A Smartphone Is a Hearing Assistive Technology

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Disclaimer

I have no relevant financial or nonfinancial relationships in the products or services described, reviewed, evaluated or compared in this presentation.
Learning Objectives

1. Identify smartphone features that facilitate communication.

2. Identify smartphone apps that facilitate communication and provide access to multimedia.

3. Identify how a smartphone can provide a wealth of hearing assistive technology functions.
HLAA Statement of HAT

• “Hearing Assistive Technology, or HAT as it is commonly referred to, is technology that can help in various listening situations.

• Often, a hearing aid or an implant is not enough in certain situations. In such cases, there are technologies that are designed to help people with hearing loss. These are designed to enhance telephone communication, TV reception, ensure an effective smoke alarm, or listening in various kinds of public venues. Your hearing professional should evaluate your need for one or more of these devices and direct you to the appropriate vendor.”
Benefit and Satisfaction of HA to Improve Hearing

Multiple Environmental Listening Utility (MELU)

Kochkin et al, 2010
Noisy Planet

Common Sounds

- Air raid siren at 50 ft (threshold of pain)
- Maximum levels in audience at rock concerts
- On platform by passing train
- Typical airliner (B737) 3 miles from take-off (directly under flight path)
- On sidewalk by passing bus
- On sidewalk by passing typical automobile
- Busy office
- Typical suburban area background
- Library
- Bedroom at night
- Isolated broadcast study
- Leaves rustling
- Just Audible
- Threshold of Hearing

Sound Level (dB)

Source: Handbook of Environmental Acoustics, James P. Cowan, 1994
<table>
<thead>
<tr>
<th>DAILY EVENT</th>
<th>HEARING ASSISTIVE DEVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wake-up</td>
<td>Alarm clock with vibrator and/or flashing light</td>
</tr>
<tr>
<td>Land lines: home and work</td>
<td>HAC phone, texting, built in amplification, ringer connected to visual or vibrator signal, speech recognition</td>
</tr>
<tr>
<td>1:1 conversations</td>
<td>Personal communication device (FM or infrared)</td>
</tr>
<tr>
<td>Small group meetings</td>
<td>Portable FM or infrared device, loop, real-time captioning, 1:1 personal communicator</td>
</tr>
<tr>
<td>Noisy restaurant</td>
<td>Personal communication device with directional mike</td>
</tr>
<tr>
<td>Large group meetings</td>
<td>Large-area infrared, FM or loop system</td>
</tr>
<tr>
<td>Cell phone</td>
<td>HAC phone, vibrate option, texting, high volume output</td>
</tr>
<tr>
<td>Vehicle</td>
<td>1:1 device with directional mike, emergency siren recognizer</td>
</tr>
<tr>
<td>Family meals</td>
<td>Portable infrared or FM device in middle of table</td>
</tr>
<tr>
<td>TV</td>
<td>Captioning, Infrared, FM or loop connected to TV</td>
</tr>
<tr>
<td>Door bell</td>
<td>Vibrator worn on body and flashing lights</td>
</tr>
<tr>
<td>Child care</td>
<td>Baby monitoring device with vibrating annunciator</td>
</tr>
<tr>
<td>Fire/Carbon Monoxide alarm</td>
<td>Flasing lights and/or vibrating annunciator</td>
</tr>
<tr>
<td>Weather alert</td>
<td>Weather radio with vibrator and/or flashing light</td>
</tr>
<tr>
<td>Theater</td>
<td>Infrared, loop or FM</td>
</tr>
</tbody>
</table>

Digital Swiss Army Knife

- Mobile/portable
- Volume control/Speaker phone
- Direct Audio Input (DAI)/Loop compatible
- Bluetooth
- Telecoil compatibility/HAC features
- Closed Captioning
- Text communication
- Communication Apps
- Increased audio bandwidth
- Audio, visual, haptic (Vibration) features
- Video conferencing (Skype, FaceTime, Google Hangouts)
- Electronic media (Internet, movies, music, etc.)
United Nations Study

• More people have access to cell phones than toilets
• 7 billion people:
  – 6 billion have mobile phones
  – 4.5 billion have access to working toilets
Fact Checker

**Mobile Phones vs. Toothbrushes (Billions)**

- World Population (6.8 Billion)
- Number of Global Mobile Subscriptions (4.6 Billion)
- Number of Global Mobile Users (4.0 Billion)
- Number of Toothbrushes Sold Annually (3.5 Billion)

Source: 60SecondMarketer.com
More Reach for Phone Than Partner in Morning
### Mobile Phones Are More Important Than?

