AFB

American Foundation for the Blind

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Incorporated in 1921

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July 18, 1996

Mr. William F. Caton, Secretary
Federal Communications Commission
Room 222, 1919 M Street, N.W.
Washington, D.C. 20554

Re: In the Matter of Closed Captioning and Video Description, MM Docket No.95-176

Dear Secretary Caton:

Enclosed are an original and four copies of the advance section of the final report submitted to the Department of Education by the American Foundation for the Blind entitled, "Project to Conduct Research on Described Video's Audience and Methods of Distribution."

In our original comments in response to the above captioned docket, we advised that we would make this follow-up information available.

Sincerely,

Alan M. Dinsmore

Alan M. Dinsmore
Senior Governmental Relations Representative

Enclosure(s)

AD/jc

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In keeping with our goal to achieve equality of information access for people who are blind or visually impaired, this document is available, upon request, in the following accessible formats: IBM computer diskette, braille, cassette, and large print.

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PROJECT TO CONDUCT RESEARCH ON DESCRIBED VIDEO'S AUDIENCE AND METHODS OF DISTRIBUTION

GRANT #H026G40001

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(ADVANCE SECTION OF THE FINAL REPORT TO THE UNITED STATES DEPARTMENT OF EDUCATION)

The mission of the American Foundation for the Blind is to enable persons who are blind or visually impaired to achieve equality of access and opportunity that will ensure freedom of choice in their lives. AFB accomplishes this mission by taking a national leadership role in the development and implementation of public policy and legislation, informational and educational programs, and quality services.

Background

AFB is the leading organization providing demographic and socioeconomic data on people who are blind or visually impaired in the United States. We have, since our inception in 1921, been interested in issues concerning that population's access to media. In recent years, as video description has become a viable option, AFB has taken a significant role in the burgeoning of these services. Video descriptions for television programs have been available since 1988. Described video cassettes have been available since 1991. These descriptions (also known as audio descriptions) have proven invaluable in making video programs accessible to blind and visually impaired viewers. In 1990, a meeting was coordinated by AFB to set up a dialogue among leaders in the description field. One result of that historic meeting was the AFB Press publication entitled "A Picture is Worth a Thousand Words for Blind and Visually Impaired Persons Too: An Introduction to Audiodescription", which discusses the history of description, and lists important organizations and phone numbers for people who are interested in more information.

Recently, AFB completed a study, "Adding Audio Description to Television Science Programs: Impact on Legally Blind Viewers," under a subcontract of National Science Foundation (NSF) grant number ESI-9253447 to the WGBH Educational Foundation. The NSF-funded study evaluated psychological, social, and cognitive impacts on blind and visually impaired people of described video on television science programs. The participants reported strong preference for adding description to programs. The 111 legally blind participants reported that they watch television but have strong awareness of missing information that is available to fully-sighted people. Majorities also reported that adding description makes programs more enjoyable, interesting, and informative. Further, carefully designed tests showed that participants who saw the described version of a program learned more about the content of the program than did those who saw the version without the added video description.

In keeping with AFB's mission to achieve equality of access to information for people who are blind or visually impaired, this document is available, upon request, in one or more of the following formats: electronic file, braille, large print, and audio recording.

In 1994, AFB received the two-year grant identified above to study described video's audience and methods of distribution from the Department of Education (DOE), Office of Special Education and Rehabilitative Services, under the Educational Media Research, Production Distribution, and Training Program. The Principal Investigator is Corinne Kirchner, Ph.D., Director of Programs and Policy Research, who is a leading expert on disability statistics, particularly on blindness and visual impairment. She was consultant to a 1992 study of the viewing habits and interests in science programming among people who are blind and visually impaired, and was also Principal Investigator on the NSF-funded grant referred to above. The Project Director for the current grant is Jaclyn Packer, Ph.D., who has wide research experience in the area of disability, using quantitative and qualitative research methodology.

This study investigated the actual and potential audiences for video description, and determined the range of methods of delivery that are potentially available. In order to address the issue of who the audience is, two surveys were conducted: a telephone survey of a representative sample of visually impaired individuals throughout the country, and a written survey (in large print and braille) of a sample of people currently on the mailing list of one of the large producers of video description. In addition, secondary analyses were conducted of major federal databases which contain relevant social-demographic information about people who are blind or visually impaired.

Current Methods of Distribution

Currently, there are two main methods of delivery of video description, referred to as "closed" and "open" description. "Closed" descriptions can be heard on a select number of programs by anyone owning a stereo television or VCR with SAP-capability, or by using an inexpensive set-top decoder. Programs with "open" descriptions are available on certain cable television networks. Open descriptions are mixed directly into the regular soundtrack, requiring no special equipment in order to be heard by the viewer.

Closed descriptions are currently available for several programs on 131 public television stations, and Turner Classic Movies (since April 1996). Open descriptions are available on Nostalgia Television, Kaleidoscope Television, throughout Canada on the Family Channel, and several hundred independent broadcast and cable affiliates throughout the United States, as well as throughout North America via satellite signal. There are also 140 open-described home videos available for borrowing, rent, or sale at the current time. All these outlets are increasing.

Because open descriptions are delivered as part of the main video program soundtrack, all viewers receive the description. Closed descriptions, on the other hand, must first be recorded onto a third audio channel of the master videotape and then inserted into the Secondary Audio Program, or SAP channel, of the broadcast signal prior to being transmitted to the viewer. While most broadcast network facilities are set up for stereo audio -- that is, two channels, left and right, networks have historically been hesitant to use SAP technology for descriptions because it would require large-scale retooling of their plants, at considerable expense, to accommodate the third audio channel. The exception is the Public Broadcasting Service (PBS),

which recently built a new broadcast facility that can handle three channels of audio. Only a few commercial network affiliates have designed their facilities to handle SAP; the extra audio capacity is not used for audio descriptions, but for foreign-language soundtracks (when it is used at all).

