



Optimize Sound Quality with Omega AI

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Webinar FAQs

Optimize Sound Quality
with Omega AI

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Risks and Benefits

The applicability and accuracy of the course content may vary by the clinical, geographical, and cultural context; you should evaluate the course accordingly.

As healthcare is rapidly evolving, new findings may change the validity of the information presented in this course. Providers should always consult the latest research and guidelines from professional associations.

The interventions discussed in this course may be limited in generalizability, requiring practitioners to consider specific individual and population factors.

The course may not cover all possible risk factors, diagnostic methods, or treatment options, and complex cases may require additional considerations.

Healthcare providers should apply cultural competence and sensitivity to ensure effective and respectful care based on their patients' diverse needs.

Providers should always evaluate the limitations of diagnostic and screening tools, considering their potential for false results as well as any ethical implications.

It is the responsibility of course participants to critically evaluate the evidence from multiple sources to guide professional practice.

Learning Outcomes

1

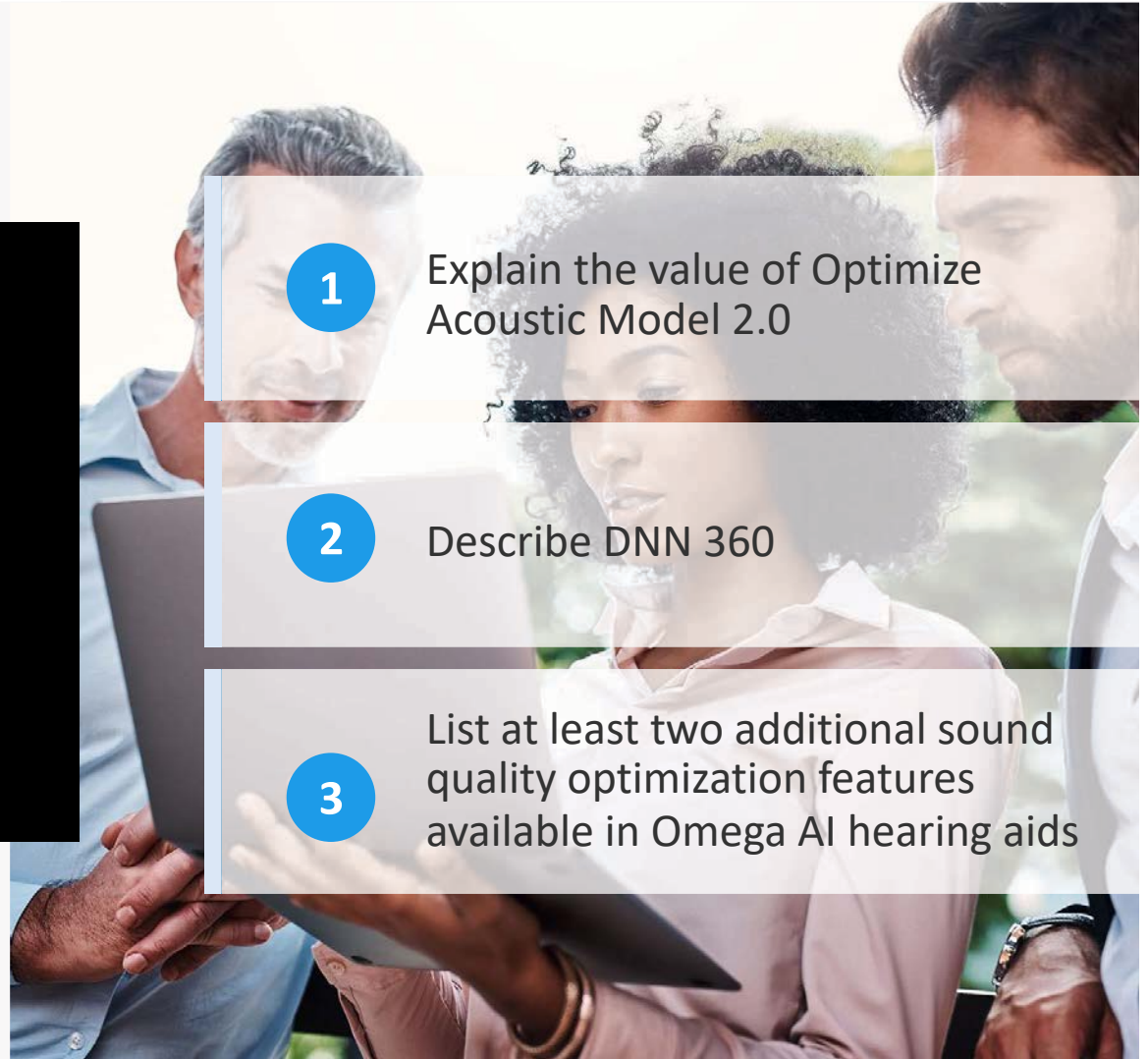
Explain the value of Optimize Acoustic Model 2.0

2

Describe DNN 360

3

List at least two additional sound quality optimization features available in Omega AI hearing aids



Reminders

Evidence-Based

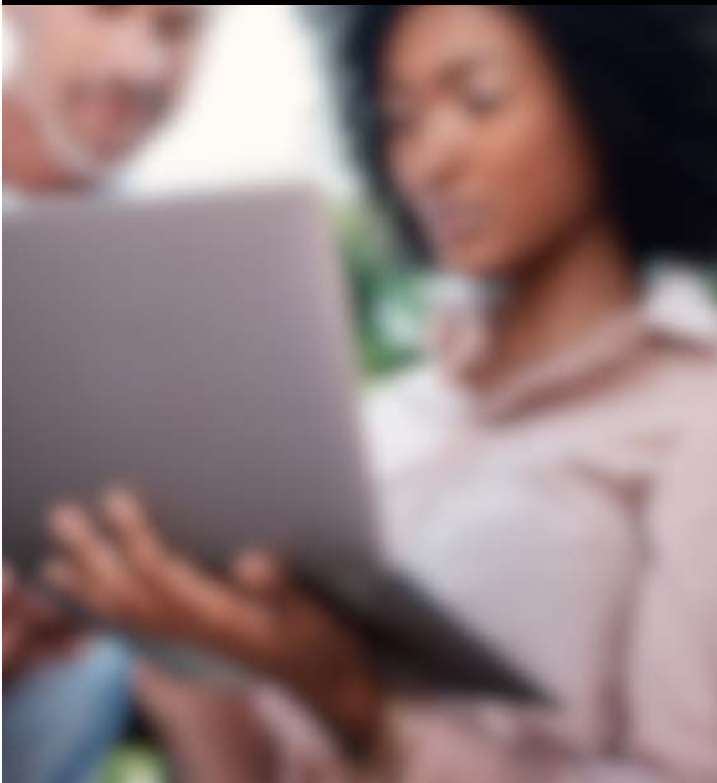
All CE courses on continued.com must be evidence-based. In evidence-based continuing education sessions, the presenter provides:

The best available, current, scientific evidence to support a particular practice or guideline which can include exploratory or pilot study data and the related evidence

Information about his/her clinical expertise, expert opinion, and experience in this topic area

Information related to client/patient/caregiver values

An indication of the level of evidence (e.g., systematic review, randomized control trial, cohort study, expert opinion, etc.) for each piece of evidence presented, ensuring clarity on the strength and reliability of the supporting data



Agenda

Artificial Intelligence

Voice AI

Edge Mode+

DNN Enhanced Speech in Noise

DNN 360

Generative AI Features

Sound Quality Toolbox

Optimize Acoustic Model 2.0

Sound Manager

Acoustic Music Optimization

Streaming Precision



Sound Quality

“....a **perceptual reaction** to the sound of a product that reflects the listener’s reaction to how acceptable the sound of that product is.”

Richard H. Lyon

**Natural
Sounding**
Rich and Clear



**Comfort for
loud sounds**

Top Drivers
of Hearing Aid
Performance and Sound

**Minimize
background
noise**



**Ability to
tell direction**

EDGE^{AI}



GENESIS^{AI}



Setting the *speed*
of Innovation

evolv^{AI}



Signature
SERIES



Picasso





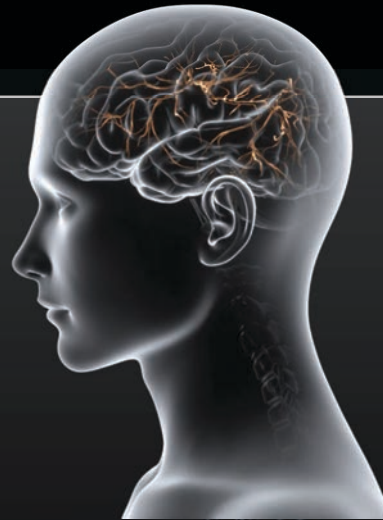
Always creating new paths



Introducing

OMEGA^{AI}

**Technology so intelligent,
it's superhuman**



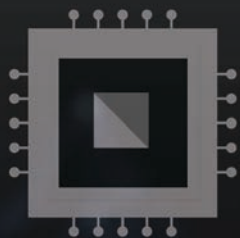
G3 Neuro Processor

Neuro Sound Technology

Mimics the human brain to better replicate how a “normal” hearing system works

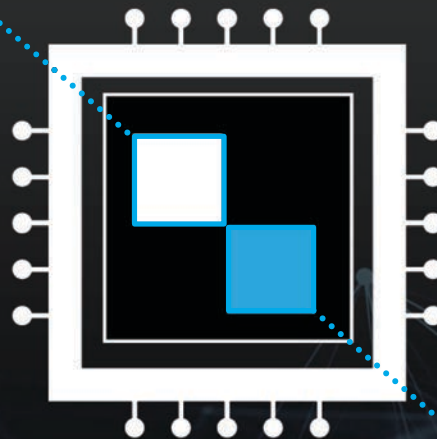
Encodes a wearer’s acoustic environment, senses movement, digitizes intent and then adapts to it all to deliver an unrivaled sound experience

Competitor A



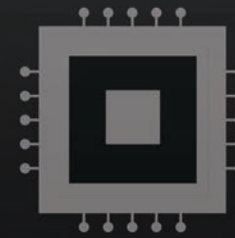
Embedded DNN

G3



Integrated Neural Processing Unit (NPU)
dedicated to DNN processing, runs in
parallel with our G2 Neuro Processor

