positions. This will require the front row to be located at least 1.5 times the display width from the front wall.

References:

1. Architectural Acoustics by David Egan ISBN # 0-07-019111-5

2. Video Engineering by Arch Luther ISBN # 0-07-135017-9

3. ANSI S12.60-2002 Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools

Video-conferencing Systems Guidelines

Desktop videoconferencing systems

Desktop Video-conferencing Systems (such as the Tandberg 1700 shown in the image below) are designed to be used by 1-2 participants, and typically provide the following features & functionality:

- Format: Desktop, Small Meeting Rooms and Offices
- Group Size: 1-2
- Display Size: Single 20" Widescreen LCD
- Audio: Integrated Speakers
- Camera: Compact HD, Manual Tilt, Manual Focus, 65 Degree Horizontal Field of View
- Multi-site hosting capabilities for up to 3 remote sites
- Network Protocols and Bandwidth: 2 Mbps H.323 or SIP, H.264, 2.3 Mbps Multi-site
- Dual Display: camera/remote sites and PC content
- PC Monitor/ Video Input: DVI-I + Audio
- PC Input Using VNC: Yes

Suitable for use with 1 to 2 participants, on a receiving connection. Not recommended for hosting multipoint calls of more than 3 participating sites.

Side-by-side layout shows the 5+1 multipoint image on the left, with the Duo channel (far end computer) video on the right

Alternative layout showing the remote PC, the connected sites (cameras) and the local camera (confidence monitor)

The desktop system can also provide a full screen display of the PC signal (local or remote PC) or the videoconferencing main channel with all participating sites in either 'quad-split' or a '5+1' layout.

Stand-alone Single Display videoconferencing System

Stand-alone single display Video-conferencing Systems (such as the Tandberg 3000 shown in the image below) are designed to be used by 2-4 participants, and typically provide the following features & functionality:

- Format: Freestanding Roll-About, Codec behind display
- Group Size: 2-4
- Display Size: Single 42” Plasma
- Audio: Integrated Speakers
- Camera: Motorized pan/tilt/zoom camera, 74 Degree Horizontal Field of View
- Multi-site hosting capabilities: 4 Video
- Multi-Site Features: Audio Rate matching, Transcoding
- Network Protocols and Bandwidth: H.320, 2 Mbps IP (H.323 or SIP), H.264
- Dual Display: H.239 Dual Stream, DuoVideo, Emulation (split image on built-in monitor)
- PC Monitor/ Video Input: DVI-I + Audio
- Document Camera Input: Yes – Composite Video
- VCR/DVD Input: Yes
- PC Input Using VNC: Yes
- Wireless LAN: Yes

This type of videoconferencing systems is suitable for administrative type videoconferencing meeting use, with up to 4 local participants. Bandwidth limitations affect its ability to host multi-site calls with more than 3 participating sites, and there is no ability to add a secondary monitor on an RGB connection (required to display native resolution of computer based signal sent via the ‘duo’ channel).

Side-by-side layout shows the multipoint image on the left and the Duo channel (image from a DVD player) on the right.

This picture-outside-picture layout shows the main channel on the left, self view on the upper right and the far end video on the lower right

Tandberg Profile 6000 MXP

Stand-alone single large display Video-conferencing Systems (such as the Tandberg 6000 shown in the image) are designed to be used by 5-10 participants, or up to 20 with the addition of a second display, and typically provide the following features & functionality:

- Format: Freestanding, Codec in Column, Optional Wheel Base
- Group Size: 5-10, or 10-20 with two displays (optional)
- Display Size: Single 50" Plasma (second display, on separate stand, optional)
- Audio: Integrated Speakers, Optional Satellite Speakers
- Camera: Precision-HD PTZ, 74 Degree Horizontal Field of View
- Multisite Option: 4 Video, 3
- MultiSite Features: Audio Rate matching, Transcoding
- Network Protocols and Bandwidth: 4 Mbps IP(H.323 or SIP),6 Mbps in MultiSite
- Dual Display: H.239 Dual Stream, Duo-Video, Emulation (split image on built-in monitor), DVI-I and S-Video Output to Secondary Display
- PC Monitor/ Video Input: DVI-I + Audio
- Document Camera Input: S-Video + Audio
- VCR/DVD Input: Composite Video + Audio
- PC Input Using VNC: No
- Wireless LAN: No

This type of videoconferencing systems is suitable for administrative meeting or distributed academic session type videoconferencing use, with up to 10 local participants. The built-in videoconferencing CODEC provides multi-site hosting capabilities for up to 6 participating sites, and it also provides the ability to add a secondary monitor, on a separate stand, on an RGB connection (required to display native resolution of computer based signal sent via the 'duo' channel).

