

SUMMARY

This report explores how Bell ExpressVu can make its programming and interactive services more accessible to blind and visually-impaired viewers.

- Blind and visually-impaired people are as likely to own TV sets and watch television as sighted people.
- These groups can understand most of a TV show from audio alone (or from audio and whatever reduced visual component they can perceive). But the portion they cannot understand is often significant: Just who *is* holding the murder weapon?
- An accessibility technique known as *audio description* makes TV much more accessible. A separate narrator, reading from a carefully-honed script, uses pauses in dialogue and other appropriate moments to explain out loud any on-screen action that would not be understandable from the soundtrack alone. In effect, audio description – also known as descriptive video or video description – talks you through a program.
- Regulators require numerous U.S. and Canadian broadcasters to provide described programming.
- Descriptions are transmitted on second audio program (SAP), which presents a problem for DTH satellite subscribers, since such signals do not carry SAP. ExpressVu has already shown leadership by airing CTV and Global programs with main video and descriptions on channel 211, the Descriptive Video Channel. The descriptions are *open*; everyone tuning into that channel hears the mixture of main audio plus descriptions without resetting any equipment.
- But a single channel is no longer sufficient to carry all networks' described programming in open format. It's widely assumed that, from now on, every CRTC license renewal of an English- or French-language station will impose a description requirement. To keep up with this influx, multiple virtual channels – one for each station airing described shows – are needed.
- Non-programming services and interfaces also have to be accessible. Since nearly all viewer interaction with an ExpressVu set-top box takes place using visual menu systems, blind and visually-impaired people have trouble doing much more than changing channels and adjusting volume. (Blind viewers can operate the number and other keys on a remote control purely by touch, but they can't see the on-screen menus or can't see them well.)
- ExpressVu can create an audiovisual interface to its personal video recorder that would enable a blind subscriber to record described shows at the touch of a button. There are some implementation issues at the tail end of that project that might not be cleared up without EchoStar's help.
- It may be relatively easy to provide large-print menus and interfaces on EPGs and elsewhere. That's all the accessibility some visually-impaired people need.
- No cable or satellite provider has created an electronic program guide or other visual interface that's truly accessible to the blind. But a freely-downloadable prototype of such a system does exist and can be used as a basis for improvement.
- ExpressVu could operate a joint venture with EchoStar to make both services' EPGs and interfaces accessible (with ExpressVu's working equally well in English and French). That would be a world first – and costs could be recouped by licensing the technology to other vendors around the world.

BACKGROUND

Population and audience

It's hard to find accurate, up-to-date figures on the number of blind and visually-impaired people. Statistics Canada surveys the topic only every ten years; the last report was issued in 1994, and the next one won't come out until 2003.

Statistics Canada's available figures are as follows:

- 581,110 people report having a visual impairment. 51,005 people are "legally blind" (Naeyaert, 1990).
- 119,670 use "aids and services for persons who are blind or vision-impaired" – everything from "large-print reading materials" to "white canes" (Statistics Canada, 1994). This group is likely to rely on the assistance of audio description to enjoy television, as will be explained shortly. 1,355 people said they "need but do not have" such aids and services because they "did not know it existed," pointing out an issue of insufficient public awareness.

With the aging of the population and general population growth, these numbers will have increased, though the exact increment is not known.

Keep in mind an important point: Blind people don't all live alone. Mixed households – consisting of blind and sighted family members or residents – are common.

Television viewing habits

We don't have unambiguous Canadian figures on TV viewing habits of blind people. Statistics Canada (Naeyaert, 1990) reports that 95.8% of visually-impaired Canadians report "TV, radio, reading" as a favourite leisure activity, but those three rather different activities are not subdivided. Nor are any credible figures available on cable or satellite subscription or VCR ownership.

U.S. estimates are, however, probably comparable. The American Foundation for the Blind (Packer and Kirchner, 1997) surveyed 417 sample respondents and found:

- 97% own a television
- 97% watch TV two or three times per week (24 mean hours watched per week)
- 83% own a VCR; 81% of this group rent, borrow, or buy videotapes (26% of them one or more times per week)
- 68% subscribe to cable TV

Extrapolating to the Canadian experience, with our much higher penetration of cable TV and quicker adoption of DTH satellite reception, it's a safe assumption that ExpressVu's existing subscriber base includes blind and visually-impaired people. A subscriber survey could estimate exactly how many.