Competitor B and C



Dedicated AI chip

NPU



Transforming Hearing Aids with Artificial Intelligence



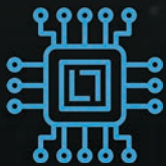
Intelligent
Hearing



Health
Monitoring



Personal
Assistant



Artificial Intelligence

Engineering of machines that mimic cognitive functions



Machine Learning

Ability to perform tasks without explicit instructions and reliance on patterns



Deep Learning

Machine learning based on artificial neural networks

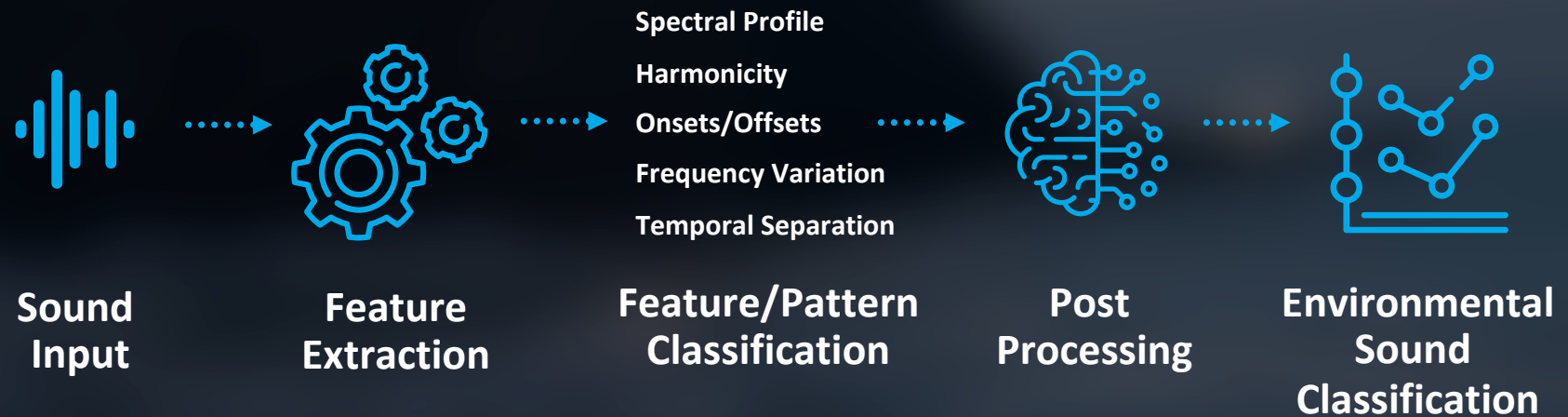


Generative AI

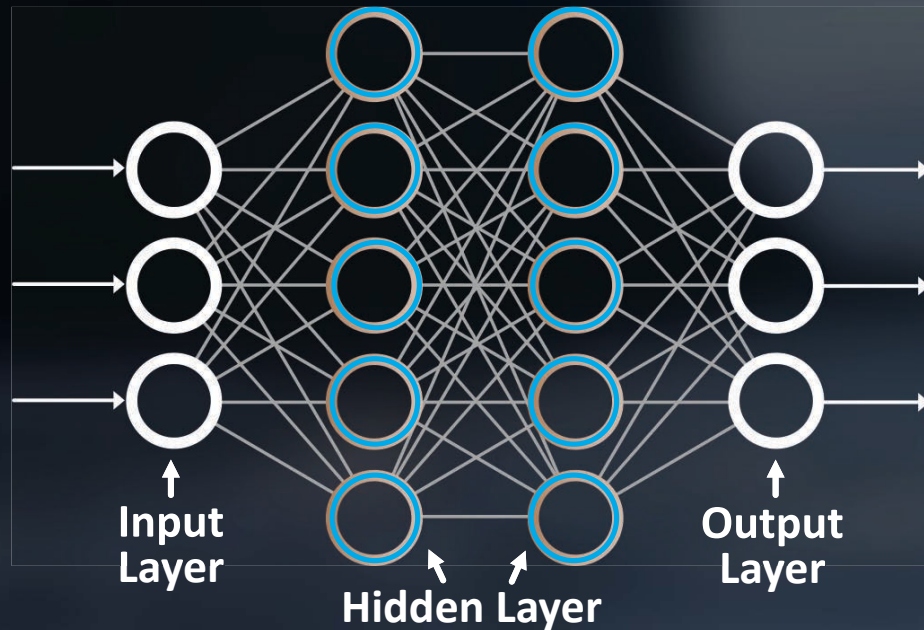
Subset of deep learning that generates new content based on patterns from large datasets

Machine Learning

Acoustic Environmental Classification System

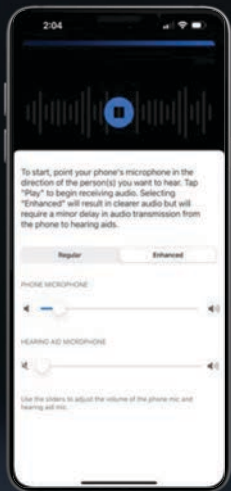


Deep Neural Networks (DNNs), a subset of machine learning, open the possibility of creating sophisticated algorithms with greater accuracy by creating a mesh of nodes and layers that can decode information after it has been extensively trained

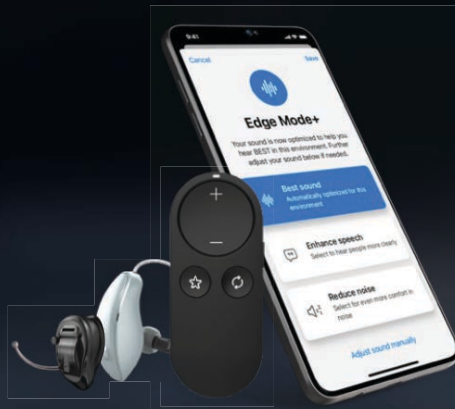




AI-Driven Sound Quality Advancements



Voice AI



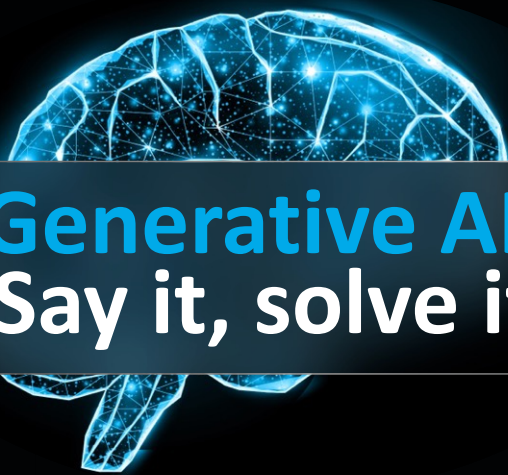
Edge Mode+



**DNN Enhanced
Speech in Noise**



**World's First DNN-Driven
Directionality System**



Generative AI: Say it, solve it

ALL NEW
TeleHear AI

ALL NEW
Starkey AI Assist

Voice AI

24 Technology Exclusive

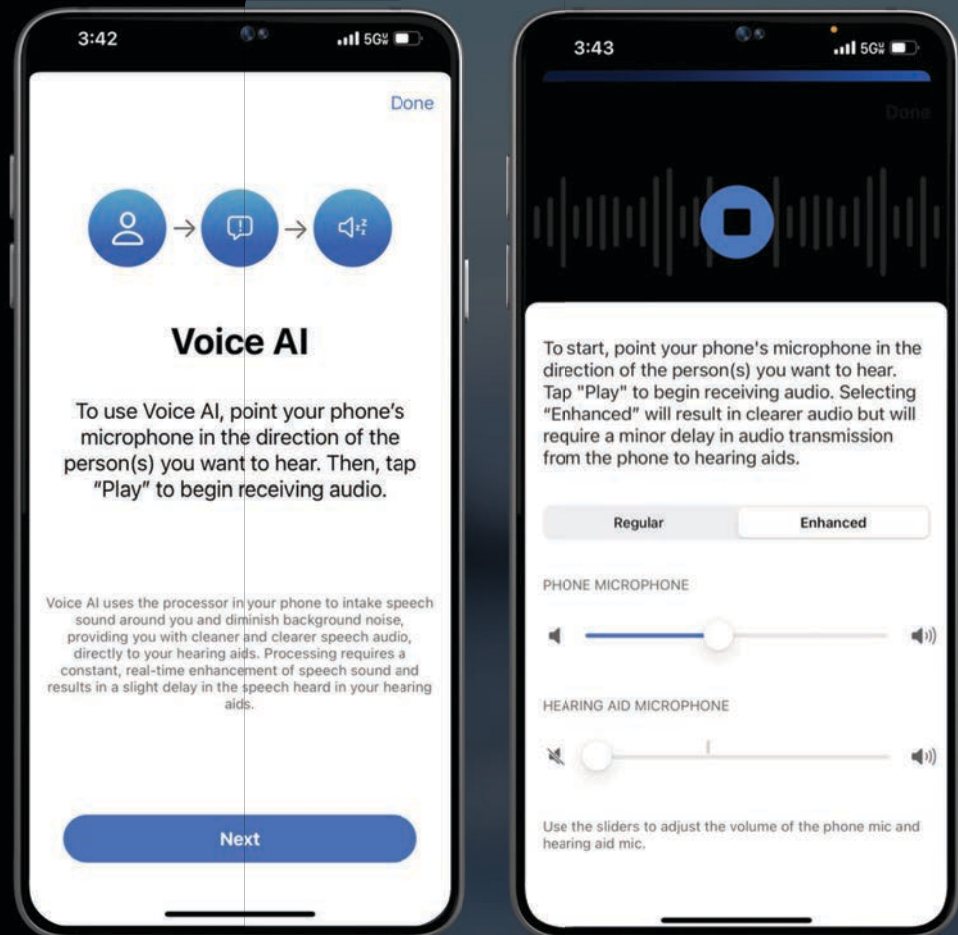
Regular

Similar to Live Listen function but without the low pass filter imposed by iOS

Enhanced

Adds Voice AI algorithm

Adjust input of the Phone Microphone and Hearing Aid Microphones independently as desired



Edge Mode+

On-demand real-time analysis of environments for additional help with comfort and clarity

