Video On Demand Essay, Research Paper

Video on Demand

Video on Demand (VOD) has been actively pursued for the past several years. VOD would accomplish three distinct purposes in terms of community service. These include interactive distance learning, video conferencing, and entertainment. While it is the first two, video conferencing and interactive distance learning, which would serve to the best advantage in terms of education and business; it is the last, entertainment which has the most appeal to the largest number of people. The application of video on demand in terms of education and business is currently being utilized in remote learning programs and company training programs around the nation.

Video on demand can take many forms. In the simplest of forms it is a series of Video Cassette Recorders (VCR) located in a control station which are networked to either homes, classrooms, motel rooms, etc. The customer simply calls in their order and a technician retrieves the tape and plays it over the centrally located VCR. This setup and slightly more complex ones which operate under similar procedures, with customers ordering only individual programs, are referred to as one-way multicast (Shenoda). Video on demand is particularly adapted to “narrowcasting” the ability of the networks to economically present specialized television programming even for small audiences (O’Brien).

Transport Standards

Video on Demand is supported by two major systems and transport standards: Telecommunication Union-Telephony (ITU-T) Recommendation H.320 Audiovisual Systems specifications and related standards and Motion Picture Experts Group (MPEG) systems and standards (Shenoda). Both ITU-T and MPEG were developed with the purpose of supporting compression and encoding of video and audio signals (Shenoda). They were also developed to those signals with data/graphics and control signals as well as others and to transport those through the networks which are already in existence today (Shenoda).

It is the H.320 specification which is most applicable for narrowband time-division multiplexed (TDM) networks (Shenoda). MPEG on the other hand is more suited to broadband packet-oriented networks and it is these networks which maintain end-to-end quality of service (Shenoda). A third type of specification is motion JPEG but this specification, while it is useful in high-quality video such as that utilized in studio program presentation, is of less general interest due to the high amount of bandwidth it consumes (Shenoda).

An underlying physical layer and an overlying H.221 framing standard is recommended for ITU-T H.320 (Shenoda). Shenoda also reveals that:

“Above framing reside H.230 control signals, the G.7xx suite of digitized-audio protocols, and the H.261 codec standard for digitized video. Data or other information can be multiplexed with video and audio using the H.221 framing standard.

H.320 specifies the system reference configuration and basic requirements. It is based on encoding the program elements to fit in a P x 64-kbit/second channel, which can be from 64 kbits/s to 1920 kbits/s. One or more channels are framed to fit standard transmission rates (T1 or E1) using the H.221 framing recommendation. (Shenoda)”.

It is the type of system described above by Shenoda which most often finds its utilization in current distance-learning and videoconferencing applications such as that which will be described below. These systems are able to relay reasonable quality video using higher-capacity channels of 1 Mbit/s or more while at the same time having the ability to utilize existing networks (Shenoda).

ITU-T recommends H.261 for videocompression in H.320 systems (Shenoda). This recommendation is based on constant video frame frequency sampling and block encoding where there are 625 to 525 lines of video and where “a block is a number of lines with a number of pixels per line” (Shenoda). Encoding allows the variance of the amount of information transmitted wit the final result being a variable quality of video as well at the receiving or decoding end (Shenoda). The intent of this setup is to allow the utilization of different but constant transmission rates (Shenoda). This allows the user to choose the transmission rate which is most economical in terms of maximizing video quality and of minimizing transport cost (Shenoda). Guidelines as to what is typical in this type of setup is that quality first becomes acceptable starting with 384 kbits/s and improves substantially at 1 Mbit/s and above (Shenoda). There are numerous other recommendations for multiplexing, voice compression, the utilization of dual cameras in teleconferencing applications, etc. (Shenoda).

MPEG differs form the above standards in that the protocol stack incorporates a “core physical layer, a network and transport adaptation overlay and several elements above network transport (Shenoda).” Other considerations include program streaming (multimedia multiplexing) which incorporated digitized audio utilizing ISO/IEC 13818-3 voice coding (Shenoda). Multimedia multiplexing also incorporates digitized video utilizing H.262 video codec and signals for user to user control (Shenoda).

MPEG is broken into MPEG-1 and MPEG-2 with the latter having the highest resolution and a richer syntax (Shenoda). MPEG-1, however, allows even lower transmission rates because of its ability to encode at even lower resolution (Shenoda). This is particularly useful for applications such as CD-ROMs (Shenoda). Numerous ITU and International Standards Organization are associated with MPEG (Shenoda).

