FULL ACCESS

A GUIDE FOR BROADCASTING ACCESSIBILITY

FOR CANADIANS LIVING WITH HEARING LOSS

Canadian Hard of Hearing Association
Association des malentendants canadiens

ACKNOWLEDGEMENTS:

The Canadian Hard of Hearing Association (CHHA) is pleased to collaborate with the Canadian Radio-Television and Telecommunications Commission (CRTC) and the Broadcasting Accessibility Fund (BAF) which promote accessibility measures and ensure they are in place. CHHA is grateful to the Broadcasting Accessibility Fund for its support of the creation of this guide.

This guide will examine the kinds of accessibility regulated by the CRTC which are designed to support people living with a hearing loss.

Sincere thanks to the members of the CHHA Broadcasting Accessibility Fund (BAF) Advisory Committee for volunteering their time and expertise on this project. Thank you also to Cheryl Colmer for consulting on the views of the caption profession for pre-recorded and live broadcasts.

DISCLAIMER:

The Canadian Hard of Hearing Association does not endorse specific websites, businesses or products, which are included in this guide for information purposes only. CHHA has no control over the nature, content and availability of those sites.

The links provided in this Guide are accurate as of the publication date, but may in future be no longer active. If you do encounter a failed link, please contact CHHA so that online resources can be updated.

The Canadian Hard of Hearing Association endeavors to keep the information in this Guide up to date but we make no representations or warranties of any kind (express or implied) about the completeness, accuracy, reliability, suitability or availability, with respect to the website or the information, products, services, or related graphics contained on the website for any purpose.

FULL ACCESS

A GUIDE FOR **BROADCASTING ACCESSIBILITY** FOR CANADIANS LIVING WITH HEARING LOSS

Table of Contents

Table of Contents

PREFACE

WHO WE ARE

PREFACE

Because of their hearing loss, many people have difficulty understanding the speech and sounds of television. They may hear the words being spoken, but not understand them. Background noise, music, and overlapping speech make it difficult to hear worlds clearly or identify sound effects. Actors with obscured faces and voice-over narration make speechreading impossible. Captioning is an important accessibility function that fills in the missing information.

People living with hearing loss deserve full access to broadcast media. For many, this requires the availability of quality captioning (on-screen text translation of speech and sound effects) and enhanced audio options. This guide, also useful for family members and caretakers, explains the options available and how to access support. It is also useful for those who have low vision (e.g. Usher's Syndrome) in addition to hearing loss.

This document includes practical guidelines on:

- accessing closed captioning *(Section A, pg. 4)*
- troubleshooting technical problems with captioning and seeking help *(Section B, pg. 8)*
- enhancing audio experiences *(Section C, pg. 12)*
- learning more about the technical aspects and future directions *(Appendix, pg. 19)*

For more information on other forms of broadcasting accessibility (such as accessibility measures tailored to those who live with vision loss, mobility issues, and others) visit CHHA's Broadcasting Accessibility website at *www.chha.ca/BAFENG*.

WHO WE ARE

The **Canadian Hard of Hearing Association (CHHA)** helps to empower Canadians living with hearing loss through four pillars of activity:

- **Education:** offers information to its members and the public regarding accessibility in broadcasting
- **Public Awareness:** works to raise awareness of the ways accessibility can be enhanced
- **Service:** helps those experiencing difficulties
- **Advocacy:** advocates for improvements to broadcasting accessibility where needed

The **Broadcasting Accessibility Fund (BAF)** is an independent funding body that supports innovative projects which provide insight into the advancement of accessibility in broadcasting.

The **Canadian Radio-television and Telecommunications Commission (CRTC)** is an arms-length body accountable to the Ministry of Canadian Heritage. The CRTC's mandate is to interpret, create and enforce policy under the *Canadian Broadcasting and Telecommunications Act.* The CRTC regulates and licenses all Canadian television and radio stations including all accessibility requirements. As the CRTC serves public interests, they regularly hold "public hearings, round-table discussions, informal forums, and online discussion forums designed to gather Canadians' views about broadcasting and telecommunications services…". ("About Us" Canadian Radio-Television and Telecommunications Commission. *http://www.crtc.gc.ca/eng/acrtc/acrtc.htm*)

SECTION A: 

CAPTIONING

SECTION A: CAPTIONING

Captioning is text interpretation of television's audible words and sounds. The text is displayed on the screen, identifying the speaker, sound effects and icons for elements such as music.

Captioning helps people learning English or French as a second language by making it easier to follow the dialogue. Captions are also beneficial in noisy environments such as restaurants and gyms, doctors' offices and other locations where it is difficult to hear, or if TV audio must be muted.

This section examines how captioning is set up, and ways to adjust how captions look.

CAPTIONING

Although all televisions manufactured after 1993 are equipped with captioning capability, the method to access captioning varies. The two most common types of captioning when viewing television programs or streaming videos and documentaries are Open and Closed Captioning.

- Open captioning (OC) appears on the screen and cannot be turned off, nor can the appearance of the text be altered. This is often used in documentaries or films designed to be accessible
- Closed captioning (CC) can be turned on or off. Captions appear on the television screen when enabled (eg: figure 1). This guide will focus on closed captioning and how to access it

Figure 1: Example of closed captioning on television

Tip

To learn more about captioning, see the Appendix (pg. 19).

How to activate closed captioning

Some TV remotes have a CC button to click, to activate captioning (Figure 2).

Not all smart and digital TV remotes have a CC button. These TVs rely on a menu system on the TV itself. The remote is used to open a designated menu within the service provider's setup options (the service provider is the company responsible for the user's cable/satellite/internet services). To activate captioning with these remotes, consult the operating manual provided with the remote and/or television. Steps may vary from one model to another. If the operating manual is not available, search for the closed captioning, Subtitling or Language Option among the menu items.

Cable decoder/set-top boxes have their own remotes. Consult the operating manual provided by the specific cable provider.

Figure 2: Closed caption button on a universal remote

Figure 3: Roku closed captioning menu

Tip

If the Operating Manual is not available, download a copy from the manufacturer's or cable provider's website. If there is no immediate access to the Internet, call the cable provider for assistance.

Figure 4: Set-top box

Steps will vary from one decoder box model to another. For example, for a Rogers set-top box, the first step is to click 'Menu/Setup'; then choose 'Settings/Options'; 'Closed Captioning' and follow the option to turn captioning on. In other models the first step is 'Preferences and Accessibility' or it may be 'Audio and Subtitles'. Generally, closed captioning must first be enabled on the television, and then through the decoder box menu options before it can be accessed through the TV remote (eg: Figure 4).

Figure 2: Amazon.com | Figure 3: https://blog.roku.com/developer/2014/01/16/new-closed-caption-features-for-brightscript-developers | Figure 4: http://www.rcrwireless.com

Changing how captions look

Caption channel selection

For TVs: The closed caption function on the set-top-box (STB) or remote turns the closed captions on and off, sets the language for closed captions and allows different closed caption channels (CC1, CC2, T1, T2, S1, S2, etc…) to be selected. Typically, CC1 is used unless otherwise specified.

Using channels other than CC1 may not open the broadcasted closed captioning. The other channels are for other language uses, program information, scheduling, public announcements, and technical information. In Canada, CC1 provides captioning in the broadcaster's designated main language (English/French).