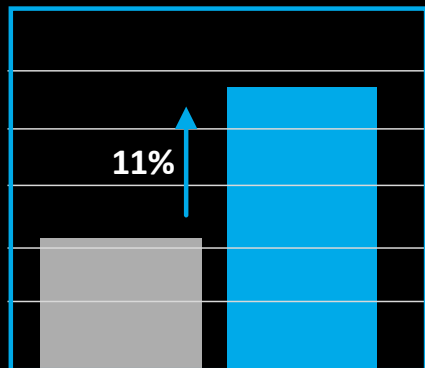
Unique adaptations for every environment



Edge Mode+

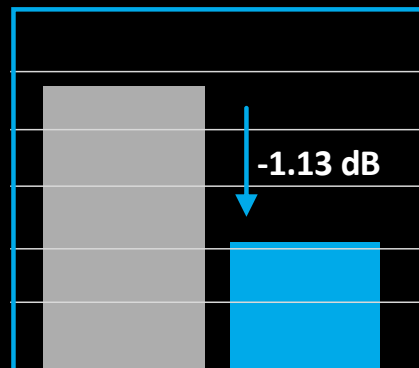
Edge Mode+ has been shown to improve speech recognition and decrease listening effort

Word Recognition Score



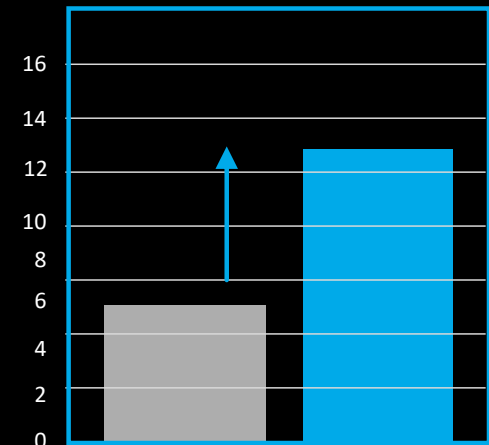
Default Settings Edge Mode+ Enhance Speech

Listening Effort SNR



Default Settings Edge Mode+ Enhance Speech

Edge Mode+ provides better signal-to-noise ratio by up to 13dB



Default Settings Edge Mode+ Reduce Noise

Edge Mode+

Edge Mode+

20 & 16 Technology

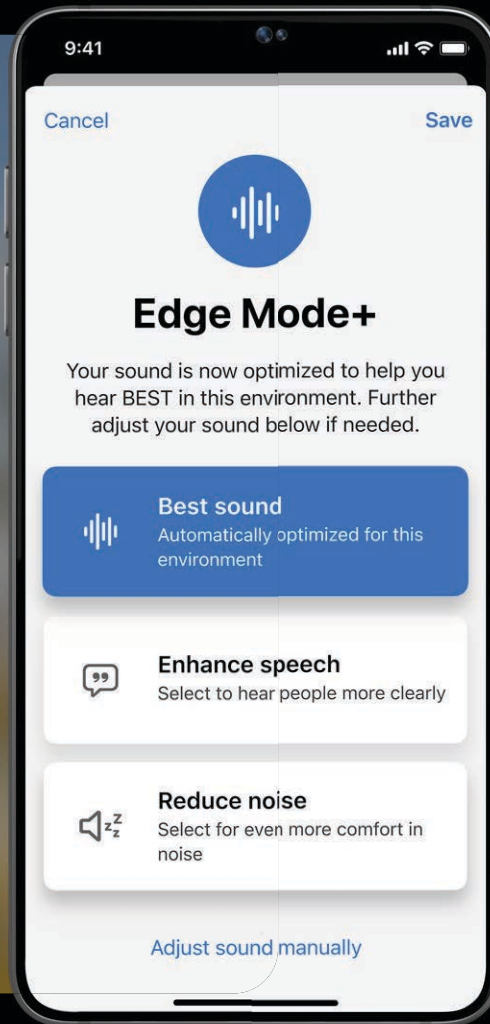
Settings are fixed once engaged
Turn ON and OFF to accommodate
changes to listening environments

Automatic Edge Mode+

24 Technology

Automatically rescans as
environment changes





Edge Mode+

Best sound

Automatically optimized settings for this environment

Enhance speech

Tap to gain more clarity and hear others more clearly

Reduce noise

Tap to get even more comfort by further reducing background noise

24 & 20 Technology



Patient Benefits

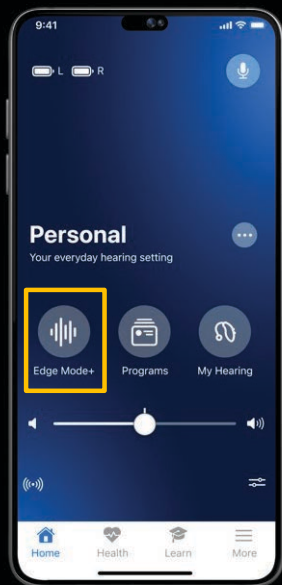
On-demand adjustments
made for the listener

More adjustments than can
be achieved through
My Starkey or Pro Fit

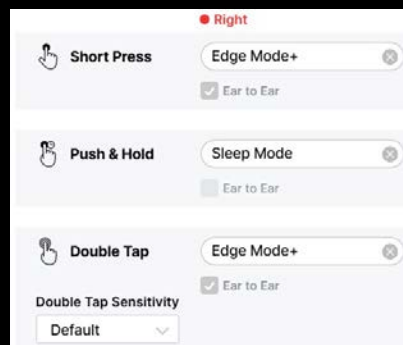
Eliminates the need for
hearing aid programs

