Hearing Aid Manufacturers Panel

Wireless Innovation to Help Connect You with Your World

HLAA Convention, Austin, Texas
June 26, 2014
Primary Topics

- Bluetooth Connectivity
- Telephone Accessories/FM
- Streaming Devices
- Smart Phones
- Apps
HIA Member Panelists

- Bill Dickinson, Au.D., Phonak LLC
- Annette Mazevski, Au.D., Ph.D., Oticon, Inc.
- John Nelson, Ph.D., ReSound
- Tom Powers, Ph.D., Siemens Hearing Instruments
- Dennis Van Vliet, Au.D., Starkey Hearing Technologies
Bluetooth

Tom Powers, Ph.D.
Vice President of Product Management and Government Accounts
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Bluetooth Applications

- Thomas A Powers, Ph.D.
- Vice President
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Bluetooth

- What is it?
- Benefits?
- Limitations?
- How does this apply to our industry?
Bluetooth

- Bluetooth is an industrial specification for wireless personal area networks (PANs) first developed in 1990’s in Sweden.
- The Bluetooth name originally came from the Danish Viking and King, Harald Blåtand whose name translates to Bluetooth in English. He is known for uniting Denmark & Norway.
- Bluetooth exists in many products, such as telephones, tablets, media players, robotics systems, handheld, laptops, computers, printers, cameras, and console gaming equipment, and some high definition headsets, modems, and watches.[27]
- Increased use in medical devices including blood pressure and glucose monitors, stethoscopes and asthma inhalers.
Bluetooth

- Bluetooth is a standard and communications protocol primarily designed for low power consumption, with a short range based on low cost transceiver microchips in each device.
  - Pairing of communicating Bluetooth devices is always required & the transmission is secure due to encryption.
  - Bluetooth devices use a radio communications system, so they do not have to be in line of sight of each other.
  - Over a secure, globally unlicensed short-range radio frequency ~ 30 feet.
Bluetooth

• Benefits

  ▪ Wireless
    – Eliminates wires/connection cables
    – Easier to set up and improves safety not to mention cosmetics
    – Inexpensive technology
    – Standardized protocol
      – High degree of compatibility among devices/models
Bluetooth

• Benefits

  – Doesn’t need to be line of sight (like infrared technology)

  – Low power consumption (relative)

  – Instant Personal Area Network (PAN)

  – Worldwide technology
    – Universal wireless standard
Bluetooth Development

• EHIMA and Bluetooth Special Interest Group (SIG) have announced a partnership to develop a standard for new hearing aids, while improving existing features, and creating new ones such as stereo audio from a mobile device or media gateway with Bluetooth® wireless technology

• Allows the development of connections to all kinds of smart phones and multimedia sound signals with a standard everyone can implement
Bluetooth

- Limitations

  - Short communication range
    - Class 1 – up to 300 feet
    - Class 2 – up to 30 feet (most commonly implemented class)

  - Communication between devices must be direct
    - A pairing is required and does not allow for communication between other devices outside that pairing
Bluetooth

- Limitations

  - Limited audio signal bandwidth: 7.5 K Hz
  
  - High transmission delay
    - > 100 ms (typically ~200 ms)
    - Degraded lip synchrony if audio paired to visual stimulus (non-issue with cell phones)
    
    - Power consumption
      - Considered low for some applications but in hearing aid industry considered to be high

  - Size of components
Bluetooth

• How has this been applied apply to our industry?

  ▪ Wireless programming
    – NOAHLink
    – CONNEXX Link

    – Diagnostic equipment
      – Handheld devices that transfer results to PC (such as tympanometers or OAE equipment)

    – Pairing of Bluetooth devices to hearing instruments
      – Via headsets and t-coil
      – Via DAI connection
      – Via remote controls
Wireless connection

- New technology for optimum stereo sound
- Near field magnetic transmission system
Multiple connection possibilities.

- All-in-one plug-and-play solution!
- Connects phones and transmitters via multipoint technology
- Additional connectivity to:
  - FM
  - Companion mic
  - Induction loop systems
  - Line-in (iPod, mP3 player, etc.)
  - Other Bluetooth-enabled devices
Telephone Accessories/FM

Bill Dickinson, Au.D.
Vice President of Audiology
Phonak LLC
What drives satisfaction for hearing aid users?