RECOMMENDATION 1: In the course of a future demographic survey of ExpressVu subscribers or potential subscribers, include questions concerning hearing and visual impairment of subscribers and household members; their viewing preferences; and accessibility requirements and suggestions.

More relevantly, with improved accessibility, ExpressVu could aggressively *market itself* to the blind consumer base. It's a much bigger audience than just the blind, since many blind and visually-impaired people live with sighted people. Selling the service to a blind audience also succeeds in selling it to the sighted residents of the same household. There's also an enormous potential for goodwill and favourable press coverage, and not merely due to any humanitarian overtones – meeting the needs of an underserved market through new technology is an even more favourable angle.

RECOMMENDATION 2: When improvements have been made to ExpressVu accessibility, market the service to blind and visually-impaired viewers and their households. Promote ExpressVu's market leadership in the press.

How blind viewers watch TV

First of all, blind and visually-impaired viewers watch TV the way sighted people do: By turning on a set, tuning to a channel, and following along. The difference is that the blind viewership cannot see the TV screen to any useful degree; visually-impaired viewers cannot see the screen *well*. The result? Both groups follow TV mostly through the soundtrack.

But it's not called *television* for nothing. The visual component of TV is not always duplicated in the soundtrack. (If it were, TV would actually be radio.) It may be easier to follow TV without pictures than without sound, but in the latter case you still miss a lot:

- On-screen action that doesn't have an immediately identifiable sound (and that includes *most* action). What characters are doing is the single biggest question mark for a blind viewer.
- Appearance of characters and settings. It's especially pronounced in nature documentaries (what *does* a beluga look like?), but present in all television programming.
- Virtually all on-screen titles, including opening and closing credits. While a blind viewer may not care who the costume designer was, the writer, director, and composer names are likely to be of interest.

Standard television broadcasts, then, are *inaccessible* to blind and visually-impaired viewers to a greater or lesser degree.

Audio description

Audio description solves the problem of not being able to see a TV screen. Also called *descriptive video* or *video description*, it's a process of creating an additional narration track

that explains whatever is taking place on-screen. A separate narrator, reading from a carefully-honed script, uses pauses in dialogue and other appropriate moments to explain out loud any on-screen action that isn't understandable from the main soundtrack alone.

Description started in the late 1980s on PBS, which still airs described programming. The CRTC and the FCC have separately required broadcasters to air programs with description. Networks and stations with description requirements are as follows:

- **Canada:** CTV, Global (roughly two hours a week); Omni-2, TorontoOne (roughly two hours a month)
 - Vision and TVA are “expected” to air description
 - WTSN and Réseau Info Sports (as yet unlaunched) voluntarily committed to airing description, but it hasn't happened yet
 - CITY-TV and all Showcase variants have aired some described programming
- **U.S.:** ABC, CBS, Fox, NBC, PBS; Lifetime, Nickelodeon, TBS, TNT, USA (50 hours per calendar quarter for each service)
 - Turner Classic Movies airs many described movies

Everyone assumes that description will be included in every English- and French-language broadcaster's license renewals from now on. Most broadcasters will be required to air described shows, while some will merely be expected or encouraged to do so. The FCC is unlikely to broaden the range of affected networks for some time, and indeed, the FCC was sued by broadcasters and other groups to rescind the order requiring described programming. (No ruling on that lawsuit has been issued.)

SAP carriage

Audio description is almost always delivered via second audio program (SAP), with the attendant need for plant infrastructure that can broadcast it and home equipment that can receive it.

In the U.S., only stations in the top 25 Nielsen markets are required to *originate* audio descriptions on SAP, but all stations are required to pass those signals through if they already have the needed equipment. In Canada, CRTC requirements so far have focused on rollout plans for transmitters in specific cities. Toronto, Montreal, Hamilton, Kitchener, and Vancouver are some cities where transmitters are already upgraded and are broadcasting descriptions on SAP on CTV, Global, and CITY. Some, if not most, cable systems carry programs with the SAP signal intact.

SAP signals are present on broadcast and cable systems, but direct-to-home satellite services do not usually carry them. (Alternate audio tracks may be available on a DTH service, but they aren't SAP per se.) ExpressVu showed leadership in coming up with an interim solution to the problem: CTV and Global programs with audio description are duplicated on virtual channel 211 with main video and the full mix of main audio plus description in *open* format. (Everyone tuning into this Descriptive Video Channel hears that mix; you don't have to do anything to turn the description track on.)