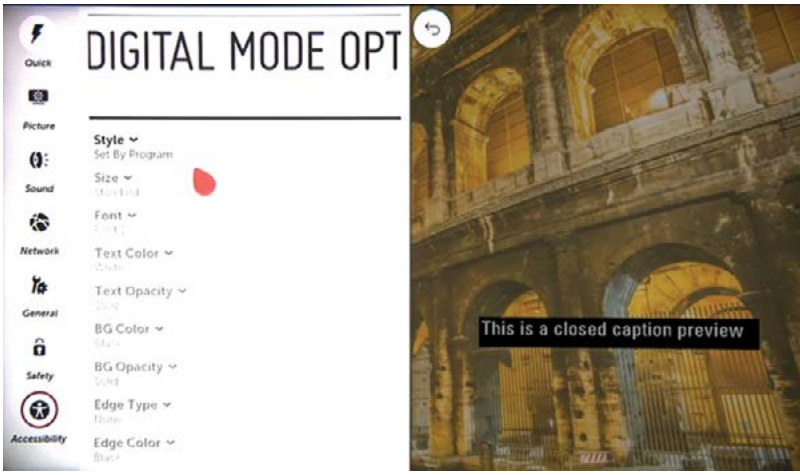
If the captioning is difficult to read, the default size and font can sometimes be changed. The following section explores how to change the default caption settings to improve readability. Note that older analog televisions do not allow users to change the look or style of captions.

Smart and digital televisions

Smart televisions and some digital televisions allow users to change the location, colour or size of the captions, as well as the colour of the background. Each manufacturer has its own settings for this (eg: Figure 5).

For example, caption style for an LG Smart TV can be adjusted using the Smart TV remote: click on the Home button and select the Quick Settings tab. At the bottom of the Quick Settings Menu is the Accessibility Menu. There are two settings that can be used for closed captioning service, Analog or Digital Service. In the Analog service, the display settings are preset and cannot be changed, but if the user selects the Digital Service, the text size, font, colour and other settings can be adjusted. A closed caption preview screen will show to the right of the menu. See Figure A for more details.

Figure 5: Smart TV closed caption menu



Tip

Features and menu options vary between manufacturers but are often available under the same menu where the captions are activated. Consult the operating manual or go to the manufacturer's website to find more information about these features.

Figure 5: https://www.youtube.com/watch?v=JdegnvP5K7E

Video streaming

(e.g. Netflix, Hulu, Roku, iTunes, programs on broadcaster's websites, etc.)

There are no industry standards to turn captions on/off so there are differences between each streaming provider. One way to turn on captions when video streaming is to select the movie or TV show, and then select 'Audio & Subtitles' from the options panel, select the 'captions' option then 'return/back' to return to the options panel. The captions should appear when the show plays.

There may also be a CC button on the player window depending on the provider (eg: Figure 6).

Figure 6: Closed captioning button on YouTube

Another method is to set up 'Your Profile' in the streaming account with the desired font, colour, text, size, and background. The captions will play automatically when future programs start. Consult the streaming provider's online User Guide.

Tip

Online instructions for many streaming services can be found by searching the Internet with the following phrase: "How do I turn on captions on my <write in the name of specific streaming system.>"

Tip

For other methods of turning on caption of the most popular streaming providers, visit the links in the Internet Based Broadcasting (Streaming Services) section in the Appendix.

How to enable captioning on a smartphone

When accessing a video with captions on the internet, the captions are most often generated from a 'sidecar file'. Accessing sidecar closed captions with a mobile smartphone depends on the type of phone, the caption settings on that phone, and the app used to play a video.

Captioning is usually enabled through the 'Settings' menu, and/or by turning them on in the player/app being used. For more information on how to enable captions on a specific mobile device, use the phone's Settings menu.

Figure 6: CBC News, The National

SECTION B:

TROUBLESHOOTING COMMON CAPTIONING PROBLEMS

SECTION B: TROUBLESHOOTING COMMON CAPTIONING PROBLEMS

This section discusses suggested solutions to some common problems associated with captioning, reasons why these problems happen, and some ways to troubleshoot and solve them.

ISSUE	CAUSE	TROUBLESHOOTING SUGGESTIONS
There are no captions or sound for one or more stations.	Closed captioning signal is not being sent by the service provider or broadcaster, or the television is not receiving it.	If using an over-the-air system contact the broadcaster. Reset the television, antenna and set-top box hardware. If this fails to resolve the problem contact television service provider (e.g. cable, satellite provider, or internet provider) or broadcaster
There are no captions or sound for one specific show	Some programs from the US can have captions with them but they are often stripped off for the Canadian market.	The Canadian broadcaster must re-do the captions; contact the broadcaster and bring the matter to their attention. They may not be aware that the captions were removed.
There is an extra sound track describing what is seen on-screen	Audio description has been activated	Search through the menu options with the remote or with the smart television controls for audio description, and disable it.
The captions don't make sense	Most common cause: interference with the reception of the signal.	If using an over-the-air digital antenna, try moving it around to get a better signal, or purchasing a high-end antenna. Purchasing and installing a signal booster may also help. If using a digital or smart TV with cable, the problem may be a loose cable (tighten all connectors), or a faulty outdoor cable or the signal from the cable company. Contact the service provider.
On live broadcasts the captioning is not in synchronized with the audio	Person speaking is talking too fast for the captionist to keep up. Captions will lag more than 5 seconds, contain errors or be missing.	In some situations, such as live debates or breaking news, the speed of the interaction cannot be changed.
In post-production programs, the sound and captions are not synchronized	This is a technical problem with the service provider or the way the captions were programmed during post-production.	Contact the service provider
The caption background appears but no captions	The captioning may be set up on a channel other than CC1	Set your captioning to CC1

ISSUE	CAUSE	TROUBLESHOOTING SUGGESTIONS
Incorrect words, missing letters, word "phonetic" in parentheses to denote that this caption does not include the correct spelling	The captionist's computer dictionary does not have the words or terms being spoken.	On live broadcasts this cannot be corrected. Post-production broadcasts should not have these errors and if they do, inform the broadcaster.
Continuous lag during the show of more than 5 second lags between what is spoken and the appearance of the caption.	Transmission lag can happen for content delivered to captionist from broadcaster, or from captionist to broadcaster. This can be caused by slow network connections, or disruptions in service delivery hardware such as routers and switches.	Contact your service provider for help.
None of the words spoken or written match the words that are appearing as captions.	This delay is not caused by the captionist or their software, but is a result of the way that the station receives the live captions and how their equipment is set up.	Contact service provider or broadcaster.
Hilarious captioning failures	*http://www.ai-media.tv/7-hilarious-caption-fails/*	

Still need help? Try these links

DBS Talks	*http://www.dbstalk.com/topic/65548-closed-caption-problems/*
Comcast Forums	*http://forums.xfinity.com/t5/Non-X1-Service/Closed-captioning-problems/td-p/796644*
TV Forums	*http://www.tv-forums.com/*
CNET	*https://www.cnet.com/forums/search/?query=captioning*
Rogers Community Forums	*http://communityforums.rogers.com/t5/forums/searchpage/tab/message?filter=location&location=category:EnglishCommunity&q=captioning*

Tip

Whether getting help from online forums or a service provider, it is helpful to:

- *Record any problem(s) and solutions that have been tried*
- *Use photos, written notes, etc*

This can be useful when trying to explain the problem, particularly if the problem is irregular.