On-line Application

Many of the standards which address clocking, synchronization, delay, packetization, adaptation layers and connection management and routing are currently in place and are in a constant state of evolution, others are being established (Shenoda). One interesting feature of these systems is their on-line application. This utilization offers not only long-distance learning but also the integration of data services and voice trunking. Software has been developed specifically for the purpose of networking classrooms to facilitate them to simultaneously pull files from the Internet and to enhance the learning experience (Shenoda).

On-line applications can be supported over existing ATM networks. Shenoda observes: “H.320 networks can be supported on ATM networks today, much like voice, using CES between terminals and MCUs. For example, ADC Kentrox AAC-3 equipment is used to support a distance-learning application among 40 schools, though not all schools are online yet. It offers interactive video teaching plus integration of data services and voice trunking on the same ATM network. Special software has been developed in the network control system to take care of the scheduling. At preprogrammed hours, the network control system reconfigures the ATM VCCs to interconnect the appropriate classrooms with each other, and set up the MCU to perform the proper redistribution of audiovisual signals. In the meantime, any class can simultaneously pull files from servers across the Internet via the gateway router. In this manner, information may be pulled from any Web server to the multiple classrooms participating in the session (Shenoda)”. While training and documentation for on-line systems is critical for its efficient use, database considerations are not significantly different from typical requirements nor are access and security requirements.

Business Applications

As businesses move from “Main Street” to a global presence, they experience more and more needs in terms of technology. Often times the various fractions of a business are spread across wide geographic areas and coordination between the various offices is easily disjointed. Technological advancements such as the telephone, e-mail, fax, and videoconferencing become the lifelines which connect one unit with the others. Videoconferencing is particularly useful in that it allows the transmission of visual clues which replicate those of traditional “face-to-face” interactions (Lantz).

Videoconferencing is an asset to communication and provides a service that no other technology can currently match in terms of the clear transmission of information. This includes both visual images of others involved in the conference and of data such as charts and spreadsheets which are being presented.

Educational Applications of Video on Demand

Educators have obtained the capability almost overnight to transform dry textbook learning into challenging and exciting interactive video coupled with prerecorded video. Many excellent examples of this type of utilization of video on demand are available today in businesses and schools across the country. One such example is an anti-violence program for schools designed to take advantage of the advances in television technology and of video on demand in particular. This program includes a specially designed curriculum referred to as “Take Two”. The “Take Two” curriculum distinguishes itself in many ways but one of the most amazing and effective of which is the provision of three virtual field trips (Lovett). Each of the three video field trips are interactive and fully utilize the capabilities of video on demand and its coupling with the more traditional media of prerecorded video tapes. The students who participate in the program are transported to various locations through the magic of interactive video and are exposed to conflicts which allow them to interact with experts in conflict resolution situations (Lovett). Each of the videos were aired over the local public broadcasting channel and participating schools were provided with more traditional support materials such as texts and worksheets to supplement the miracle of interactive video. The pre-recorded portions of the video virtual trip were interesting and captivating as well but it was the live on-air performances made possible by video on demand which served to make the experience most memorable and effective.

Because the “field trips” incorporated into the program were interactive the relative expense of the overall program was kept to a minimum. This allowed the development of curriculum which provided a variety of different experiences via video. The first “trip” took the students to the juvenile detention facility in Jacksonville where the students met with detention center staff where they viewed a video depicting life behind bars for young offenders (Lovett). Students were further made a part of the experience by being able to call or fax questions to the facility staff (Lovett). The preparatory material for this field trip exposed students to the concept that many when faced with conflict choose flight over fighting. Interactive video facilitated the introduction of a reformed runaway who was available to answer student questions (Lovett).

The second field trip introduced the students to the Duval County Sheriff who discussed the various ways that police officers incorporate conflict resolution into their duties (Lovett). Again, this “trip” utilized interactive video in addition to more conventional teaching methodologies. Students saw many of the same concepts regarding conflict resolution that were depicted in their curriculum and were again able to fax and call in questions. The third field trip concentrated on the potential consequences of unsuccessful conflict resolution and focused on the physical consequences of such failure (Lovett). These consequences were reinforced by interactive video featuring a doctor representing the trauma center at Jacksonville’s University Hospital and a staff member from a shelter for abused spouses and children (Lovett). As with the previous two videos students were allowed personal participation through calls and faxes (Lovett).

Conclusions

Although the concept of video on demand has been tossed around for some time and utilized on a small-scale basis it is not yet a viable commercial alternative on a large-scale basis (Shenoda). It will undoubtedly be Video on Demand’s utilization in business and application which will bring it to the forefront in terms of commercial applications directed toward entertainment.

Sources Cited

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