From Remote Mics & Telecoils to LE Audio & Auracast: Accessibility for All and the Evolution of Wireless Technologies in Hearing Aids

Part 1: Technology

Juliëtte Sterkens, AuD
Hearing Loss Association of America

Brian Taylor, AuD, WS Audiology

Webinar FAQs:

How to ask a question:

Click Q&A, type your question and Send.

Where to get the handout:

Resources in the classroom and under Pending Courses in your account

How to view captions:

Click Live Transcript CC button

Click Show Subtitle

How to earn CEUs:

After the webinar, go to your Pending Courses and pass the multiple-choice exam.

For assistance or tech support:

Call 800-753-2160

customerservice@audiologyonline.com

Use the Q&A window

Risks/Benefits

- The applicability and accuracy of the course content may vary by the clinical, geographical, and cultural context; you should evaluate the course accordingly.
- As healthcare is rapidly evolving, new findings may change the validity of the information presented in this course. Providers should always consult the latest research and guidelines from professional associations.
- The interventions discussed in this course may be limited in generalizability, requiring practitioners to consider specific individual and population factors.
- The course may not cover all possible risk factors, diagnostic methods, or treatment options, and complex cases may require additional considerations.
- Healthcare providers should apply cultural competence and sensitivity to ensure effective and respectful care based on their patients' diverse needs.
- Providers should always evaluate the limitations of diagnostic and screening tools, considering their potential for false results as well as any ethical implications.
- It is the responsibility of course participants to critically evaluate the evidence from multiple sources to guide professional practice.

Learning Outcomes

After this course, participants will be able to:

1.) Describe the different types of wireless technologies in modern hearing aids

2.) Differentiate the advantages and limitations of various types of wireless technologies inside modern hearing aids

3.) Implement a clinical strategy that leverages all types of wireless technologies in order to improve patient accessibility and outcomes.

Disclosures

- Juliëtte Sterkens, AuD
  - Retired from private practice in Oshkosh WI in 2012
  - Consultant to the Hearing Loss Association of America (HLAA) 13+ yrs
  - I receive a consulting fee from HLAA, thanks to grant funding from the David and Carol Myers Foundation
  - Frequent guest lecturer at several AuD programs
  - Board member of HEAR-in-the-Fox Cities, a non-profit which funds hearing aids for children in Northeast Wisconsin

Professional Awards

UW-Oshkosh - Distinguished Alumnus Award 2015
Arizona School of Health Sciences - Humanitarian of the Year 2013
Academy of Doctors of Audiology - Leo Doerfler Award 2013
Wisconsin Audiologist of the Year 2011
Larry Mauldin Award 2011
American Academy of Audiology - Presidential Award 2011

- Products and equipment are used for illustration and are not product endorsements. Exclusion should not be construed as disapproval.

Disclosures

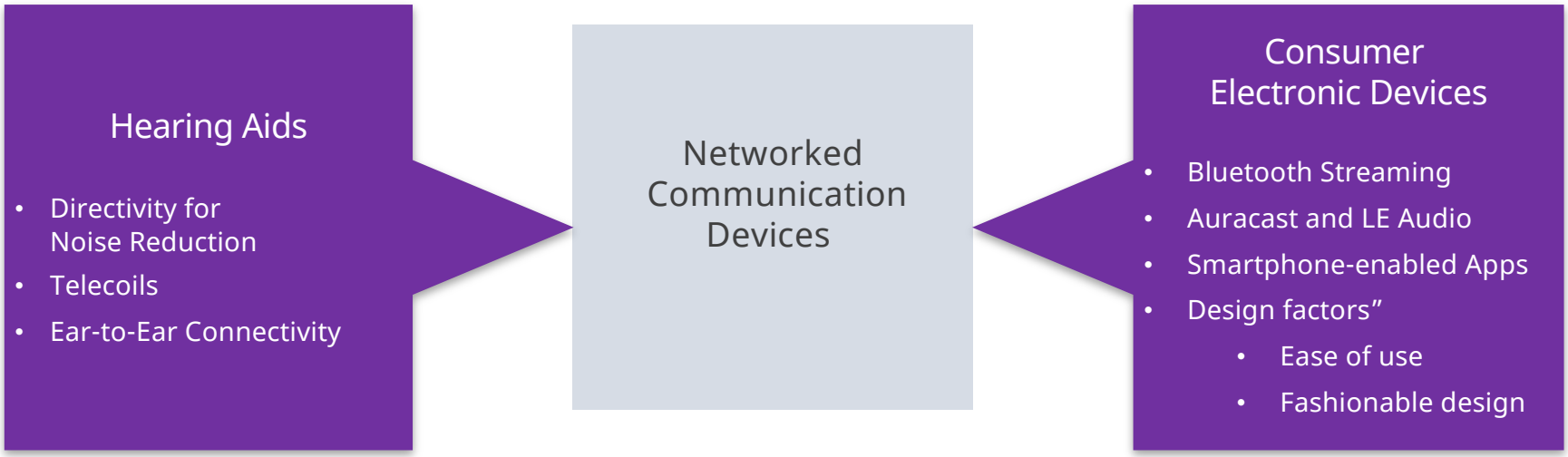
- Brian Taylor, AuD
  - Senior Director, Audiology, WS Audiology
  - Adjunct Instructor, University of Wisconsin
  - Editor, Audiology Practices
  - Editor-at-Large, This Week in Hearing (HHTM)

Part 1

- Introduction: Network Communication Devices
- Overview of Wireless Technologies, How They Work, and How They Have Evolved Over the Past 30 Years
- Differentiate Remote Mic, Telecoil, LE Audio, and Auracast Wireless technologies
- Latest developments related to Auracast, including its advantages and limitations
- Summary

What are Wireless Technologies (WT)?

Convergence of Technology



What are Wireless Technologies (WT)?

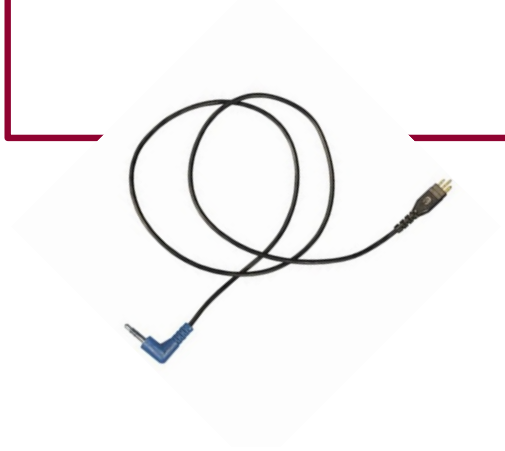
Hearing aids are **networked communication devices** that enable greater accessibility and improved performance. WT are the backbone of this portable, individualized network.

How to think about Wireless Technologies

- Requires a shift in thinking from an afterthought to a “must-have”

The “Accessory” Era (1980’s to 2015)

- Telecoils
- Remote Mics
- Direct audio input
- FM + shoe
- Infrared
- “Booted,” Isolated and Fixed
- “Choose one”



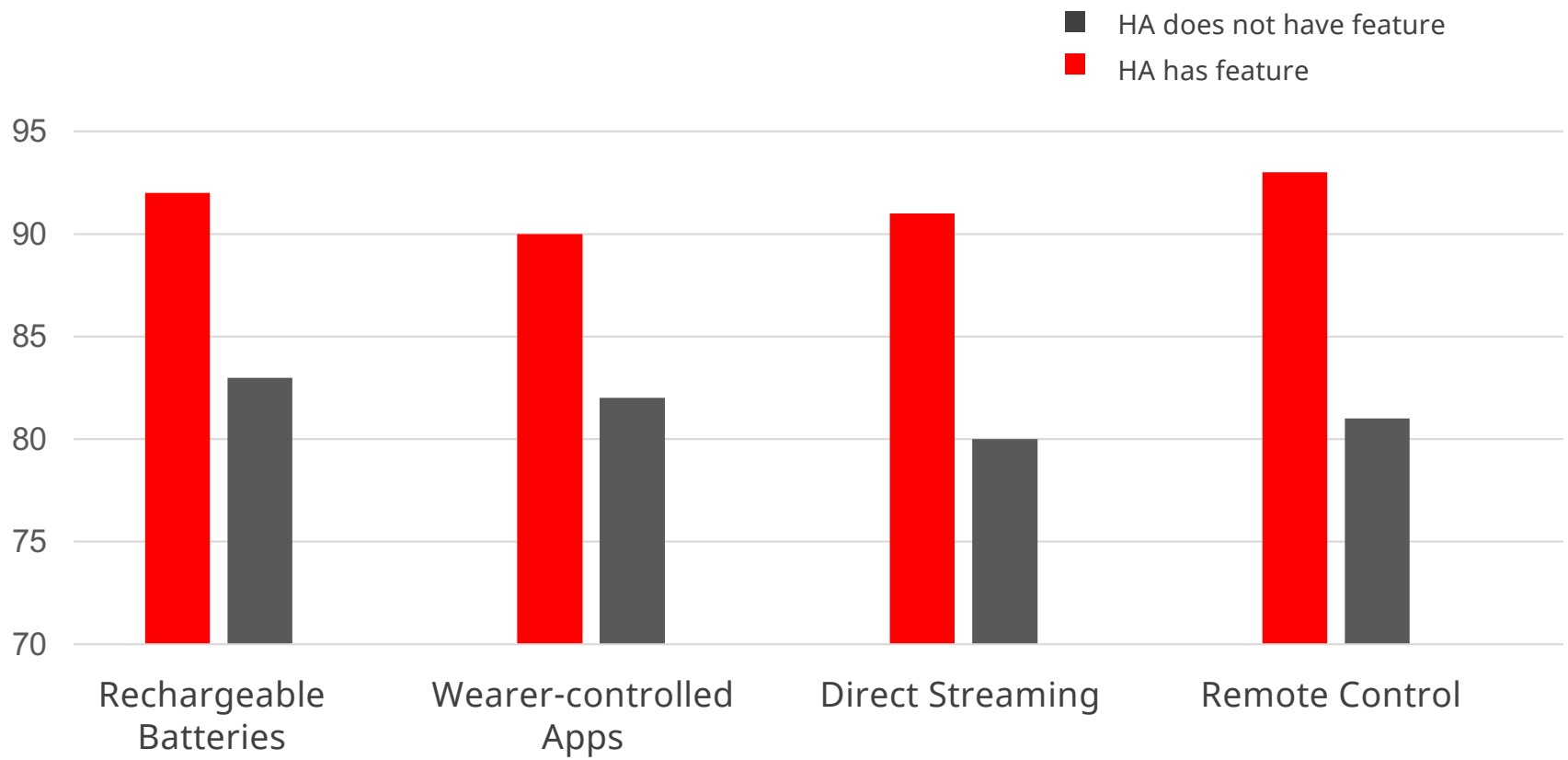
The “Networked Communication Device” Ecosystem (evolving since ~2015)