Edge Mode+

Three ways to engage



My Starkey



**Hearing Aid
User Controls**



**StarLink
Remote Control**

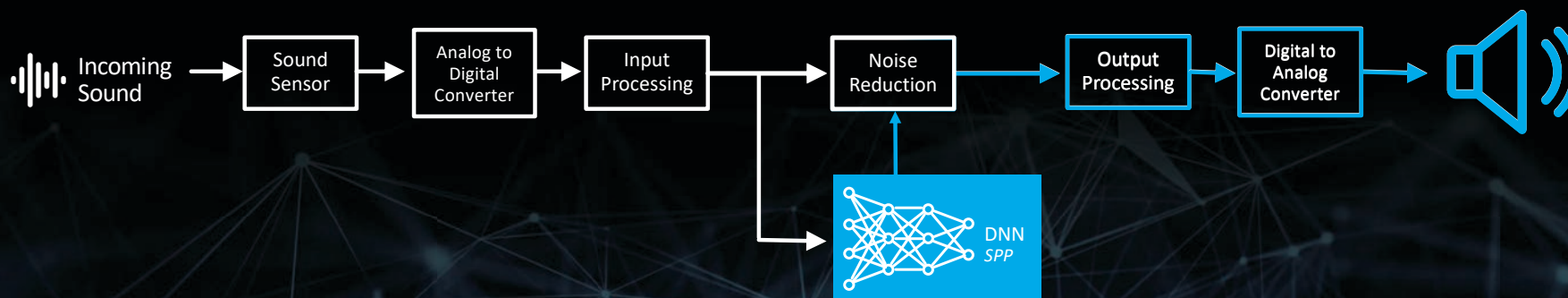


Deep Neural Network Enhanced Speech in Noise

Industry's first Speech Probability Predictor

30% more accurate
at identifying speech

Conventional AI Noise Reduction





DNN 360

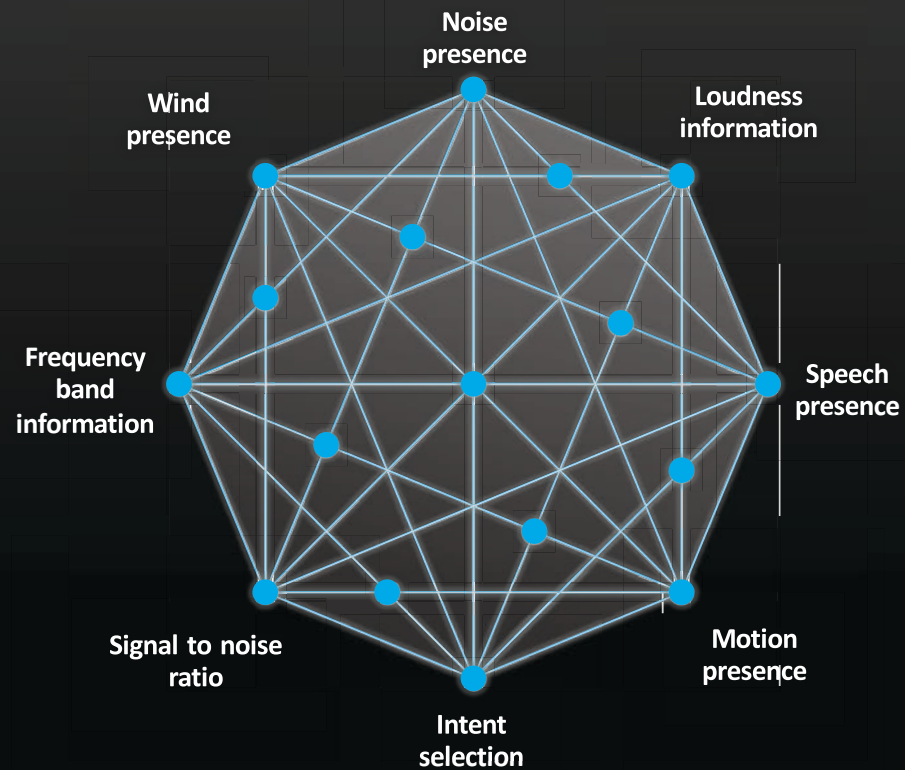
Better hearing
all around

DNN 360

Acoustic
information

Sensor
information

User intent
information



Omnidirectional



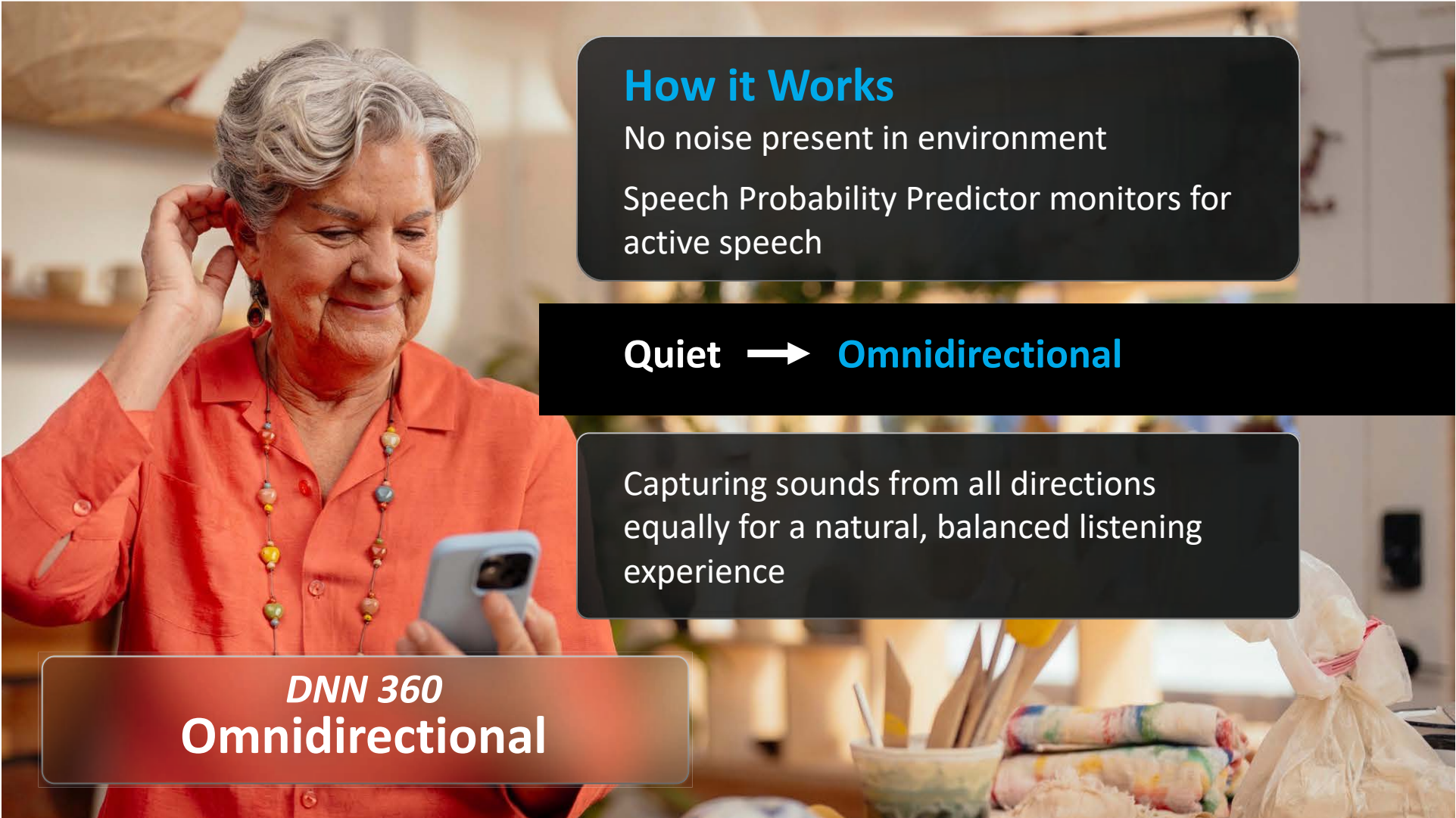
ALL NEW
DNN Spatial Awareness



ALL NEW
DNN Directionality



Motion Based
Optimization



How it Works

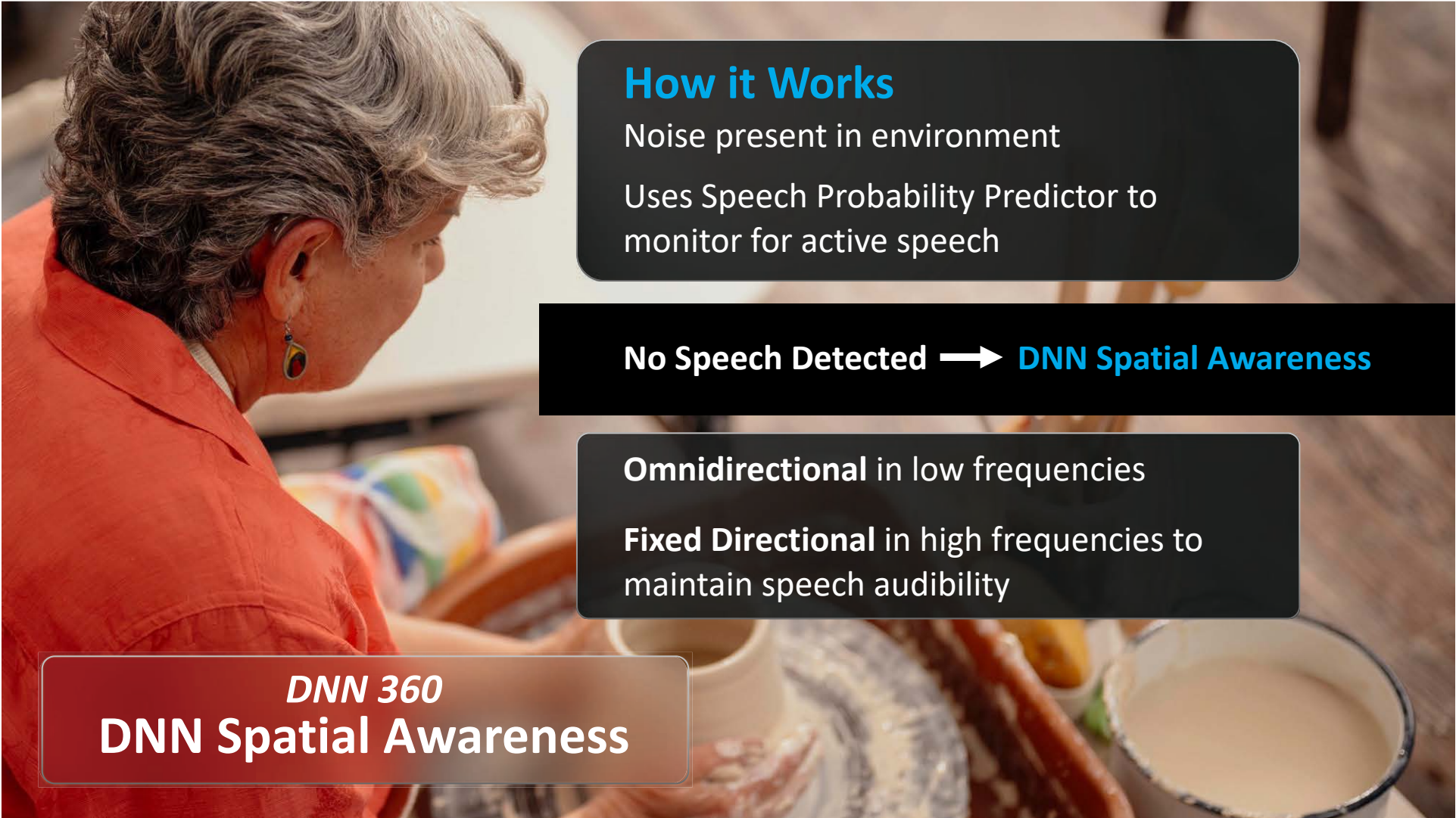
No noise present in environment

Speech Probability Predictor monitors for active speech

Quiet → Omnidirectional

Capturing sounds from all directions equally for a natural, balanced listening experience

DNN 360
Omnidirectional



How it Works

Noise present in environment

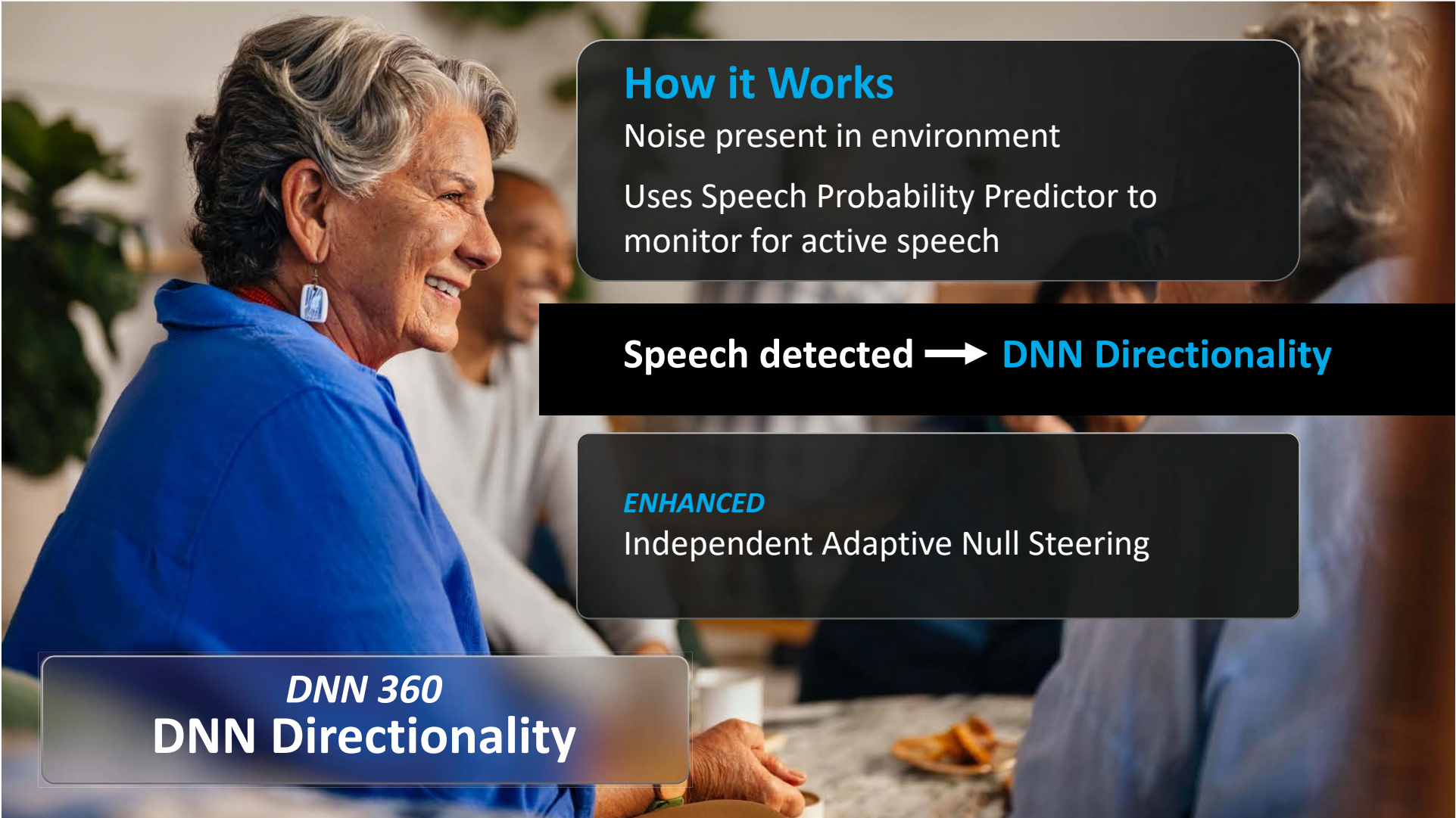
Uses Speech Probability Predictor to monitor for active speech

