

Phonak Insight.

Expand your world, with Roger On Sphere™

Powered by RogerSense OS™ with always-on Sphere technology, Roger On Sphere defines a new era of sound for Roger remote microphone technology, demonstrating significant gains in performance thanks to the Deep Neural Network (DNN) used to extract and enhance speech in noise.

Roh M., Gigandet X., & Sans M. October, 2026

Introduction

People with hearing loss typically have reduced speech understanding in noise ability, and benefit from technology that improves Signal-to-Noise Ratio (SNR) for sounds of interest. Since 2013, Roger remote microphone technology is a solution for these individuals, improving their listening in background noise, reverberation, and across distance (Thibodeau, 2014; Thibodeau, 2020).

Remote microphone technology works by bringing the talker's voice closer to the microphone, to provide significant SNR benefit. Beyond the physical microphone placement, additional digital signal processing (DSP) strategies can be implemented to improve the overall audibility and intelligibility of the signal. DSP features such as adaptive gain behavior, multibeam technology, stereo mode and in more recent years headset mode, have shown Roger technology to be highly versatile, designed to provide a seamless listening experience.

Roger technology has shown superior performance over other remote microphones, showing lower latency, predicted speech intelligibility, and audio quality compared to three other remote microphone systems (Roh et al., 2025). Clinical evidence also shows Roger multibeam technology outperformed fixed directional remote microphones for far-field speech in noise tests for both children (Neumann et al., 2025) and adults (Stewart et al., 2026) with hearing loss.

More recent studies are looking into novel applications of Roger technology, improving speech understanding in noise following some types of stroke (Gaastra et al., 2024), language disorders (Gordon et al., 2025), as well as neurodegenerative disorders such as Frederick's Ataxia (Melville et al., 2026). Quality of life benefits that go beyond speech intelligibility, such as listening effort and self-esteem, have also been documented (Scarinci et al., 2022; Roh et al., 2026).

Recent developments in denoising – namely the use of large Deep Neural Networks (DNN) – in Phonak hearing aids, have shown significant performance gains over historical noise reduction methods. This system available as Spheric Speech

Clarity has demonstrated Phonak's largest improvements in signal to noise ratio, with a hearing aid alone (Ulloa Sanchez et al., 2026). Beyond improved speech understanding, reductions in listening effort and increased efficiencies in brain activity have been shown (Vaisberg et al., 2025).

The new Phonak Roger On Sphere combines the established benefits of remote microphones with Phonak's DNN denoising capabilities. As a result, Roger On Sphere delivers significant performance gains compared to its predecessor, Roger On.

RogerSense OSTM

RogerSense OS defines the umbrella of digital signal processing features that encompasses how Roger On Sphere processes incoming signals (Figure 1):

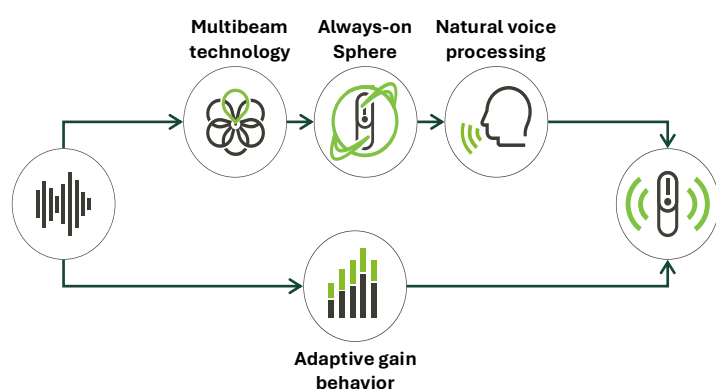


Figure 1. RogerSense OSTM, the signal processing strategy used by Roger On Sphere.

Multibeam technology

Multibeam technology allows Roger On Sphere to selectively capture speech from different directions. It uses 3 microphones to interpolate an additional three "virtual" mics, to create up to 12 directional beamforms, allowing precise localisation (Gigandet et al., 2018). Users can benefit from enhanced spatial awareness thanks to stereo mode support when used with a binaural set of RogerDirect devices.

Always-on Sphere™ technology

At the core of RogerSense OS is the always-on Sphere technology, used to separate speech from noise in real-time. Based on the Phonak Sphere technology, Roger On Sphere uses an on-board DNN to process the beamformed sound and remove background noise, preserving the target speech signal with the greatest SNR. Further information on the DNN model can be found in other articles (Diehl et al., 2023; Hasemann & Krylova 2024).