The arrival of technologies for the high-speed transmission of digital information promises a complete revolution in the way that Americans receive and send all forms of information, from television programs to newspapers. Although digital television (known as Advanced Television, or ATV) has not yet come into general use, other forms of digital communication, such as Direct Broadcast Satellite and the Internet, are already changing the way Americans receive video information. These digital technologies provide opportunities for alternative methods to deliver audio descriptions.

Policy Environment

The availability of, and access to, video description have become important policy issues, as evidenced by the amount of research and policy-relevant activity currently being undertaken concerning description. A moderate body of research exists on video description including studies conducted in both the United States and Europe, and this research base continues to expand.

Federal support for description services has been available in some form since 1988. Four agencies have provided a total of $10.5 million dollars in grants and contracts for activities ranging from research and development, start up, ongoing production, outreach, business development and evaluation research. Agencies funding description services include the Corporation for Public Broadcasting, the National Endowment for the Arts, the U.S. Department of Education (Office of Special Education Programs and the National Institute on Disability and Rehabilitation Research) and the National Science Foundation.

Currently, there is no statutory requirement for access to video descriptions comparable to the Television Decoder Circuitry Act of 1990. The Americans with Disabilities Act, passed in 1990, contains no specific language requiring the use of audio descriptions, primarily because broadcast descriptions of television programs had just come into being at the time the act was passed. However, on February 8, 1996, President Clinton signed the Telecommunications Act of 1996 which contains important language for blind and visually impaired television viewers. The new law requires the Federal Communications Commission to issue a report to Congress on the use of audio descriptions accompanying video programming "... in order to ensure the accessibility of video programming to persons with visual impairments..." That report will "assess appropriate methods and schedules for phasing video descriptions into the marketplace, (and) technical and quality standards for video descriptions...". The report will likely have a significant impact on the availability of described programming.

Study Approach

For the current Department of Education grant, one of AFB's priorities was to investigate the ways in which video description is currently being distributed, and to look into possible alternative methods. To this end, we subcontracted with the CPB/WGBH National Center for Accessible Media (NCAM) to investigate, and issue a report on, current and alternative methods for transmitting descriptions.

Created in July 1993, NCAM is an organization that works on issues related to making public media accessible to under-served populations including disabled persons, users of minority languages, and people with low literacy skills. NCAM's mission includes applying the power of new technologies to serve diverse constituencies and reaching out to groups now denied access to public media and developing common ground and technologies to serve them.

Under their subcontract, NCAM conducted a series of investigations including the following:

- Conducted an inquiry of public, commercial, and cable television stations currently equipped with SAP;

- Conducted an inquiry to determine the available space and feasibility of broadcasting open descriptions on cable television

- Determined which state-of-the-art digitally encoded and decoded audio can be accommodated within the standard NTSC Vertical Blanking Interval, a follow up of WGBH's 1991-92 study (An Investigation of Vertical Blanking Interval Audio Encoding for Technical Distribution of Television Programs Containing a Special Soundtrack for Blind and Visually Impaired Viewers. Research Rep. Grant #H133C10223. February 28, 1995. U.S. Department of Education, National Institute of Disability Rehabilitation and Research).

- Determined what other technologies presently exist for broadcast television that would allow delivery of digitally encoded audio;

- Conducted an inquiry of Radio Reading Services currently simulcasting described programs;

- Contacted National Public Radio and American Public Radio stations to determine where and by what means simulcasts are possible either on the main audio or sub-carrier frequencies of public radio;

- Investigated other potential -- and previously unexplored -- methods for distributing video description including high-quality phone delivery via an 800 number; high-bandwidth computer delivery; and distribution of audio cassettes and CD-ROMs;

- Produced a report on the status of Direct Broadcast Satellite television and the Advanced Television System being designed by the Federal Communications Commission as related to video description;

NCAM delivered its completed report to AFB on May 2, 1996. Earlier drafts had been shared with AFB and with members of our panel of advisors. Substantial feedback was shared with NCAM, who revised earlier drafts to incorporate our suggestions.

AFB's panel of advisors includes people with direct involvement in video description issues, engineering, telecommunications, media research, and disability statistics, including three advisors who are blind. Our Technical Experts Panel consists of:

Barry Jay Cronin, Ph.D., Director, Online Strategies & Editorial Concepts, (Formerly, Executive Director, Media Access Technology, WGBH, Boston, MA)

William A. Gerrey, Electrical Engineer, The Smith-Kettlewell Eye Research Institute, San Francisco, CA

Janice Jones, Media Research Analyst, Corporation for Public Broadcasting, Washington, DC

Mitchell P. LaPlante, Ph.D., Co-Director, Disability Statistics Rehabilitation Research and Training Center, University of California, San Francisco, CA

J. Elton Moore, Ph.D., Director, Rehabilitation Research and Training Center on Blindness and Low Vision, Mississippi State University, Mississippi State, MS

Lawrence A. Scadden, Ph.D., Senior Program Director, Programs for Persons with Disabilities, National Science Foundation, Arlington, VA

James L. Fischer, Director, System Planning and Integration, Ameritech New Media Enterprises, Chicago, IL (As of May 1996, Mr. Fischer is no longer with Ameritech, and has been replaced on our committee by Victor Nowakowski, Engineering Manager, Ameritech New Media)

In addition to the panel of advisors, Paul Schroeder, Chair of AFB's Initiative on Access to Electronic Information, serves as a valuable advisor on technical issues.

