

# AUDIO FOR COMMITTEE ROOMS

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## 1. INTRODUCTION

Audio services for committee rooms are paramount to the success of discussions. For governments, the successful distribution of the spoken word is also very important. Committees are used to discuss bills, government policy and party strategies. To properly implement a long-term solution for integrating technology into committee rooms, a prototype committee room was built. This unique opportunity allowed many facets of the room to be tested and configured. This was especially important for determining the accommodation requirements for multimedia devices in the room, such as television cameras and large-screen projection.

Of particular interest was testing a digital delegate system. Existing infrastructure for committee rooms uses technology from the late 1970s. The prototype would allow testing of current technology and determining if it would be appropriate. The prototype room would also allow for testing sound reinforcement in a broadcast environment. Traditionally, larger committee rooms require sound reinforcement. However, as many committees are televised, it is important to ensure that any sound reinforcement in the room does not have a negative affect on televising.

## 2. GENERAL LAYOUT



Figure 1 - Room Layout

Figure 1 shows the general layout of the room. A Simultaneous Interpretation Booth, a Multimedia Control Room and a Multimedia Equipment Room are located at the front of the room. A pair of projection screens is located near the front of the room on the left and right sides. Six cameras are used to capture the proceedings. A large table is in the centre of the room; public seating is at the rear. Each position in the room is equipped with a listening station; this is required to provide simultaneous interpretation. At the large table, the listening station is integrated with a delegate station. The delegate station includes a microphone and small loudspeaker for sound reinforcement.

## 3. DELEGATE SYSTEM

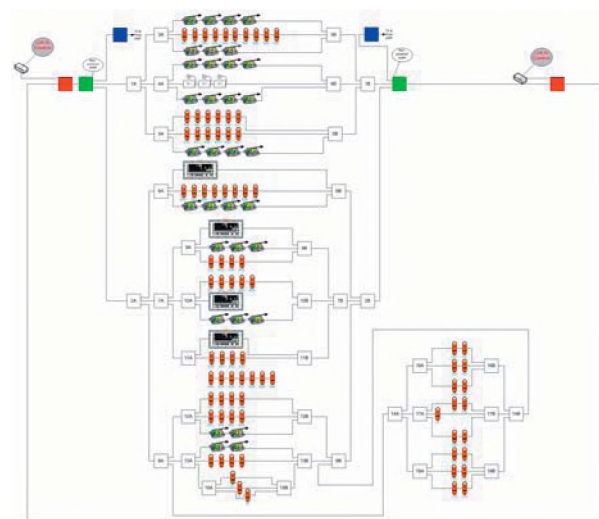


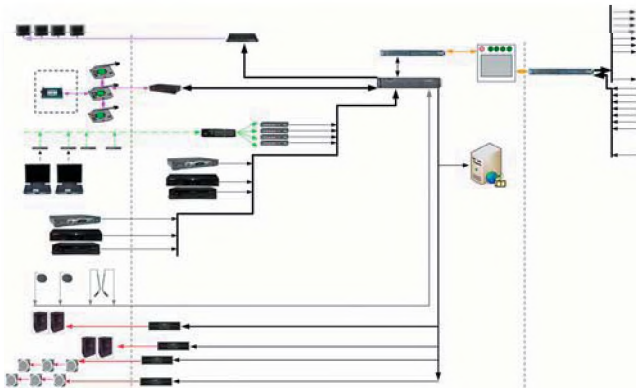
Figure 2 - Digital Delegate System

Figure 2 shows the block diagram of the delegate system. Of interest in the design of this system is the redundant loop. This is one of the main requirements of this system – it must be able to withstand failures and continue operating. In this case, there are redundant controllers, power supplies, interface boxes (for access to external audio systems) and cabling paths. The failure of any single device will have no affect on the overall system – it must continue to operate. This design philosophy allows proceedings to continue while hardware is repaired or replaced.

Access to other audio systems was provided via an analog interface device. This allowed any of the system channels to be delivered to external systems. This was used to

provide audio for conferencing, sound reinforcement (both ceiling loudspeaker and infrared) and television. Inputs to the system were also used to provide audio from conferencing, presentation materials and ambient room sound for the interpreters. These signals were delivered via the DSP system.

#### 4. DSP SYSTEM



**Figure 3 - Audio Block Diagram**

The DSP system provided two main functions: routing and processing; as can be seen in **Figure 3**. As can be seen in the diagram, the major purpose of this system is the routing of signals within the room and to the central control area. Of interest is the “stove” like device near the upper right corner of the diagram. This is used to “lock-out” signals leaving the room; in certain situations, it is imperative that discussions be held in confidence. In order to ensure that electronic eavesdropping is not possible, all signals leaving the room are severed. In the prototype, this was done by de-powering Ethernet hubs which were carrying Cobranet traffic. This removed the committee room from the central control area. Other systems were also locked-out using similar techniques.

One interesting result from the prototype was the discovery of a loss of synchronization between the video and audio from the room, with the video being delayed to the audio. It was determined that there was a six-frame delay of the video. This was perceptible to the trained eye and was particularly noticeable when viewing a video conference. It was thought that the delay was caused by cascading of several video format conversions. In the case of a video conference, the far-end video signal passed through more processing devices than the committee room camera feeds, thus increasing the overall delay.

Each signal conversion adds one or two frames of delay (33 or 66 ms) to the video signal. By comparison, the audio delay is very short; latency for audio conversions is approximately 10 ms. In a traditional broadcast plant environment, the audio is usually bundled with the video in an SDI chain – which will aid in synchronizing the two signals. In the prototype, audio was handled separately as

there are numerous channels. Also, the video signals from the cameras pass through the committee room to a central control area, where all camera switching is done. Operators in this location do not control all aspects of the room audio, thus it is not possible to include the audio feeds with the video feeds.

It is a relatively simple matter to introduce additional delay through the DSP to resynchronize the audio and video.

#### 5. RESULTS

The prototype systems were demonstrated to the various stakeholders. Each group was brought in separately and a run through of the various systems was done. Once all of the groups were brought in, their input was used to change aspects of the system.

In general, all groups were pleased with the room and were happy with the results. One area of particular concern was with ambient sound in the multimedia control room. Two operators work in this room, one of whom controls the microphones in the room. Traditionally, they work inside a committee room. In the prototype, they worked behind glass and required ambient sound. The initial results indicated that there was not enough a sense of direction from the playback system. Thus, an additional microphone pair was tested on the front wall of the room. This augmented the existing pair in the ceiling above the middle of the table. The results were then demonstrated and a difference was noted. The pair over the table offered better intelligibility at the expense of a sense of direction. The pair on the front wall offered better direction, but did not achieve the same level of fidelity. It is likely that both will be installed in future rooms and the operator will be able to choose which pair to use for monitoring.

#### 6. CONCLUSION

In conclusion, the prototype offered a unique opportunity to test multimedia systems and integration techniques. A consensus was achieved and the task of designing systems will be much easier now that a baseline has been established for multimedia systems and integration techniques.



**Figure 4 - The Prototype, looking toward the front of the room**