When all else fails, contact the television service provider or broadcaster depending on television service. For example, if receiving signal over-the-air, contact the broadcaster. If using a decoder box, the cable or satellite company should be contacted. Most service providers also offer troubleshooting guidelines in the Owner's Manual provided with the decoder box, as well as a webpage with Frequently Asked Questions.

Tip

Broadcasters are only required to keep a recording of their programs for four weeks by the CRTC – after this date, they may not have access to these recordings. It is important that you contact them as soon as possible after the problem occurs in order to resolve the issue in a timely manner.

SECTION C:

ENHANCING THE AUDIO EXPERIENCE

SECTION C: ENHANCING THE AUDIO EXPERIENCE

Poor sound quality can interfere with understanding speech and sound effects. The best possible sound quality is important for viewers to hear dialogue over any program background noise.

If the television speakers do not provide sufficient volume, clarity or speech comprehension, assistive devices can bring the sound directly to the listener's ears through headphones, hearing aids or cochlear implants. This section will examine several types of systems, such as proprietary wireless protocol communication systems, FM and infrared, induction loop, as well as some low-cost alternatives.

Discreet wireless microphones

Bluetooth, Phonak Roger Link and Apple systems are examples of proprietary wireless communication systems that improve the individual's audio listening experience. Hearing healthcare professionals synchronized devices to hearing aids or cochlear implants in the hearing clinic. There are limitations as to how many devices can be synchronized to a hearing aid or cochlear implant at any one time.

The main benefits to using these systems are:

- The audio quality is very high, and the volume is set at levels of the audiometric profile prescribed by the hearing healthcare professional, which can greatly improve the perception of clarity in speech and music.

Drawbacks:

- They tend to drain the hearing aid/cochlear implant batteries faster than using the hearing aid/cochlear implant's microphone setting.
- Unless the program is set up to use the microphone while the system is enabled, the user will hear the television but will not hear other sounds in their environment, such as family members speaking to them, telephones, alarms or other important sounds. It is important to discuss the program set-up with the hearing healthcare professional while in the clinic.

Figure 7: Discreet wireless devices

Figure 7: www.alibaba.com

FM and infrared systems

Most FM (eg: Figure 9) and infrared (eg: Figure 8) systems consist of a transmitter/emitter that connects the television's audio system to a receiver and headset worn by the user. Sometimes, the receiver is incorporated into the headset itself.

FM systems use radio waves to transmit sound whereas, infrared systems use light to transmit the sound. Both systems are wireless, however, there are some considerations before deciding on which system to use.

Figure 8: Infrared listening system with a television

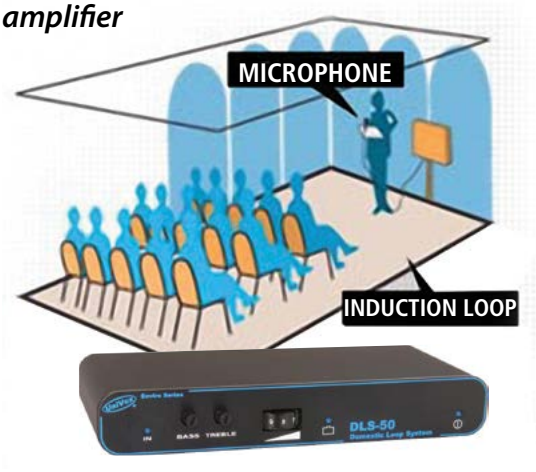
Figure 9: Personal FM system

- FM systems are susceptible to outside radio interference from other systems, from both inside and outside the house nearby, or a second FM system in the home set to the same frequency.
- If more than one person is using the same home system in the same room, all the receivers must be set to the same frequency as the transmitter.
- Although most FM systems provide a signal strength with little fluctuation in audio quality, the radio waves can travel through solid objects and walls; if privacy is an issue for the user, then this would not fit with their needs.
- Infrared systems use infrared light waves to transmit sound, and will not be affected by interference from outside radio transmissions.
- As the light waves cannot penetrate through solid objects, there is greater privacy using infrared systems and multiple systems can be set up in adjacent rooms without needing to adjust the frequency set (as with FM transmitters).
- When using infrared systems, there needs to be a direct line between the user and the receiver, with no physical barriers blocking the light transmission. The beam can't travel around corners in an 'L' shaped living room.
- Using a neck loop (an induction loop worn around the neck), or silhouettes (small induction hooks worn directly against the hearing aid or cochlear implant processor on or near the ear) works well when the hearing aids/cochlear implants have activated telecoils (or t-coils). The listener will hear the audio signal at the level of amplification set by the hearing healthcare professional.
- Another important consideration is the cost of infrared and FM systems. Generally, smaller home systems are less expensive than larger group systems (such as those designed for theatres or large meeting rooms) but they can be expensive, and require some maintenance to keep them working optimally.

Figure 8: photo by Ken Bosma | Figure 9 : Wikipedia - A Landmark Audio Technologies FM350 assistive listening device (ALD)

Induction loop systems

Figure 10: Induction loop system and amplifier



Induction loop systems (also known as hearing loops, or loop systems) use an electromagnetic (EM) field to transmit sound. Induction loop systems (eg: Figure 10) technically work with flux coils, but are more commonly known as telecoils (or t-coils). This type of technology picks up modulated electromagnetic frequencies and converts them into sounds that are picked up by personal amplification devices, such as hearing aids, bone anchored hearing aids, or cochlear implant processors.

For most induction loop systems, a wire is taped to the floor or baseboards around the perimeter of the room, and the current in the loop of wire induces an electromagnetic field that is then "conveyed" to the listener's telecoil. One benefit of using an induction loop system with personal amplification devices (such as hearing aids or cochlear implants) that have a telecoil, is that no additional headphones or receivers are needed.

While induction loop systems require very little maintenance once set up, they can be susceptible to electrical interference. Therefore, it is important that this system is installed correctly to produce an adequate signal for a telecoil to pick up. Unlike proprietary systems such as Bluetooth systems, telecoils do not drain the batteries on a hearing aid or cochlear implant any faster than when using the hearing aid microphone program, and telecoils work with all induction loop systems.

A hearing healthcare professional can provide information and support on telecoils and systems that will help with listening to the TV.

Lower cost accessibility options

Sound energy weakens over distance, so bringing the audio source closer to the listener is a simple alternative to improve the listening experience. This can be done with small speakers placed close to the listener. Wireless, portable television speakers such as the TV Soundbox, for example, have a range of 100 feet and have volume control that works independently from the televisions' speakers.

There are speakers that bring sound close to where the listener sits, and are even designed to blend into the furniture with customizable colour options, such as the Audio Fox brand wireless TV speakers. After the speakers are set up, the volume can be controlled by a remote that is provided with the speakers. These types of systems come with single or dual speakers that can be draped over the back of a chair, couch or bed.

Figure 10: www.hearingloop.org and http://www.tecear.com/UniVox_DLS50_Loop_Kit.htm

SECTION D:

WHERE TO GO FOR HELP

SECTION D: WHERE TO GO FOR HELP

For help with captioning or other accessibility issues, users should contact their service provider. Most service providers offer troubleshooting guidelines in the Owner's Manual provided with the decoder box, as well as a webpage for Frequently Asked Questions. If the service provider is unable to help, then refer to the following section on how to make a complaint.

Providers can be contacted by telephone, email or live chat service through their website. Email or live chat provides a paper-trail for future reference.