The following recommendations were developed with the input and approval of the Technical Experts Panel after carefully considering the report produced by NCAM, as well as drawing on their own expertise in the various related areas. Following our recommendations is a summary of alternative delivery methods from the NCAM report. The full report, which includes a more thorough discussion of each method, will be included as an appendix in AFB's final report to the Department of Education.

Recommendations

1. **Ensure that new digital transmission standards, e.g., ATV, and DBS, mandate specific "set-aside" of audio bandwidth capacity to accommodate video descriptions.**

Because implementation of ATV is still several years away, the FCC has the opportunity now to make provisions for accessibility of video programming via audio descriptions. Standards have been set and, once approved, will provide for multiple channels of audio. In view of the availability of significantly greater bandwidth capacity, reserving a portion of bandwidth specifically for the delivery of audio descriptions is practical and essential to ensure that this form of accessibility will be built into new and emerging digital transmission modes.

In addition, receiver manufacturers should be required to support simultaneous multi-channel audio-decoding capability so descriptions can be delivered separately from a program's main audio. Otherwise, the audio description channel will require greater bandwidth since it will have to include the main program audio as well. This dual decoding capability must be ensured throughout the full line of a manufacturers TV sets, not merely in the "high-end" sets. Access capabilities must not be limited to high-priced equipment. Dual decoding will also make the description process much cheaper because professional audio mixing sessions will not be necessary.

2. **Support a variety of methods to promote the delivery of audio descriptions on current video program distribution platforms.**

Since the shift from the current analog-based NTSC standard to digital transmission methods is still years away, it is critical that the FCC take action to support a variety of currently viable delivery methods. In addition, since the switch to ATV will be a gradual and lengthy process, analog delivery methods will still have to be supported, thus guaranteeing that methods put into use now will be viable for years to come. Giving viewers several options will only serve to increase the audience for descriptions, both for entertainment and educational uses.

   a. **Promote the use of "Secondary Audio Program (SAP)" and open description--which are already proven methods--to deliver video descriptions.**

   Estimates are that millions of SAP-equipped televisions are already in use by consumers and millions more will be sold in the coming years. Open descriptions are available on any television set. Until other methods are put into general use, open descriptions and SAP will continue to reach the widest audience. These forms of delivery should be supported even when new delivery methods are implemented, thus guaranteeing that consumers relying on older technologies will not lose access to descriptions.

b. Consider the use of the VBI to route descriptions around broadcast facilities, at both network and local levels.

Using the VBI would eliminate the expense of refitting broadcast plants to support a third audio channel. Since descriptions would still be delivered to the viewer via SAP, current consumer technology would not have to be altered. (While it might be possible to deliver VBI-encoded descriptions directly to the home, the viewer would incur additional cost to purchase a specialized decoding device.)

3. Explore other "short-term" methods such as datacasting, horizontal overscan or audio-only delivery.

Other methods may provide short-term solutions to the challenge of delivering audio descriptions. For example, transmission via datacasting or horizontal overscan may be effective and relatively easy to accomplish during the transition to digital television. However, delivery of descriptions only (without program audio), which must later be synchronized to program audio, cannot really be considered a practical idea at this time.

Under certain circumstances, audio-only delivery may provide a useful means of expanding access to video programs. Since this form of delivery would provide access to audio in situations where the use of a television is impractical such as while driving a car, it should be explored as a "universal" access option providing a benefit to the general audience. In any event, audio-only distribution should be seen as a supplement to, rather than a substitute for, methods which ensure integrated access to video programming for people who are blind or visually impaired.

4. Explore the uses of the Internet for delivery of descriptions.

The use of the World Wide Web to deliver audio and video is growing rapidly. At some point in the future, there will undoubtedly be a convergence of television and computers, making it possible to watch a television program while simultaneously accessing information about that program from the Web. It is unlikely that the Internet will replace television as the medium of choice for watching programs and movies, but it is becoming increasingly clear that it will be an alternative to television itself. While all blind and visually impaired viewers may not wish to use their computers to watch television programming, it would be wise to closely examine Internet delivery methods, especially to ensure that audio and video material delivered via the Internet is accessible to individuals with disabilities.

Summary of Alternative Delivery Methods

Under grant #H026G40001 from the U.S. Department of Education, the American Foundation for the Blind (AFB) commissioned the CPB/WGBH National Center for Accessible Media (NCAM) to research alternative methods for delivery of descriptions. These alternatives range from simple, readily available technologies to more complex methods which will require much research and development before they can be put into use. Below are brief summaries of each method including a description, an assessment of cost to both consumers and providers and additional comments.

Current Methods:

1. Secondary Audio Program (SAP) Technology (current delivery method for closed descriptions)

Description: Transmission of audio descriptions accomplished by the use of a third audio channel and the Secondary Audio Program, or SAP channel. Accommodation of this technology typically requires changes to network and local station plant wiring and equipment. To receive descriptions, the viewer needs a stereo television or VCR equipped with the SAP feature.

Consumer cost: Stereo VCRs or televisions range in price from a few hundred to several thousand dollars, depending on features.

Broadcaster cost: To the major networks, the cost may be as high as hundreds of thousands of dollars to refit their main facilities to carry a third channel of audio.

Comments: Viewers already receive audio descriptions on many public television stations using the SAP method, and have since 1990. The PBS network has altered its main facility to accommodate the third audio channel. The other major networks are generally unwilling to retrofit their facilities, or even to commit to using this extra audio capacity for descriptions. Future competition for other uses of the SAP channel may force broadcasters to choose between descriptions and, say, foreign-language translations.

2. Open-Description (Potentially an Open-Description Channel)

Description: Dedicated channel broadcasting only programs with open descriptions.

Consumer cost: This channel would presumably be a cable channel, so the consumer would be responsible for monthly cable charges.

Broadcaster cost: Since descriptions are a part of the regular program audio, no special equipment would be necessary to broadcast them.