- Smartphone + HA = Hub
- Telecoils
- Remote Mics
- Auracast/LE Audio
- Wireless and Portable
- “Choose several”

Enhance patient autonomy

- Hands-free calling for convenience and safety
- App-based wearer control for fine-tuning
- Boosts sense of agency and empowerment

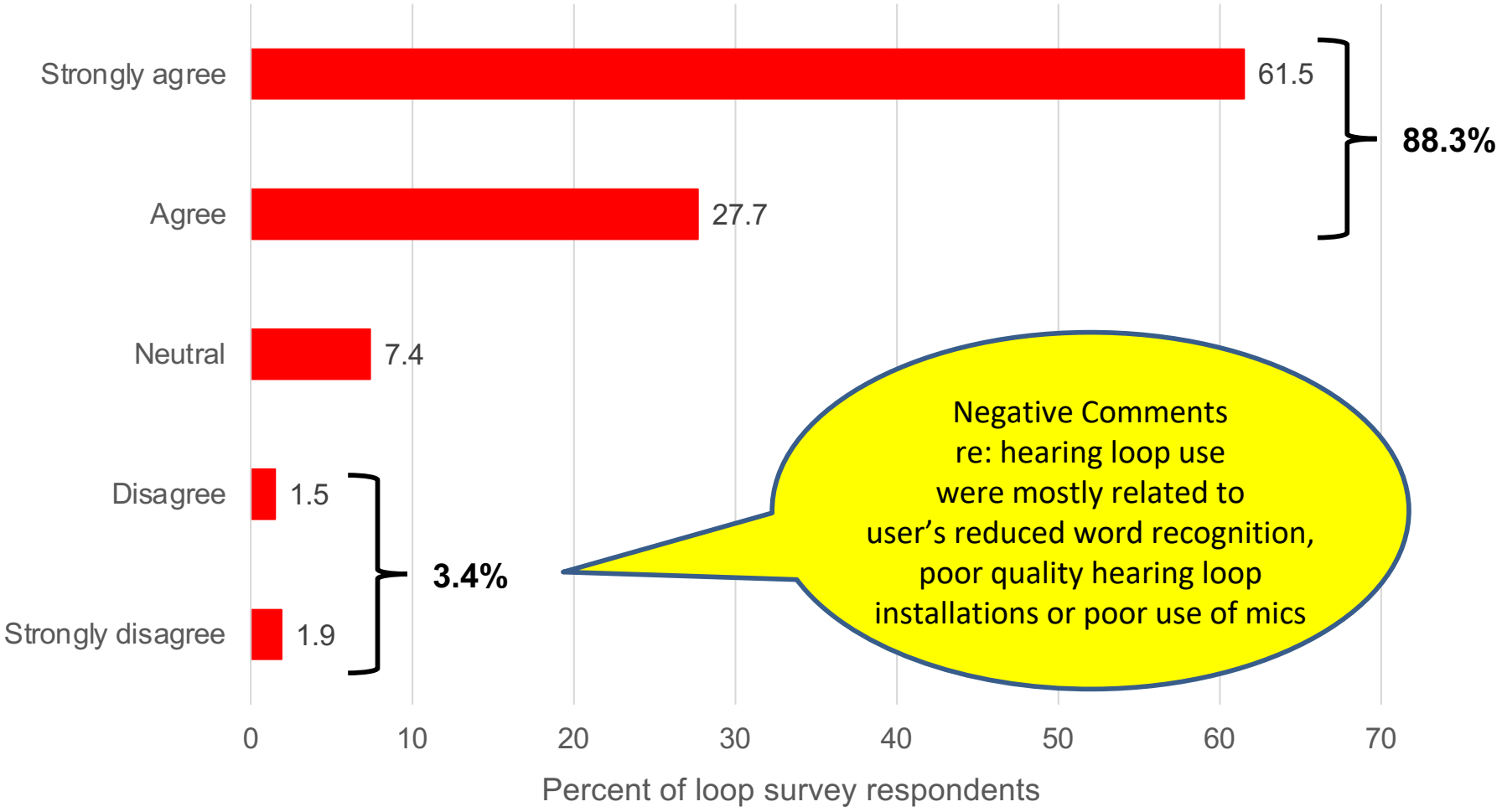
Boost overall satisfaction



MarkeTrak 2022

Consumers were more satisfied with their hearing devices due to use of telecoil in hearing loops

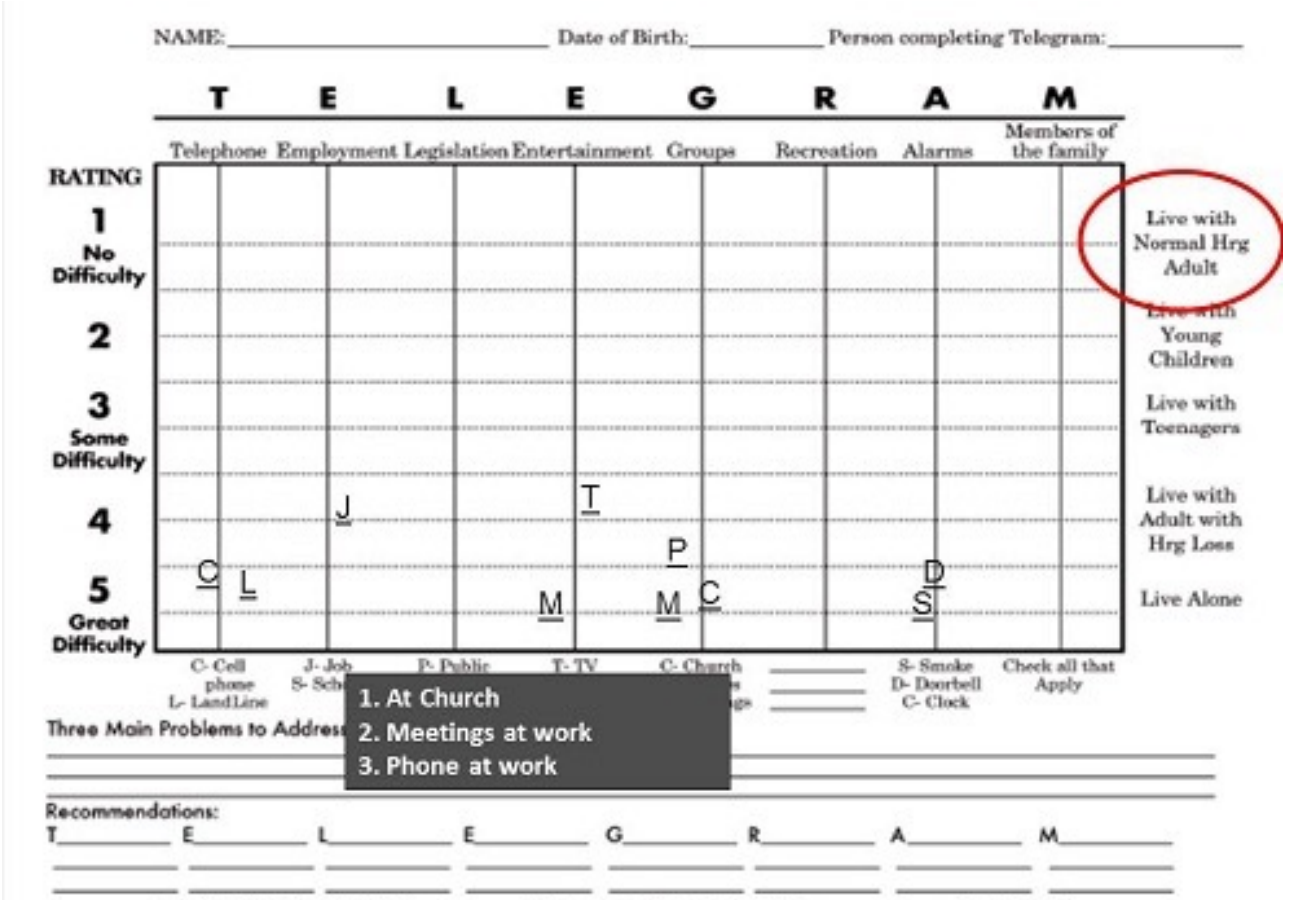
(n=866)



Kochkin, Sterkens, Compton-Conley, Beck, Taylor, Kricos, Caccavo, Holmes, Powers, (2014)
Consumer perceptions of the impact of inductively loops venues on the utility of their hearing devices
The Hearing Review, 21(10), 16-26

An essential part of the treatment process

- Talk about WTs as an indispensable, integrated solution, not an assistive device or accessory



Thibodeau, Linda M.. Hearing assistance technology (HAT) can optimize communication. The Hearing Journal 57(11):p 11, November 2004. | DOI: 10.1097/01.HJ.0000324401.41896.fd