% of U.S. adults who could not live without ...

<table>
<thead>
<tr>
<th>Item</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>73%</td>
</tr>
<tr>
<td>Car</td>
<td>42%</td>
</tr>
<tr>
<td>Internet access</td>
<td>28%</td>
</tr>
<tr>
<td><strong>Mobile phone</strong></td>
<td>26%</td>
</tr>
<tr>
<td>Computer/Laptop</td>
<td>24%</td>
</tr>
<tr>
<td>Television</td>
<td>23%</td>
</tr>
<tr>
<td>Sex</td>
<td>20%</td>
</tr>
<tr>
<td>Navigation system</td>
<td>8%</td>
</tr>
<tr>
<td>Social networking sites</td>
<td>7%</td>
</tr>
<tr>
<td>Tablet computer</td>
<td>6%</td>
</tr>
</tbody>
</table>

Conducted online in June 2013 among 2,210 adults
Source: Harris Interactive
Take the LEAP: HAT Types

• **Listening to a talker**
  – One on one, group, place of worship, meeting, classroom, lecture, conferences, presentation, theater, etc.

• **Electronic media**
  – Radio, TV, mp3, YouTube, etc.

• **Alerts**
  – Doorbell, alarms, telephone ring, environmental sounds, etc.

• **Phone communication**
  – Landline, mobile phone, etc.
I. Listening to a talker

One on one, group, place of worship, meeting, classroom, lecture, conferences, presentation, theater, etc.
Mimi Hearing Amplifier (free) iOS

Higher-frequency boost with moderate compression

This preset gives most gain towards the top end of the frequency spectrum. However, there is less gain at the very top end of the frequency spectrum, making them sound less bright or harsh than a regular steep sloping preset.

The compression is heavy, allowing maximum gain at the expense of a more natural sound.
Petralex (free) (iOS)(Android)
Jacti ListenApp (free) iOS

FDA approved, optimized for use with Apple EarPods and personal audiogram
Speak It (Android)(free)
Virtual Voice (Android)(free)
Live Caption ($3.99)(iOS)(Android)

good morning grandma, how are you feeling today?

I am feeling great today!
A very handy note application for people who are deaf, with speech to text translation

VoiceControl: The Terms
Sarslander’s Note Listen
Speech powered by Nuance
Dragon Dictation (free)(iOS)
Deaf - Hearing Chat ($3.99/$5.99) Android, iOS

out: hello
in: Hello
out: could you say a few words about yourself?
in: I'm John, I'm completely deaf
out: OK, what about your family?
in: They are hearing, I lost sense of hearing after illness
in: so I found this solution to communicate with hearing people, who does not sign
Sorenson BuzzCards (free) iOS

Large coffee with cream and sugar, please.

DINING
- Coffee Shop
  Large coffee with cream and sugar, please.
- Fast Food
  Cheeseburger with large fries and a medium.

GENERAL
- I Will Call You
  What is your phone number?
- Restroom
  Where is the restroom?

TRAVEL
- Airport
  Please take me to the airport.
- Bus Stop
  Where is the nearest bus stop?

BuzzCards™ 1.1 is trademarked and copyrighted © 2015 by Sorenson Communications. All rights reserved.
Iseewhatyousay App for Pebble ($4.99)

- Remote voice-to-text from Android smartphone to wrist worn device via Bluetooth
- Pebble vibrates when a new message is sent to watch
- Initiate remote listening to open phone app by pressing 'Select' button on watch
Mimix - Speech to Sign Language (free) Android
Motion Savvy with Leap Motion (tablet)

UNI PRO
Two-way communication tool for the deaf

NO DATA CONNECTION REQUIRED
ONE OF A KIND TABLET
Other Smartphone Options: Face to Face