**MELU = Multiple Environmental Listening Utility**

**Satisfaction = more benefit in more environments**

<table>
<thead>
<tr>
<th>Satisfaction with HA benefit</th>
<th>% Listening situations satisfied or very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Dissatisfied</td>
<td>6</td>
</tr>
<tr>
<td>Dissatisfied</td>
<td>7</td>
</tr>
<tr>
<td>Somewhat dissatisfied</td>
<td>6</td>
</tr>
<tr>
<td>Neutral</td>
<td>23</td>
</tr>
<tr>
<td>Somewhat satisfied</td>
<td>31</td>
</tr>
<tr>
<td>Satisfied</td>
<td>64</td>
</tr>
<tr>
<td>Very satisfied</td>
<td>50</td>
</tr>
</tbody>
</table>

MarkeTrak VIII – Satisfaction Study
n=1970, 2010, USA
Top 12 listening situations important to a hearing aid user

- One on One
- Small groups
  - TV
  - Car
  - Outdoors
  - Listening to music
  - Leisure activities
  - While shopping
  - Place of worship
  - Restaurants
  - Concert/movie
  - Telephone
Wireless Connectivity in Hearing Instruments

Big WIN for consumers

Scope: all HA users
Reach: industry/world wide
Depth: market/industry changing

Change the conversation…. 
Hearing systems
Hearing solutions
Digital Transmission Technologies

Data rate and typical average power consumption

- **Ultra Wide Band**: 3 – 10GHz
  - Range: 3-10m

- **WLAN**: 2.4 / 5GHz
  - Range: 10-50m

- **ISM**: 2.4GHz
  - Range: 3-10m

- **3G Mobile Phones**: 0.9 / 1.8 / 1.9GHz
  - Range: 3-10m

- **Inductive**: 0.15–30MHz
  - Range: 1m

- **Wibree**: 2.4GHz
  - Range: 1-3m

- **Bluetooth**: 2.4GHz
  - Range: 1-3m

- **Cellular Network**: 400/800/900MHz
  - Range: 1-3m
Contemporary solutions for hearing on the telephone

<table>
<thead>
<tr>
<th>Acoustic phone program or Telecoil</th>
<th>Binaural signal input</th>
<th>Streaming Devices</th>
<th>Remote Microphone</th>
<th>DECT cordless phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>For those clients with a non-wireless hearing aid</td>
<td>For use with multiple phones everyday in many locations</td>
<td>For use with a Bluetooth phone. For calling on the move and for handsfree operation during car driving</td>
<td>For use with a Bluetooth phone. For users who already have the Roger pen for hearing in noise/over distance</td>
<td>For the best possible call understanding on a home phone</td>
</tr>
</tbody>
</table>
Two ears are better than one
Streaming Voice Binaurally

- **Advantages**
  - Hearing phone signal both ears
  - Automatic
  - Easy connectivity
  - Superior phone performance

- **Concessions/ trade-offs**
  - Variability between everyday hearing needs and dedicated phone needs
Binaural Phone Streaming

- Noise matters
- Bilateral matters
- Openness of canal matters

DuoPhone, Picou 2012
Binaural Phone Streaming

DuoPhone, Picou 2012
Remote Microphone Technology?
Benefits of Remote Mic technology

- Improved understanding in difficult situations ….. Such as every day life!
  - Speech in all levels of noise
  - Speech at distance greater than 2M
  - Speech from multiple talkers
  - Speech with one-on-one
  - Speech in group
  - Speech from TV
  - Speech from Telephone
  - Speech… anywhere and everywhere!

- Car, shopping, restaurant, outdoors, place of worship, car, music……..
- MELU!!!!
Remote microphone trending

- **1996**: MicroLink
  - The first miniaturized ear-level FM receiver
- **2000**: MLx
  - The first universal ear-level FM receiver
- **2003**: Multi-frequency FM
  - The first frequency-flexible FM system
- **2007**: Dynamic FM
  - The first adaptive FM system
- **2013**: Adaptive digital wireless transmission at 2.4 GHz

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Traditional FM system

FM- Roger Systems:
• unidirectional
• medium range
• 216 MHz … 2.4 GHz
• Audio-signal
• few control commands
• schools, TV, crowds
Bridging the understanding gap with Roger

Roger is the new digital standard that uses the 2.4 GHz technology. It bridges the understanding gap, in noise and over distance, by wirelessly transmitting the speaker’s voice directly to the listener.
Maximum performance: Roger Focus evidence

Speech-in-noise testing revealed an average improvement of 53% with Roger Focus compared to no device.

Note: with the exception of subjects 3 and 9 all individual scores showed significant improvement.

Subjects 2, 4, 12, and 14 scored 0% without any device and almost 100% with Roger Focus.
Roger for Adults
Speech understanding in various noise levels

Promising future!