A portable SNR enhancement tool

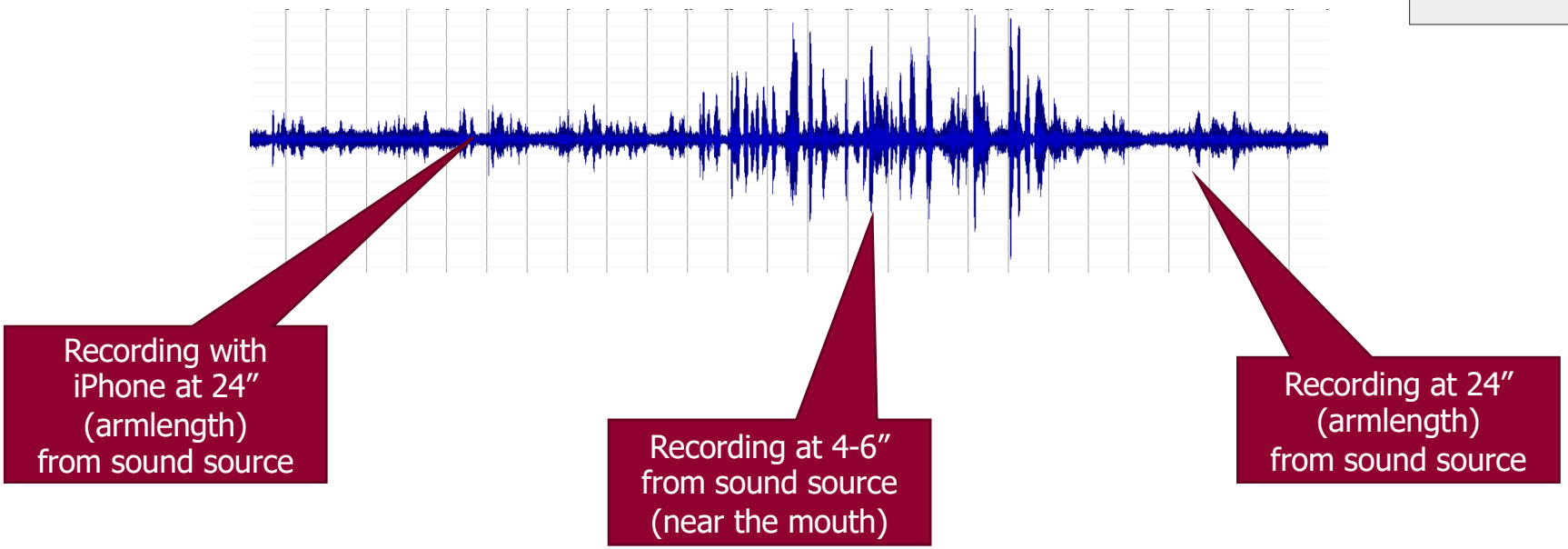
- Many positives stem from improving the wearer's SNR:
  - Improved speech intelligibility
  - Improved listening effort
  - Reduced cognitive load & fatigue
  - Reduced social withdrawal

Why the need for Wireless Technologies?

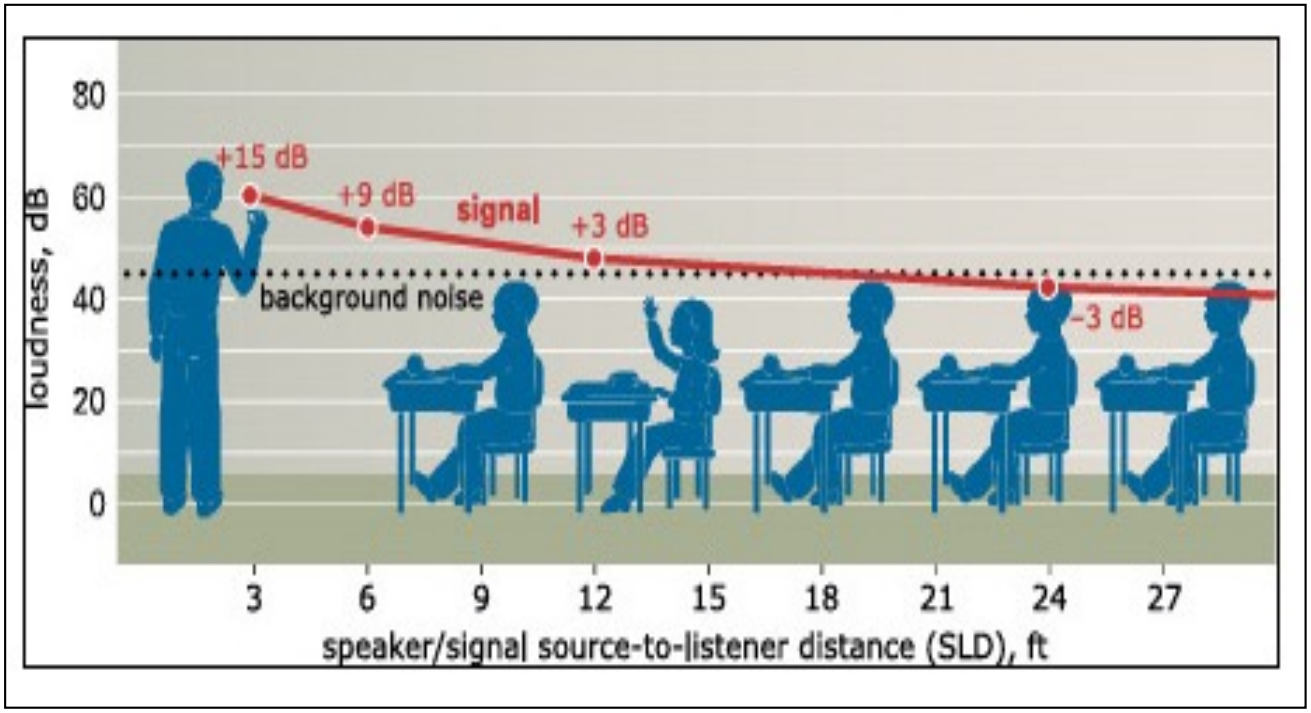
- Degree of hearing deficit *post*-hearing aid fitting can be substantial
- Hearing Aids do not correct reduced auditory processing as measured by a speech-in-noise test
- Directional microphone limitations
  (Directivity Index Improvement ~5-6 dB for *occluding molds & near-field* background noise)
- Effective range of the microphone on hearing aid/CI is limited

HEARING LOSS LEVEL	TYPICAL PRESCRIBED GAIN	RESIDUAL HEARING DEFICIT in dB HL
16 to 25 Slight	4 to 10	12 to 15
26 to 40 Mild	10 to 20	16 to 20
41 to 55 Moderate	20 to 30	21 to 25
56 to 70 Mod/Severe	30 to 40	26 to 30
71 to 90 Severe	40 to 50	31 to 45
91+ Profound	46+	45 to 55

Source: Clark and English, 2019



Speech Over Distance



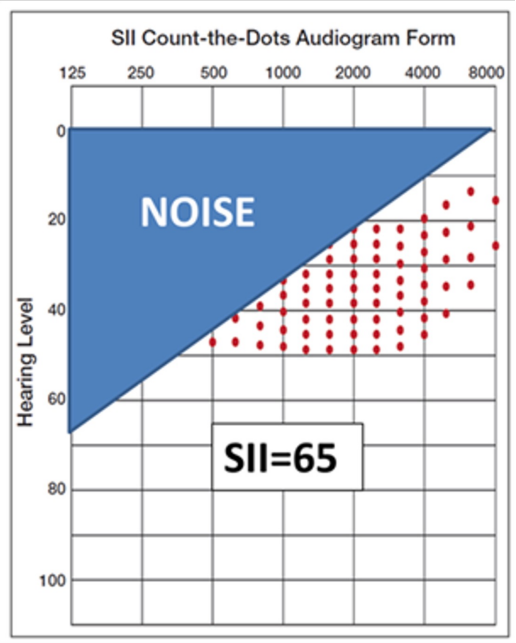
Reverberation further diminishes the ability to understand speech

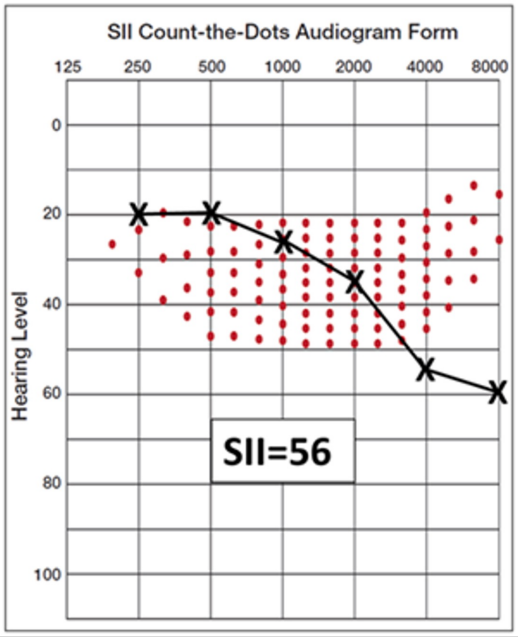
Crandell C, Smaldino J (2000) Classroom Acoustics for Children with Normal Hearing and with Hearing Impairment. Lang Speech Hear Serv Sch 31(4): 362-370.

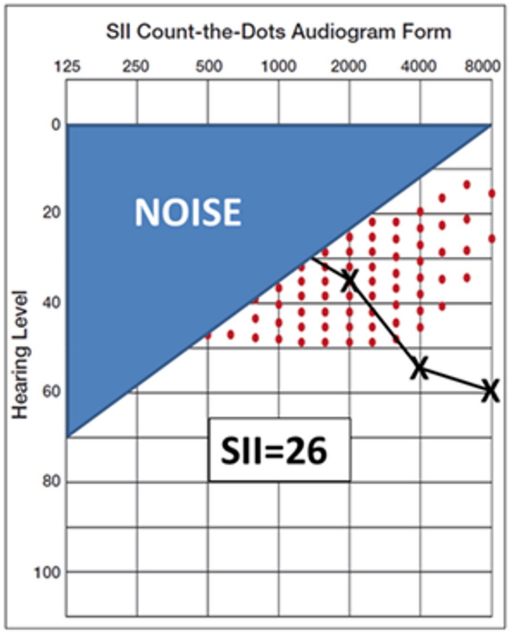
Speech In Noise

What happens when we hear speech in noisy backgrounds?