- Text Messaging
- Instant Messaging
- Email
## U.S. Smartphone Use 2015

### Text Messaging, Voice/Video Calls, Internet, Email

<table>
<thead>
<tr>
<th>Feature</th>
<th>% of smartphone owners who used feature</th>
<th>Average number of surveys (max 14) in which they reported using these features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text messaging</td>
<td>97%</td>
<td>7.0 surveys</td>
</tr>
<tr>
<td>Voice/video calls</td>
<td>92%</td>
<td>4.1</td>
</tr>
<tr>
<td>Internet</td>
<td>89%</td>
<td>4.4</td>
</tr>
<tr>
<td>Email</td>
<td>88%</td>
<td>5.3</td>
</tr>
<tr>
<td>Social networking</td>
<td>75%</td>
<td>4.2</td>
</tr>
<tr>
<td>Take pictures/video</td>
<td>60%</td>
<td>1.4</td>
</tr>
<tr>
<td>News</td>
<td>55%</td>
<td>1.7</td>
</tr>
<tr>
<td>Watching video</td>
<td>50%</td>
<td>1.3</td>
</tr>
<tr>
<td>Games</td>
<td>47%</td>
<td>1.9</td>
</tr>
<tr>
<td>Maps</td>
<td>41%</td>
<td>0.8</td>
</tr>
<tr>
<td>Music or podcasts</td>
<td>41%</td>
<td>1.3</td>
</tr>
</tbody>
</table>


Respondents were contacted twice a day over the course of one week (14 total surveys) and asked how they had used their phone in the preceding hour (besides completing the survey). Only those respondents who completed 10 or more surveys over the course of the study period are included in this analysis.

**PEW RESEARCH CENTER**

6 facts about Americans and their smartphones, PEW, APRIL 1, 2015
ReSound LiNX²/Beltone Legend

- 4th Generation MFi
- Can stream audio binaurally from iPhone to hearing aids (no streamer)
- Voice calls
- Music
- Movies (Netflix)
- Vodcasts/podcasts
- Map navigation audio directions
- Face time audio
- Serve as remote mic
GN ReSound LiNX Smart App
ReSound Smart App (iOS)

The ReSound Smart™ app controls and personalizes hearing experience
First hearing aid app with a direct connection between ReSound LiNX™ hearing aids and iPhone®, iPad® or iPod touch®.

• Adjust volume settings on your hearing aids
• Change manual and streamer programs
• Adjust treble and bass
• Link a program and settings to favorite places
• See battery and connection status
• Stream phone calls, music, audio from videos, movies & games, turn-by-turn directions, FaceTime® conversations, Siri®
• Help locate lost or misplaced hearing aids
ReSound (iOS & Android)(free)
ReSound Steamers)
ReSound LiNX²/Beltone Legend (Mfi)

- iOS
  - Requires iOS 7.1 or later
  - App optimized for iPhone 5, iPhone 6, and iPhone 6 Plus
- Android™ smartphone running version 2.3.5 or later
Starkey Hearing Halo™

- MFi
- Stream calls, FaceTime®, music from iPhone directly to hearing aids using Bluetooth® 4.0 wireless technology
- Remotely control aids with iPhone app
- Help hear comfortably in noise
- Eliminate buzzing and whistling
Cochlear™ Baha® 5 Sound Processor (Mfi)
Cochlear™ Baha® 5 Sound Processor (Mfi)
Cochlear CI Nucleus 6 (Mfi)(future)
ReSound LiNX² & Starkey Halo HAs
Apple Watch Apps for Hearing Aids
Oticon MFi

- Gateway/intermediary device required
- Oticon’s MFi solution available for all existing and future users of Oticon’s ConnectLine instruments
- iPhone 5
MobileConnect!
Theater App(s)(free)

Real-time audio transmission
Wherever the Connect-System is installed,
this app enables you to receive live content.

BYOD – Bring your own Device
Bring your own device and use your own smartphone and headphones.
CinemaConnect!
Movie Theater App(s)(free)
Transence (app not yet released)

Zero to full engagement, Under a second.
Jacoti Lola (free)(iOS)

Jacoti Lola™ turns your iPhone into an assistive listening device

If you have problems understanding the speaker in a room, Jacoti Lola™ is the solution!
Jacoti Lola™ (free)

- Requires Jacoti Lola Hub™, a small application that runs on a Mac computer and broadcasts the speakers voice and/or the computer’s system audio to connected listeners via WiFi.
- Full multimedia experience with enhanced audio during presentations or video.
- Jacoti Lola™ connects with Made for iPhone® hearing aid technology.
- Suitable for:
  - Auditoriums, classrooms, meeting rooms etc.
LoopFinder App (free)(iOS)

Find hearing loop enabled venues around you.