Comments: The viewer would need no special equipment to hear descriptions. All programs would be described, but the channel may not be available to viewers in all areas. Could be used for educational purposes, and could reach a general audience with ease. Narrative Television Network (NTN) is already broadcasting open-described programs on Nostalgia Television, Kaleidoscope Television, throughout Canada on the Family Channel, and several hundred independent broadcast and cable affiliates throughout the United States, as well as throughout North America via satellite signal.

Hybrid Methods (for Current Analog Television Transmissions):

3. Vertical Blanking Interval (VBI)

Description: Carriage of digitized audio descriptions in a program's vertical blanking interval. Ideally used to route audio around a broadcast plant, thus eliminating the need to rewire the facility to accommodate a third audio channel. May also be used to transmit descriptions from network facilities to local affiliates. Descriptions would still need to be inserted into the SAP channel at the transmitter, prior to broadcast. May also be possible to deliver VBI-encoded descriptions directly to the viewer, bypassing the SAP channel.

Consumer cost: As with the SAP method, the viewer must have a stereo television or VCR equipped with the SAP feature. Such receivers can cost from a few hundred to several thousand dollars. (Should VBI-encoded descriptions be delivered directly to the viewer, a special decoder would need to be developed. Estimates are that such a device could cost the consumer as much as $200.

Broadcaster cost: VBI encoders cost approximately $4,000-$6,000.

Comments: Since the VBI is an integral part of the analog television signal, descriptions encoded there would be a normal part of the broadcast. However, the amount of space necessary in the VBI for high-quality data encoding- perhaps as many as three lines -- may not be available in all areas. One company has devised a way to encode acceptable-quality audio data using only one line, but this will limit the speed at which the descriptions can be encoded. (It is important to note that in the future, programs broadcast in the digital domain will not contain a VBI; rather, program and ancillary information will be sent as packets of data. See ATV, below.)

4. Datacasting

Description: Delivery of digitized audio to computers via the broadcast signal. Audio data are inserted into either the VBI or the visible portion of the picture and are received by the viewer's computer.

Consumer cost: Specialized hardware and software start at less than $100, excluding the cost of a computer, sound card, video line and other peripherals.

Broadcaster cost: Equipment available for lease for several hundred dollars.

Comments: Data transmitted in the VBI are invisible to the viewer but suffer from slow delivery rate; data sent in the visible picture can sometimes be seen by the viewer but the delivery rate is extremely fast. Data containing both program audio and descriptions can be delivered to viewer's computer prior to broadcast and listened to without video. Description-only data can be delivered prior to broadcast but the viewer would have to synchronize the descriptions to the program at broadcast time. Alternatively, the viewer could listen to the descriptions from the computer and watch the program on television, all in real time. This assumes that the computer and television are adjacent, which is not necessarily the case in all households. The complexities of such a system could prove problematic.

5. Horizontal Overscan

Description: Delivery of digitized program audio and descriptions in the horizontal blanking interval (HBI). Description data are inserted into the visible portion of the picture, but far enough off to the left or right to be excluded from the viewer's sight.

Consumer cost: Receivers cost approximately $30.

Broadcaster cost: Undetermined.

Comments: Currently, this method of delivering audio is used by one manufacturer of electronic talking dolls, known as "TV Teddy," which respond to data encoded in the HBI of videotapes. This method has not yet been used in a broadcast situation. Inserting data into the horizontal overscan portion of the picture may cause problems in older television receivers.

6. Intercast

Description: Delivery of data via the VBI to home computers.

Consumer cost: Intercast hardware and software will be included in most PCs sold after June, 1996. Retrofit PC cards will be available for less than $200.

Broadcaster cost: Undetermined.

Comments: Intercast operates at a data rate that is too slow to accommodate quality audio transmissions. Thus, it is not currently a viable option for delivery of audio descriptions.

Digital Methods:

7. Advanced Television (ATV)

Description: Digital method of delivering and viewing television programming, as opposed to the current analog method. ATV will accommodate multiple streams of audio for each program; one of these streams could be a description track.

Consumer cost: Because regulations are not yet final, cost of consumer ATV receivers are not yet known.

Broadcaster cost: Costs to refit broadcast facilities to support both digital and analog estimated to be in the millions of dollars.

Comments: Viewers will have the potential to choose from a variety of audio tracks for each program, one of which could be descriptions. Descriptions could be provided unmixed (to be mixed with program audio by the receiver) or pre-mixed with program audio, as they are today. Once standards are approved by the FCC, ATV implementation will take approximately seven to 15 years. Different ATV receivers will accommodate audio tracks in different manners, depending on the features included in the device.

8. Direct Broadcast Satellite (DBS)

Description: Digital television programming delivered from satellites directly to viewers, received with a stationary 18 inch dish. Can provide four channels of audio per program, with the likelihood of more in the future.

Consumer cost: Hardware costs approximately $1,000-$3,000, including decoding devices and satellite receiver.

Broadcaster cost: Undetermined.

Comments: DBS will probably be the way many viewers receive their first ATV transmissions. Multiple-channel audio capacity does not currently allow for unmixed delivery of audio, so descriptions would have to be mixed with program audio prior to broadcast. No formal standards exist for DBS; extra audio channels have not been dedicated for any specific use. DBS could also be used as an audio-only service, to deliver descriptions and program audio to a user's computer for playback at any time.

9. Integrated Services Digital Network (ISDN)

Description: Delivery of descriptions via a completely digital service which can carry a wide variety of information (phone, fax, computer, television, etc.) over a single interface.

Consumer cost: Approximately $1,000 for hardware and software, plus hourly and/or monthly service charges, which range from approximately $6 per hour to $26 per month or more, depending on service provider.

Broadcaster cost: Undetermined.