No Speech Detected → **DNN Spatial Awareness**

Omnidirectional in low frequencies

Fixed Directional in high frequencies to maintain speech audibility

DNN 360
DNN Spatial Awareness



How it Works

Noise present in environment

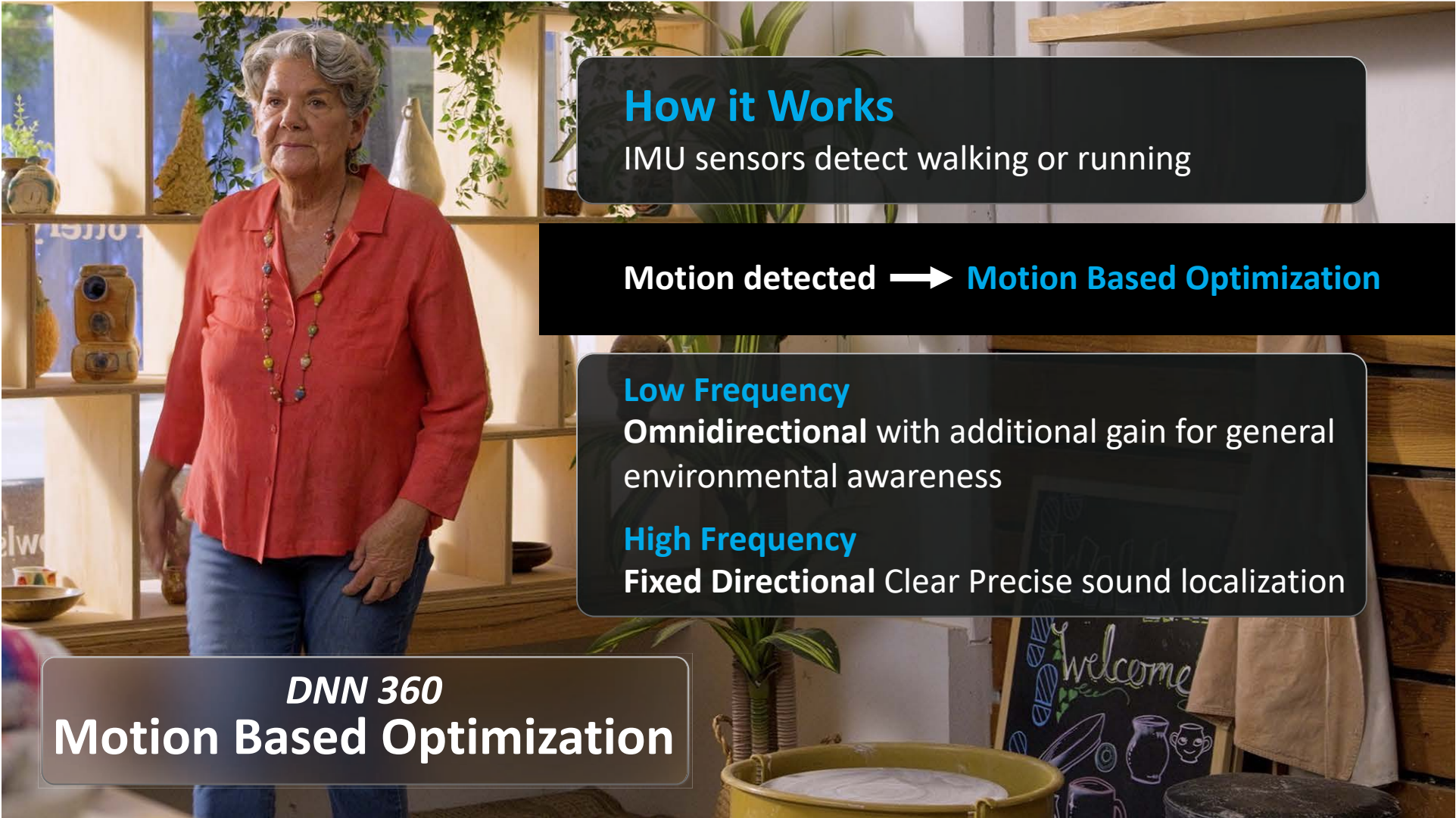
Uses Speech Probability Predictor to monitor for active speech

Speech detected → **DNN Directionality**

ENHANCED

Independent Adaptive Null Steering

DNN 360
DNN Directionality



How it Works

IMU sensors detect walking or running

Motion detected → Motion Based Optimization

Low Frequency

Omnidirectional with additional gain for general environmental awareness

High Frequency

Fixed Directional Clear Precise sound localization

DNN 360
Motion Based Optimization

DNN 360



Omnidirectional



DNN Spatial Awareness



DNN Directionality



Motion Based Optimization



DNN 360

28%

improved

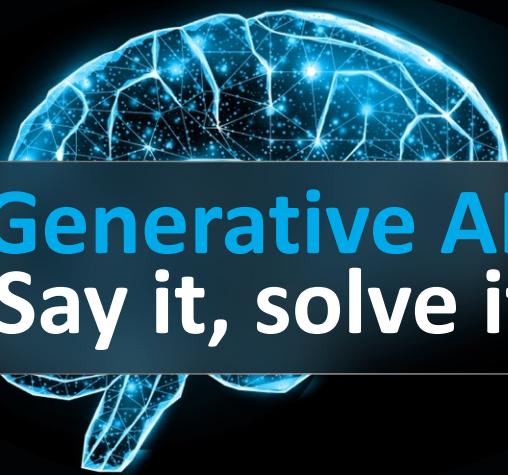
SPEECH
INTELLIGIBILITY

Up to
8dB SNR

FOR BETTER
SPATIAL
AWARENESS

Maintains *spatial awareness* in
non-speech environments

Maintains our *industry-leading*
battery life



Generative AI: Say it, solve it

ALL NEW
TeleHear AI

ALL NEW
Starkey AI Assist



Starkey AI Assist

Answers your product-related
questions by leveraging Gen AI
and current Starkey content

ALL NEW

Starkey AI Assist

sound too tinny

To address the issue of sound being "too tinny" in hearing aids, several adjustments can be made:

- Decrease high frequency gain above 3 kHz by reducing gain for soft, average, and loud inputs in the high frequencies by 4 dB (2 steps) ¹.
- Decrease high frequency gain above 2 kHz by lowering gain for soft, average, and loud inputs at and above 2000 Hz by 4 dB (2 steps) ¹.
- Increase low frequency gain for soft, average, and loud inputs by 4 dB (2 steps) to balance the sound quality ¹.
- If using a Music program, decrease treble and increase bass via the QuickFit screen for a fuller sound ².
- Utilize Speech Mapping or Verify Comfort features to identify and adjust frequencies contributing to the tinny quality ².
- Consider adjusting the overall output above 1000 Hz, increasing compression, or changing the experience level to provide less gain ².

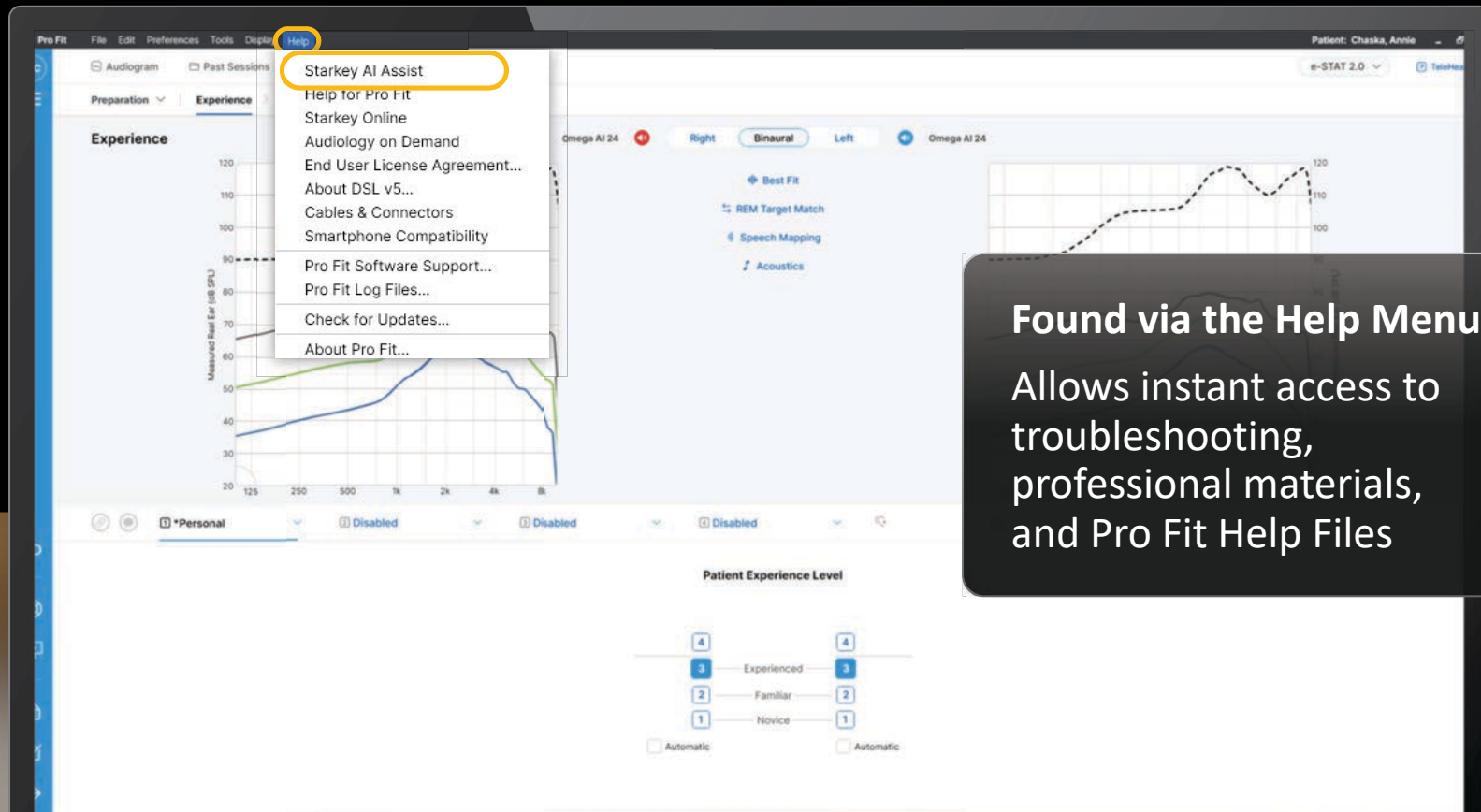
These steps aim to reduce excessive high-frequency amplification and enhance the overall tonal balance, resulting in a less tinny and more natural sound experience ^{2 1}.