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Single display TB 6000 system with Picture-outside-Picture (POP) layout with the far end '5+1' split on the left, and the far end computer signal and the self view on the right. The order of the layout can be changed with a simple button push, displaying either the self view or the far end computer signal on the large image on the left

This image capture of a single display TB 6000 system, shows the side-by-side layout with the 5+1 multipoint image on the left and the far end XGA computer video on the right. With the addition of a second display both images can be shown on separate screens.

Tandberg Profile 8000 MXP

Stand-alone dual large display Video-conferencing Systems (such as the Tandberg 8000 shown in the image) are designed to be used by 10- 20 participants, and typically provide the following features & functionality:

- Format: Freestanding, Codec in Column
- Group Size: up to 20
- Display Size: Dual 50" Widescreen Plasmas
- Audio: Integrated Speakers, Optional Satellite Speakers
- Camera: PrecisionHD PTZ, 74 Degree Horizontal Field of View
- Multisite Option: 4 Video, 3
- MultiSite Features: Audio Rate matching, Transcoding
- Network Protocols and Bandwidth: 4 Mbps IP(H.323 or SIP),6 Mbps in MultiSite
- Dual Display: DVI-I to each of the Displays, DuoVideo, H.239 Dual Stream
- PC Monitor/ Video Input: DVI-I + Audio
- Document Camera Input: S-Video + Audio
- VCR/DVD Input: Composite Video + Audio
- PC Input Using VNC: No
- Wireless LAN: No

This unit provides the functionality and features similar to the aforementioned TB 6000 system equipped with a second display, with the advantages of being an all-in-one system. The system is similar in features and performance to the TB 6000, with the only difference being that the 8000 comes equipped with two 50 displays and a single, fixed stand (no wheels) to support the complete system

The main videoconferencing channel is displayed on the left display, while the second video channel (duo-channel) is displayed on the right screen. The 'duo-channel' is typically used for transmitting and displaying supporting materials such as DVD, document camera or computer generated type sources.

Image capture of a TB 8000 system with the main channel on the left display showing the participating sites in a 5+1 layout, while the right display shows the image of an object captured by a document camera at one of the remote participating sites.

Large seminar-room/boardroom integrated AV & Videoconferencing systems

Boardrooms or seminar rooms with a capacity of more than 20 and up to 50 participants require custom designed and integrated AV/video systems, which can range in cost from $ 100,000 to 400,000, depending on the functional and performance requirements, as well as the millwork requirements.

Additionally, integrated systems require dedicated AC outlets as well as conduit and back box infrastructure to be successfully integrated into the room. Creating a suitable videoconferencing room environment, such as lighting, room, acoustics and noise control are of particular importance in larger rooms, however, implementing these important measures can be very expensive, particularly when existing rooms require being converted to videoconferencing suitable facilities.

Video-conferencing Systems Budget Estimates

Desktop videoconferencing systems

Tandberg 1700, with all software options, including installation app $ 14,000, incl taxes

Stand-alone Single Display videoconferencing Systems

Tandberg 3000, with all software options, including installation app $ 29,500, incl taxes

Tandberg 6000, with all software options, including installation app $ 45,000, incl taxes

- *Option for TB 6000, second 50" display with stand app $ 6,000, incl taxes*

Tandberg 8000, with all software options, including installation app $ 60,000, incl taxes

Extended Warranty and service contracts are not included, please contact the Media Group for more information

Large seminar-room/boardroom integrated AV & Videoconferencing systems

Please contact with the UBC Media Group, Mr Tony Voon, Director, at 604 822 5763, for a consultation and budget estimate