

Beltone Direct Line 2nd Generation Accessories Bring Connectivity to a New Level

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INTRODUCTION

The first generation of Beltone Direct Line accessories brought groundbreaking technology to end users of Beltone True and Promise wireless hearing aids. For the first time, hearing aid users were able to connect to their mobile phones, televisions, laptops and other electronic devices through wireless technology with a true radio system utilizing 2.4 GHz technology. This major advancement in the evolution of hearing systems allowed hearing aid wearers to experience improved signal to noise ratios when watching television or listening to music at home, as well as when communicating on their mobile phones in crowded noisy environments or while driving in the car. An additional benefit to patients as well as dispensers was the ability to fit hearing aids completely wirelessly, improving the ease and comfort of a fitting session by eliminating the use of fitting cables.

One of the major advantages of having a wireless platform which incorporates 2.4 GHz technology is the ability to continue to bring new accessories to the platform, as well as make improvements to existing accessories. Beltone's second generation of wireless products was created in response to feedback from hearing aid users and dispensers. Similar to the market research process which helped define the requirements for the first generation, the design team of audiologists and engineers surveyed and collected opinions from the market to improve and add to the platform. Collecting valuable customer and end user feedback ensures that the current and future versions of Direct Line accessories will meet and exceed user needs.

Direct Personal Audio Link (myPAL)

The myPAL wireless microphone (Figure 1) revolutionizes Beltone's wireless hearing system by allowing hearing instrument wearers to create their own wireless networks in which they are able to hear any individual they desire

in less than optimal communication situations. By placing the microphone on the clothing of a spouse, friend, instructor or lecturer, the signal of interest is transmitted directly to the hearing instruments. The signal to noise ratio (SNR) improvement is comparable to that of a much more costly FM system, with distances of up to 30 feet. Figure 2 below illustrates the same SNR improvement of an FM system and the myPAL compared to directional hearing aid performance in noise¹.



Figure 1. Direct Personal Audio Link (myPAL)

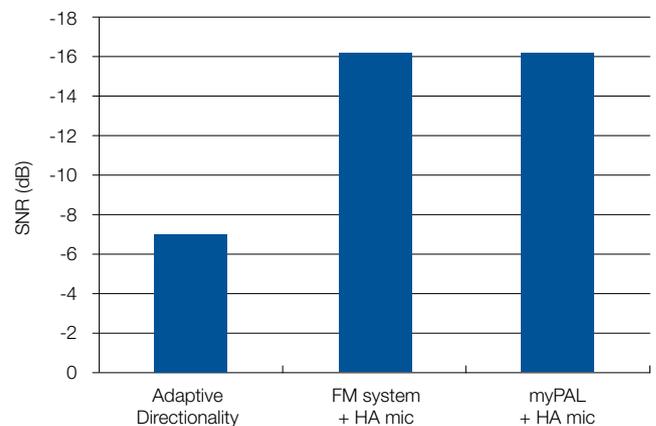


Figure 2. Lab test results comparing myPAL to Adaptive Directionality and FM.

Utilization of the myPAL enables a hearing impaired individual to enjoy and participate in conversations in a variety of situations in which they may have otherwise had

communication failures. Increasing the number of listening environments in which hearing instruments are useful has been shown to lead to greater levels of customer satisfaction. Kochkin² found a correlation between increasing available listening environments and hearing aid user satisfaction. For end users to be highly satisfied with their hearing instruments, they must be able to utilize them in more than 10 different listening situations. These results are shown in Figure 3.

An additional SNR improvement feature that also extends the utility of hearing instruments is the line-in functionality of the myPAL. Line-in utility enables direct streaming from any sound source which has a standard 3.5 mm audio jack, also known as a “mini jack”. Users can enjoy wireless digital streaming from audio sources such as an MP3 player, laptop, or mobile phone. With line-in use, the myPAL has a frequency response of up to 10 kHz for optimal music sound quality.

As many as 3 myPAL microphones can be paired to a single set of Beltone wireless hearing instruments. The hearing instruments have the ability to connect to one microphone at a time. Conversely, an unlimited number of hearing instruments can connect to one myPAL, thereby offering the direct transmission of an instructor or lecturer’s voice to an audience of Beltone wireless hearing instrument users.

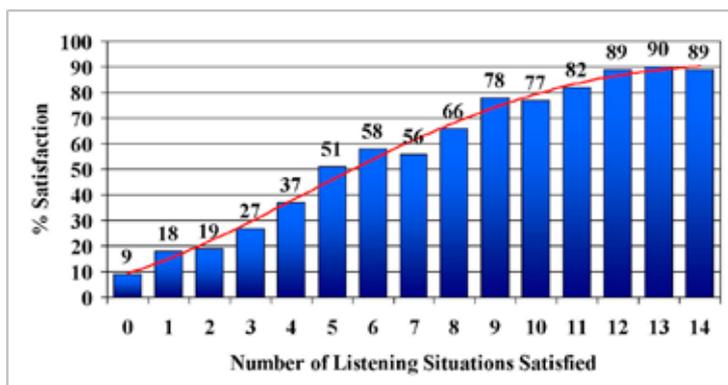


Figure 3. Impact of Improving Multiple Environmental Listening Utility (MELU) on Satisfaction (n=2,572 hearing aid owners)