2 references ▾

1 [PRO_SoundQuality.html - Part 1](#)

2 [FLYR4093-02-EN-SC - ...e QuickTIP A24_F.pdf - Part 1](#)

Starkey AI Assist



Found via the Help Menu

Allows instant access to troubleshooting, professional materials, and Pro Fit Help Files



TeleHear AI

Allows hearing aid wearers
to manage their own
sound concerns

INDUSTRY
FIRST

TeleHear

Synchronous

Remote Programming

Live virtual session
with provider

Real time changes made

Asynchronous

Remote Programming

Help request sent to
provider by the patient

Not in real-time

TeleHear AI

Adjustments

Patient interacts with
Gen AI technology to
improve hearing aid
settings

Real time changes made

INDUSTRY
FIRST



TeleHear AI

Patients describe their sound concerns via a conversational interface

AI interprets the issue and offers adjustments based on professional expertise

Exclusive to Omega AI

**Faster fittings,
greater satisfaction**



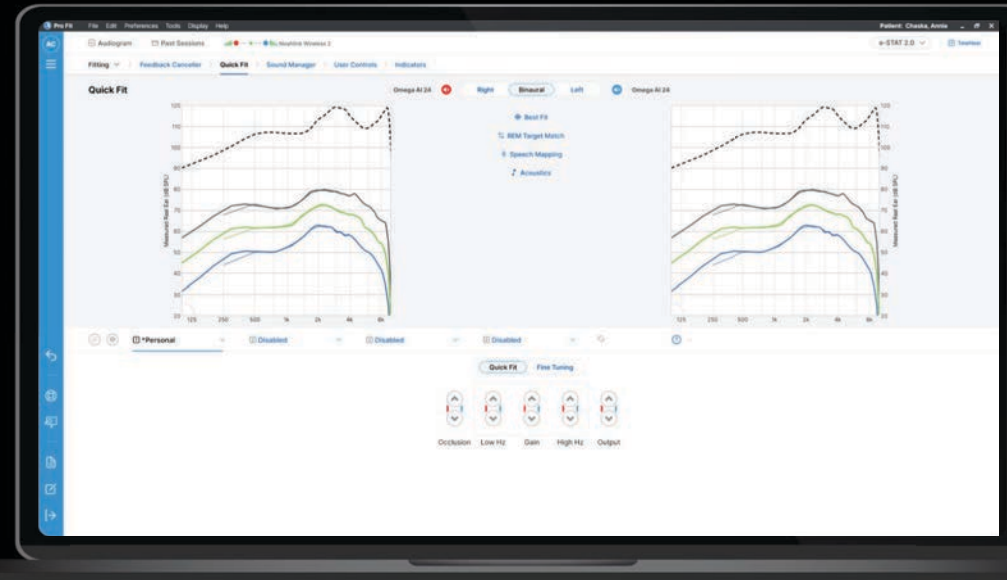
Starkey Pro Fit



eSTAT 2.0

Proprietary Fitting Formula

Developed with the additive compressor architecture to provide more gain for soft speech and better audibility at higher frequencies



~4-6 dB more gain for soft sounds*

10% higher speech intelligibility scores for soft speech vs. previous technology

*Varies with the audiogram and acoustic stimuli

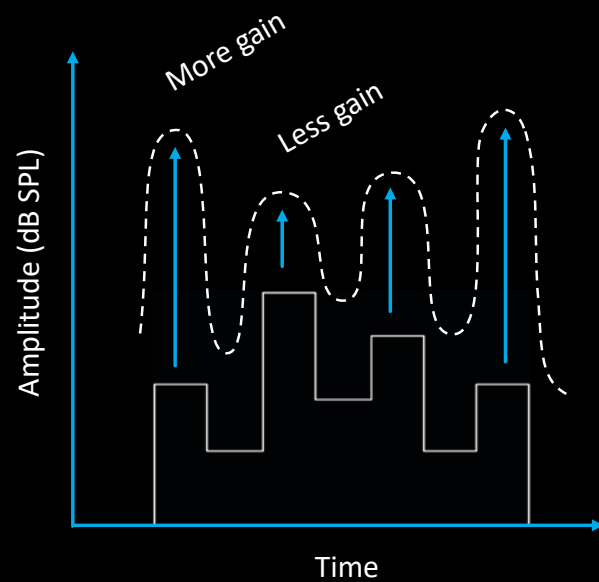
More gain at higher frequencies**
($> 3\text{kHz}$)

Improved vent modeling

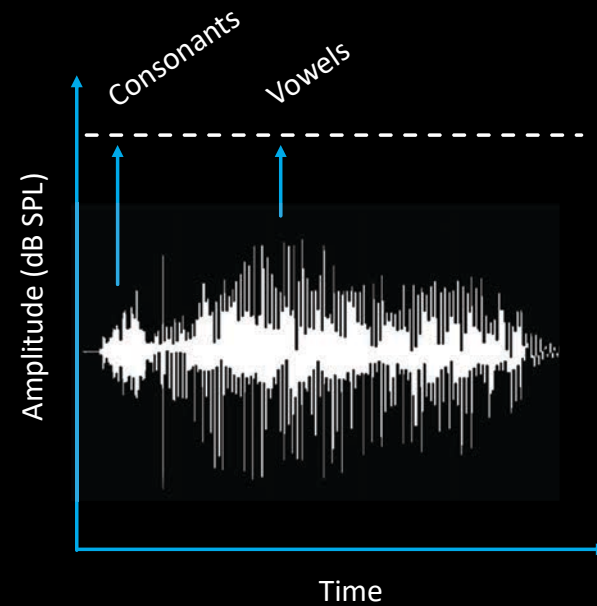
**Varies with audiogram and with frequency