Select from different venue categories.
2. Electronic media

Radio, TV, mp3, YouTube, etc.
Closed Captions Smartphone Apps

- ABC Family
- Amazon Instant Videos
- CaptionFish
- CBS
- Cox Communications
- CWTV Now
- Discovery
- Hulu Plus

- NBC
- Netflix
- PBS
- Subtitles
- TED Talks
- Watch ABC
- Watch TBS
- Watch TNT
- YouTube
Netflix (iOS) (Android) (Windows) (free)
Netflix Subtitles

iPad, iPhone, iPod Touch

Note: Subtitles and captions on iOS devices can be customized from within the Settings menu in iOS.

To enable subtitles and alternate audio on your iPad, iPhone, or iPod Touch:

1. During playback, tap anywhere on the screen.
2. Select the Dialog button ( ) in the upper right corner.
3. Select your preferred audio or subtitle options.
4. Tap Done.

Subtitles settings in iOS7 may be impacted by the device settings. You can change these options by:

1. Select settings
2. General
3. Accessibility
4. Subtitles & Captioning
5. Style
6. Select preferred option

Enable and customize subtitles and closed captions:

Closed Captions + SDH must be enabled from the iPad, iPhone or iPod Touch menu under Settings > General > Accessibility > Closed Captions + SDH before they can be enabled in the Netflix app.

You can then customize the appearance of subtitles and closed captions on your iOS device by going to Settings > General > Accessibility > Subtitles and Captioning > Style. To ensure Netflix displays your new customized subtitles, make sure Video Override is turned off from within font, size, color, and opacity.
TED (iPhone Android) with TEDiSUB ($1.99)

My life in typefaces
Informative, Fascinating
16:01 | Apr 2014 | Matthew Carter

The flower-shaped starshade that might help us detect Earth-like planets
Fascinating, Informative
06:38 | Apr 2014 | Jeremy Kasdin

How I help transgender teens become who they want to be
Informative, Inspiring
16:53 | Apr 2014 | Norman Spack

For parents, happiness is a very high bar
Informative, Informative
18:11 | Apr 2014 | Jennifer Senior

Should you live for your résumé ... or your eulogy?
Inspiring, Fascinating
05:01 | Apr 2014 | David Brooks

Summary
Stress. It makes your heart pound, your breathing quicken and your forehead sweat. But while stress has been made into a public health enemy, new research suggests that stress may only be bad for you if you believe that to be the case. Psychologist Kelly McGonigal urges us to see stress as a positive, and introduces us to an unsung mechanism for stress reduction: reaching out to others.

Kelly McGonigal
YouTube (free)(iOS & Android)

okay I am one senate seat
Lyrics Lite (Android/iOS) (free)

**Titanium**

By **Sia, David Guetta**

From the album: **Nothing But the Beat**

You shout it out
But I can't hear a word you say
I'm talking loud not saying much
I'm criticized but all your bullets ricochet
You shoot me down, but I get up

I'm bulletproof nothing to lose
Fire away, fire away
Ricochet, you take your aim
Fire away, fire away
You shoot me down but I won't fall, I am titanium
You shoot me down but I won't fall

---

Imagine Dragons

**Night Visions** (2012)

1. **Radioactive** 3:06
2. **Tiptoe** 3:14
3. **It's Time** 4:00
4. **Demons** 2:57
5. **On Top of the World** 3:12
6. **Amsterdam** 4:01
7. **Hear Me** 3:55
8. **Every Night** 3:37
9. **Bleeding Out** 3:43
10. **Underdog** 3:29
11. **Nothing Left to Say/Rocks** 8:56
Shazam (free) (iOS & Android)
SoundHound
Windows/Blackberry/iOS/Android (free)
NextRadio App (free) Android

- Most smartphones have built in FM Radio
- Apple has not turned theirs on...yet
- Sprint, Boost and Virgin allow access in some areas
3. Alerting

- Alarm clock
- Doorbell
- Door knock
- Telephone ring
- Fire/Smoke alarm
- Burglar alarm
- Child monitoring
- Timers (appliances, test)
- Computer prompts
- Weather alerts
Tap Tap (iOS) ($2.99)
Myeardroid (Android)(free)

Training of your background:
- Background sound

Training and selection of your sounds:
- Telephone
- Doorbell
- Alarm
- Alarm Clock

Start ▶

Training - Doorbell

I would need to record your own sound to train the app. Please wait 5 seconds and after make it sound until the training process is completed.