Natural voice processing

Natural voice processing is Roger's new amplification strategy that improves the preservation of temporal speech characteristics when compared to Roger's legacy amplification approach. It uses a self-adaptive amplification engine that maintains a desired output level while minimizing speech envelope distortion and maintaining a clearer and more dynamic sound.

Adaptive behavior

The tried and tested adaptive gain behavior in Roger, analyses the surrounding noise floor and adjusts the gain of Roger, such that the speech remains above the noise. This has been a cornerstone in Roger technology that has set itself apart from alternative systems in order to provide significant benefits in speech intelligibility (Thibodeau, 2014; Wolfe et al., 2015; Neumann et al., 2024; Roh et al., 2025; Stewart et al., 2026).

Automatic microphone modes

The versatility of Roger On Sphere expands beyond the typical presenter mode use case. Using an accelerometer, Roger On Sphere can tell whether the device is being worn in the vertical plane, horizontal plane, or being hand-held in a more angled position. This automatic microphone mode selection drives the multibeam technology that is used in RogerSense OS.

With RogerSense OS, all acoustic modes benefit from the always-on Sphere technology, in any situation, regardless of the noise level.

For table mode, Roger On Sphere also features **own voice comfort**. This allows for the attenuation of back-facing directional microphone via the myRoger microphone app, this reduces the perception of a listeners own voice, when the Roger microphone is placed on the table.

Headset mode

In addition, we updated headset mode. This mode is dedicated to online calls when Roger On Sphere is connected to a PC/laptop/smartphone. The DNN de-noising feature as well as other gating mechanisms improve the voice pick up of the speaker so that less intrusive noise gets through to the other end.

MultiTalker Network (MTN)

Roger On Sphere also benefits from an extension of the MultiTalker Network feature. Traditionally only supporting the MultiTalker Network in presenter mode, Roger On Sphere now allows MultiTalker Networks to be used in combination with table mode as well. This allows up to 10 Roger On

Sphere devices to be used as an alternative to the traditional Roger Table Mic solutions, allowing a mixture of table mode and presenter mode to be used within the same network.

Roger protocol

The 2.4GHz proprietary Roger protocol is the transmission method supported by Roger On Sphere. Controlling the sink (receiver), source (transmitter), and transmission (protocol), guarantees a stable and low-latency speech signal which is important for live speech communication. At its core, the Roger protocol was built for people with hearing loss, and its parameters provide the best balance of battery life, audio quality, and delay.

Roger boasts some of the lowest transport latencies in the industry. Like its predecessors, Roger On Sphere continues to achieve a transport latency of less than 20ms, faster than three other broadcasting remote microphone systems (Roh et al., 2025).

With the new hardware and antennae redesign, Roger On Sphere is further optimized for front-facing conversations. In free-field conditions with clear line of sight, it can achieve up to five times greater transmission range than Roger On 3. The larger range not only allows you to maintain the benefits of Roger across a larger distance but also serves as a proxy to greater stability of the signal and reduced likelihood of dropouts.

Roger remains one of the most compatible remote microphone systems available across a wide range of hearing aid and cochlear implant manufacturers. This is thanks to our design-integrated Roger receivers, as well as our Roger X and Roger Neckloop for more universal use cases. Roger On Sphere is also compatible with our ear-level receivers, the Roger Focus II.

Maintaining this universal compatibility is important, as we believe enhancing technologies such as Roger should be made widely available. Furthermore, with a compatible Roger receiver, users can now access DNN denoising technology developed by Phonak, without owning a Phonak hearing aid. It gives access to Sphere technology, for the first time, to Advanced Bionics cochlear implant processors, as well as all non-Phonak hearing devices in the market.

Expected end user benefits

Remote microphone technologies primarily improve the SNR experienced by the user. Signal levels may range depending on whether somebody is speaking in a whisper (45dB) or

shouting (70dB), while noise would vary depending on the acoustical environment one is in. The resulting range of SNRs is therefore quite large, but typical listening situations may range from +10dB SNR (quiet) to -5dB SNR (very noisy) for an average listener. At greater distances, the SNR becomes further negative (-6dB per doubling of distance), and this is where remote microphones can provide access to speech even in these adverse conditions.

Here, we show several technical measurements that highlight the signal processing innovations that result from RogerSense OS and Roger On Sphere, resulting in an improved SNR across various situations.