BASIC ACCESSIBILITY

ExpressVu has a number of options to provide *basic* accessibility to blind subscribers. We can define that term to mean giving subscribers access to audio description on the broadcasters ExpressVu carries that offer it.

Solving the proliferation problem

Events have outpaced the provision of a single virtual channel. CTV and Global already counterprogram described shows; even CHCH and Global (both owned by CanWest and both covered by CRTC description requirements) counterprogram from time to time. A single channel cannot handle all the described programming even from these networks. Some other Canadian broadcasters already air described shows, a number that will grow rapidly as more and more license renewals are issued. Further, ExpressVu already carries six of the 11 U.S. broadcasters that regularly air described programming.

The technically simplest solution to this problem is to establish a contiguous series of virtual channels with open description, one for each station that regularly airs described programs plus one or two extras for miscellaneous described broadcasts. The idea here is that these virtual channels would begin at, say, channel 777 and continue without interruption until, say, channel 817. The blind or visually-impaired subscriber would simply tune to channel 777 and surf upward from there, or of course tune in to whatever specific channel number interests him or her.

Problems with virtual channels

There are two problems with the recommendation to set up contiguous virtual channels for description.

- In the very long term, ExpressVu will run out of bandwidth for those channels since dozens upon dozens of broadcasters will air programming with description.
- ExpressVu has to obtain the description signal in the first place, which may be difficult, at least in the case of American networks. It remains unresolved whether the signals ExpressVu currently receives already include SAP. In the case of CTV and Global, ExpressVu ran a separate line to their plants to receive the description signal, which is unlikely to work for far-off U.S. broadcasters or even for Canadian broadcasters outside Toronto.

RECOMMENDATION 3: Research the ease or difficulty of obtaining the description track from all services presently airing description or known to begin doing so within the next year. Go to necessary length to obtain all description tracks.

RECOMMENDATION 4: Establish a series of contiguous virtual channels, one for each broadcaster that regularly airs described programming, plus one or two extra channels for miscellaneous described broadcasts.

Solving the listings problem

Everyone involved in description in North America has been tremendously frustrated by the difficulty of obtaining accurate listings of described shows. The only people who seem to know the true list of described shows in any given weeks are the individual networks; all the traditional listings services have incomplete information or, more commonly, none at all.

Consequently, blind subscribers cannot really tell which programs are described without taking the drastic step of leaving their equipment permanently set to SAP – ill-advised since some stations air silence on SAP when descriptions aren't running. ExpressVu itself may need to make reasonable efforts to fill in this information gap.

Bell ExpressVu could work alongside other cable and satellite providers to strongly persuade broadcasters and listings services to provide accurate information. The easiest thing to do with that information is announce it in voice on a virtual channel.

ExpressVu can record weekly announcements of upcoming described programming – one big recording for all stations or individual recordings for each station. The announcements can loop continuously on virtual Descriptive Video channels when no described programming is on. In other words, the only time an actual TV show appears on a DV channel is when a described show is *scheduled*; at all other times, what you find on that channel are verbal announcements of upcoming described shows. (The text of the announcements will need to be visible on-screen.)

It may be practicable to expand the regular recording sessions held at ExpressVu to include these announcements. Under battle conditions, anyone on staff with a clear voice could record the announcements – even monaural audio will do in a pinch. The announcements can also recap the various number assignments for the DV channel line-up.

RECOMMENDATION 5: Work with other cable and satellite operators, broadcasters, and listings services to secure accurate weekly listings of described programming.

RECOMMENDATION 6: Record voice announcements of upcoming described shows for playback on DV channels when no described programs happen to be on.

French programming

Eventually, French-language programming will begin to be aired in Canada with description. (No known French-language programs are broadcast with description at present.) ExpressVu should investigate the interface options once subscribers have the choice of English *and* French described programming. Should the voice announcements of upcoming shows work in one language? both languages separately? both in the same stream? Should other-language described shows be mentioned in listings? Answers to these questions may rest on the degree of bilingualism of blind subscribers and may differ among francophones and anglophones. Subscriber surveys may be needed.

RECOMMENDATION 7: Examine the requirements for bilingual service in providing described TV listings.

INTERMEDIATE ACCESSIBILITY

Once blind and visually-impaired subscribers can easily watch programs with description, ExpressVu should blaze another trail and turn ExpressVu into the most powerful invention for blind people since audio description itself: Make the PVR accessible.