Record

Latest detected sound:
- Doorbell

11:07:30

Analyzing...
OtoSense (Android, iPhone) $7.99

OtoSense mobile application
Hearing Aide (Android) free

• Hearing a pre-programmed warning sound, smartphone alerts users to danger via 20 second vibrations and a message

• 5 standard alarms pre-sets (fire alarms, crying babies, etc.)

• App can also store custom alarms
Roost, Smart Smoke/CO Alarm

- WiFi
- Retrofit existing alarms
- Roost 9v battery $35.00
- Android/iOS app
- Low battery alerts
- Notifications sent to family and friends when you are away
- Snooze false alarms when you burn the bacon
Weather Apps

Resources/suggestions:
www.weather.gov/subscribe
Weather Radio (free) iOS Android Blackberry

- Get tips to survive natural disasters, customize your emergency checklist, and save meeting locations
- Receive alerts from the National Weather Service
- Locate open shelters and Disaster Recovery Centers, and apply for assistance
- Upload and share your disaster photos
- Stay connected on social media and the FEMA blog
Weather Alert USA (iOS)($3.99)

- **Excessive Heat Warning (California)**
  - East Bay Hills and the Diablo Range; East Bay Interior Valleys; North Bay Interior Valleys; North Bay Mountains
  - Event
  - Map
Emergency Email and Wireless Network
WiFi Baby Monitors
Smartphone Call Alerts and LED Lights

Philips™ Hue Lights

- starter pack
- downlight lamp
- light strip
- bloom lamp
Philips Hue Go Smartphone Control
## LED Lights and Smartphone

<table>
<thead>
<tr>
<th></th>
<th>iLumi Small A21 Smartbulb</th>
<th>LIFX Edison A21</th>
<th>OORT SmartLED</th>
<th>Osram Lightify Classic A60 Tunable White</th>
<th>Philips Hue A19</th>
<th>Sengled Pulse</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bulb form factors available</strong></td>
<td>E26, E27, PAR30</td>
<td>E26, E27, GU10 *</td>
<td>E26, E27</td>
<td>E26, E27, PAR16, strips, outdoor</td>
<td>E26, E27, GU10, PAR16, BR30, strips, lamps</td>
<td>E26, E27, B22</td>
</tr>
<tr>
<td><strong>Wireless technology</strong></td>
<td>Bluetooth</td>
<td>Wi-Fi</td>
<td>Bluetooth</td>
<td>ZigBee</td>
<td>ZigBee</td>
<td>Bluetooth</td>
</tr>
<tr>
<td><strong>Maximum brightness (stated)</strong></td>
<td>800 lumens</td>
<td>1000 lumens</td>
<td>180 lumens</td>
<td>810 lumens</td>
<td>600 lumens</td>
<td>600 lumens</td>
</tr>
<tr>
<td><strong>Bulb lifespan (stated)</strong></td>
<td>50,000 hours</td>
<td>40,000 hours</td>
<td>40,000 hours</td>
<td>20,000 hours</td>
<td>15,000 hours</td>
<td>25,000 hours</td>
</tr>
<tr>
<td><strong>Hub or standalone?</strong></td>
<td>Standalone</td>
<td>Standalone</td>
<td>Either (Hub coming soon)</td>
<td>Hub</td>
<td>Hub</td>
<td>1 speaker acts as master for up to 7 satellites</td>
</tr>
<tr>
<td><strong>Total number of bulbs supported per system</strong></td>
<td>50</td>
<td>No stated maximum</td>
<td>No stated maximum</td>
<td>50</td>
<td>50</td>
<td>8</td>
</tr>
<tr>
<td><strong>Home-automation compatibility</strong></td>
<td>None</td>
<td>Works with Nest</td>
<td>Other OORT devices</td>
<td>WeMo</td>
<td>None</td>
<td>Other Sengled devices</td>
</tr>
<tr>
<td><strong>Mobile OSes supported</strong></td>
<td>Android, iOS</td>
<td>Android, iOS</td>
<td>Android, iOS</td>
<td>Android, iOS</td>
<td>Android, iOS</td>
<td>Android, iOS</td>
</tr>
<tr>
<td><strong>IFTTT support?</strong></td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Street price</strong></td>
<td>$90</td>
<td>$79</td>
<td>$25</td>
<td>$40</td>
<td>$52</td>
<td>$79</td>
</tr>
</tbody>
</table>