What happens when a person with hearing loss hears in that same noise?



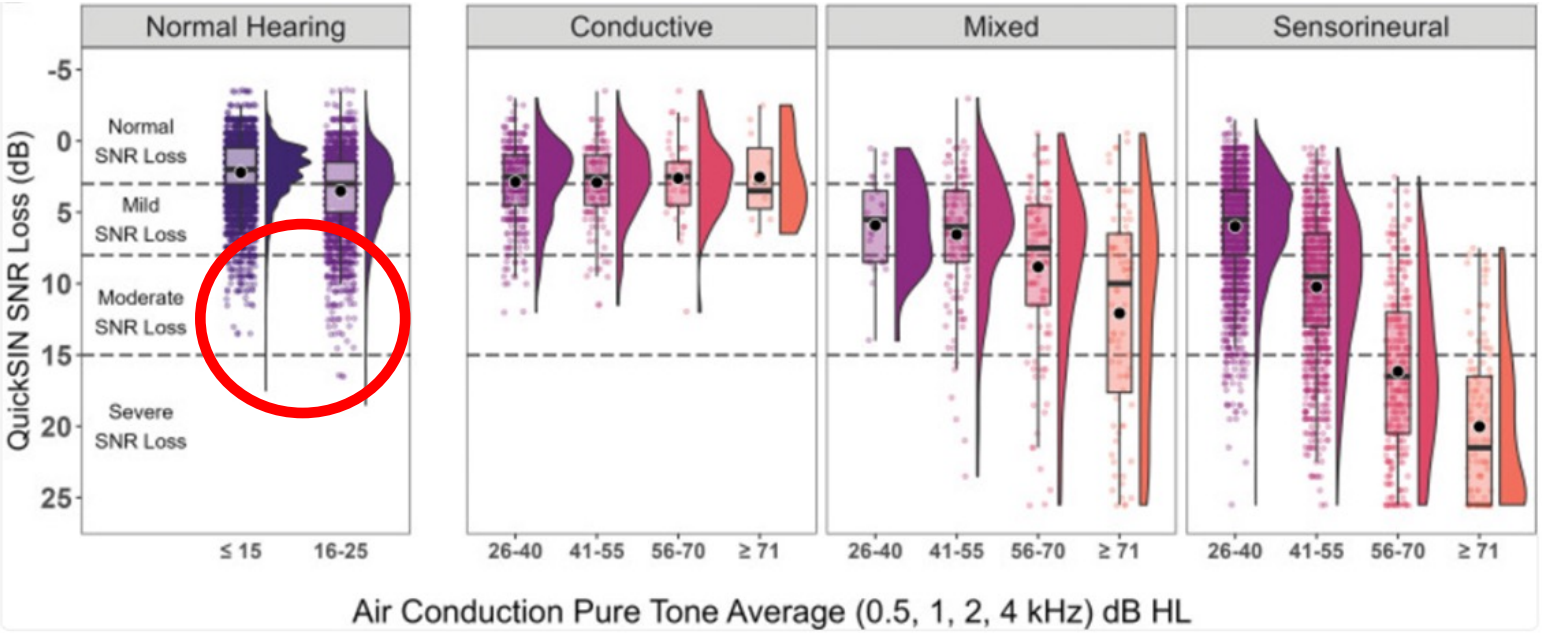




www.audiologyonline.com/articles/research-quicktakes-volume-1-understanding-28674

SNR loss (Quick SIN scores)

- Even some with normal hearing have significant SNR loss
- Note individual variability between patients in each group



Smith, Michael L.[1,2]; Winn, Matthew B.[2]; Fitzgerald, Matthew B.[1]. A Large-Scale Study of the Relationship Between Degree and Type of Hearing Loss and Recognition of Speech in Quiet and Noise. Ear & Hearing 45(4):p 915-928, July/August 2024. | DOI: 10.1097/AUD.0000000000001484

Wireless Classroom Technologies in 1995-2010

- **Classroom** FM transmitters

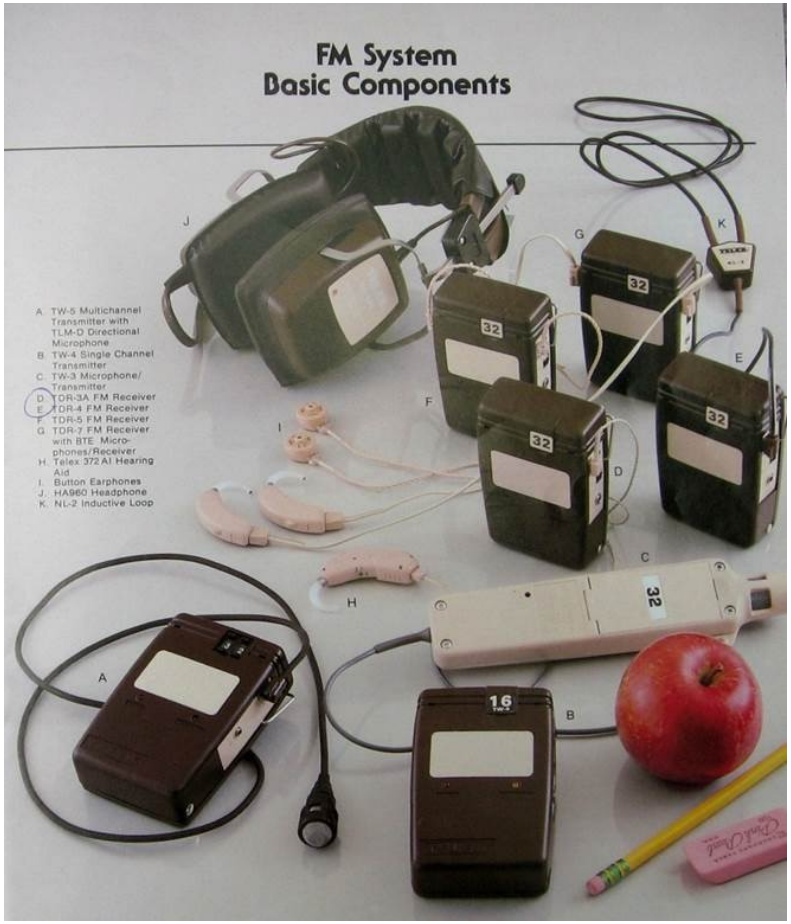


Image retrieved at https://canadianaudiologist.ca/bidding-farewell-to-personal-fm-feature

Personal Wireless Technologies in 1995-2005's

- **Personal** wireless FM systems
  - ✓Williams AV (previously WilliamsSound) - US made
  - ✓The Conversor - UK made

Wireless Technologies 2010 and later

- **Signia**

Wireless Technologies 2010 and later

- **Phonak Roger**

roger

Wireless Technologies 2010 and later

- **Oticon**

Wireless Technologies 2010 and later

- **Widex**

Various remote mics with built-in telecoil

Starkey Remote Microphone +

Resound Multi Mic

Widex Sound Assist

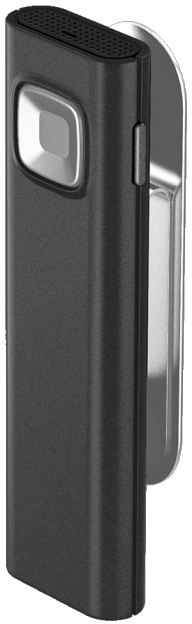
Rodemerk, K and Galster, J (2015) - The Benefit of Remote Microphones Using Four Wireless Protocols, JAAA

By Galster, J (2015): https://canadianaudiologist.ca/wireless-technology-is-constantly-changing-are-you-keeping-up/

Live Listen: iPhone used as a remote microphone

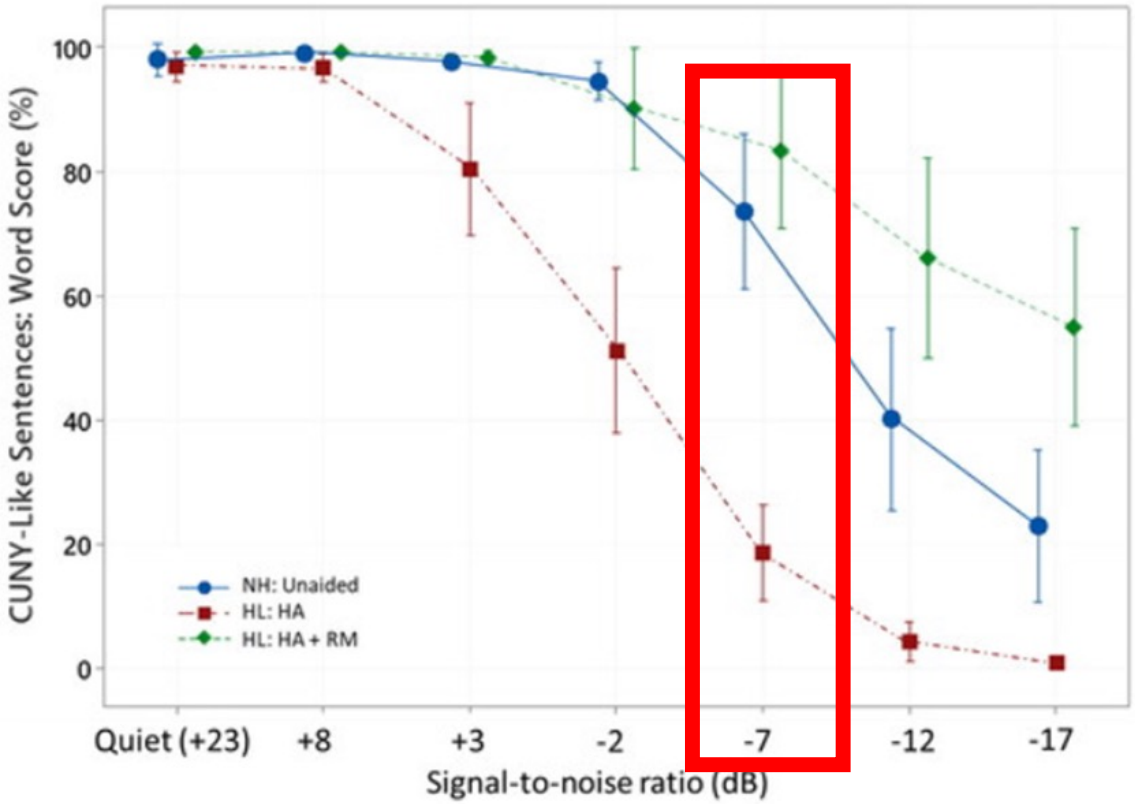
Remote Microphones

- Picks up someone's voice and sends it directly into the hearing aids
- 10 to 20 dB SNR improvement
- Low-delay transmission mediums:
  - Bluetooth Low Energy (LE Audio)
  - Proprietary 2.4 GHz wireless