Let the provider know what steps, if any, have been taken to try and solve the problem. Keep written notes of the problem, the results of the conversation, the service representative's name, and the date and time of conversations. Indicate the preferred method of communication (phone, text or email) and contact information.

If the service provider is unable to help, then the user has the right to make a complaint..

Tip!

Broadcasters are only required to keep a recording of their programs for 4 weeks – after this date, they may not have access to these recordings. It is important to contact them as soon as possible after the problem occurs.

What to expect from the service provider

When the service provider responds to an issue, a standard troubleshooting checklist may be used to ensure that nothing has been missed, including looking for issues at their end. They may reboot the system, or remotely connect with a decoder box to find out what is causing the problem. A representative may be scheduled to make a home visit to solve the problem.

It is important to note that a television broadcaster wants to correct captioning problems and depends on complaints from their viewers to do so. It is also one of the ways in which they track their viewer's reactions. If viewers do not contact them, the broadcaster will not know about the problem. Often the problem is not with a broadcaster, but with the cable or satellite company, so it can often take several days to get the problem resolved.

If the service provider is unable to help

If the user does not receive a satisfactory solution from the service provider, a complaint can be filed directly with the CRTC.

The CRTC requires all complaints to be made in writing, with the user's full name included (the CRTC does not follow up on complaints made anonymously). Be sure to file the complaint within 4 weeks of noticing the issue with accessibility, as broadcasters are only required to keep recordings of their broadcasts for a limited period, and they may not have access to them after this period.

When writing a complaint, include the following information:

- The user's name, and an email or postal address
- A description of the problem and/or the concern
- The radio or TV station's name or call sign, and location
- The date, time and name of the program or advertisement
- The name and location of the service provider (i.e. cable company, satellite provider, or wireless distribution service), where applicable.

The user can file a complaint with the CRTC without fear of retaliation from any company, but the service provider does have a right to review the complaint and respond to it. Complaints are handled by CRTC Client Services; once a complaint is filed it will be reviewed and the complainant should receive a reply within 10 business days to confirm how it will be handled.

If the service provider does not respond within 20 calendar days, the CRTC will send a written reminder. If there's still no answer, the CRTC raises all unanswered complaints with the company when it applies to renew its license.

If the complaints allege that the company violated the Broadcasting Act or CRTC policies or regulations, CRTC staff will decide if any further process or regulatory action is required. Although uncommon, it is possible for a service provider to have their license renewal denied if the company fails to address violations of the Broadcasting Act or CRTC policies. Most often, broadcasters work to resolve any issues forwarded by the CRTC to maintain their licensing.

There are three different ways to file a complaint to the CRTC:

- File a complaint online at: *http://crtc.gc.ca/eng/contact/#complaint*
- File a complaint by mail to:
  Canadian Radio-television and Telecommunications Commission
  Ottawa, Ontario
  Canada, K1A 0N2
- File a complaint by fax: 819-994-0218

APPENDIX

APPENDIX

This section elaborates on captioning, audio quality, internet accessibilty and useful resources and links for further reading.

How closed captioning works

The technology is called closed captioning (CC) because it can be turned on and off. Captions appear on the television screen only if enabled by the viewer. On some televisions, the viewer can access the captioning through a CC button on the remote control, but on some TVs they must be activated using a designated menu on the service provider's setup options. Although all televisions manufactured after 1993 are equipped with captioning capability, the method to access CC varies.

There are two types of closed captioning: live and post production. Live captioning is usually performed in real time by a captionist who is listening from a remote location. It usually appears on the screen showing up to two or three lines at a time of roll-up text. Live news broadcasts use this type of captioning. Post production captioning typically provides better quality captioning because the captioning can be reviewed and corrected before the program is broadcast.

Types of captioning

Live captioning is usually performed by a captionist in real-time and will appear on the television screen text during a live broadcast such as news or sports. There is little or no time for any errors to be corrected. Also, there will always be a lag between when something is said and when the caption appears. For live programming, the broadcaster is usually responsible for providing the captions.

Post production captioning is created after a show is filmed but before it is broadcast. Captions can be checked and errors removed before broadcast. The most common display of post-production captions is called 'pop on and off' where all lines of captioning appear/disappear at once; they do not roll-up the screen. Sometimes the production studio is responsible for captioning and sometimes it is the broadcaster's responsibility.

Speech Recognition (SR) captioning enables the recognition and translation of spoken language into text by computers, and is typically used for online content. Unfortunately, the quality of captions provided through speech recognition software varies a great deal. Greater accuracy often comes with a higher price tag. Speech recognition technology is a rapidly advancing sector of software development, and has seen great improvements in recent years it is expected to become a popular choice for organizations to produce written content for accessibility purposes.

Shadow captioning/Shadow speaking uses trained speakers who listen to the original audio, interpret it and repeat it to the computer's speech recognition system, circumventing the problems of difficult acoustics and speaker variability. (*https://www.crim.ca/Publications/2006/documents/plein_texte/PAR_BouGals_Interspeech06.pdf*)

How post-production captioning is created

Pre-recorded (off-line) broadcasts are captioned a few different ways, depending on the technology used by the TV station. Some stations use videotapes, others provide an audio feed to the captionist and in some cases, an option to file videos electronically is offered.

Captionists watch and listen to the pre-recorded program and create a transcript of the dialogue and descriptions of other acoustic information. They break up the transcript into 2-3 line phrases, which can either roll up or pop up on the video screen. The captionist also assigns a time-code address to each caption phrase as well as a position code, so the information is properly synchronized with the video when broadcast. Because off-line captions are pre-recorded, they can be edited thoroughly to meet the CRTC accuracy requirements.

When relying on the audio feed alone, captionists attempt to capture all the spoken and sound effect information accurately. The audio quality plays a large role and is a major factor in the accuracy of the captions, as background noise can be disruptive. People talking over sound effects interferes with speech intelligibility and possibly caption quality.

While the quality of captions is governed and must meet a certain standard, there is no standard or governance on the networks which requires their anchors/reporters speak at a rate of speed that is, for example, 200 words per minute (wpm), a rate at which verbatim captioning is feasible. Many times, interviewers or talk shows feature a rate of speech over 300 wpm. This can be a difficult target to reach. Even if the captionist can capture everything said verbatim at a rate of 300 wpm, there is a limited number of lines set for the captions to appear on screen (usually between 2-3 lines, obscuring no more than a few inches of the screen at a given time), and the captions would appear too quickly for easy readability. In such cases, captionists must summarize what is said, so that the information can be more easily digested by the viewer. The CRTC recognizes this as a valid reason, but limits how often it can be done: "Speech must only be edited as a last resort, when technical limitations or time and space restrictions will not accommodate all of the spoken words at an appropriate presentation rate." (Broadcasting Regulatory Policy: CRTC 2011-741 Canadian Radio-Television and Telecommunications Commission. *http://www.crtc.gc.ca/eng/archive/2011/2011-741.htm*)

Captioning for pre-recorded programs is labor intensive, requiring up to 18 hours to caption a one-hour program offline, depending on the complexity of the program, the speaking rate, the rate of scene change, and difficulty of topic. (Broadcasting Regulatory Policy: CRTC 2011-741 Canadian Radio-Television and Telecommunications Commission. *http://www.crtc.gc.ca/eng/archive/2011/2011-741.htm*)

Newer software programs use predictive technology which can greatly aid in translating words from Stenotype into English (even if those words were not previously programmed into the captionist's dictionary loaded in the program). With this type of programming, mistakes can occur and the predictive technology can mistranslate a word. The size of the dictionary can also affect the quality of the captions produced; for example, a new captionist may have a smaller dictionary with a vocabulary of 50,000 words or less, while an experienced captionist may have a dictionary with 350,000 words.

