With the advent of wireless hearing aid technology, a new realm of possibilities has opened for hearing aid wearers for connectivity to other wireless electronic devices. Hearing aids have progressed beyond correcting for hearing loss; they are tools that allow patients to interact wirelessly with multimedia devices as part of a wireless lifestyle.

SurfLink Mobile is the latest accessory in Starkey Hearing Technologies’ line of wireless hearing aid accessories. A combination audio streaming device, remote microphone and remote control, SurfLink Mobile takes full advantage of IRIS™ Technology to stream audio from a mobile phone or entertainment device (e.g., MP3 player or computer) directly to Starkey Hearing Technologies wireless hearing aids. This wireless communication is robust over a two-meter range, allowing for handheld, desktop or pocket use of SurfLink Mobile while actively streaming audio.

SurfLink Mobile Design Overview

SurfLink Mobile is designed to be small, sleek and extremely portable (Figure 1). A full-color touchscreen display with a simple, easy-to-use interface makes the patient’s experience seamless and intuitive. The device includes a rechargeable lithium-ion battery that can be charged via SurfLink Mobile’s micro USB port using the provided cable and wall charger. A power button at the top of SurfLink Mobile is used to power the device ON and OFF, as well as to wake the display when it enters sleep mode to conserve power. Volume buttons, located along the side of the device, control hearing aid or streamed audio volume. Ports for the two microphones that allow SurfLink Mobile to operate as an omni-directional or directional remote microphone are located along the surface of the device.

Inside SurfLink Mobile are two IRIS Technology 900 MHz radios that communicate wirelessly with the hearing aids, as well as Bluetooth® Radio. This advanced hardware allows for stereo audio streaming, two-way communication with a mobile phone, and seamless connectivity to any Bluetooth audio device. Wired connectivity to audio devices is also possible via the micro USB port on SurfLink Mobile, allowing for streaming of audio from a non-Bluetooth computer or television.
Bi-directional Mobile Phone Streaming

For the first time, SurfLink Mobile allows wearers of Starkey Hearing Technologies wireless hearing aids to use hearing aid microphones to pick up their own voices while talking on their phones. This frees patients from the existing requirement of wearing streaming devices around their necks in order to keep microphones in close proximity to their mouths. During a conversation, SurfLink Mobile streams two-way audio in real time from the mobile phone to the hearing aids and from the hearing aids back to the mobile phone. This process of two-way audio streaming for phone use is uniquely available with SurfLink Mobile.

Two-way audio streaming and the ability to leverage a hearing aid microphone as the input to the mobile phone are complex processes that make phone use strikingly simple. The signal from the Bluetooth mobile phone is transmitted via Bluetooth to SurfLink Mobile. The mobile phone signal is then converted to a 900 MHz signal, sent wirelessly to the wireless hearing aids and presented through the device receivers into the wearer's ears. The wearer's voice signal is picked up by the hearing aid microphones and sent via 900 MHz back to SurfLink Mobile, then to the mobile phone via Bluetooth communication.

This process allows for completely hands-free mobile phone use. For communication in very noisy environments, the wearer has the option to use the built-in microphones on SurfLink Mobile to pick up voices for transmission back to the mobile phone.

Incoming calls to the paired mobile phone are signaled to a SurfLink Mobile user by a ring indicator in his or her hearing aids. The call can be answered or declined directly from the SurfLink Mobile device with a single press of a button. The wearer only needs to have SurfLink Mobile in reach to answer incoming mobile phone calls. Outgoing calls are dialed from the mobile phone and then conducted via SurfLink Mobile.

During a mobile phone call, the streamed audio volume level can be easily adjusted using volume buttons on the side of SurfLink Mobile. Bluetooth communication between a mobile phone and SurfLink Mobile occurs over the standard 30-foot Bluetooth range. The 900 MHz communication between SurfLink Mobile and Starkey Hearing Technologies wireless hearing aids occurs over a two-meter range. This allows the wearer to answer and conduct mobile phone calls with just the SurfLink Mobile device in hand.

A benefit of phone use through SurfLink Mobile is the bilateral presentation of that phone signal to the pair of wireless hearing aids. The bilateral presentation of a phone signal has shown mild benefits when compared to the more traditional unilateral phone use. In the case of more occluded fittings, the bilateral streaming of audio directly to hearing aids has shown additional advantages over acoustic listening and unilateral phone use (Picou & Ricketts, 2011).

One-Way Audio Streaming

Audio streaming from Bluetooth-capable entertainment devices or other audio devices is also possible with SurfLink Mobile, allowing the hearing aids to act as highly customized headphones. This allows the wearer to be as much as 30 feet away from the entertainment device and still stream audio wirelessly via a SurfLink Mobile device. In addition, using the provided micro USB to 3.5-millimeter audio jack cable, SurfLink Mobile can connect directly to any audio device that has a 3.5-millimeter output jack in order to stream audio from that device to the hearing aids. For example, SurfLink Mobile can be connected to a computer in order to stream podcast or music audio directly to the hearing aids, eliminating the need to use headphones or speakers.

Remote Microphone Functionality

SurfLink Mobile also acts as a remote or conference microphone — a function that provides an improved signal-to-noise ratio in noisy or difficult
listening environments without the need for FM transmitters or the commonly associated direct audio input boot. For example, when used as a remote microphone, SurfLink Mobile directly transmits the remote talker’s voice to both hearing aids. If the remote talker is in a noisy restaurant, an option is provided to activate directional microphones—embedded on SurfLink Mobile—that reduce competing noise, sending a signal with improved signal-to-noise ratio to the patient’s ears. When used as a conference microphone, the patient places SurfLink Mobile in an omnidirectional mode in the center of the table where multiple speakers might be present. In this situation, the surrounding audio is sent directly to both of the patient’s hearing aids.

Remote Control Functionality

SurfLink Mobile also acts as a fully functional remote control for Starkey Hearing Technologies wireless hearing aids. The SurfLink Mobile Remote can be configured to one of three different interfaces, from a basic mode with very simple controls to a more advanced mode with more controls, each based on a patient’s needs and desires. Combining the remote control and streaming functionality into a single, small package makes things simple and easy for the wearer.

Conclusion

With SurfLink Mobile, Starkey Hearing Technologies wireless hearing aid wearers can fluidly adjust their hearing aids, enjoy hands-free conversations with family members on their mobile phones, and connect wirelessly to Bluetooth entertainment devices. SurfLink Mobile can be carried in a pocket or purse and, by leveraging IRIS Technology, operate over a two-meter range with Starkey Hearing Technologies wireless hearing aids, allowing for unmatched convenience and flexibility in our patients’ increasingly wireless world.

Acknowledgements

Carreen Pederson, M.A., joined the Starkey Hearing Technologies product development team in 1998 and has been involved in many aspects of product development and training during her tenure. Currently, Pederson is a Senior Software Product Manager with a focus on the development of wireless hearing device features and accessories. Prior to joining Starkey Hearing Technologies, Pederson was a clinical audiologist and graduate student supervisor in a university hearing clinic. She earned a B.A. in speech and hearing science and disorders from the University of Iowa and an M.A. in audiology from Northwestern University.

References