Comments: ISDN has the potential to make receiving many different kinds of information a simple process, using a single conventional copper wire or, in the improved B-ISDN form, a fiber cable. Standards exist but development has been slow and equipment is not yet widely available. Copper-wire version of ISDN is faster than current modem-based methods of exchanging data, but is not as fast as B-ISDN. As with video dialtone, slow development may cause ISDN to be surpassed by other technologies.

10. Internet

Description: Delivery of descriptions only or descriptions mixed with program audio via the World Wide Web.

Consumer cost: Minimum monthly charges range from $10 to $20 per month or more, depending on the service provider and how many hours the user is on-line. User must also have a computer, Internet browser software and modem (or direct connection).

Broadcaster cost: Undetermined.

Comments: As an audio-only service, the Internet could provide a relatively low-cost method of receiving and storing descriptions and program audio. Delivering unmixed descriptions alone, to be played back in conjunction with the program audio at the time of broadcast, would create problems of synchronization which may be impractical. Issues of rights to program soundtracks could prove difficult to negotiate.

11. Video Dialtone (VDT)

Description: Delivery of audio and video via telephone line, using digital technology.

Consumer cost: Undetermined.

Broadcaster cost: Undetermined.

Comments: VDT would give viewers access to video-on-demand services, which could allow the viewer to choose described programming specifically, when available. Development and implementation of VDT are somewhat unpredictable, partly due to the lack of regulations from the FCC. Consumer-level devices may not be available for three to five years, by which time other technologies may have superseded this one.

12. Digital Video Disc (DVD) (also known as Digital Versatile Disc)

Description: CD-sized disc which can hold enough data for up to four full-length movies. Has the capability to carry up to eight audio channels, one of which could be used for descriptions.

Consumer cost: Discs will cost approximately $25; DVD players approximately $599.

Broadcaster cost: Not relevant, since DVDs are intended for non-broadcast use.

Comments: DVDs could easily carry closed descriptions on one of the extra audio tracks, eliminating the need for an open-described version of the movie. However, the DVD standards committee did not commit any of the extra channels for specific use (for descriptions or foreign languages, for example).

Audio-only Methods:

13. Audio-only Receiver

Description: Portable device which would receive program audio and descriptions from the SAP channel.

Consumer cost: Approximately $90-$125, depending on features.

Broadcaster cost: No charge.

Comments: In many ways similar to a radio, an audio-only device would receive television audio only or, if the right model is purchased, radio and television audio. Described programs may be listened to by monitoring the SAP channel. This is a fairly simple method of delivery, provided the SAP channel continues to be used for descriptions. As with all audio-only services, issues of rights to program audio would be a problem.

14. Radio

Description: Delivery of program audio with descriptions using conventional radio signal transmission.

Consumer cost: Radios range in price from less than $20 to several thousand dollars, depending on features.

Broadcaster cost: Undetermined.

Comments: Broadcasting program audio with descriptions over radio would be one of the simplest methods of delivery. Radios exist in nearly every household in America. Difficulties with rights clearances and limited bandwidth available for new stations could prove problematic. Public radio stations might be willing to devote certain portions of their broadcast day to airing described soundtracks; however, no one has ever experimented with this idea.

15. Satellite Radio

Description: Delivery of digital audio programming from satellites directly to listeners. Signal is received via silver-dollar sized antenna.

Consumer cost: Approximately $10 per month, excluding hardware, depending on service provider. Designed primarily for listeners in cars equipped with special S-band radios; retrofit devices available for approximately $55. Home devices not yet available but are under development.

Broadcaster cost: Undetermined.

Comments: Satellite radio can provide as many as 30 music channels plus 20 channels for news, sports, talk shows and educational uses. The signal can reach virtually anywhere. Stations would be dedicated to specific types of programming 24 hours a day; thus, descriptions with program audio could potentially be dedicated to at least one station. The service could be used by anyone in a situation where a television is not appropriate. However, broadcasts cannot currently be localized. Carriage of descriptions on satellite radio would suffer from the same rights-clearance problems as other audio-only services.

16. Radio Reading Service (RRS)

Description: Delivery of program audio and descriptions via the already existing Radio Reading Service, using proprietary listening devices.

Consumer cost: Listening devices are provided free to certified blind or print-impaired users.

Broadcaster cost: No charge.

Comments: There are already 31 RRS stations which carry some described programs. The RRS audience is generally fairly small, so this method would not necessarily reach all those who need the service. Unless there were more than one RRS service in the area, the listener would have access to only one program at a time. (Tests are being conducted to carry multiple channels of

services over cable in Asheville, NC; this may allow for the carriage of one or more channels of program audio with descriptions.) Additionally, RRS is undergoing a period of change due to competition for subcarrier space from other data services, such as paging and Radio Broadcast Data Service (RBDS).

17. Telephone

Description: Delivery of descriptions via conventional telephone receiver.

Consumer cost: Service would be toll-free.

Broadcaster cost: The cost of supporting of a toll-free number varies from region to region, depending on telephone company. Local phone companies could provide equipment to broadcaster at no charge or for a rental fee.

Comments: Delivering descriptions via conventional telephone is a relatively low-tech, simple method. Telephones exist in nearly all homes in America. Sound quality would be relatively poor; tying up a user's phone line or holding a telephone handset up to one's ear for an entire program would be inconvenient.

18. Audio Cassette

Description: Delivery of descriptions and program audio on conventional or proprietary audio cassette.

Consumer cost: Potentially free or very inexpensive, depending on implementation. User must have a playback device.

Broadcaster cost: Undetermined.

Comments: As an audio-only service, this would provide a low-cost delivery method of program audio and descriptions. It may also have universal appeal, making it possible for anyone to listen to a program in situations where watching television is not practical. However, clearing rights to soundtracks will be very complex. One way around the rights problem would be to issue cassettes in a proprietary format, as is done currently with Recording for the Blind and Dyslexic or the National Library Service for the Blind and Physically Handicapped.