Table Mode

Table mode is activated when Roger On Sphere is placed on the table. It uses the three mics to create up to six beamforms around the table, to focus on the beam with the greatest SNR. It is expected that with RogerSense OS the noise pick up from table mode will be significantly reduced.

Technical measurements were set up to investigate the SNR improvements provided made possible with Roger On Sphere when compared to Roger On 3. The table mode setting was selected, as this is the most challenging near-field listening condition supported by Roger On microphones.

Measurements were recorded in a room with reverberation characteristics similar to a classroom or office space (RT_{60} wideband = 0.6ms). The Roger On Sphere was placed on a table 0.75m from the B&K talking head (Figure 2). An ISTS signal was played from a B&K talking head fixed at 65dB SPL when measured at the microphone. Five loudspeakers generating diffuse café noise from the ARTE database were played at various levels, so that the resulting SNR measured at the Roger ranged from +5dB SNR to -20dB SNR.

The Roger microphones were placed in the same position and location throughout, resulting in three conditions:

- Roger On Verification mode: omnidirectional mic with all signal processing and beamforming disabled
- Roger On 3 table mode (legacy signal processing and beamforming)
- Roger On Sphere table mode (new RogerSense OS)

A Roger Neckloop was used to record the output of the Roger microphones in the study. This allows the cleanest comparison between Roger On 3 and Roger On Sphere, without any hearing aid gain or compression characteristics colluding the results. In this condition, the comparison is limited to the DSP characteristics, as the remote microphone was placed in the same position throughout the measurements.

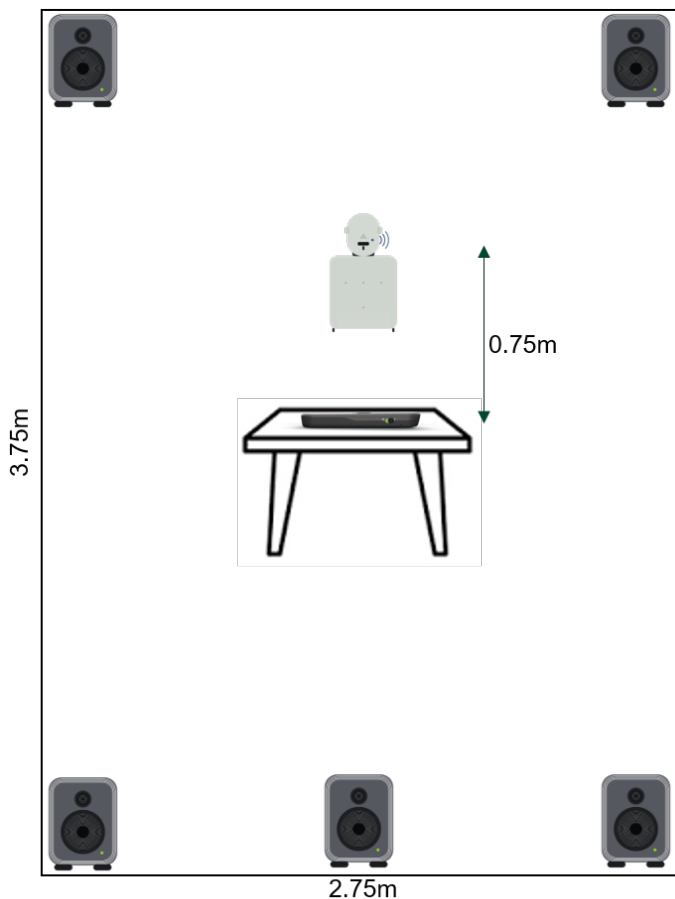


Figure 2. Room set-up for Table mode. A Roger Neckloop was used to capture the output audio.

The Hagerman & Olofson phase-inversion method was used to measure output SNR of the speech signal (Hagerman & Olofson, 2004). Figure 3 shows the results relative to the same measurement with Roger On in Verification mode, illustrating the benefit provided by Roger On 3 and Roger On Sphere respectively.

The results show that there is significant SNR improvement at the various SNRs tested for both Roger On devices, compared to a remote microphone that has no directionality or signal processing (Figure 3). The SNR benefits are maintained even at very extreme values of -20dB input SNR, highlighting the pure signal processing power that Roger technology can provide.