While the CRTC has set standards for French language captioning, there are disparities in the availability and quality of captions as compared to English language captions. The same standards are targeted for pre-recorded programs for both French and English captionists. French captionists are fewer in number than English captionists, so the Société Radio-Canada (SRC) the French-language arm of the CBC, has developed the Médiatex system for real-time captioning. The Médiatex system is a form of voice recognition software and while it does boast an 80% accuracy rate, it does not meet the CRTC established standards.

SRC submitted a report on the quality of French captioning supporting the continued use of speech recognition software when qualified French captionists are not available, but is considering alternatives to replace Médiatex.

Live program accessibility

The CRTC has separate regulations governing the quality of captioning for live programs. Live captioning includes specific types of programming where there is only enough time to stream the captions with the first airing of the program. Examples of programs where live captions are used include local news, world news, weather, talk shows, award shows, sports, certain documentaries, religious shows and live breaking news. For these types of programs, the CRTC mandates 95% accuracy rates for English programming, and 85% accuracy rates for French programming. For live programming, the lag time between the audio and the captions must not exceed five seconds, averaged over the program.

For many stations the typical process for captioning live programs is:

- A captionist or caption house is contracted to create captions for a live event/show.
- The content is delivered to the captionist via an audio line (over a telephone line or the Internet). Because the broadcast of a show is slightly delayed from the real-time version the captionist receives the audio slightly earlier.
- The captionist accesses an encoder that will merge the captions with the show.
- The captionist has the TV show ready to be played on a TV screen.
- Using the stenography or re-speaking machine and software, the captionist types or speaks what is being said (eg: Figure 11).

Figure 11: Captionist typing on a stenograph machine

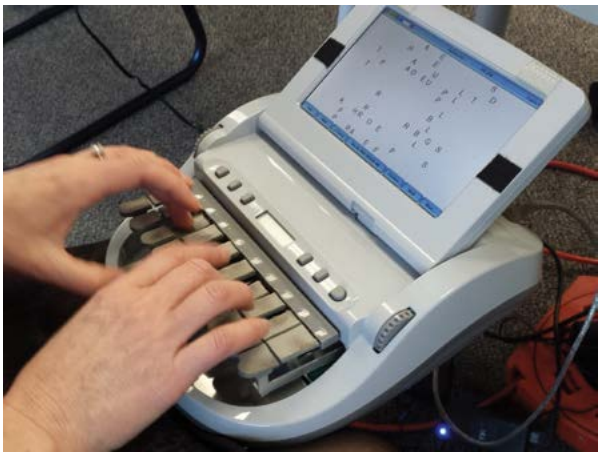


Figure 11: photo by Mike Gifford

Sources of errors in live captioning

The quality of captioning in live programming can be affected by several factors. There are specific terminologies related to each type of program and often a captionist must do additional research before they caption the live content to add the relevant terminology for their dictionaries to increase the speed and accuracy of their captions.

In some cases, such as during breaking news, news anchors speak at an extremely high speed for extended periods of time, i.e. 300-400 words per minute. It is impossible to prepare or research for breaking news, so the captionist must simply do their best. Captioning quality may suffer and the captionist may need to include in parentheses "phonetic" to denote that this caption does not include the correct spelling, and is instead spelled phonetically.

In some cases, the captionist cannot see the show and must caption by audio only which makes it more challenging, depending on the quality of the audio feed provided by the networks. Also, some captionists use the internet to transmit their captions to stations, which can cause lag in the synchronizing of captions with the show. Sometimes, human error is to blame and a captionist may mistype the dialogue.

Audio quality problems

There are three main causes of audio quality problems with the content:

- The transmission signal from the broadcaster's end
- The reception hardware at the user's end such as the television, mobile device, Internet, cable, over-the-air antenna, satellite or phone signal
- The technical production quality of the show itself

Transmission:

The bandwidth of a signal, in this context, relates to the effective audible range where information is being provided. For example, a telephone is capable of transmitting sound between 400 Hz and 3400 Hz so the 'bandwidth' is 3000 Hz (the difference between 3400 and 400 Hz). This the normal range for speech. Televisions have a broader bandwidth and can transmit sounds above and below this range because there is more sound information in a television show such as music and sound effects. The amount of bandwidth used to transmit sound information is controlled by the broadcaster.

Compression is a term that can be thought of as 'automatic volume control'. Compression turns up the volume of the quieter sounds and turns down the volume of the louder sounds. There are several technical reasons why a broadcaster would do this even for people who do not have a hearing loss. The use of compression ensures that the entire dynamic range (from soft to loud) can be successfully transmitted without appreciable distortion.

Here is an example of a compression circuit at work: In normal conversational speech, vowels such as [a] in the word 'father' is about 20 decibels louder than the consonant [f] beside it. A 2:1 compression system would make that difference 10 decibels (dB) rather than 20 dB. It may be that the loud [a] is too loud and would distort the broadcasting system. This is a very reasonable strategy and the [a] is still louder than the adjacent [f] so most of the relationships of speech are maintained. Compression is so useful that almost all hearing aids fit today have some degree of compression programmed in.

However, for hard of hearing people who use hearing aids, the signal is compressed a second time through the user's own hearing aids. This initial 20 dB difference between [a] and [f] has been reduced to 10 dB and now 5 dB or less. Overuse of compression such as a speech or music signal being compressed twice, can seriously degrade the clarity.

To prevent doubling up of the signal, hearing healthcare professionals should prescribe a hearing aid program for broadcast transmission that is more linear (read: no compression) than the other programs.

Reception:

The term 'signal to noise ratio' (SNR) refers to the difference between the sound level (in decibels) of the signal (the sound being listened to) and the sound level (in decibels) of the noise. With signal to noise ratio, this is a subtraction of two values. In a typical classroom, the SNR may be 10 dB. This means that the signal is 10 dB higher level than the noise. A 20 or 30 dB SNR would be even better but given the noisy characteristics of a classroom, this is rarely obtained. A negative SNR such as -10 dB means that the noise is 10 dB louder than the speech signal.

Improving the SNR is a reception issue. It is unlikely that a producer of TV or music would alter the signal to noise ratio because the music or sound effects provide emotional enhancement, and in general, contributes to the overall impression of the radio or TV transmission.

The most useful thing is to find some way to improve the SNR and this can be accomplished by decreasing the 'noise' part of it and a realistic strategy would be to advocate for more transmissions to be in stereo where the noise and music can be in one transmission route and the signal or speech can be in another.

If the transmission is in stereo, then the end user can use their own stereo TV or radio receiver to enhance the signal or speech channel, and reduce (or disable) the noise/music channel in their listening environment. Many televisions (and home radio systems) come with two or more loudspeakers for stereo listening; each with their own control. The signal loudspeaker can be left as is and listened to at a comfortable level, and the noise/music speaker volume can be turned down or even be turned off.

Technical production

If the audio quality from the production itself is preset for theatrical reasons (e.g. if the director wanted the sound level of the music to be greater than the dialogue), there is not much that can be done after the fact. One solution is to turn off the sound and use the captions exclusively, however, the captionist also likely found it difficult to hear what was being said and the viewer will miss the benefit of the captioned non-speech sounds such as the music.