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Recently, AFB completed a study, "Adding Audio Description to Television Science Programs: Impact on Legally Blind Viewers," under a subcontract of National Science Foundation (NSF) grant number ESI-9253447 to the WGBH Educational Foundation. The NSF-funded study evaluated psychological, social, and cognitive impacts on blind and visually impaired people of described video on television science programs. The participants reported strong preference for adding description to programs. The 111 legally blind participants reported that they watch television but have strong awareness of missing information that is available to fully-sighted people. Majorities also reported that adding description makes programs more enjoyable, interesting, and informative. Further, carefully designed tests showed that participants who saw the described version of a program learned more about the content of the program than did those who saw the version without the added video description.

In keeping with AFB's mission to achieve equality of access to information for people who are blind or visually impaired, this document is available, upon request, in one or more of the following formats: electronic file, braille, large print, and audio recording.

In 1994, AFB received the two-year grant identified above to study described video's audience and methods of distribution from the Department of Education (DOE), Office of Special Education and Rehabilitative Services, under the Educational Media Research, Production Distribution, and Training Program. The Principal Investigator is Corinne Kirchner, Ph.D., Director of Programs and Policy Research, who is a leading expert on disability statistics, particularly on blindness and visual impairment. She was consultant to a 1992 study of the viewing habits and interests in science programming among people who are blind and visually impaired, and was also Principal Investigator on the NSF-funded grant referred to above. The Project Director for the current grant is Jaclyn Packer, Ph.D., who has wide research experience in the area of disability, using quantitative and qualitative research methodology.

This study investigated the actual and potential audiences for video description, and determined the range of methods of delivery that are potentially available. In order to address the issue of who the audience is, two surveys were conducted: a telephone survey of a representative sample of visually impaired individuals throughout the country, and a written survey (in large print and braille) of a sample of people currently on the mailing list of one of the large producers of video description. In addition, secondary analyses were conducted of major federal databases which contain relevant social-demographic information about people who are blind or visually impaired.

Current Methods of Distribution

Currently, there are two main methods of delivery of video description, referred to as "closed" and "open" description. "Closed" descriptions can be heard on a select number of programs by anyone owning a stereo television or VCR with SAP-capability, or by using an inexpensive set-top decoder. Programs with "open" descriptions are available on certain cable television networks. Open descriptions are mixed directly into the regular soundtrack, requiring no special equipment in order to be heard by the viewer.

Closed descriptions are currently available for several programs on 131 public television stations, and Turner Classic Movies (since April 1996). Open descriptions are available on Nostalgia Television, Kaleidoscope Television, throughout Canada on the Family Channel, and several hundred independent broadcast and cable affiliates throughout the United States, as well as throughout North America via satellite signal. There are also 140 open-described home videos available for borrowing, rent, or sale at the current time. All these outlets are increasing.

Because open descriptions are delivered as part of the main video program soundtrack, all viewers receive the description. Closed descriptions, on the other hand, must first be recorded onto a third audio channel of the master videotape and then inserted into the Secondary Audio Program, or SAP channel, of the broadcast signal prior to being transmitted to the viewer. While most broadcast network facilities are set up for stereo audio -- that is, two channels, left and right, networks have historically been hesitant to use SAP technology for descriptions because it would require large-scale retooling of their plants, at considerable expense, to accommodate the third audio channel. The exception is the Public Broadcasting Service (PBS),

which recently built a new broadcast facility that can handle three channels of audio. Only a few commercial network affiliates have designed their facilities to handle SAP; the extra audio capacity is not used for audio descriptions, but for foreign-language soundtracks (when it is used at all).

The arrival of technologies for the high-speed transmission of digital information promises a complete revolution in the way that Americans receive and send all forms of information, from television programs to newspapers. Although digital television (known as Advanced Television, or ATV) has not yet come into general use, other forms of digital communication, such as Direct Broadcast Satellite and the Internet, are already changing the way Americans receive video information. These digital technologies provide opportunities for alternative methods to deliver audio descriptions.

Policy Environment

The availability of, and access to, video description have become important policy issues, as evidenced by the amount of research and policy-relevant activity currently being undertaken concerning description. A moderate body of research exists on video description including studies conducted in both the United States and Europe, and this research base continues to expand.

Federal support for description services has been available in some form since 1988. Four agencies have provided a total of $10.5 million dollars in grants and contracts for activities ranging from research and development, start up, ongoing production, outreach, business development and evaluation research. Agencies funding description services include the Corporation for Public Broadcasting, the National Endowment for the Arts, the U.S. Department of Education (Office of Special Education Programs and the National Institute on Disability and Rehabilitation Research) and the National Science Foundation.

Currently, there is no statutory requirement for access to video descriptions comparable to the Television Decoder Circuitry Act of 1990. The Americans with Disabilities Act, passed in 1990, contains no specific language requiring the use of audio descriptions, primarily because broadcast descriptions of television programs had just come into being at the time the act was passed. However, on February 8, 1996, President Clinton signed the Telecommunications Act of 1996 which contains important language for blind and visually impaired television viewers. The new law requires the Federal Communications Commission to issue a report to Congress on the use of audio descriptions accompanying video programming "... in order to ensure the accessibility of video programming to persons with visual impairments..." That report will "assess appropriate methods and schedules for phasing video descriptions into the marketplace, (and) technical and quality standards for video descriptions...". The report will likely have a significant impact on the availability of described programming.

Study Approach

For the current Department of Education grant, one of AFB's priorities was to investigate the ways in which video description is currently being distributed, and to look into possible alternative methods. To this end, we subcontracted with the CPB/WGBH National Center for Accessible Media (NCAM) to investigate, and issue a report on, current and alternative methods for transmitting descriptions.