With the new RogerSense OS processing, Roger On Sphere improved SNR by up to 14.2dB SNR when compared to the no signal processing condition (Figure 3). This improvement exceeded the capabilities of Roger On 3, by an additional 3dB in the recording environments (at -15dB SNR or 80dB noise). When compared to Roger On 3, the 3dB SNR improvement provided by Roger On Sphere is equivalent to a 50% decrease in noise power of the output signal.

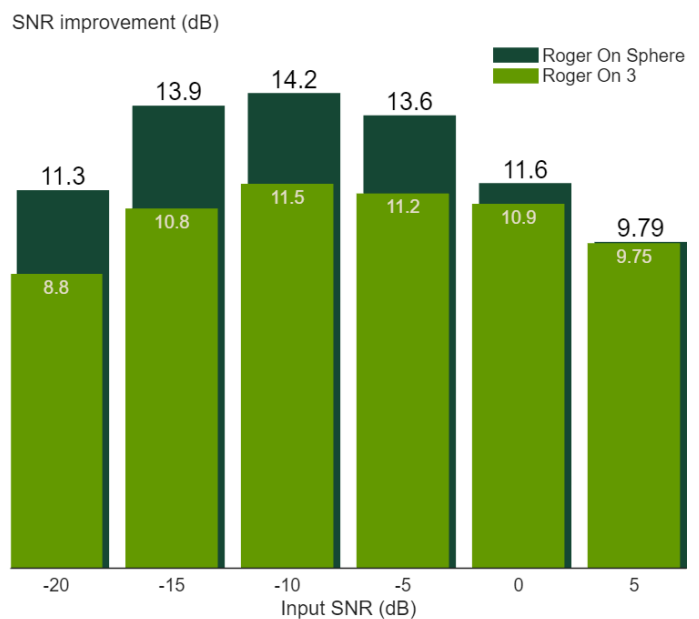


Figure 3. SNR improvement as a function of Input SNR with Roger On Sphere in Table Mode. Note reference was in comparison to the Roger On Sphere in Verification mode (no signal processing).

Figure 4 shows a spectrogram of recordings from Roger On 3 and Roger On Sphere. When visually comparing the two panels, the reduction of red (loud noise) in the signal and intensity of the lower frequencies clearly shows the denoising effects of Roger On Sphere for a better preserved signal.

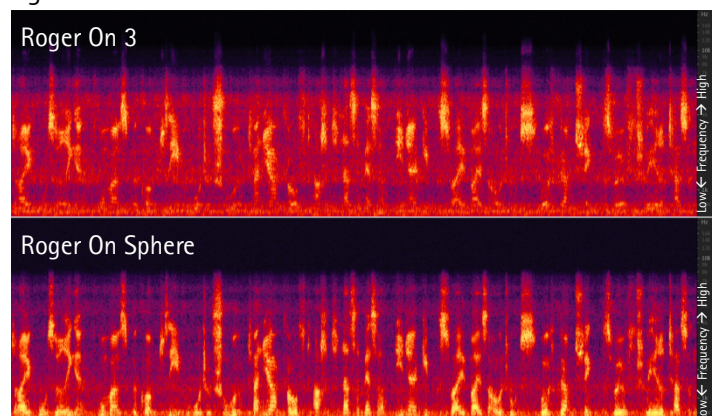


Figure 4. Spectrogram of the responses at -4dB SNR for Roger On 3 (top) and Roger On Sphere (bottom). Brighter colors represent signal intensity.

Presenter Mode

We also wanted to assess the potential additional benefit Roger On Sphere could give to hearing aid users, in distances where a traditional hearing aid may be used instead of with a Roger microphone.

HASPlv2 is a mathematical model for estimating speech intelligibility and has been used in other studies attempting

to show speech intelligibility predictions with reasonably good accuracy (Kates & Arehart, 2021; Zanin et al., 2025).

A similar set up was used as above, with the same room acoustics and speaker set up (Figure 5).