Internet based broadcasting

More Canadians than ever are accessing news, information and entertainment media through the internet, and the trend of 'cutting cable' is a popular way to save on utility expenses while still enjoying television programming. There are many different types of online streaming services ranging from publicly generated content on YouTube to internet-only shows. Companies which stream made for television content such as Netflix, Hulu, Roku, Android Box, AppleTV and others have integrated closed captioning into their program services, often due to public pressure and lobbying from consumer groups.

Streaming video and radio programs

Figure 12: Captions in a variety of languages

The CRTC also requires that any program previously aired through traditional broadcaster and therefore captioned, must have captions available when streaming (eg: Figure 12).

Public streaming sites such as YouTube may have tools available to create or add captions to video but there are no regulations requiring them. There is also no vetting process to ensure that captions are accurate or consistent. Finding accessibility options (such as turning on the captioning for videos) is different with every service provider.

There are still gaps in accessibility from websites, video and podcast sharing groups (such as Vimeo and Project Free TV) and downloading sites. In some cases, captioning is not available, while in others, the captioning is computer generated and not of the same quality as post-production captioning, and still in others the captioning may be incomplete. It is a bit of a 'hit and miss' situation for this type of online content. For those who download shared content through video downloading sites (such as BitTorrent), a downloader can sometimes search for a caption or subtitle file, but the availability of the appropriate file and format varies greatly. A site such as OpenSubtitles.org can be used to find caption files for specific shows.

Online podcasts and radio station websites also vary in the accessibility options and the transcripts available for shows.

Figure 12: The Wikimedia Foundation Inc. /wikimediafoundation.org

Streaming services

This is a non-exhaustive list of some of the most popular online streaming providers, and how to access the captioning function on their video player:

Figure 13: Streaming services on a Smart TV

Netflix

Subtitles and captions are usually shown on the bottom of the screen, in synchronization with dialogue and/or sound. Subtitles may be shown at another part of the screen to avoid overlapping important information (such as names shown during documentary interviews).

To turn on captions, use the 'Audio & Subtitles' panel. When the show is playing, the captions should appear. To save or adjust the subtitle and captions settings, play a TV show or movie for at least 5 minutes with these preferences enabled.

Netflix allows customization of the appearance of subtitles and captions which will change the look of subtitles and captions on many Netflix ready devices.

To customize how captions are displayed, login to the Netflix account and go to the context menu to select the user's account (in the top right corner of the screen), under 'Your Profile' choose 'Subtitle Appearance'. A pop-up window will appear, where the font, colour, text size and background colour can be adjusted as desired. ("How do I adjust subtitles, captions and alternate audio on my device?" Netflix Help. *https://help.netflix.com/en/node/372*)

Apple TV

To enable and adjust subtitles, and alternate audio while streaming on Apple TV:

First, hold down the center button on the Apple TV remote, then select the preferred audio or subtitle language options. The captions should play automatically when the next show begins. ("How to enable subtitles on Apple TV" Cult of Mac. *http://www.cultofmac.com/385800/how-to-enable-subtitles-apple-tv/*)

Google Chromecast

Subtitles must be adjusted from the device with Chromecast (most PCs can have captions automatically enabled, by selecting this option through the Accessibility or Ease of Access settings in the Control Panel).

To adjust subtitles and alternate audio from the Android or Apple iOS device, tap anywhere on the screen during playback and select the Dialog button which will open the preferred audio or subtitle options. Enable subtitles and then tap 'Done'. (*https://chrome.google.com/webstore/detail/videostream-for-google-ch/cnciopoikihiagdjbjpnocolokfelagl?hl=en*)

Figure 13: By Digital journal [CC BY-SA 4.0 (http://creativecommons.org/licenses/by-sa/4.0)], via Wikimedia Commons

ROKU 3+

On newer Roku devices, Audio & Subtitles options are accessible during playback. Start playing a movie or TV show and during playback, press the down arrow. When the Audio & Subtitles options opens, select the preferred subtitle option. Not all videos offered through the Roku streaming devices have closed captioning. ("Roku Closed Captioning Help" Roku Support. *https://support.roku.com/hc/en-us/articles/208756848-Roku-Closed-Captioning-Help*)

Hulu.com

While Hulu.com is typically only available to residents of the US, some people can access this in Canada if they have activated their subscription from a valid US address. To activate captions, hover the mouse over an episode or movie thumbnail until a window appears. For videos where closed captioning is available, a 'CC' icon appears beneath the air-date. To enable captioning during playback, hover over the 'Gear' icon and choose 'On' under 'Closed Captions'. This preference will now be saved for future videos that offer this ability. Not all videos available on Hulu offer closed captioning. ("How to turn off/on closed captions the classic Hulu experience" Hulu Help Centre. *https://help.hulu.com/en-us/turn-on-off-closed-captions-on-hulu)*

Android TV

Turn on captions on an Android TV for supported apps that provide closed captions. The text size and caption style including font, colour and other aspects can be changed as desired.

To turn captions on, go to the Android TVs Home screen, scroll down to 'Settings'. Under 'Preferences' select 'Accessibility', next select 'Captions'. Select 'Display', and finally select 'On'. To customize the appearance of captions, go to the Android TVs Home screen, scroll down to 'Settings', under 'Preferences', select 'Accessibility'. Next select 'Captions', and select 'Configure' from the list. Then customize the following options:

- Language
- Text size
- Caption style: Choose a custom colour combination, or scroll to the bottom of the list and select 'Custom'. This will bring up additional options on font, colours, and more. ("Turn captions on or off" Android TV Help. *https://support.google.com/androidtv/answer/6123344?hl=en*)

Kodi

When using Kodi apps (such as the Exodus or Genesis Kodi add-ons available to US users) to stream TV shows, documentaries and movies, there is an option to download subtitles when available. This feature is only available on Kodi Gotham v13 or higher, and ensure an up to date skin is in use.

Head to 'System', then click 'Settings', under the 'Settings' list go to 'Video', scroll to find 'Subtitles' from the Kodi main menu. In this screen, the viewer can setup Kodi subtitles however preferred. In this menu several features can be controlled including the subtitle language, the service they download from, and their appearance.

Click on 'Languages' to download subtitles for, and select the preferred languages (several are available, as they are internet based), and when finished click 'OK'.

Scroll further down in this dialog box to 'Default Movie Service'. Click on it, and an empty dialog will appear. In this dialog, click on 'Get More' to add Kodi subtitle services. The Kodi subtitle add-on list will appear. Scroll down to OpenSubtitles.org and click it, then click 'Install' on the box that appears. A notification indicating that the service to add Kodi subtitles will appear.

Other services can be added from the list of subtitle providers, but the OpenSubtitles.org Kodi service is complete and works well. ("Guide: How to add Kodi subtitles to your streams and movies" HTPC Beginner. *http://www.htpcbeginner.com/guide-add-kodi-subtitles/*)

YouTube

Captions are only available on videos where the owner has added them, and on certain videos where YouTube automatically provides them via computerized speech recognition software. Unfortunately, the quality of captions provided through the speech recognition software varies.