Remote mic effectiveness

- Multiple studies show that remote mics help overcome poor SNRs
- In poor SNRs remote mics can provide far greater improvement than directional mics
- Results largely depend on the wearer's own PI function



Zanin, J., Vaisberg, J., Swann, S., & Rance, G. (2024). Evaluating benefits of remote microphone technology for adults with hearing loss using behavioural and predictive metrics. International Journal of Audiology, 64(4), 327–335. https://doi.org/10.1080/14992027.2024.2354500

Q1

Telecoils & Hearing Loops

- Earliest use in 1930's
- Initially, to permit hearing on landline telephone The "**T**" stood for telephone
- First "public" hearing loop (1953) permitted Winston Churchill to hear in the House of Commons
- Late 1950's: Telecoil permitted hearing of radio and TV via a small loop pad
- 1970's - Netherlands, most schools for deaf and hard of hearing children used hearing loops
- Early 2000's: **Renewed** hearing loop interest in US started in earnest in Holland MI. It spread to other communities in early 2010's
- 2010 ADA standards for Accessible Design mandates neckloops and clear signage

Tel-Audio table-top hearing aid made by the National Electrical Research and Mfg Co in Washington, DC w/ external telecoil (1936)

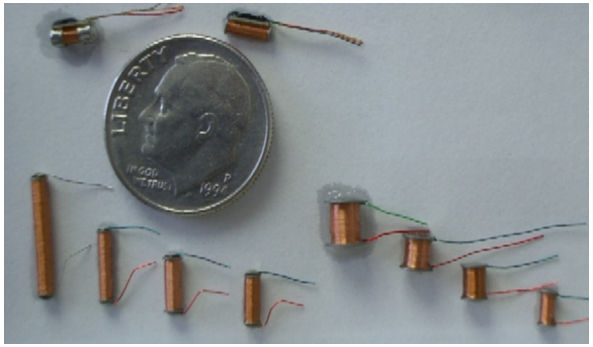


Photo: Tibbitts industries

For more information see hearinglosshelp.com/blog/brief-history-of-t-coils-and-loop-systems

Hearing loops are *directly* hearing aid compatible

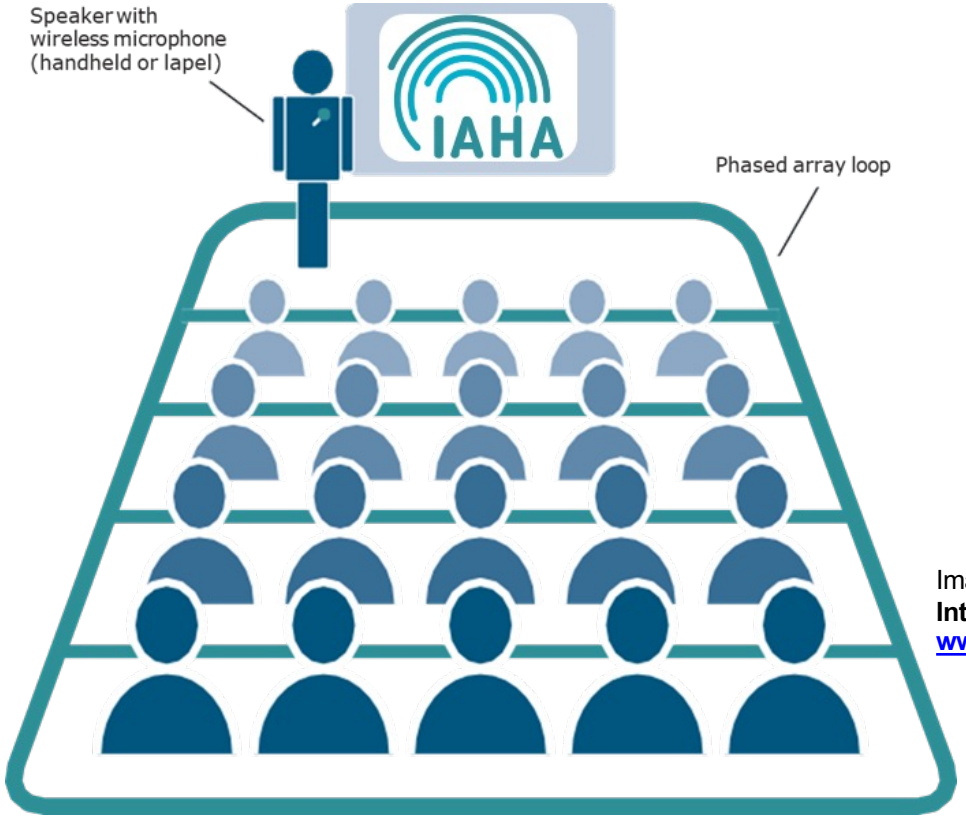


Image courtesy:
International Association for Hearing Access
www.IAHA-global.com

Sound (voice from the lectern)

Microphone

The lectern Mic

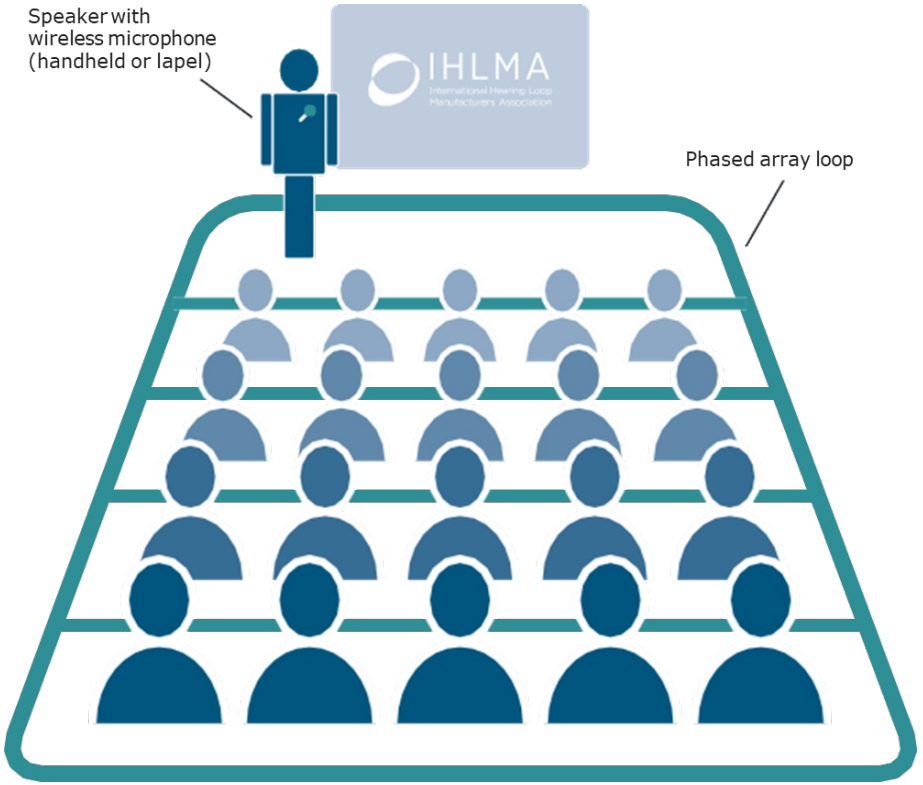
Hearing Amplifier

Loop wire

T-coil in Hearing Device

Becomes the HA Mic

The telecoil *is* the receiver in a hearing loop



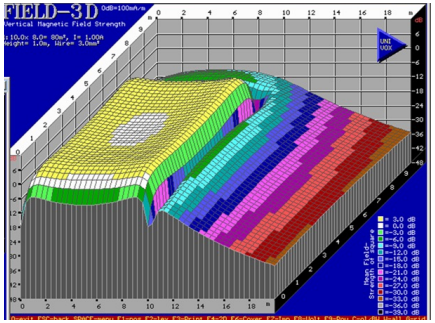
Added benefit: The hearing aid processes sound according to the user's own needs

Sound (Voice from lectern) → Microphone → **Signal-to-Noise Improvement of 10-25 dB** → T-coil in Hearing Device

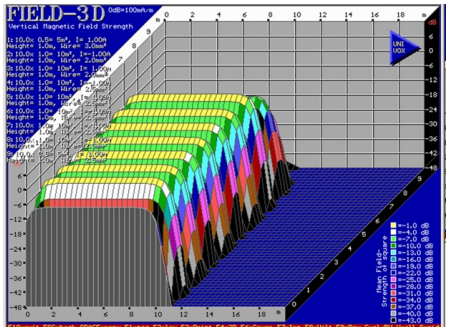
Hearing loop locations in North America: centerforhearingaccess.org/state-lists