Direct Phone Link 2

One of the most common complaints of hearing aid wearers is the frustration over missing portions of telephone conversations, particularly when using a mobile phone. The Direct Phone Link 2 (Figure 4) overcomes this obstacle by connecting a Bluetooth mobile or landline phone to the hearing instruments with greater connectivity and SNR than the first generation Phone Link. Current versions of Bluetooth technology consume an excessive amount of power for audio streaming applications and therefore would be prohibitive for direct streaming to hearing instruments at this time. The Direct Phone Link 2 receives the Bluetooth signal from a mobile or landline phone and converts it to a 2.4 GHz proprietary signal which is streamed to Beltone wireless hearing devices. Improvements to the Direct Phone Link 2 over the original Phone Link include updated noise reduction technology which reduces the amount of noise heard by the listener on the other end of the phone call. The 2.4 GHz connection to the wearer’s hearing instruments has also been strengthened to eliminate “dropouts” of either the right or left hearing instrument. As with the previous version, the Phone Link 2 can be paired with as many as 8 hearing instruments, and the new connectivity improvements allow two phones to be actively connected. The end user enjoys the convenience of being able to easily switch an active connection between either two Bluetooth enabled mobile phones, or a Bluetooth mobile phone and a Bluetooth landline phone.



Figure 4. Direct Phone Link 2

The Phone Link 2 has a volume control for the hearing instruments, and now includes the additional features of Program change and the ability to mute the hearing instruments. Essentially this nifty accessory is a remote control as well as a Phone Link. Or, if an end user wishes to discreetly adjust volume and make program changes with their smartphone, the Beltone SmartRemote app can be downloaded at no charge. The SmartRemote app integrates with the Direct Phone Link 2, is seamless and easy to use, and is available for use with both iPhone® and Android™ phones.



Figure 5. Direct Remote Control 2

Direct Remote Control 2

Many end users of Beltone hearing instruments prefer to have a separate dedicated Remote Control (RC), and may not necessarily use a Phone Link or smartphone. Therefore suggestions for improvements to the original Remote Control were gained by surveying dispensers and hearing instrument users. A primary objection heard was in regard to the batteries used in the original Direct Remote Control: the majority of people surveyed stated that they would prefer to have a rechargeable battery rather than the difficult-to-find AAAA batteries required by the first generation RC. The Direct Remote Control 2, shown in Figure 5, has a micro-USB port to conveniently recharge the RC either with an AC adapter or with a USB port. The new Direct Remote Control 2 also incorporates a true on/off switch, a larger display incorporating more icons for better usability, and the ability for the end-user to adjust microphone/streaming balance when streaming. There is also a mute button for the hearing aid microphone, which satisfies a popular request from end-users. And now that the device is rechargeable, the display time has been increased and will remain illuminated for approximately 20 seconds following a button press.

Direct TV Link 2

The electronics world is changing at a rapidly increasing pace, and the Direct TV Link 2 (Figure 6) has been redesigned to keep up with this evolving audio technology. New televisions with analog audio output are becoming scarce, and a larger percentage of the televisions being manufactured today incorporate only digital and optical audio output. The design team for the TV Link 2 set a primary goal to ensure that this popular accessory would be able to interface with newer televisions, yet at the same time remain easy to use, preserving the “plug and play” aspect which the legacy product established. The versatile TV Link 2 is able to stream the following television output formats without the need for special adapters:

- Analog
- Optical (Toslink)
- Coaxial
- Pulse Code Modulated (PCM)
- Dolby 5.1

The above output formats can occur in either Pulse Code Modulated (PCM) or Dolby 5.1 signal formats. Competitor hearing instrument manufacturer’s TV streamers are only able to accept PCM signal formats. *Beltone’s Direct TV Link 2 is the only system of its kind which is able to stream PCM signals AND Dolby 5.1 signals.* The importance of

having a system which streams Dolby 5.1 is appreciated when certain television program content occurs in Dolby format. Many sporting events, concerts and other program material may only be broadcasted in Dolby. In these situations a system which solely accepts PCM signals would not send any sound to the hearing instruments. Beltone “downmixes” the Dolby 5.1 surround system to a 2-channel Left and Right signal in the TV Link2 with a unique proprietary signal processor.

For many modern televisions, the output sound heard may be slightly ahead in time of the visual image. This is due to the fact that the visual signal may take more time to process than the audio signal. The effect will vary by the television station which is broadcasting the signal. Beltone recognizes that many individuals might find this effect to be bothersome, therefore the TV Link 2 has a delay control feature. This feature enables the user to adjust the delay of the streamed sound so that it matches the visual image on the television. When in delay mode, the volume bar at the top of the TV Link2 provides an increase or decrease in the delay of the streamed signal. The streamed signal can be delayed anywhere from 0 to 250 ms.



Figure 6. Direct TV Link 2

The upright stand which optimizes streaming and connectivity is now integrated within the TV Link 2. In comparison

to the first generation TV Link, the improved version sits lower on its stand for more stability and easier access for the cables from the TV.

Summary

In a continuously changing technology world, Beltone’s second generation Direct Line wireless hearing accessories were created to keep hearing instrument users connected to their phones, televisions, music, computers, and people around them. By listening to and utilizing customer feedback, this new generation of products was developed to have greater usability, connectivity and sound quality while remaining simple and easy to incorporate into any lifestyle.

References

1. Haastrup, A. ReSound Unite™ Mini Microphone – Improved Listening for Hearing Impaired Children. ReSound White Paper, 2012.
2. Kochkin, S. From Customer Satisfaction to Customer Bliss. A Knowles Electronics Seminar for dispensers and audiologists. 1998.

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