If a video offers captions, they can be turned on by clicking the captions icon at the bottom of the video. ("Turn captions on and off" YouTube Help: Accessibility Settings. *https://support.google.com/youtube/answer/100078?co=GENIE.Platform%3DAndroid&hl=en*)

Popular broadcasting sites that offer help

Bell Fibe:	Turn closed captions on or off *http://www.bellaliant.ca/support/article/turn-closed-captioning-on-or-off/13528*
Bell Five TV App:	How to turn on captions in the Bell Five TV app *http://support.bell.ca/Fibe_TV/Receivers/Fibe-TV-app-on-Apple-TV.how_to_turn_on_the_fibe_tv_apps_closed*
Cogeco:	Closed captioning services *https://www.cogeco.ca/web/on/en/residential/support/33/326/faq-television/remote-control/what-is-closed-captioning-ccand-how-do-i-set-it-up-on-my-tv*
Rogers:	*http://www.rogers.com/web/content/search?scope=global&term=captioning*
Shaw:	*http://www.shawdirect.ca/english/customercare/accessibility/*
Telus:	*https://www.telus.com/en/on/search/execute.do*
Videotron:	*http://support.videotron.com/residential/television/tv-package-channels/channels/general-use/displaying-subtitles/illico-tv-new-generation*
Sasktel:	*http://support.sasktel.com/app/answers/detail/a_id/12023/~/turning-on-closed-captioning*

Future directions

With more Canadians accessing their entertainment, news and information through the internet, accessibility is becoming more important. Accessibility of websites is becoming a mainstream issue; however, many developers forget accessibility in the core design and in some cases, it is impossible to retrofit a website. This was true for Netflix which eventually lost a class action suit in the US and had to introduce accessibility long after it had launched its service.

The World Wide Web Consortium or W3C, has developed a set of guidelines to promote the continued expansion of the web, and provides standards and testing tools for accessibility features. Despite the efforts to create a unified approach to web-accessibility, some of these standards have earned criticism, mainly for their lack of consumer focus. Their guidelines are also criticized for being filled with obscure jargon and definitions that web developers may be unfamiliar with, which makes it difficult for these guidelines to be followed. (Accessibility SIG Meeting (July 24, 2007) Putting the User at the Heart of the W3C Process [Notes]. *http://wiki.cetis.ac.uk/Putting_the_User_at_the_Heart_of_the_W3C_Process*)

As a result, some countries have developed their own guidelines for accessible web content. In Canada, there are three standards regulating the accessibility of government websites: the Standard on Optimizing Websites and Applications for Mobile Devices, the Standard on Web Usability and the Standard on Web Interoperability. The government also developed the Web Experience Toolkit (WET), a set of components for building websites available to anyone developing an accessible website. ("Web Experience Toolkit" Government of Canada. *http://www.tbs-sct.gc.ca/hgw-cgf/oversight-surveillance/communications/ws-nw/wet-boew-eng.asp*)

There are different approaches to creating accessible web content, and some organizations have caught on to this trend but choose to amend their website after launch. It is easier to create accessibility features during the development of the website than it is to recode things afterwards, sometimes requiring a complete overhaul. When this happens, some businesses and web masters elect to develop a separate webpage for accessible content, usually in text-only format (which is accessible to screen readers and refreshable braille displays).

Ironically, these text-only websites could still be inaccessible. If the link to the accessible website is embedded within the main website, there would be no way for a person to navigate to the accessible link. Also, the link may not offer sufficient description for someone using a screen reader to identify what it is to navigate to it. (Moss, T. (Nov. 1 2006) Separate text-only version? No thanks! Webcredible. *http://www.webcredible.com/blog/separate-text-only-version-no-thanks/*)

Integrating the same accessibility features available with traditional broadcasting into online access points would improve the quality and impact of programming. While some have done this voluntarily, many websites that offer video or podcast streaming have not.

For the web to be accessible for all, several different factors must work in harmony and this will not be possible unless a universal set of guidelines is developed, and can easily be followed. W3C is working to develop guidelines to fulfill this need, but it is also important that governments support this and develop web accessibility legislation that applies to web-based organizations.

Radio accessibility

In Canada, radio transmissions are primarily made through analog signals in AM and FM frequencies, and programming is widely available across the country especially in areas with large markets (such as major cities). Prior to widespread public use of the internet, few forms of broadcasting rivaled the reach of radio. Radio programs are often the main source of information, news and entertainment for people with low or no vision, but there are limitations in terms of accessibility – especially for those living with hearing loss.

While people who live with mild or moderate hearing loss can also experience some challenges in understanding the radio, those with severe to profound losses find radio broadcasts too difficult to follow. Some radio broadcasters will provide transcripts of their shows upon request, but this is generally limited to talk shows and will only be available once the program is finished.

While amplifying the sound can help some people, many who live with hearing loss would benefit from captioned radio programs. Digital radio broadcasting (DRB) is used extensively throughout Europe, the United Kingdom and Australia, among other countries. It has the capacity to include real-time captions that can be read on a display of a digital radio receiver. This feature allows people with hearing loss not only to follow discussion and read the lyrics to music, but also to participate in interactive radio shows during broadcast.

Common problems and solutions for improving audio quality

Background noise, music, sound effects and ambient noise can make understanding dialogue more difficult for people with hearing loss. When the volume control on a radio is not sufficient enough to aid in comprehension, there are ways to bring the sound closer to the ear or to be synchronized with hearing aids.

Having a radio connected to an induction loop system in the home can make it easier to follow speech by allowing the listener to hear the program directly through their hearing aids/cochlear implants, as would devices that synchronized through Bluetooth products. This raises the audio volume to the amplification level set by the audiologist during fitting/programming to maximize the clarity of speech sounds.

If these are not options, there are other ways to improve audio clarity through assistive listening devices.

FM and infrared systems

FM and infrared systems can help with amplifying radio programs as well. It is often helpful to connect the television, computer, radio and CD/MP3 device docking station to an audio system with multiple component options, so that any assistive devices can be coupled to this central system and the listener can simply switch the components as desired without having to unplug and reconnect to different devices repeatedly. Many systems offer a variety of component connection options including stereo jacks, RCA cables, HDMI and USB – be sure to check that the system offers sufficient connection ports for the devices to be connected to it, including the FM or Infrared device.

Other options

FM and infrared systems may come with stereo speaker systems, and positioning these speakers closer to the listener brings the sound closer to the ear, reducing deterioration that can occur over a distance.

Another option is to purchase high-end headphones that can be plugged into the radio. The better the headphone, the better the volume control that limits how loud the sound can be raised, to protect hearing. Wireless headphones provide even greater freedom of movement for the listener.

Transcripts from service providers and captioned radio

Some radio stations offer transcripts online for select, non-music based programs. However, some stations only provide transcripts upon request after the program has aired. There are broadcasters that offer their program transcripts freely through their website for public access.

LexisNexis Academic Universe offers access to a variety of news media, including a wide array of radio transcripts from US and some international broadcasters. While this service is for registered users and students of New York University, visitors can also sign in using their Facebook and Twitter account free of charge.

If a user would like to access a transcript to a radio program, broadcaster websites may offer them; if not, they will need to contact the broadcaster directly. Sometimes, broadcasters will direct listeners to a third-party company that is responsible for producing the transcripts. Look for an email address associated with the broadcaster's Transcripts and Recordings Department or their Accessibility Department if available, and specify the date and time the program was aired, as well as the name of the program and subject. Be sure to contact the broadcaster shortly after the broadcast, as transcripts may not be available indefinitely. Transcripts are intended for personal use, and cannot be shared or distributed publicly without proper authorization. ("Get Those 'Must-Haves' From Canada's Top TV and Radio Stations." Cision. *http://www.cision.ca/resources/broadcast-recordings/*).