The Hearing Loop installation Standard

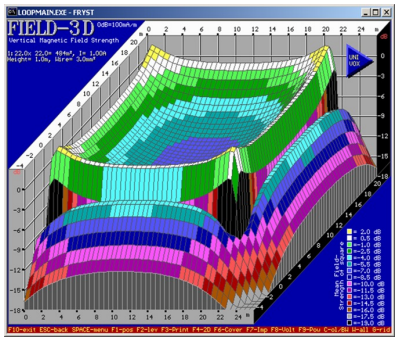
- BS 7594 Code of Practice for Audio-Frequency Induction Loop Systems (AFILS) - published in 1991
- IEC 60118-4 induction loop standard, **first developed in 1981**
- Latest hearing loop standard dates to **2014** (60118-4:2014)
- Specifies ✓**Permittable EMI** levels
  ✓**Broad frequency response** (100-5000Hz)
  ✓**Even** magnetic field strength in the seated area



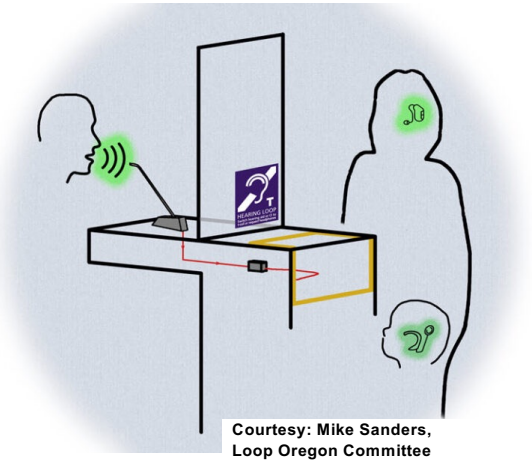
Perimeter hearing loop



Phased Array hearing loop



Poorly performing hearing loop, which does not meet the IEC 60118-4 standard

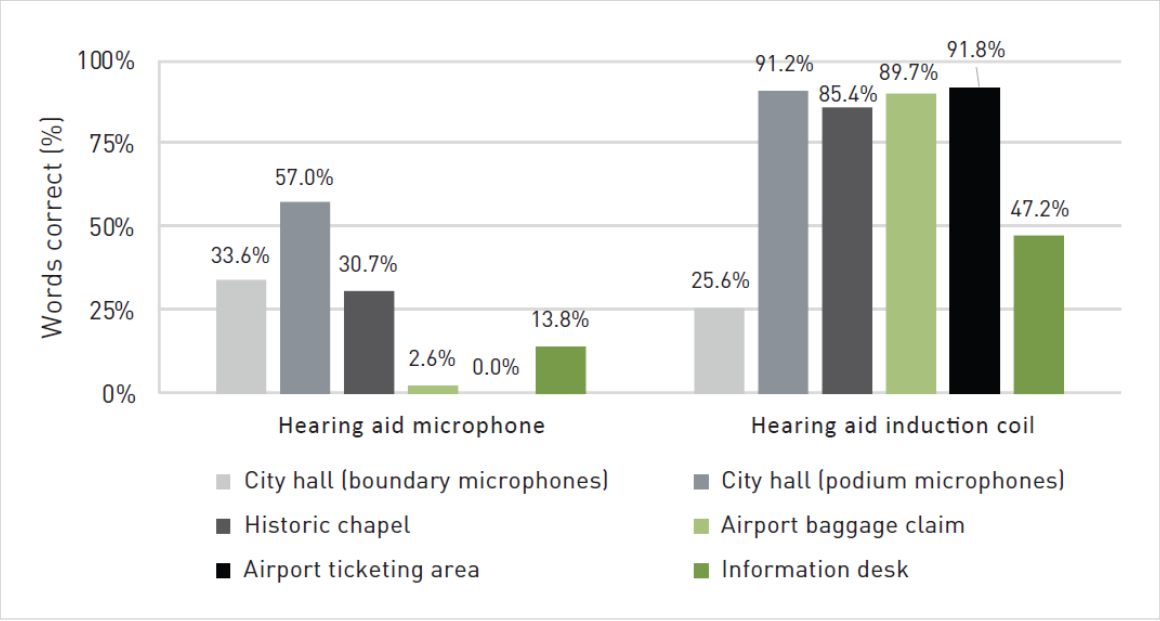


Courtesy: Mike Sanders, Loop Oregon Committee

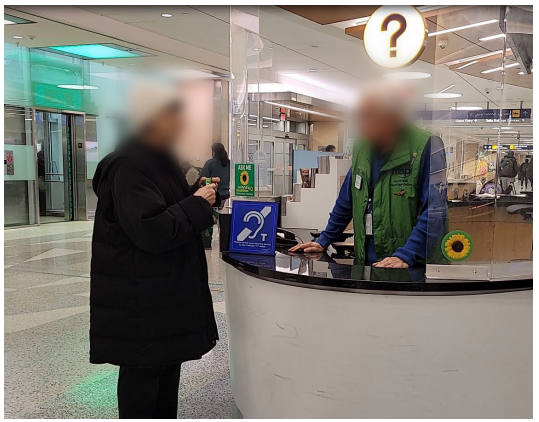
Counter hearing loop

Effectiveness of hearing loops

- Google Speech-to-Text (SST) was used to analyze sound recordings made **out** vs. **in** looped areas
- SNR ratio benefits were estimated to be between **20-**to-**30 dB**



QR code link to comparative microphone and telecoil recordings



A Sound Investment: Hearing loops and induction coils in Intrigue AI yield dramatic improvements in public spaces
https://cdn.mediavalet.com/usil/starkeyhearingtech/QAZ_JNt1DEyOeULzeGImKw/IzR8haVK2kqjQPUyZgj-BA/Original/Hearing%20Loops%20and%20Induction%20Coils%20in%20Genesis%20AI%20-%20Whitepaper.pdf

FM/RF Assistive Listening (more about this in Part 2)

- The most common type of ADA assistive listening system used in the United States
- Can work well for users with hearing aids & T-coils with a neckloop
- No FM installation standard
- FM/RF systems range around the world:
  - 72 to 76 MHz
  - 216 to 217 MHz
  - 2.4 GHz is also used

Telecoils make multiple devices “hearing aid compatible”

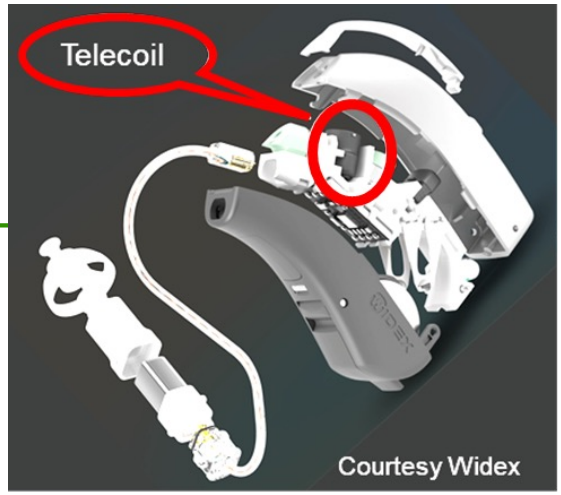
- Assistive listening systems
  - Hearing loops (no borrowed equipment)
  - FM/RF and infrared systems (with neckloop)
  - Auracast (with neckloop) for HAs/CIs without built-in Auracast (more in part 2)
- Group tour guide systems, via neckloop
- Individual museum guide systems, via neckloop
- Airline onboard entertainment, via neckloop (photo)
- Computers, tablets, via neckloop
- Circumaural headphones

Telecoil information

www.centerforhearingaccess.org/qr-telecoils

Geemarc amplified neckloop

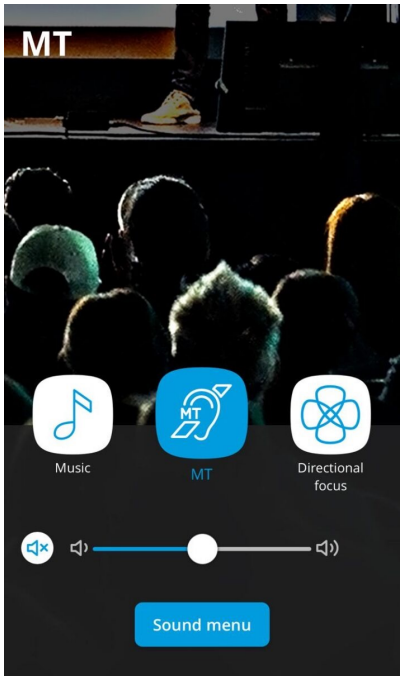
Telecoil programming & verification

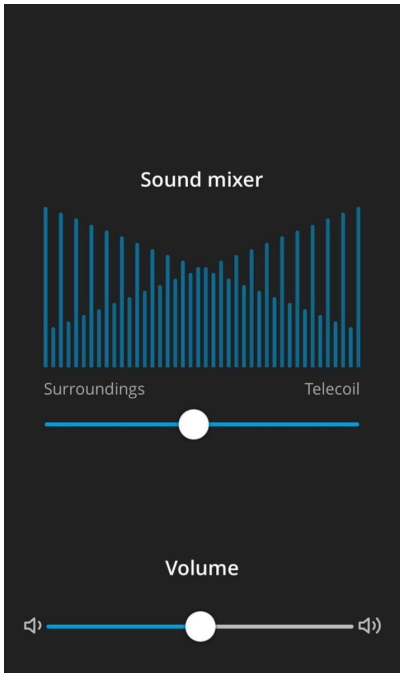


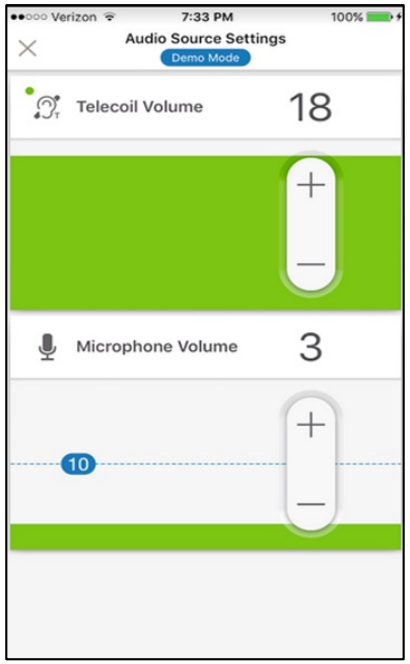
Manual Telecoil (NOT an autocoil)

