

Capturing and Playing Multimedia Events with STREAMS

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STREAMS is a prototype application designed and implemented at Bellcore to support the recording and playback of technical presentations, training sessions, and meetings. During playback STREAMS lets users make choices about how the recorded information is to be presented. To further aid users, STREAMS incorporates powerful searching techniques for locating information in audio and video streams.

STREAMS is based on digital storage of multiple streams. A stream is typically an audio track or a (silent) video track. Streams are stored independently, but share a common dimension — time. This common dimension is used to synchronize the streams during playback, browsing, and searching.

The driving paradigm of STREAMS is to empower the user to make intelligent choices. STREAMS lets the user (implicitly) allocate resources by controlling playback. For example, the user can turn off playback of a video stream, increase the quality of the audio, or decrease the frame size of another video stream. STREAMS also empowers the user

by providing searching mechanisms designed to enable rapid browsing so users can quickly identify points of interest.

While our primary goal with STREAMS is to improve the capture and playback of events such as meetings and lectures, STREAMS can be viewed as a multimedia authoring tool. Multimedia authoring is currently an expensive task. It is only cost effective to author multimedia products that have a large market. It may be practical, however, to use STREAMS to prepare multimedia instructional material for narrow markets. An educator could capture a lecture and annotate it with prepared text and graphics. While this approach might not produce material that is as rich and compelling as a carefully authored multimedia presentation, it can rapidly generate large libraries of instructional multimedia presentations.

The video tape shows an auditorium at Bellcore that is one of the environments in which STREAMS events are captured. The auditorium has been outfitted with traditional

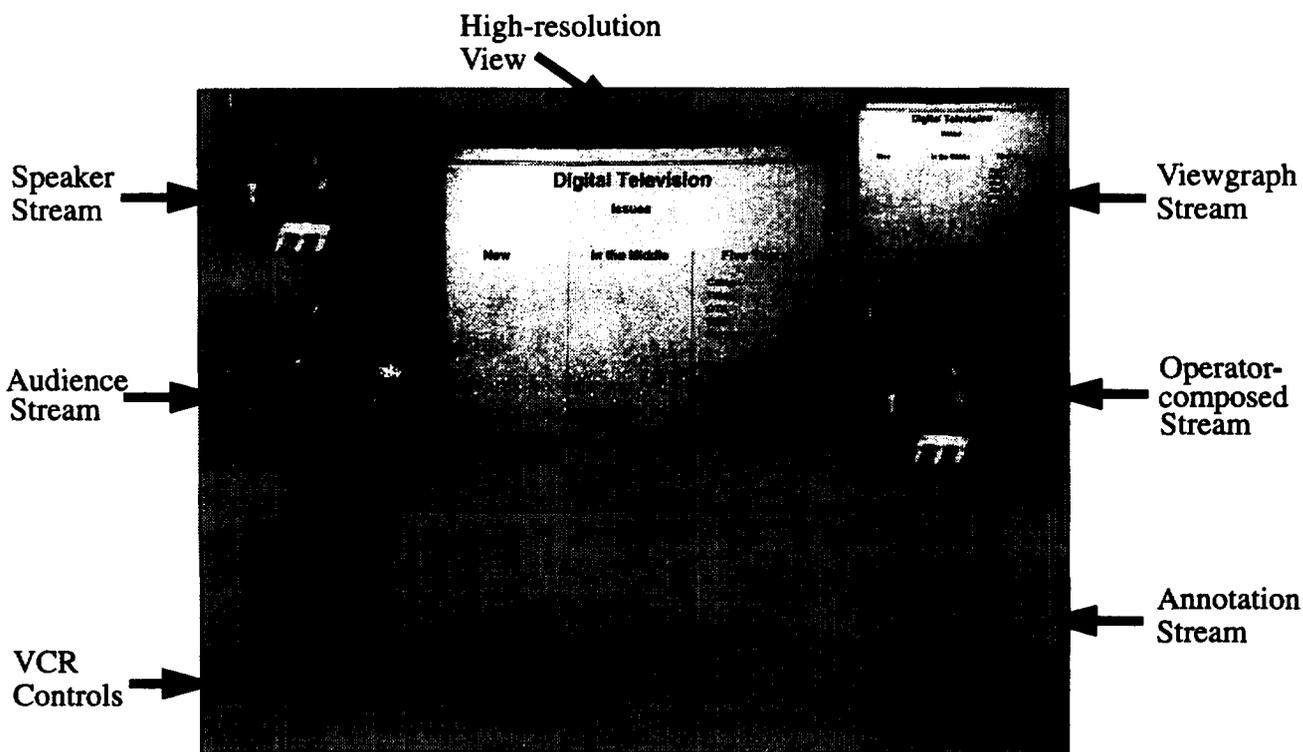


Figure 1. Sample interface for STREAMS prototype.

media capture equipment (i.e., video cameras and microphones), in order to capture multiple streams for each event. The video briefly describes the types of processing that are done to take the media from the original analog form to the digital form used by STREAMS. This includes media specific compression such as H.261 for motion video and source specific processing such as automatically removing redundant frames from video of the view graphs.

The video goes on to show how STREAMS can be used to play back a recorded event. STREAMS supports VCR-like traversal methods such as play, pause, and rewind, as well as random jumps. STREAMS goes beyond these traditional searching and accessing methods to provide media and

source specific searching tools that allow users to rapidly locate sections of interest and then play back these sections at full fidelity. The searching tools are optimized to the type of media being searched (e.g., video, audio, text annotation) and to the source (e.g., video of speaker vs. video of view graphs).

Figure 1 shows the playback user interface for STREAMS as shown in the video tape. There are four visual preview streams. The user can select one of these streams for presentation at a higher resolution and frame rate. In addition, a stream showing audio and text comments inserted by other users who have previously viewed this record is displayed.