Additive Compressor

Slow Compressor



Fast Compressor





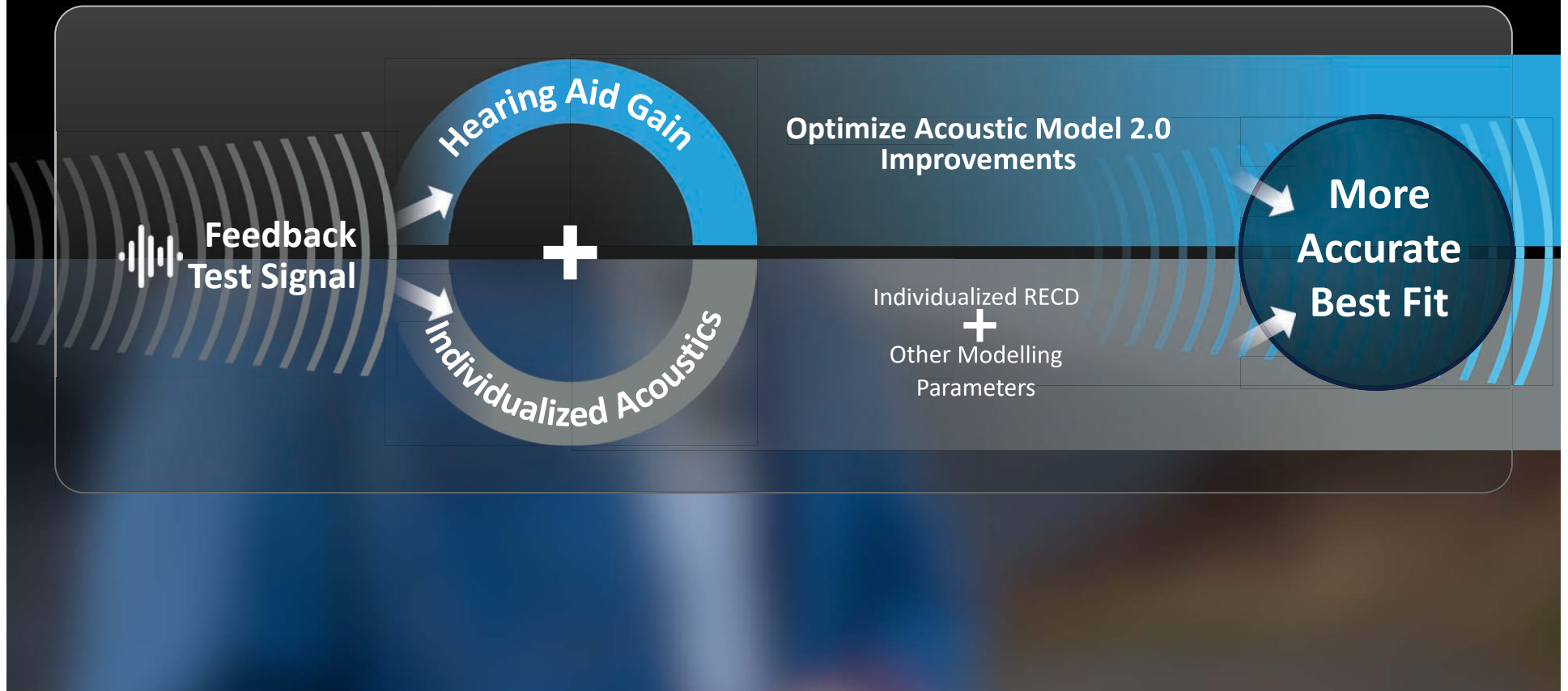
Optimize Acoustic Model 2.0

Improved target modeling to
provide a more accurate Best Fit

ENHANCED

EXCLUSIVE TO OMEGA AI

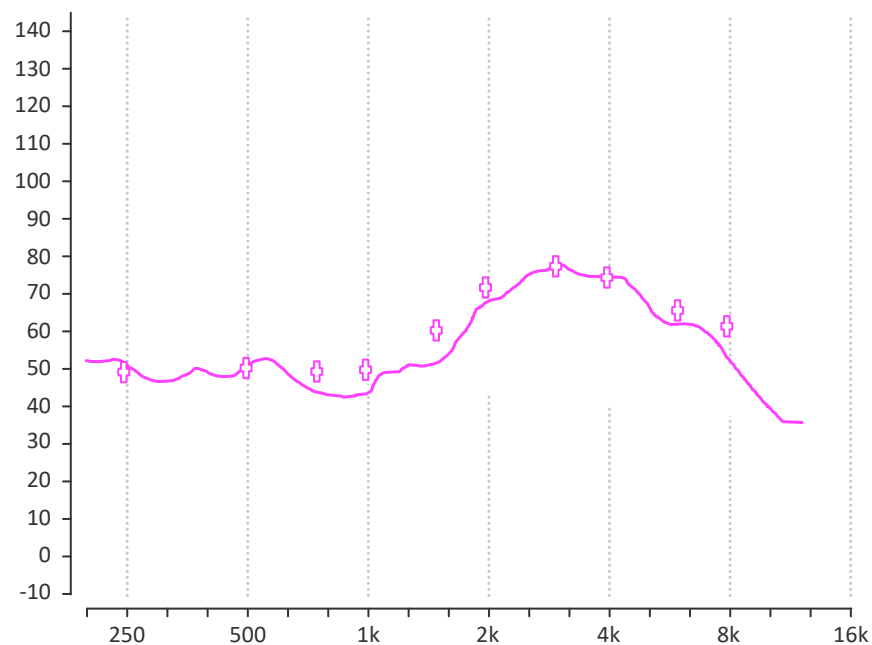
Starkey **Pro Fit** Optimize Acoustic Model 2.0



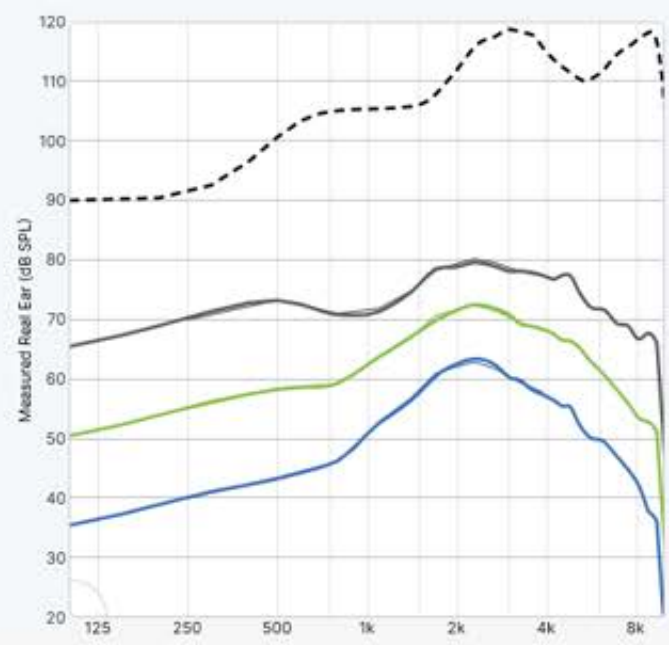
Optimize Acoustic Model 2.0

THE GOAL More accurate fittings resulting in better perceptual outcomes for patients