Mic + T vs **Telecoil-***Only:*

- **T-only** for open/RIC fittings
- **Mic + T** if occluding earmolds, client needs to hear own voice / voices in vicinity.
  - ✓Adjust M/T mix in fitting software
  - ✓As a rule: Less gain in the Mic for clients with poorer discrimination
- Better yet: Teach clients how to vary M/T mix with smartphone App







Reading Telecoil Specifications

- 31.6 mA/m = 60 dB SPL
- SPLITS = equivalent to the Telecoil Reference Test Gain (RTG)
- SPLIV vs. SPLITS

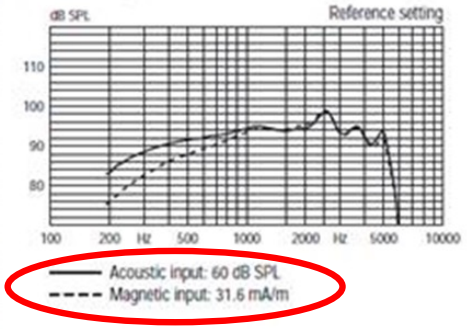
Technical Specifications

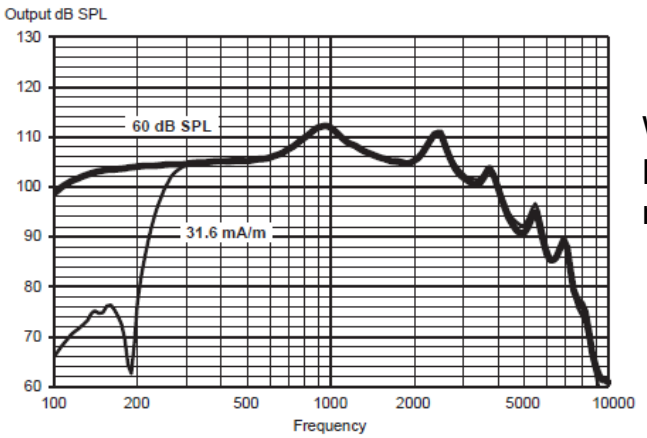
		LS67-DW		
		IEC 60118-0 2nd IEC 711 Ear simulator	IEC 60118-0 3rd IEC 60118-7 ANSI S3.22 2cc coupler	
Reference test gain (60 dB SPL input)	1600 Hz/HFA	44	38	dB
Full-on gain (50 dB SPL input)	Max. 1600 Hz/HFA	65 55	56 49	dB
Maximum output (90 dB SPL input)	Max. 1600 Hz/HFA	130 122	120 115	dB SPL
Total harmonic distortion	500 Hz 800 Hz 1600 Hz	0,8 0,7 0,7	0,5 0,5 1,0	%
Telecoil sensitivity (1 mA/m input)	Max.	95	-	
HFA - SPLIV @ 31.6 mA/m (ANSI)	HFA	-	99	dB SPL
Full-on telecoil sensitivity @ 1 mA/m	1600 Hz/HFA	86	80	
Equivalent input noise		26	23	dB SPL
Frequency range (DIN 45605/ANSI)		100-7000	100-6800	Hz
Current drain		1.2	1.3	mA

Data in accordance with IEC60118-0 Edition3.0 2015-06, IEC60118-7 and ANSI S3.22-2009, supply Voltage 1.3V

	Telecoil output, dB SPL	
87	1 mA/m field, 1600 Hz	80
107	10 mA/m field, 1600 Hz	100
	SPLITS (ANSI), right/left ear	94/93
	Total harmonic distortion, %	
	Reference setting. Input: 70 dB SPL	
IEC	Hz	ANSI
0.5	500, typical	0.5
0.5	800, typical	0.5
0.5	1600, typical	0.5
	Equivalent input noise level, dB SPL (A)	
16	Typical/maximum, Omni (ANSI)	12/16
23	Typical/maximum, Dir (ANSI)	20/24
	Battery consumption, mA	
1.1	Quiescent, typical/maximum	1.1/1.3
1.1	IEC	1.1
	ANSI	1.1

Frequency response with magnetic and acoustic input





Widex Moment model 440

Verify the Telecoil in a HIT box (<5 mins) once the fitting is finalized

Speechmap® for Telecoil Testing

For the first time you can use Speechmap to ensure audibility for telecoils. Simply place the instrument in the test box and select any stimulus you wish, including speech!

centerforhearingaccess.org/uploads/using-the-verifit-verify-telecoils-in-hearing-aids/

Dave Smriga (2023) AO Course #38362

The Whys & Hows of Modern T-Coil Testing/Verification

2.4 GHz/Bluetooth Wireless: The Basics

- Bluetooth® is a radio technology using short-wavelength radio waves to transmit data wirelessly over short distances.
- Bluetooth® is the name of the standardization that covers a wide range of different use types of wireless transmission.
- Bluetooth® relies on short-range radio frequency, and any device that incorporates the technology can communicate with other Bluetooth-enabled devices as long as they are within the required distance of each other, which is about 30 feet.
- Bluetooth® technology is governed by a special interest group called Bluetooth® Special Interest Group (SIG). The Bluetooth® SIG has been working closely with hearing aid manufacturers for more than a decade to bring a universal, wireless hearing aid standard to market.
- There are several proprietary wireless protocols that use the 2.400 GHz and 2.4835 GHz bandwidth (MFi, ASHA, others)

2.4 GHz/Bluetooth Wireless: The Basics

- Applications in hearing devices:
  - **Data sharing** between hearing aids (example DNR is activated in the L HA and in turn automatically activates DNR in the R HA)
  - **Audio sharing** between hearing aids (example: bilateral beamforming)
  - Near-field magnetic induction (NFMI) also used for this application)
  - Wirelessly connect with Bluetooth-enabled consumer audio devices
- Wireless protocols (4):
  - Bluetooth Classic
  - Apple's Made for iPhone (MFi)
  - Google's Audio Streaming for Hearing Aids (ASHA)
  - Low Energy Audio

LE Audio vs. Classic

	LE Audio (LC3)	Bluetooth Classic
Connection type	Short, periodic data bursts; mostly "sleeps" when idle	Continuous
Latency	~6 ms (lower latency)	~100 ms
Audio Quality	High quality,	Good to ok quality with occasional dropouts
Power Consumption	Low	High
Use cases	Point-to-point, multi-stream audio, broadcast audio (Auracast)	Point to point

Key Point: Many devices, including hearing aids, use dual-mode Bluetooth

LE Audio (LC3) vs. BLE

	LE Audio (LC3)	Bluetooth Low Energy (BLE)
Underlying technology	Bluetooth Low Energy (BLE)	A low-energy radio protocol
Key Codec	LC3 (Low Complexity Communication Codec)	Uses the LC3 codec
Audio Quality	High quality, low latency	High quality, low latency
Power Consumption	Low	Low
Key Feature	Multi-stream audio, broadcast audio (Auracast)	Multi-stream audio, broadcast audio (Auracast)

Key Point: LE Audio is an advanced version of Bluetooth audio that uses the Bluetooth Low Energy (BLE) radio. BLE is the technology, and LE Audio is the application

Bluetooth® Low Energy (LE) Audio vs Auracast™

- In 2023, after more than 10 years of collaborative efforts, hearing aid manufacturers and the Bluetooth® SIG unveiled a new generation of Bluetooth®:
- Auracast and LE Audio

LE Audio

- Streams audio signals directly between smartphones and hearing aids with excellent stability, audio quality, low latency and low energy consumption with a range of ~100 meters
- Today (2025), a growing number of **non-Apple smartphones** come with LE Audio
- Hearing aids with LE Audio capability will make direct LE Audio Bluetooth® streaming simpler, and with improved sound quality

Bluetooth
LE Audio

Auracast™

- The Bluetooth® LE Audio protocol supports the new broadcast mode, Auracast™
- Although Bluetooth® LE Audio and Auracast™ protocols are linked together, the technical hardware requirements are not the same
- You can have a device that has Bluetooth® LE Audio but does not have Auracast™ capabilities.