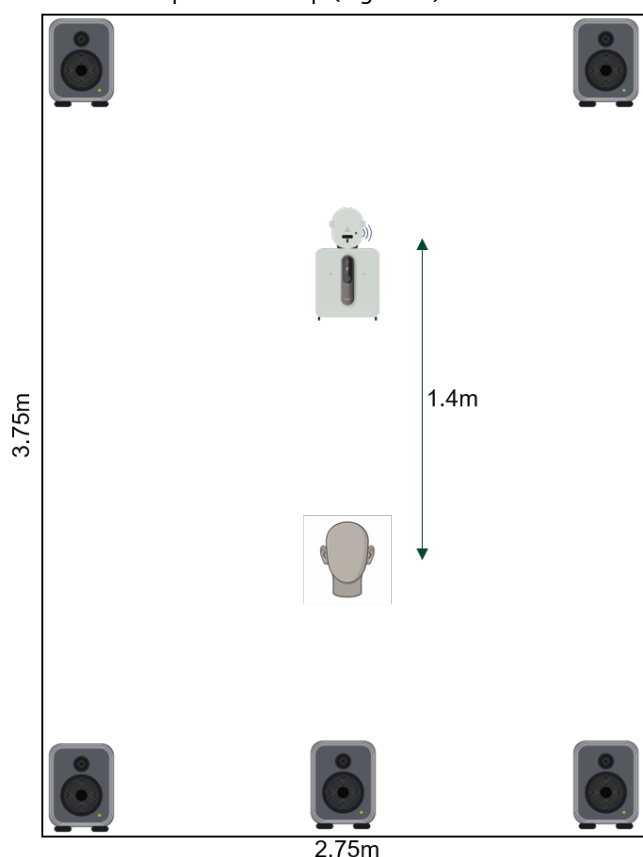


Figure 5. Room set-up for Presenter mode testing.

The Roger On Sphere was placed in Presenter mode, 20cm from the B&K talking head. A KEMAR with Phonak Audéo EON hearing aids were used to listen to OLSA sentences played at a fixed level of 65dBA when measured at the KEMAR (equivalent to 74dBA at the Roger mic). OLSA noise was played from the speakers around the room, ranging from 50dBA to 83dBA, allowing a variety of SNR levels to be configured (Figure 5).

A pair of Phonak Audéo EON hearing devices were fit to an N3 hearing loss (Bisgaard et al., 2010) with vented domes and put into a manual fixed directional beamforming setting with all noise cleaning and sound enhancing features disabled. The fixed directional hearing aid microphone setting allows us to assess the SNR improvement provided by Roger On Sphere can provide on top of hearing aids alone when it is in the RogerDirect+mic program. Removing the DSP features of the hearing aid allows for a more accurate score on the HASPIv2 metric and allows generalisation across the various hearing aid performance levels.

Using the original .wav file as the reference signal, the HASPIv2 scores were then obtained for an N3 hearing loss.

The results of the HASPIv2 were then used to generate a psychometric curve based on the data points.

The results (Figure 6) show that the hearing aid in a fixed directional beamforming with no signal processing has good prediction of speech intelligibility maintained at positive SNRs, followed a sharp decline nearing 0dB SNR, as we would expect for an N3 degree of hearing loss.

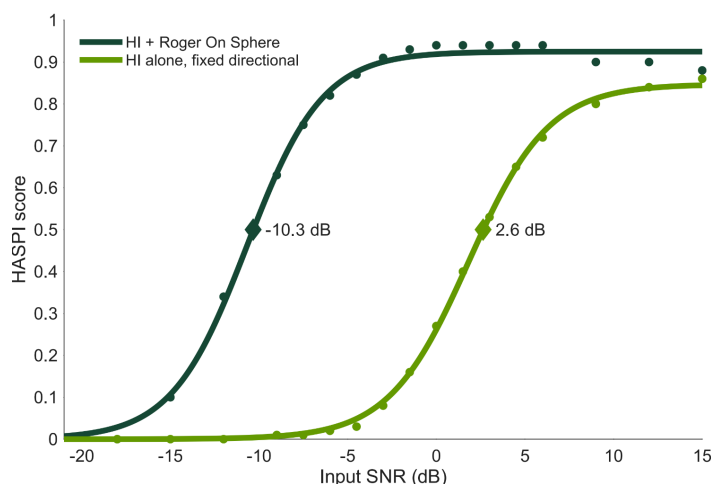


Figure 6. Psychometric curve results of HASPIv2 for Roger On Sphere in presenter mode across various SNRs.

The psychometric curve of the Roger On Sphere shows a significant leftward shift, maintaining good predicted intelligibility even in very noisy situations. The SNR₅₀ suggests a 12.9dB SNR improvement when using Roger On Sphere with a hearing aid, compared to the hearing aid in the same mode without Roger.

While it is understood that real-world SNRs often fall between 2dB and 14dB SNR (Wu et al., 2019), a range of negative SNRs were also selected to cover the extremes of the psychometric function, as well as to emulate the effects of distance negatively affecting the SNR. Even across these positive SNRs Roger On Sphere outperformed the near field microphones of the hearing aids, while maintaining that advantage at very challenging SNR values. A HASPI score of 90% was maintained until -3dB SNR, 83% better than with the hearing aid alone.

