Assistive Listening Systems

Why use an Assistive Listening System?

Background noise and reverberation, or simply distance to the sound source, degrade intelligibility and comprehension for all people. The negative effects of noise and distance are more pronounced for the hard of hearing people, whether they wear hearing aids or not. Thus, people who are hard of hearing cannot participate on equal terms with hearing people - especially in larger assembly areas - if these areas are not equipped with an effective assistive listening system. Even the best acoustical environments and the best sound systems combined with the best in digital hearing aid technology, leave the hard of hearing with an intelligibility problem. Can this signal to noise ratio deficiency be improved with the technology available to us today? Thankfully, yes, through the use of an **assistive listening system**.

In recognition of this, the Canadian Building Code Act (1992) requires that assistive listening systems and devices be made available in rooms or buildings of assembly occupancy larger than 100 square meters in area. Provincial and local building codes may add additional requirements.

An assistive listening system serves to transmit sound as directly as possible from its source to the hard of hearing person's ear. The simplest way to achieve this might be to use a small personal amplifier with a microphone and a set of earphones. Though simple, hardwired systems like this are very impractical in public venues. Apart from personal body-worn systems, they have been replaced by modern wireless systems.

Wireless Technologies, How They Work, Advantages and Disadvantages

Today there are three basic wireless technologies available that use different methods of sound transmission: Audio Frequency Induction Loop Systems (AFILS), FM broadcast technology, and Infrared light technology (IR). Each method has its own advantages and disadvantages. All three types of assistive listening technologies can easily and successfully be used for home and commercial applications alike, subject to their individual limitations.

Audio Frequency Induction Loop Systems (AFILS)

This technology is based on magnetic induction transmission and has the unique advantage that the signal is received directly by the user's hearing aid (i.e. without any additional devices) if it is equipped with a telecoil (telemagnetic pickup coil). It is most often referred to as a T-coil. An audio loop system consists of an amplifier and a hidden wire (the loop) that is placed around the perimeter of the room or listening area. When the loop amplifier is connected to an audio source such as a TV or PA system, the sound is received invisibly by the user's hearing aid without the need for an additional receiver as is required by all other technologies. The sound is also tuned to the need of the user by the hearing aid. Loop receivers are available for listeners who do not use hearing aids or whose hearing aids are not equipped with the telecoil feature.

Properly designed audio loop systems comply with the IEC 60118-4 international standard for assistive systems. In Canada, amplifiers are also required to conform to CSA, ULc or ETLc safety standards.

Advantages:

Transmits directly to hearing aids equipped with T-coils, no receiver required
Invisible use with T-coil hearing aids and cochlear implants
Sound is tuned to the listeners hearing loss by the hearing aid
Only non T-coil equipped hearing aid users require receivers (>70% of hearing aids have T-coils)
(For all the above reasons, loop systems are much more likely to be used by people with hearing loss)
Fewer receivers required than for FM & IR systems
Less money spent on receivers reduces long term costs

Disadvantages:

Simple perimeter loops spill signal outside of the loop (where privacy is required, spill can be contained with alternate loop designs)

FM Broadcast Systems

In principle, FM systems designed for hearing assistance applications work just like commercial FM radio systems operating in the 88 to 108 MHz range. In Canada, FM hearing systems operate in the 72 to 76 MHz range. Since each system may use its own broadcast frequency, several systems can operate simultaneously at one location without interfering with one another. Unlike the loop system however, FM systems require a special receiver for each person, whether s/he has a hearing aid or not. There are several listening options available for FM receivers including under-the-chin type steto-clip headsets, Walkman style headsets, ear buds (or neckloops for telecoil users).

Advantages:

Highly portable – can be used by tour groups
Easy to install
Transmission range up to 1,000 feet
Several channels available for multiple systems

Disadvantages:

Receivers required for everyone
Both headphone output and neckloop listening devices must be available at public facilities
For multiple applications (e.g. multiple languages), receivers must be able to operate on different channels.
Signal spills beyond the listening area cannot be contained
Facility owners are required to maintain, clean, dispense and collect receivers and keep receiver batteries charged

Infrared Light Systems (IR)

Infrared systems use light for signal transmission. An infrared system consists of three basic components: a transmitter (base station), an emitter, and a receiver. The audio signal is converted into infrared light by the transmitter and emitter. The receiver detects the IR signal

and converts it back into the original audio signal. Unlike FM transmission and induction loop technology, infrared light cannot pass through walls. Therefore, infrared light transmission is ideal for facilities operating several systems simultaneously in different rooms in that all receivers can be identical with no need for frequency coordination.
As with FM technology, each person must use a receiver, whether or not s/he has a hearing aid. Receiver types include lightweight under-the-chin style, over-the-head receivers for 360-degree reception and lavaliere style. Similar to FM systems, the listening options receivers include under-the-chin type steto-clip headsets, Walkman style headsets, ear buds (or neckloops for telecoil users).

Advantages

Multiple applications (e.g. multiple languages) can run simultaneously without interfering with one another
Insures confidentiality (cannot be listened to outside the room)
Personal systems easy to install
No limitation of area size as emitter panels may be interconnected

Disadvantages

Receivers required for everyone
Both headphone output and neckloop listening devices must be available at public facilities.
Not practical for outdoor applications (sunlight interference)
Most expensive system
Facility owners are required to maintain, clean, dispense and collect receivers and keep receiver batteries charged

Information Sources (used with permission):

1. Large Area Assistive Listening Systems, Cynthia Compton-Conley, Ph.D. Gallaudet University, Washington, DC, USA, 2008

2. Comparison Chart for Three Basic Types of Wide Area Assistive Listening Systems, Curtis Dickinson, CEO, Hearing Loss Help Company, Worcester, MA, USA