AURACAST™
A BLUETOOTH® TECHNOLOGY

Auracast™ Terminology

- **Auracast™- ready**
  the hearing aid has Auracast hardware (chip) on-board, but needs a firmware update for Auracast to directly connect with hearing aids
- **Auracast™- enabled** aka **Auracast™- live**
  It will directly connect with hearing aids today
- Find Auracast™ products at www.Bluetooth.com/auracast/find-a-product.
- Further reading: “Bluetooth Technology Update” 2024 Audiology Practices article

How Auracast™ Broadcast Audio Works

- An unlimited number of in-range Auracast™ receivers can join an Auracast™ broadcast from a nearby Auracast™ transmitter. “One to many” broadcasting
- A transmitter advertises the availability and information details of the stream. Any Auracast™ receiver or assistant can listen for that broadcast and join based on the user’s request.
- “One to many” broadcasting that requires 2- or 3-parts:
  - Transmitter (TV/laptop/PA system)
  - BLE audio receiver (in the hearing aid) and/or
  - BLE smartphone

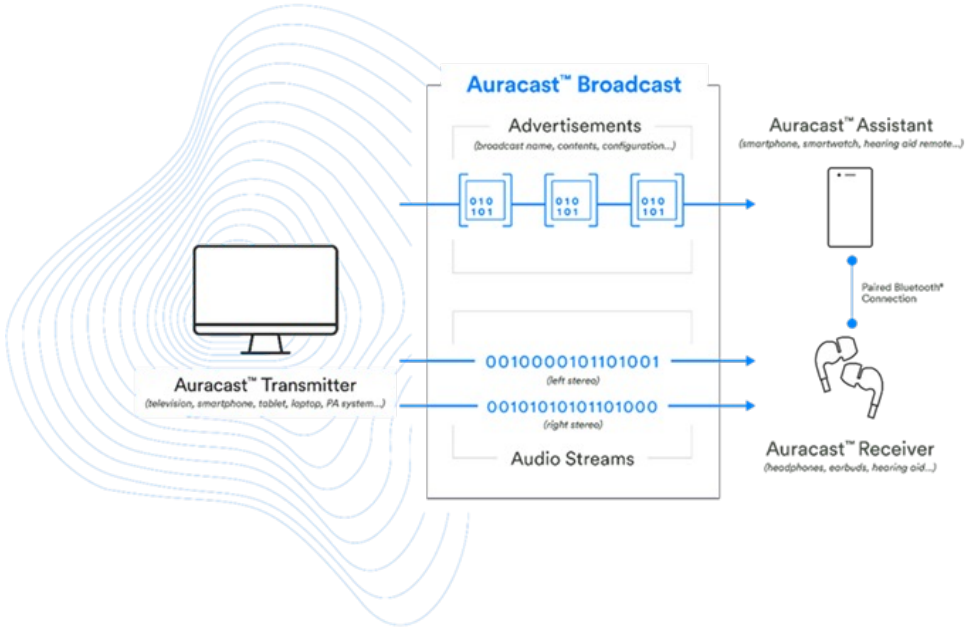
More on Auracast™

- A smartphone is not required to listen to an Auracast™ broadcast audio stream
- Once joined, the receiver listens to a direct audio stream from the transmitter. The smartphone is not involved in the listening process
- 2 methods for finding and joining an Auracast™ broadcast audio stream
  - With an assistant (e.g., smartphone or smartwatch)
  - Without an assistant

Joining With an Assistant

Most common method (similar to joining a Wi-Fi network):

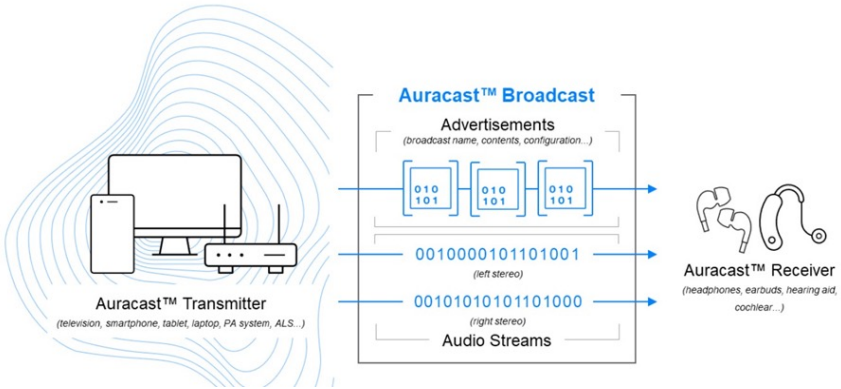
- First, a transmitter advertises the availability of an Auracast™ broadcast audio stream
- The smartphone (assistant) scans for available broadcasts, providing an interface for the user to choose which broadcast to join
- Once the broadcast is selected by the user, the assistant directs the receiver to join that broadcast directly



Joining Without an Assistant

Ideal method with hearing aids

- The receiver, which is built into the hearing aids, scans for an available broadcast and provides the mechanism on the device (button, switch, etc.) to join the broadcast stream. (Not yet available)



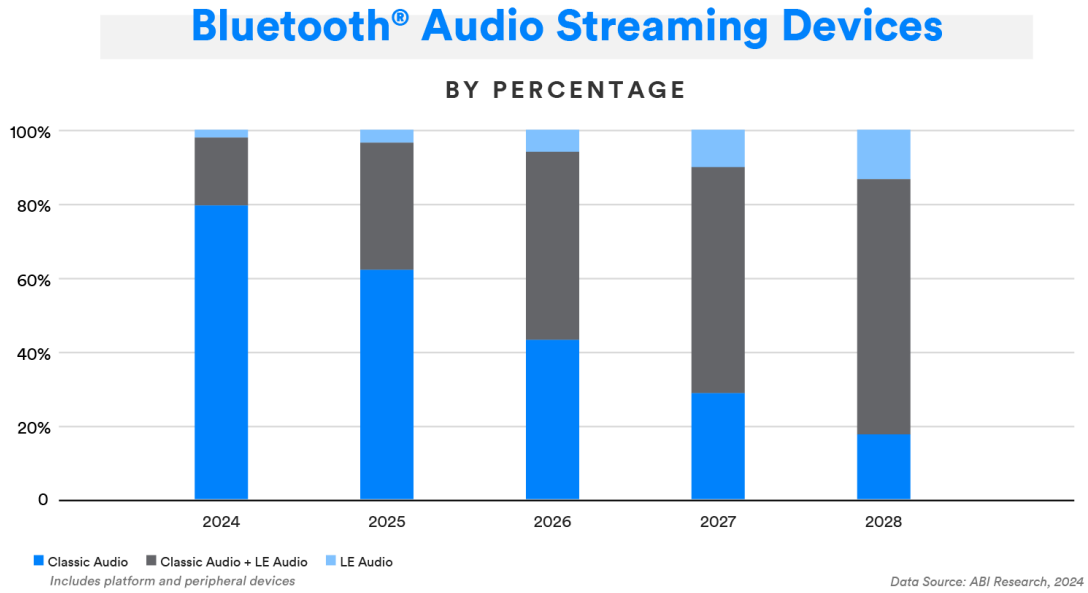
Auracast™ Obstacles & Limitations

- Auracast™ is in its infancy, thus clinicians should not anticipate broad general use of Auracast™ especially in public spaces until at least 2030. (Bluetooth SIG, 2023)
- Auracast™ needs time to mature into a stable, reliable, and user-friendly technology that can be easily adopted by end-users including hearing aid wearers
- Apple smartphones (62 to 65% market share in the US) don't use LE Audio (BLE)….yet!
- 3-part infrastructure will take significant time to be created.
  - Transmitter (TV/laptop/PA system)
  - BLE Audio compatible smartphone
  - BLE Audio receivers (hearing aids/headphones)

More Auracast™ Obstacles &Limitations

- Auracast transmitters need to be compliant with the IEC 60118-17 Standard (Expected in 2027).
- Due to lack of standards, current installs are more likely to have latency and other sound quality issues
- Skilled installers are needed (requires technical training)
- Compatibility with public address (PA) systems (even with standards in place) will take time
- Direct to hearing instrument connections are strongly preferred by wearers. Current designs for Auracast streamed Assistive Listening use intermediary devices such as smartphones, smartwatches, hearing aid remotes, or special receivers. Intermediary devices add complexity for individuals with limited dexterity, limited cognitive abilities, or limited tech familiarity.

Future of LE Audio and Market Penetration



Forecast by Bluetooth SIG (Bluetooth SIG 2024 Market Update, Section "Audio Streaming")

- Auracast is promising but uptake of LE Audio will take time (~5 to 10 years)
- Uptake is likely to be different around the country – cities and states with strong advocacy groups & supporting professionals will having higher uptake
- Alternatives continue to be MFi and Classic, ASHA is predicted to decline

2.4GHz/Bluetooth Summary

▲Advantages & ▼Disadvantages

Bluetooth® CLASSIC
Bluetooth SIG protocol

- ▲ Widely used for audio streaming & headsets
- ▲ Streams to all Bluetooth devices – *MFA*
- ▲ Supports data transfer over long range
- ▼ High energy consumption (*not ideal for small devices)*
- ▼ High latency
- ▲ High market penetration

Bluetooth® Bluetooth Low Energy Audio
Bluetooth SIG protocol

- ▲ Low energy consumption
- ▲ Direct Audio streaming HA + phone
- ▲ Improved stability
- ▲ Great audio quality
- ▲ Supports broadcast mode
- ▼ Cannot penetrate H2O: *unable to use for e2e / MI*
- ▼ Not yet fully developed/available in market
- ▼ Initial low market penetration due to implementation into mobile phones & electronics

Made for iPhone MFi
Apple proprietary protocol

- ▲ ▼ Direct phone & audio streaming for Apple devices
- ▲ Headset mode available

ASHA
Google proprietary protocol

- ▲ ▼ Direct phone call streaming for Android phones
- ▼ Headset mode not available

The Networked Communication Device Era

	Remote Mics	Telecoils/ Hearing Loops & FM / Infrared with neckloops	Bluetooth Classic/ 2.4GHz	LE Audio	Auracast
Used for at-home listening	yes	yes	yes	Yes (slowly emerging)	no
Used for in-the-car listening	yes	no	yes	Yes (slowly emerging)	no
Used for public listening	limited	yes	no	no	Yes (slowly emerging)
Needs additional equipment	no	**no**—for loops* **yes**—for FM/IR (Receiver + neckloop)	no	no	Yes (slowly emerging)
Installation standards exist	n/a	hearing loops only	n/a	n/a	Expected late 2027
Ease of use	Depends on the individual				
Expected Patient Benefit	Depends on the individual				

*Main reason consumers love hearing loops

HLAA says, “better together”

Conclusions, Part 1

- Wireless technologies should no longer be thought of as **accessories**. Instead, they are now part of **networked communication device ecosystem** with the hearing aids and smartphone/telecoil/Auracast acting as hubs.
- The role of the HCP is to match the right wireless technologies to the needs of the wearer. Verify their performance and instruct on how to use them successfully T.opics covered in Part 2).
- Best advice you can provide most patients:
  Acquire hearing aids that have a telecoil and are Auracast-ready ("**ADA-Access-Ready Instruments**").

www.tinyurl.com/ADA-Hearing-Devices

Questions

For questions regarding assistive listening
Juliëtte Sterkens – jsterkens@hearingloss.org