% Correct

Noise level (dB(A))

N = 11

54% Improvement over Traditional FM

35% Improvement over Dynamic FM

54%

Improvement over Traditional FM
First, identify needs…. Second, select best solution for YOU

**Conversation in quiet, in moderate noise or over distance**
- Streaming Device (ComPilot & RemoteMic)
- Roger Pen
- Roger Clip-On Mic

**Conversation in loud noise or over distance**
- Roger Pen & docking station
- Streaming device ComPilot & TVLink S

**TV and music**
- Roger Clip-On Mic & docking station
- Streaming device

**Cell phone**
- Roger Pen
- Streaming Device

**Home phone**
- DECT home phone

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Performance factors to consider

• During the remote microphone selection process, performance features to be considered should include:

• Microphone option
  – Directional Mics
  – Conference Mic
  – Multiple Mics

• Landline phone
• Bluetooth phone
• Audio input
• Operating and Charging time
Summary: Freedom of wireless connectivity

- Tremendous expansion of communication opportunities
  - Remote mic & phone = better MELU score

- Wireless connectivity
  - More than convenience
  - Change how connect with world
  - Change how we practice
THANK YOU
Streaming Technology

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Manager, Technology Assessment
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5 Questions

1. What is Streaming?
2. What technology do we use to stream?
3. How does Streaming work?
4. Why do we Stream?
5. Who benefits?
What is Streaming?

• A way to send audio (or video) from one type of electronic device to another

• Can be done several ways: Bluetooth, t-coil, NFMI
What Tech is Used to Stream?

- NFMI (near-field magnetic induction)
- Uses short range magnetic transmission (~2meters) to send signals to/from devices:
  - i.e., between hearing aids and streaming device
  - i.e., between hearing aids themselves, coordinating volume control, automatic features, and DSP
NFMI

Benefits
• Low energy solution
• Longer battery life compared to BT

Limitations
• Intermediary device needed
• Shorter range compared to RF

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Listening solutions for TV

• Looping
• Infrared

http://www.phonicear.com/ALD/Assistive_listening_devices/Television/Loop.aspx
How does Streaming work?
Why do we Stream?

- Technical answer
- Personal perspective
Who benefits from Streaming?

The key is which streaming solution works best for you.
Smart Devices Connectivity

John A. Nelson, PhD
Vice President
Global Audiology Relations
GN ReSound
Requirements

- 2.4 GHz antenna
- Bluetooth Smart (Bluetooth 4.0)
- Development with Smart Device Company
Accessibility

- On/Off Labels
- Hearing Aids
- Subtitles & Captioning
- LED Flash for Alerts
- Mono Audio
- Phone Noise Cancelation

Noise cancelation reduces ambient noise on phone calls when you are holding the receiver to your ear.

Adjust the volume balance for equal sound levels in both ears.
Native Control
Triple-Click
Suri

GeoTagging
There’s an app for that!

Dennis Van Vliet, Au.D.
Senior Director of Professional Relations
Starkey Hearing Technologies
Did YOU KNOW...?
93% of adults in the U.S. have a cell phone
56% of those are smartphones
81% will have smartphones by 2015
“The cell phone is the most quickly adopted consumer technology in the history of the world.”

Source: Pew Research Center’s Internet & American Life Project, April 17-May 19, 2013 Tracking Survey. Interviews were conducted in English and Spanish and on landline and cell phones. Margin of error is +/-2.3 percentage points based on all adults (n=2,252).
I don't feel quite right

I'm really anxious, nervous

I never thought I might be this way, (not that there's anything wrong with it,) but I might be a NOMOPHOBIAL!

NOMOPHOBIA IS THE FEAR OF BEING WITHOUT A MOBILE PHONE
You Love Your iPhone. Literally.

By MARTIN LINDSTROM
Published: September 30, 2011

Hyperbole? Maybe
>31 billion app downloads to date
By end of 2014 that number is expected to be >49 billion
CATEGORIES

• Basic Information about sound and hearing loss
• Screening
• Product selection guides
• Process guide
• Product Support
• Auditory Skills training
• Professional tools
BASICS

Hearing Loss Simulator
Starkey Laboratories

Sound Level Meter Pro
Mint Muse LLC

Ear ID
Blue Tree Publishing

SPL Meter
Andrew Smith

Ear Structure ID

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SCREENING
PRODUCT SELECTION GUIDE
PRODUCT SUPPORT

- ReSound Smart by ReSound (FREE)
- Trulink Hearing Control by Starkey Labora... (OPEN)
- Audéo Q Support by Phonak (FREE)

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A U D I T O R Y  S K I L L S  T R A I N I N G
Auditory Training Application
Games make it fun and engaging!
Track Player Progress over time!
Results can be delivered to the hearing professional.
PROFESSIONAL TOOLS
Available on the App Store
GET IT ON Google play
PATIENT APPS
DATA TRIGGERRED MEMORIES
imagine text is scrolling as I’m
MICROPHONE STEERING
CAREGIVER / COMPANION APPS
PROFESSIONAL TOOLS
Hearing Aid Manufacturers Panel

Long Range Forecasts
Where Will We Be in
5-10 Years????