At the 0dB SNR condition, the signal and noise powers were equal. Here, hearing aids with Roger On Sphere were predicted to provide an additional +67% better speech in noise performance compared to the hearing aids alone.

The measurements for this second study were primarily designed to provide technical measurements of the Roger On Sphere. These data are the first to demonstrate the benefits of Roger On Sphere technology and its new denoising capabilities in table mode. This study also demonstrates sustained performance when a hearing aid is

combined with Roger On Sphere in Presenter mode, even in near-field distances. All testing was done in non-anechoic conditions, and at SNR values that go beyond what is typically used, to clearly demonstrate the benefits this technology can provide to users who may experience poorer SNR performance or are in situations with poorer SNRs, such as loud restaurants or busy conferences.

Conclusion

People with hearing loss have degraded performance even at seemingly good SNR levels. Directional microphones and advanced DSP technologies can enhance hearing aid performance in these situations. However the benefit is ultimately limited by critical listening distances and the intended application of the devices. RMs, in particular, the new Roger On Sphere, complement the benefits of hearing aids, to give significant additional benefits in hearing in noise and over distance.

Prior technical and clinical benchmarking has shown that Roger remote microphone technology is superior to other solutions in the market (Thibodeau, 2014; Wolfe et al., 2015; Roh et al., 2025; Stewart et al., 2026). The present study shows that Roger On Sphere performance in terms of SNR and predicted speech intelligibility is even superior.

Hearing Care Professionals should continue to recommend the best hearing solution to their users, which may go beyond the fitting of traditional hearing aids alone. Remote microphone technology like Roger On Sphere can make a significant difference in people's lives, helping to improve the quality of life for people with hearing loss (Scarinci et al., 2022; Roh et al., 2026).

The measures shown here are purely technical, serving as a proxy to the performance of the product in the real world. Clinical studies are currently underway to validate the technical measures, and we welcome organisations to reach out for study collaborations and testing this innovative product.

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Authors and investigators

Min Roh, Senior Commercial Marketing & Audiology Manager



Min obtained his MAud(Hons) at The University of Auckland, New Zealand. He has held various roles in diagnostic and rehabilitative audiology, tertiary education, professional bodies, and in sales, before joining Sonova in 2022. In his

current role, he provides audiological insights for product development and clinical research, as well as guiding commercial marketing for the Roger business unit.

Xavier Gigandet, Senior Expert Hearing Performance



Xavier holds a PhD in Electrical Engineering from the Center for Biomedical Imaging (CIBM), Switzerland, with a focus on signal processing applied to diffusion MRI and neuroscience. Since joining Sonova in 2010, he has contributed to the development of DSP

algorithms for hearing instruments and Roger transmitters, progressing from DSP engineering to his current role as Senior Expert Hearing Performance. His work combines deep expertise in signal processing with a broader, exploratory role spanning technology development and product innovation.

Miquel Sans, DSP Engineer



Miquel obtained his Master in Electrical Engineering ETH Zurich in 2002. During more than 10 years at Demant, he has been involved in embedded low-power algorithm research and development. He joined Sonova in 2017, and since then, his

responsibilities cover key elements of Roger transmitters signal processing development: Directional denoising front-end and compressive amplification, DNN processing integration and audio path architecture.

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One-page summary

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Key highlights

- Roger On Sphere combines advanced remote microphone technology with AI-powered signal processing innovations to deliver substantial benefits in noise.
- Technical measures show a 14.2dB SNR benefit thanks to RogerSense OS signal processing, a 3dB SNR benefit over Roger On 3 when using Roger On Sphere in Table Mode.
- Phonak Audéo EON with Roger On Sphere is predicted to provide an additional 67% improvement of speech in noise intelligibility at a distance of 1.4m and an SNR of 0dB, compared to without using a Roger system.

Considerations for practice

- Roger On Sphere is the latest remote microphone technology from Phonak, designed to be used with hearing devices to enhance the listening experience of people who require support beyond hearing devices.
- Roger On Sphere in table mode boasts record-level denoising capabilities, predicted to provide equivalent comfort and intelligibility in situations twice as noisy as Roger On 3.
- Even in the near field, Roger On Sphere can provide additional benefit to fixed directional hearing aids, predicted to provide up to a 12.9dB SNR enhancement in presenter mode.