Visual interfaces

Nearly all the advanced features of TVs, VCRs, and set-top boxes rely on visual menu systems. If you can't see the menus, you can't use those features. It's a serious accessibility problem.

But it's a problem that has been mostly solved, at least in principle. After three years of research, the Access to Convergent Media Project (WGBH, 1999) has produced:

- A prototype accessible electronic program guide (EPG) that talks and responds to keypresses. (It's a free download.)
- Audiovisual menu systems for a tiny handful of DVDs, in which menu selections and instructions are given visually and in voice.

The *principles* involved in making on-screen menu systems accessible are now known, but no one has tried to implement them beyond those scant few DVDs. How could ExpressVu be the first to implement accessible menu systems in a big way?

Start by improving on reality. At present, it isn't easy to record a described show so that the description track actually *records* on the tape for later listening. Among other things, some SAP-enabled VCRs simply cannot record SAP audio onto tape; most, if not all, VCRs require navigating through a visual menu system. It would be tremendously valuable for the blind subscriber to be able to automatically record described programming. ExpressVu's PVR could do that automatically.

This feature would require a separate DV listings channel with a talking interface. (Or those same functions could be piggybacked on DV channels that air actual programming.)

The interface could simply list upcoming described shows one after another in a linear menu, or a bit more logic could be added to the system to allow the viewer to navigate by day. The user interface could be simple:

- Use the up- and down-arrow keys to move from program to program.
- Use the left- and right-arrow keys to move from day to day.
- Use the Enter key to record.

(That's the approach used in talking DVD menus, for example.) The voice prompt could announce something like "CTV, *The Associates*, 9:00, 60 minutes. Press Enter to record." The PVR would then execute a command to record that program *with open-described audio* so that, upon playback, viewers hear the descriptions without doing anything special.

This interface would make use of custom PID logic. For each keypress, the set-top box would poll the appropriate audio PID linked to that menu item. The source of the speech could be a text-to-speech engine (running on a computer in the ExpressVu plant or in the viewer's set-top box) or actual snippets recorded by a human narrator.

RECOMMENDATION 8: Program an audiovisual interface for easy recording of described shows.

Software hiccups

There is, however, a hiccup to this plan. Once you the visually-impaired viewer have recorded your shows on the PVR, how do you select them from the menu? *That* listing has to work in voice, too.

It appears that the menu of recorded shows cannot be made self-voicing without a software update from EchoStar. Nonetheless, for the blind viewer, it does merely become a question of using the up- and down-arrow keys to select and start watching programs. Through trial and error, you *can*, in fact, call up recorded programming. It's not great, but it's not impossible, either.

Nonetheless, end-to-end accessibility of the PVR interface is a serious issue that needs to be resolved.

RECOMMENDATION 9: Work with EchoStar to update menu software so that voice prompts can be added.

Promotion

Recall that StatsCan found a portion of the blind and visually-impaired was not using aids and services because they did not know they exist. Even now, a great many blind people in Canada don't know that description is up and running every day. ExpressVu will need to promote the availability of described programming, taking advantage of the occasion to point out how easy it is to listen to described shows on ExpressVu.

RECOMMENDATION 10: Promote the existence of described programming and ExpressVu's easy interface to it.

French interfaces

The existing models for audiovisual interfaces are all in American English. (Actually, there is an exception: The German-language Region 2 DVD of the film *Dancer in the Dark* has an audiovisual menu system.) As a bilingual service, ExpressVu has to make any audiovisual menus work in English *and* French. The voicing itself isn't a problem; French-language human narrators are available, and French-language text-to-speech software has existed

for a decade or more. The task becomes one of programming and project management to ensure that everything that is possible in one language is equally possible in the other.

RECOMMENDATION 11: Include bilingual access to audiovisual menus.

Large print

There's another accessibility option available that might be quite easy to implement: Large print. A visually-impaired subscriber might be perfectly able to use on-screen menus if the type were significantly bigger – say three or four very large lines of text on screen.

Large print is probably technically easy to implement and would not be resource-intensive. But experience shows that interface layouts must be rethought when using large print. Type choices are *not* unimportant; one has to take some care in choosing fonts. (Indeed, a large-print project could be a good venue to re-examine the typography used in the regular interface.)

In any case, large print would be all the accessibility that many visually-impaired subscribers need. There is the slight hiccup in that different functions work with software written by ExpressVu or EchoStar, so a large-print interface may have some gaps.