Created in July 1993, NCAM is an organization that works on issues related to making public media accessible to under-served populations including disabled persons, users of minority languages, and people with low literacy skills. NCAM's mission includes applying the power of new technologies to serve diverse constituencies and reaching out to groups now denied access to public media and developing common ground and technologies to serve them.

Under their subcontract, NCAM conducted a series of investigations including the following:

- Conducted an inquiry of public, commercial, and cable television stations currently equipped with SAP;

- Conducted an inquiry to determine the available space and feasibility of broadcasting open descriptions on cable television

- Determined which state-of-the-art digitally encoded and decoded audio can be accommodated within the standard NTSC Vertical Blanking Interval, a follow up of WGBH's 1991-92 study (An Investigation of Vertical Blanking Interval Audio Encoding for Technical Distribution of Television Programs Containing a Special Soundtrack for Blind and Visually Impaired Viewers. Research Rep. Grant #H133C10223. February 28, 1995. U.S. Department of Education, National Institute of Disability Rehabilitation and Research).

- Determined what other technologies presently exist for broadcast television that would allow delivery of digitally encoded audio;

- Conducted an inquiry of Radio Reading Services currently simulcasting described programs;

- Contacted National Public Radio and American Public Radio stations to determine where and by what means simulcasts are possible either on the main audio or sub-carrier frequencies of public radio;

- Investigated other potential -- and previously unexplored -- methods for distributing video description including high-quality phone delivery via an 800 number; high-bandwidth computer delivery; and distribution of audio cassettes and CD-ROMs;

- Produced a report on the status of Direct Broadcast Satellite television and the Advanced Television System being designed by the Federal Communications Commission as related to video description;

NCAM delivered its completed report to AFB on May 2, 1996. Earlier drafts had been shared with AFB and with members of our panel of advisors. Substantial feedback was shared with NCAM, who revised earlier drafts to incorporate our suggestions.

AFB's panel of advisors includes people with direct involvement in video description issues, engineering, telecommunications, media research, and disability statistics, including three advisors who are blind. Our Technical Experts Panel consists of:

Barry Jay Cronin, Ph.D., Director, Online Strategies & Editorial Concepts, (Formerly, Executive Director, Media Access Technology, WGBH, Boston, MA)

William A. Gerrey, Electrical Engineer, The Smith-Kettlewell Eye Research Institute, San Francisco, CA

Janice Jones, Media Research Analyst, Corporation for Public Broadcasting, Washington, DC

Mitchell P. LaPlante, Ph.D., Co-Director, Disability Statistics Rehabilitation Research and Training Center, University of California, San Francisco, CA

J. Elton Moore, Ph.D., Director, Rehabilitation Research and Training Center on Blindness and Low Vision, Mississippi State University, Mississippi State, MS

Lawrence A. Scadden, Ph.D., Senior Program Director, Programs for Persons with Disabilities, National Science Foundation, Arlington, VA

James L. Fischer, Director, System Planning and Integration, Ameritech New Media Enterprises, Chicago, IL (As of May 1996, Mr. Fischer is no longer with Ameritech, and has been replaced on our committee by Victor Nowakowski, Engineering Manager, Ameritech New Media)

In addition to the panel of advisors, Paul Schroeder, Chair of AFB's Initiative on Access to Electronic Information, serves as a valuable advisor on technical issues.

The following recommendations were developed with the input and approval of the Technical Experts Panel after carefully considering the report produced by NCAM, as well as drawing on their own expertise in the various related areas. Following our recommendations is a summary of alternative delivery methods from the NCAM report. The full report, which includes a more thorough discussion of each method, will be included as an appendix in AFB's final report to the Department of Education.

Recommendations

1. **Ensure that new digital transmission standards, e.g., ATV, and DBS, mandate specific "set-aside" of audio bandwidth capacity to accommodate video descriptions.**

Because implementation of ATV is still several years away, the FCC has the opportunity now to make provisions for accessibility of video programming via audio descriptions. Standards have been set and, once approved, will provide for multiple channels of audio. In view of the availability of significantly greater bandwidth capacity, reserving a portion of bandwidth specifically for the delivery of audio descriptions is practical and essential to ensure that this form of accessibility will be built into new and emerging digital transmission modes.

In addition, receiver manufacturers should be required to support simultaneous multi-channel audio-decoding capability so descriptions can be delivered separately from a program's main audio. Otherwise, the audio description channel will require greater bandwidth since it will have to include the main program audio as well. This dual decoding capability must be ensured throughout the full line of a manufacturers TV sets, not merely in the "high-end" sets. Access capabilities must not be limited to high-priced equipment. Dual decoding will also make the description process much cheaper because professional audio mixing sessions will not be necessary.

2. **Support a variety of methods to promote the delivery of audio descriptions on current video program distribution platforms.**

Since the shift from the current analog-based NTSC standard to digital transmission methods is still years away, it is critical that the FCC take action to support a variety of currently viable delivery methods. In addition, since the switch to ATV will be a gradual and lengthy process, analog delivery methods will still have to be supported, thus guaranteeing that methods put into use now will be viable for years to come. Giving viewers several options will only serve to increase the audience for descriptions, both for entertainment and educational uses.

   a. **Promote the use of "Secondary Audio Program (SAP)" and open description--which are already proven methods--to deliver video descriptions.**

   Estimates are that millions of SAP-equipped televisions are already in use by consumers and millions more will be sold in the coming years. Open descriptions are available on any television set. Until other methods are put into general use, open descriptions and SAP will continue to reach the widest audience. These forms of delivery should be supported even when new delivery methods are implemented, thus guaranteeing that consumers relying on older technologies will not lose access to descriptions.

b. Consider the use of the VBI to route descriptions around broadcast facilities, at both network and local levels.