Transcripts can help if a person listened to a program, but didn't understand part of it. However, they are produced at the end of a broadcast. For programs that include an interactive call-in show, a transcript will only be available after the show is finished so it would not be of benefit to a person with hearing loss during the program. While some broadcasters offer transcripts, they may not be free and as well, a shipping and handling fee could be charged for each transcript to be delivered.

When transcripts are not available, check if the broadcaster offers the program as a podcast. Podcasts are usually embedded in a media player on the broadcaster's website, and the media player allows the listener to adjust the volume, stop, rewind and replay the program. This can be helpful if certain words or parts of the dialogue are missed when listening to the recording the first time.

Smartphones offer another option; many come with an FM chip that allows users to access analog FM stations. The biggest problem is that most smartphone phone manufacturers do not activate the FM chip, forcing consumers to use streaming apps that can drain more battery power from the smartphone and typically uses data, which can lead to added expense. There are free apps that smartphone users can download to unlock the FM chip, so the user can listen to analog FM stations

saving additional battery power without using their smartphone data. In the US, there are many free apps that allow users to activate their FM chip to access free radio through their smartphones and provide a list of carriers that provide this service such as "ActivateMyChip.com", "NextRadio", "Free Radio on my Phone", and others. These services allow users not only to listen to FM radio broadcasts, but access a range of information from the broadcaster including images and interactive content. This type of broadcasting could also be used to provide accessibility features (such as song lyrics, transcriptions or captioned radio), but more public support is needed to make this happen.

Currently, Canadian national carriers such as Rogers, Telus and Shaw, as well as regional carriers such as Sasktel, Videotron, MTS and Eastlink only offer smartphones with deactivated FM chips although many devices are available from manufacturers that have them activated. Bell does offer some wireless devices with the FM chip activated and only requires a headset plugged into the headset jack to act as an antenna, but it is largely unmarked so most people are still unaware of this service. ("Campaign demands telecoms unlock the FM radio found in many smartphones" CBC News: Business. *http://www.cbc.ca/news/business/fm-radio-cellphone-telecoms-1.3577447*)

Lobbyist groups have begun to put pressure on Canadian wireless carriers and the CRTC to have more smartphones and wireless devices available in Canada with the activated FM chip. This service is important not only for easier, free access to FM broadcasts - it is also less susceptible to disruption in emergencies and would allow for emergency broadcasting and public safety alerts as mandated in the National Public Alerting System to be accessed via the wireless device. Many people carry their smartphone with them everywhere, making it an ideal route to deliver these important notifications.

Another helpful feature for people with hearing loss is the ability to record and replay segments of program that were misheard. While the days of recording radio programs on cassette tapes are largely bygone, this option is possible using internet based radio services. The majority of radio stations in Canada offer live streaming of their programs via a media player embedded on their website, and some of these do offer the ability to adjust the volume as well as pause, rewind, fast forward (up to the point of live broadcast) and play/replay the program as it is broadcast. These features can help those with some forms of hearing loss to better understand speech. Other features typically not present on embedded media players but which could offer greater accessibility and understanding of dialogue in an audio program, are tone control (which would enable the listener to adjust the pitch of the sound to be high, medium, or low, depending on which frequencies are more easily heard) and an audio speed control (which could potentially slow down the audio track, giving the listener additional time to process the sound).

Digital and satellite radio

Figure 14: A Digital Radio Broadcasting receiver

While analog radio is currently the primary carrier used by the radio broadcasting industry, there is an alternative widely used across Europe, the United Kingdom, South America and Asia that has the capacity to offer greater accessibility to persons who live with hearing loss: Digital Radio Broadcasting (DRB) for example see Figure 14.

DRB was developed using advancements in digital and modulation technology and is beneficial for its improvements to signal quality and reliability. Lightning, power lines and other sources of interference can degrade analog AM transmissions; while noise is less of an issue for FM transmissions, multipath fading and shorter range have also caused problems with audio quality. All the issues inherent to analog radio transmissions diminish or disappear completely when digital techniques are employed. Sound quality is also greatly improved due to digital broadcasting's capacity to transmit higher audio frequencies within a limited bandwidth (Freznel, L. (Oct. 1 2012) "What's The Difference Between Satellite Radio and HD Radio?" Electronic Design. *http://electronicdesign.com/communications/what-s-difference-between-satellite-radio-and-hd-radio*).

In the mid-1980s, Canada experimented with digital broadcasting (termed Digital Audio Broadcasting, or DAB) in several major cities such as Toronto, Montreal, Vancouver and Ottawa to raise awareness of DAB among broadcasters, regulators and the telecom industry. There were too many challenges and in 1996 the CRTC abandoned the plan to phase in DAB across the country, favouring analog radio broadcasting already in place. Proponents of DAB emphasize that one benefit of this form of radio broadcasting is that it can also accommodate captioning files with the audio transmission ("Canada. Details of Trials" World DAB. *https://www.worlddab.org/country-information/canada#details_of_trials*).

In 2008, several industry stakeholders conducted a live demonstration of captioned radio as proof of the viability of this technology ("Digital Radio Accessibility. Developments with Digital Radio Technology for People with Disabilities" [Report] (August 2010) Australian Communications and Media Authority. Pg. 8. *http://www.acma.gov.au/~/media/Broadcast%20Carriage%20Policy/Report/pdf/Digital%20Radio%20Accessibility%20Developments%20with%20Digital%20Radio%20Technology%20for%20People%20with%20Disabilities%20August%202010.PDF*.

In Canada, captioned radio will remain out of reach via DRB as the CRTC has no current plans to introduce this technology for Canadians. However, it is possible that expanding captioned radio services from the US and elsewhere would offer an opportunity for people with hearing loss to utilize this type of radio accessibility.

Figure 14: By Håvard Wien (Own work) [CC BY-SA 4.0 (http://creativecommons.org/licenses/by-sa/4.0)], via Wikimedia Commons

Want to learn more?

Access to Television and Radio transcripts or recordings, Canadian broadcaster contact list: *http://www.cision.ca/resources/broadcast-recordings/*

Accessible Media Inc. – *http://www.ami.ca/about-ami/web-and-mobile-accessibility*

Internet Providers in Canada – *https://www.gonevoip.ca/internet-providers/*

"History of Closed Captioning" National Captioning Institute – *http://www.ncicap.org/about-us/history-of-closed-captioning/*

How to use accessibility features through Internet Explorer – *http://www.mediaaccess.org.au/web/web-browsers/how-to-turn-on-accessibility-features-in-internet-explorer*

Media Access Canada – *www.mediac.ca*

Quality of captions on YouTube – *http://www.captionsforyoutube.com/blog/posts/2-wondering-what-youtube-has-to-say-about-captioning-youtube-videos*, *https://support.automaticsync.com/hc/en-us/articles/202356725-YouTube-s-Captioning-feature-Known-Issues-and-Tips-*

Radio Stations in Canada *http://www.cab-acr.ca/english/links/radio/default.shtm*

Specialty Channels in Canada *http://www.cab-acr.ca/english/links/specialty/default.shtm*

Television Stations in Canada *http://www.cab-acr.ca/english/links/television/default.shtm*

World Wide Web Consortium on Accessibility – *https://www.w3.org/WAI/*

W3C Web Content Accessibility Guidelines – *https://www.w3.org/TR/WCAG/*

Canadian Hard of Hearing Association
Association des malentendants canadiens