RECOMMENDATION 12: Create a large-print interface to all ExpressVu functions.

ADVANCED ACCESSIBILITY

The Holy Grail of access to a set-top device like an ExpressVu box is absolute equivalence: Everything a sighted viewer can do a blind viewer can also do.

Functional requirements

To achieve full accessibility, the functional requirements are:

- Every function carried out by any visual menu system would have to be self-voicing. The entire electronic program guide and setup menus would have to be designed to work in a visual layout or by speech output (or, more likely, both, since the on-screen menus will still be displayed when browsing by voice).
- All ExpressVu printed documentation and listings, including monthly program-guide publications, would have to be available in alternate formats (online, at accessible Web sites; and in large print, Braille, and/or talking book).
- ExpressVu Web sites would need to be upgraded to meet the Web Content Accessibility Guidelines published by the World Wide Web Consortium (1999).
- A separate phone line would need to be set up for blind viewers who could order ExpressVu service with accessibility features pre-enabled (that is, the box is already self-voicing the first time it is used). Staff training will be required.
- Everything has to work in French as well as it does in English.

The chance to be first in the world

The state of accessibility for EPG-based services is poor. No television, satellite, or cable provider has achieved full accessibility. The author is unaware of any other service anywhere that has even done as much as ExpressVu has done already. There's plenty of room to innovate.

Stated another way, ExpressVu has a rare opportunity to do what no one else has done. The necessary concepts have largely been nailed down (by the Access to Convergent Media Project, for example), and Canada is home to considerable local accessibility expertise.

What we need is for one provider to decide that accessibility is important enough to invest in it. The result might be the first-ever fully-accessible satellite TV service. Through it, ExpressVu will have given force to equality.

Better yet, the technology and algorithms used to create the accessible infrastructure can be licensed to other vendors. Bell ExpressVu could quite possibly make a profit on accessibility – by attracting more subscribers and by selling its technology. (Striking up a joint development venture with EchoStar lowers up-front costs even further.)

RECOMMENDATION 13: Start a project (perhaps a joint venture with EchoStar) to create a fully-accessible interface to all ExpressVu functions.

VALUE AND SERVICE TO SUBSCRIBERS

There's every reason to think that blind and visually-impaired subscribers will respond with overwhelming praise to any serious effort ExpressVu takes to accommodate them.

- Listening to described programming on an analogue cable system is actually quite cumbersome and error-prone for the blind person. You need to be able to wrangle on-screen menu systems just to turn SAP on and off. In some very common cases (like the author's), you may have several devices that can play SAP audio, each of which requires a different remote control and/or different key sequences to turn SAP on and off. The whole process is *not* foolproof. Anecdotal reports on blindness- and description-related online mailing lists suggest this remains a serious barrier even now.

However, ExpressVu makes it simple: All you need to remember is the channel number for the Descriptive Video Channel corresponding to the broadcaster you want to watch. The descriptions are right there, ready to hear, in open format. It's *the* simplest and most elegant method of listening to described TV yet developed.

- Blind subscribers often live with sighted people. Audio description is a *family-reunification* technology: At last, everyone in the house can watch the same show and get as much out of it as possible. (Sighted housemates don't have to carry on an impromptu description all the way through a program anymore!) Easy access to described audio makes home life more enjoyable.
- ExpressVu acknowledges reality: Subscribers have different needs (in this case, needs related to disability), and, to the extent possible, ExpressVu tries to accommodate those needs. Audio description is an important innovation in TV watching for blind people, and ExpressVu takes description – and blind people – seriously enough to reprogram its systems so the viewing experience is better for the blind and visually-impaired.
- ExpressVu can *gain* subscribers through accessibility. With a bit of promotion, ExpressVu DTH service can come to be known as *the* best way for blind people to enjoy described TV. And remember, blind people have friends (blind, sighted, and otherwise). You can't *buy* this kind of word-of-mouth publicity.

In the author's experience, any action by for-profit companies to improve accessibility is greeted positively, if not rapturously, by disabled people and the media. There is no PR or subscriber downside to improving accessibility.

CONCLUSIONS

ExpressVu is to be commended for taking the steps it already has taken to improve access to described programming. The company has some momentum going and has a golden opportunity to do what no one else has done before: Dramatically improve accessibility of its service for blind and visually-impaired subscribers.

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