Using the VBI would eliminate the expense of refitting broadcast plants to support a third audio channel. Since descriptions would still be delivered to the viewer via SAP, current consumer technology would not have to be altered. (While it might be possible to deliver VBI-encoded descriptions directly to the home, the viewer would incur additional cost to purchase a specialized decoding device.)

3. Explore other "short-term" methods such as datacasting, horizontal overscan or audio-only delivery.

Other methods may provide short-term solutions to the challenge of delivering audio descriptions. For example, transmission via datacasting or horizontal overscan may be effective and relatively easy to accomplish during the transition to digital television. However, delivery of descriptions only (without program audio), which must later be synchronized to program audio, cannot really be considered a practical idea at this time.

Under certain circumstances, audio-only delivery may provide a useful means of expanding access to video programs. Since this form of delivery would provide access to audio in situations where the use of a television is impractical such as while driving a car, it should be explored as a "universal" access option providing a benefit to the general audience. In any event, audio-only distribution should be seen as a supplement to, rather than a substitute for, methods which ensure integrated access to video programming for people who are blind or visually impaired.

4. Explore the uses of the Internet for delivery of descriptions.

The use of the World Wide Web to deliver audio and video is growing rapidly. At some point in the future, there will undoubtedly be a convergence of television and computers, making it possible to watch a television program while simultaneously accessing information about that program from the Web. It is unlikely that the Internet will replace television as the medium of choice for watching programs and movies, but it is becoming increasingly clear that it will be an alternative to television itself. While all blind and visually impaired viewers may not wish to use their computers to watch television programming, it would be wise to closely examine Internet delivery methods, especially to ensure that audio and video material delivered via the Internet is accessible to individuals with disabilities.

Summary of Alternative Delivery Methods

Under grant #H026G40001 from the U.S. Department of Education, the American Foundation for the Blind (AFB) commissioned the CPB/WGBH National Center for Accessible Media (NCAM) to research alternative methods for delivery of descriptions. These alternatives range from simple, readily available technologies to more complex methods which will require much research and development before they can be put into use. Below are brief summaries of each method including a description, an assessment of cost to both consumers and providers and additional comments.

Current Methods:

1. Secondary Audio Program (SAP) Technology (current delivery method for closed descriptions)

Description: Transmission of audio descriptions accomplished by the use of a third audio channel and the Secondary Audio Program, or SAP channel. Accommodation of this technology typically requires changes to network and local station plant wiring and equipment. To receive descriptions, the viewer needs a stereo television or VCR equipped with the SAP feature.

Consumer cost: Stereo VCRs or televisions range in price from a few hundred to several thousand dollars, depending on features.

Broadcaster cost: To the major networks, the cost may be as high as hundreds of thousands of dollars to refit their main facilities to carry a third channel of audio.

Comments: Viewers already receive audio descriptions on many public television stations using the SAP method, and have since 1990. The PBS network has altered its main facility to accommodate the third audio channel. The other major networks are generally unwilling to retrofit their facilities, or even to commit to using this extra audio capacity for descriptions. Future competition for other uses of the SAP channel may force broadcasters to choose between descriptions and, say, foreign-language translations.

2. Open-Description (Potentially an Open-Description Channel)

Description: Dedicated channel broadcasting only programs with open descriptions.

Consumer cost: This channel would presumably be a cable channel, so the consumer would be responsible for monthly cable charges.

Broadcaster cost: Since descriptions are a part of the regular program audio, no special equipment would be necessary to broadcast them.

Comments: The viewer would need no special equipment to hear descriptions. All programs would be described, but the channel may not be available to viewers in all areas. Could be used for educational purposes, and could reach a general audience with ease. Narrative Television Network (NTN) is already broadcasting open-described programs on Nostalgia Television, Kaleidoscope Television, throughout Canada on the Family Channel, and several hundred independent broadcast and cable affiliates throughout the United States, as well as throughout North America via satellite signal.

Hybrid Methods (for Current Analog Television Transmissions):

3. Vertical Blanking Interval (VBI)

Description: Carriage of digitized audio descriptions in a program's vertical blanking interval. Ideally used to route audio around a broadcast plant, thus eliminating the need to rewire the facility to accommodate a third audio channel. May also be used to transmit descriptions from network facilities to local affiliates. Descriptions would still need to be inserted into the SAP channel at the transmitter, prior to broadcast. May also be possible to deliver VBI-encoded descriptions directly to the viewer, bypassing the SAP channel.

Consumer cost: As with the SAP method, the viewer must have a stereo television or VCR equipped with the SAP feature. Such receivers can cost from a few hundred to several thousand dollars. (Should VBI-encoded descriptions be delivered directly to the viewer, a special decoder would need to be developed. Estimates are that such a device could cost the consumer as much as $200.

Broadcaster cost: VBI encoders cost approximately $4,000-$6,000.

Comments: Since the VBI is an integral part of the analog television signal, descriptions encoded there would be a normal part of the broadcast. However, the amount of space necessary in the VBI for high-quality data encoding- perhaps as many as three lines -- may not be available in all areas. One company has devised a way to encode acceptable-quality audio data using only one line, but this will limit the speed at which the descriptions can be encoded. (It is important to note that in the future, programs broadcast in the digital domain will not contain a VBI; rather, program and ancillary information will be sent as packets of data. See ATV, below.)

4. Datacasting

Description: Delivery of digitized audio to computers via the broadcast signal. Audio data are inserted into either the VBI or the visible portion of the picture and are received by the viewer's computer.

Consumer cost: Specialized hardware and software start at less than $100, excluding the cost of a computer, sound card, video line and other peripherals.