* Coming soon
Peeple WiFi Camera in Door Peepholw

• Device detects door vibrations, as would occur when someone knocks. Accesses your home Wi-Fi network and notifies you via an app on your mobile device(s)
• App shows live video of who's at the door, whether you're at home or elsewhere
• Records video of who has been at your door, so you can see who dropped by while phone was off
Ring (Android, iOS)

App free, device $199
4. Phone communication

Landline, feature phone, smartphone, etc.
## Coupling Smartphone to Hearing Aid/CI

<table>
<thead>
<tr>
<th>Acoustic</th>
<th>Gateway Device</th>
<th>Loop Induction</th>
<th>Direct Audio Input (DAI)</th>
<th>Wireless 2.4GHz &amp; 900 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smartphone</td>
<td>Smartphone</td>
<td>Smartphone</td>
<td>Smartphone</td>
<td>Smartphone</td>
</tr>
</tbody>
</table>

- **Intermediary device** (Neck loop)
- **3 prong Euro cord (and boot)**

### Diagram

- **Hearing aid**
  - **Intermediary device** (Neck loop)
  - **3 prong Euro cord (and boot)**
  - **Hearing aid**
iPhone Accessibility Features (some require T-Coil)
Android Hearing Accessibility
Android Hearing Accessibility

Direct access

Open your accessibility settings by pressing the Home key 3 times in quick succession.

Accessibility

TalkBack

Negative colors

Interaction control

Hearing

Flash notification
Flash the camera light when you receive notifications or incoming calls, or when alarms sound.

Turn off all sounds

Hearing aids
Improve the sound quality of your device for use with hearing aids.

Samsung subtitles (CC)
Off

Google subtitles (CC)
Off

Sound balance
Adjust the sound balance in media players for when earphones are connected.

Mono audio
Switch audio from stereo to mono for when you are using one earphone.
iPhone Hearing Accessibility

- **Hearing Aids**
  - **Aventa’s Hearing Ai**
  - ReSound LN961-DRW UP
  - Triple-click the home button at any time to bring up hearing aid options.

- **Control on Lock Screen**
  - Allow access to Hearing Aid Control at any time including the lock screen.

- **Hearing Aid Mode**
  - Hearing Aid Mode improves audio quality with some hearing aids.
# iPhone Hearing Accessibility

<table>
<thead>
<tr>
<th>Settings</th>
<th>Bluetooth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airplane Mode</td>
<td>Off</td>
</tr>
<tr>
<td>Wi-Fi</td>
<td>GN-Visitor</td>
</tr>
<tr>
<td>Bluetooth</td>
<td>Hearing Aid Phone</td>
</tr>
<tr>
<td>Cellular</td>
<td>Off</td>
</tr>
<tr>
<td>Personal Hotspot</td>
<td>Off</td>
</tr>
<tr>
<td>Notification Center</td>
<td></td>
</tr>
<tr>
<td>Control Center</td>
<td></td>
</tr>
<tr>
<td>Do Not Disturb</td>
<td></td>
</tr>
<tr>
<td>General</td>
<td></td>
</tr>
</tbody>
</table>

Bluetooth Devices:
- Jabra SOLEM...
- VW PHONE
- USGLVLT05011

Now Discoverable
Free Face to Face Communication

- FaceTime
- ooVoo
- Skype
- Hangouts
- Viber
- Imo
- Fring
- Line
- Tango
Smartphone Telecommunication Relay Services

- Text-to-Voice TTY-based TRS
- Voice Carry Over (VCO)
- Captioned Telephone Service (CapTel)
- IP Captioned Telephone Service
- Internet Protocol Relay Service (IP Relay)
- Video Relay Service (VRS)
- 711 Access to TRS
- Video Remote Interpreter (VRI)

https://www.fcc.gov/guides/telecommunications-relay-service-trs
Accessibility for Hearing Loss

- FaceTime, Skype, ooVoo
- Videophones for the Deaf and Hard of Hearing such as Sorenson nTouch, Z4, Z5, P3, and Convo
- Captioned Phones such as Clear Captions, Hamilton Relay and Sprint Relay
- Video Remote Interpreters
- Closed Captions
- Text Messages, Emails
- Mono Audio, Louder TV
- Visible and Vibrating Alerts
- Hearing Aid Compatible

http://www.deafhh.net/wp/deaf-apps/
4G/LTE

- 4th Generation/Long Term Evolution
- LTE implementation in U.S. began 2013
- **HD Voice** available between calls of various service providers?
- Adoption of **Full HD Voice** has positive implications for very high voice quality via smartphones

![Diagram showing frequency bands for POTS, HD Voice, and Full-HD Voice](image)
Evaluated HA Telephone Strategies

Research conditions:

- Acoustic telephone w/wo plugging opposite ear
- Unilateral telecoil w/wo plugging opposite ear
- Unilateral wireless streaming
- Bilateral wireless streaming (best)


Mobile Phone Bandwidth

Mobile Phone Telephone Quality

• Speech perception comparable to CD quality
• Phoneme-recognition scores improved
• Speech perception improved for both hearing loss and normal-hearing adults
• Speechreading cues available though poorer than face to face
• Significant audio-visual benefits for CI users


Accessories for iPhone

DAI patchcords

- 3.5 mm jack for most smartphones and 2.5 mm jack to connect to streamer 3.5 mm jack with either mono or binaural universal 3 pin Euro jack patchcord to connect to HA/Implant
SSD/UHL

Mono headset or earplug patch cord

- 3.5 mm mono audio jack for smartphone
- Some streamers use 2.5 mm jack
Hamilton Mobile WebCapTel (free)
Wireless CapTel by Sprint (free)

Hello Carol speaking. Hi Ted I’m good how about you? That’s very cool about a new app. It sounds wonderful! I’m glad you are saving on your monthly wireless bill and can now place calls anywhere with Wireless CapTel by Sprint!

This is what your captions will look like:

- Font Type: Arial
- Font Size: 36
- Font Color: Green
- Background: Black

Restore
IP-Relay (iOS) (free)

hi this is joe (confirming spelling) GA

hi Joe. bob here. wondered where we will meet for lunch today qq GA

oh hi bob let's go ahead and meet at lucy's at 12:30 GA

Enter your Text
Purple P3 VRS (free)(iOS/Android)
Ntouch Mobile (VRS/VCO)(iOS/Android)(free)
Z5 Mobile (free) (Android & iOS)
Glide (Twitter in Videos)
ClearCaptions (Android/iPhone)(free)
FaceTime (iOS) (free with iPhone)
Mobile Skype
(Android/iOS/Blackberry/Windows)(free)
Google Hangouts (Android/iOS)(free)
FaceTime Advantage with MFi Smartphone

http://www.hearingreview.com/2015/01/speech-intelligibility-benefits-facetime/
FaceTime Bilateral

<table>
<thead>
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<th>Mean Percent Correct</th>
<th>Audio</th>
<th>Audiovisual</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>48%</td>
<td>71%</td>
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</table>

http://www.hearingreview.com/2015/01/speech-intelligibility-benefits-facetime/
Made for iPhone Connectivity

RogerVoice (beta testing)

• RogerVoice subtitles phone conversations in real-time
• App allows deaf people to have phone conversation, entirely using automatic voice recognition (ASR)
• 1st caption phone available worldwide, in English, Spanish, Italian, Polish, French, Japanese
• BETA tests sometime summer 2015
Say It With Signs (Android)(free)

• Combines voice-to-text and text-to-sign technology for mobile phone calls
• Deaf person replies through text message which is converted into audio for hearing person
5 Minute Rule for Zinc-Air Batteries

• To activate a hearing aid battery, users need to remove sticker on battery to allow oxygen to mix with zinc-oxide inside battery

• Ethan Manuell, an 8th grade hearing aid user, tested batteries to see if waiting after pulling tab off before inserting made a difference
  – 5 minutes wait after pulling off sticker, battery will last 2-3 days longer
Zpower Rechargeable Battery

Two ZPower rechargeable batteries = 200 disposable zinc-air batteries.
Portable USB Battery Pack

- Portable USB battery packs are inexpensive
- Astro E4, for example, is small, light, and fast charging
- Able to keep smartphone running for a few days when electricity is inaccessible
Questions/Comments

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