Real Ear Curves on REM System



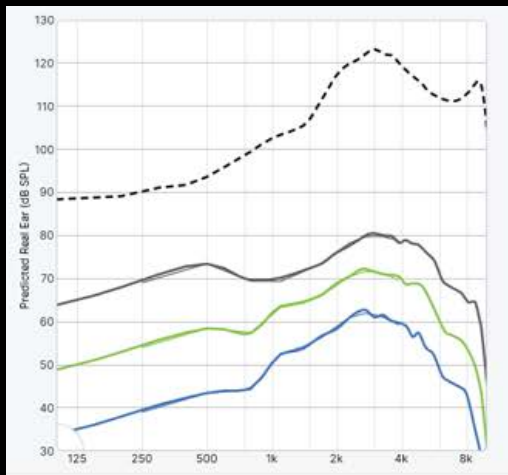
Measured Real Ear View within Pro Fit



Modeling Selection

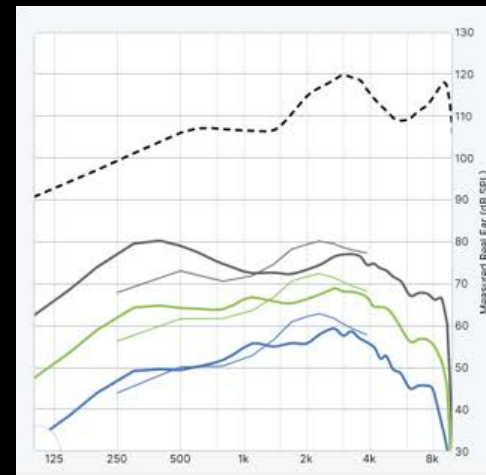
Target Match

Updates the frequency response to the newly modeled targets



Do Not Target Match

Updates the frequency response to account for Real Ear Insertion loss only



Patient Experience Level

Automatic vs Manual

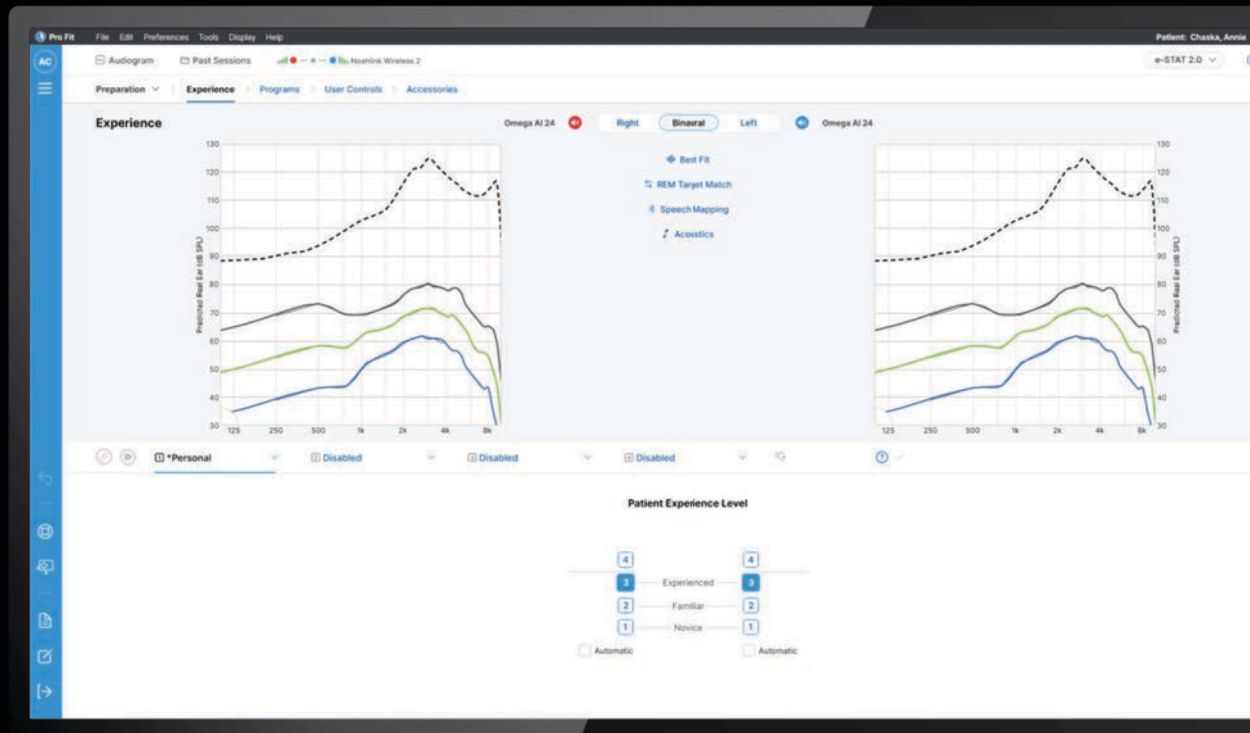
1 = 75% Gain

2 = 85% Gain

3 = 100% Gain

4 = 110% Gain

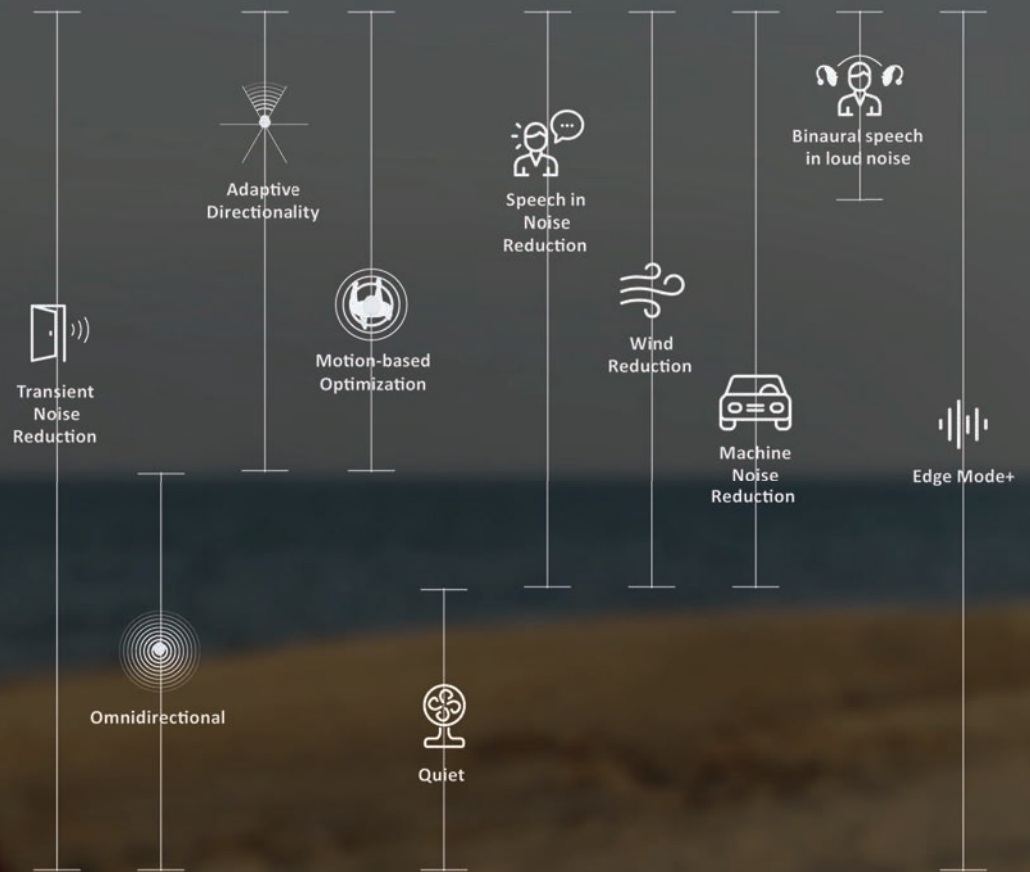
4 is not part of automatic pathway



Sound Manager

Louder, more
challenging
listening
environment

Quieter, easier
listening
environment

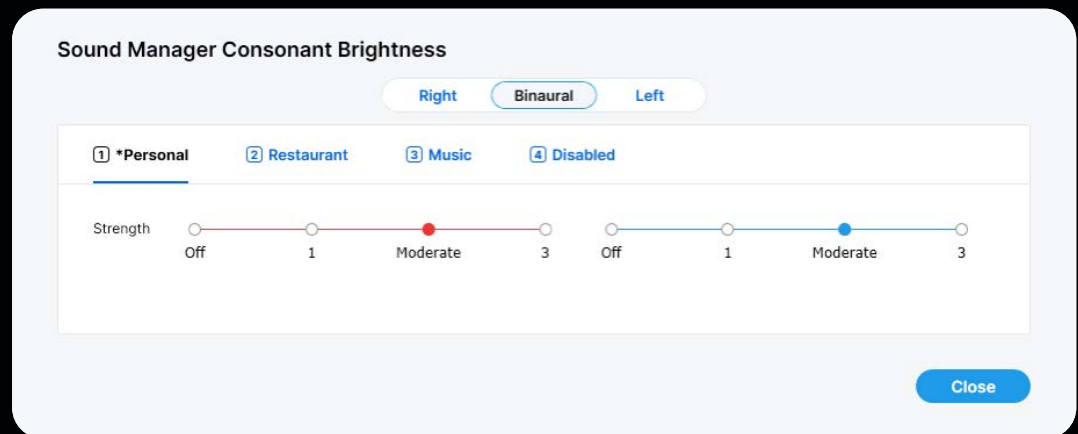


Consonant Brightness

Controls the fast compressor component of the Additive Compressor system to make certain parts of speech more audible

Strength settings available on the 24 technology tier

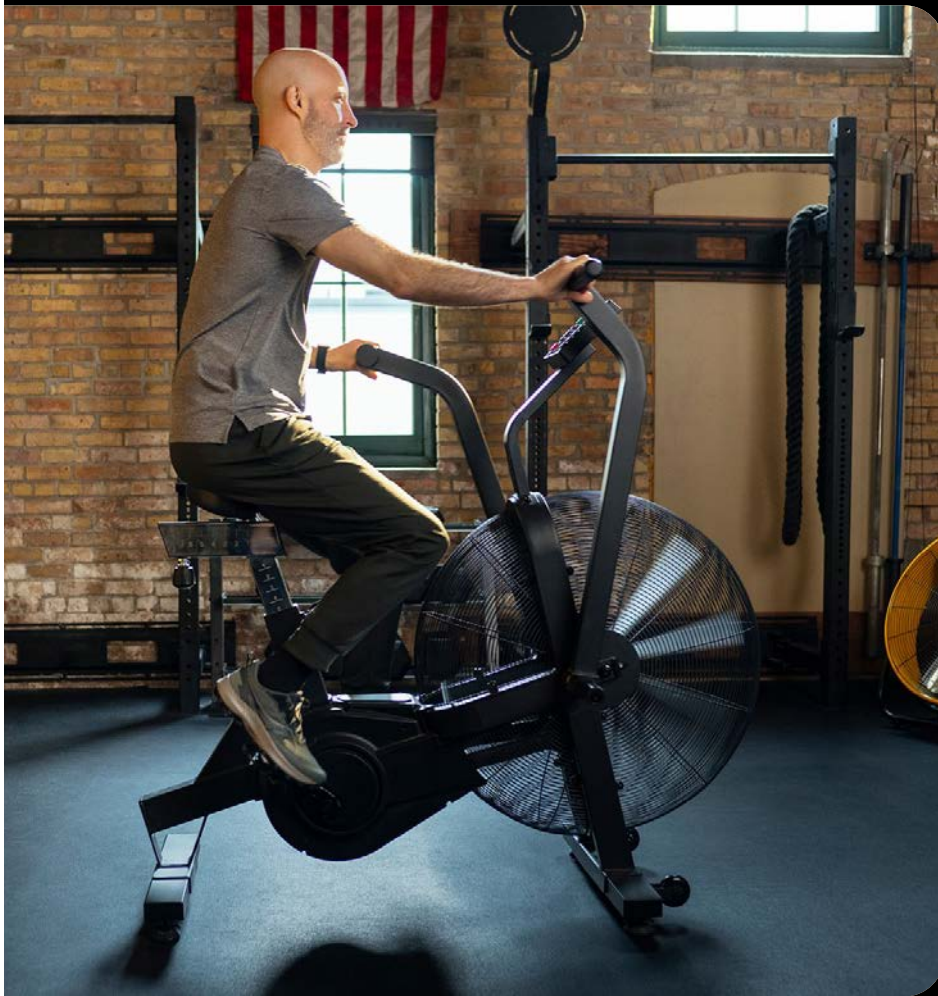
ON/OFF control for lower technology tiers: 20, 16 & 12





Motion-Based Optimization

Motion detection adaptations improve sound quality and increase spatial awareness



Motion-Based Optimization

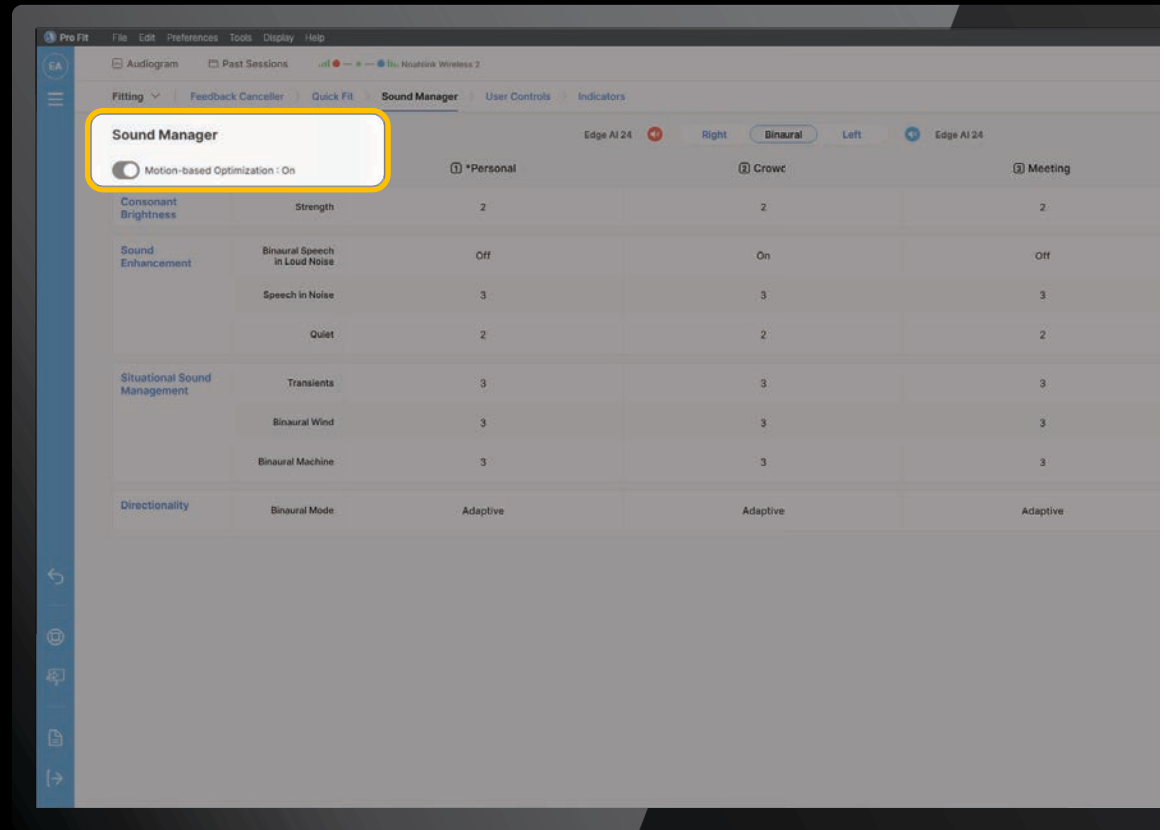
Small movements that impact the hearing aid placement, like chewing or putting on glasses or a hat, will activate our renowned feedback cancellation system to be at its most aggressive

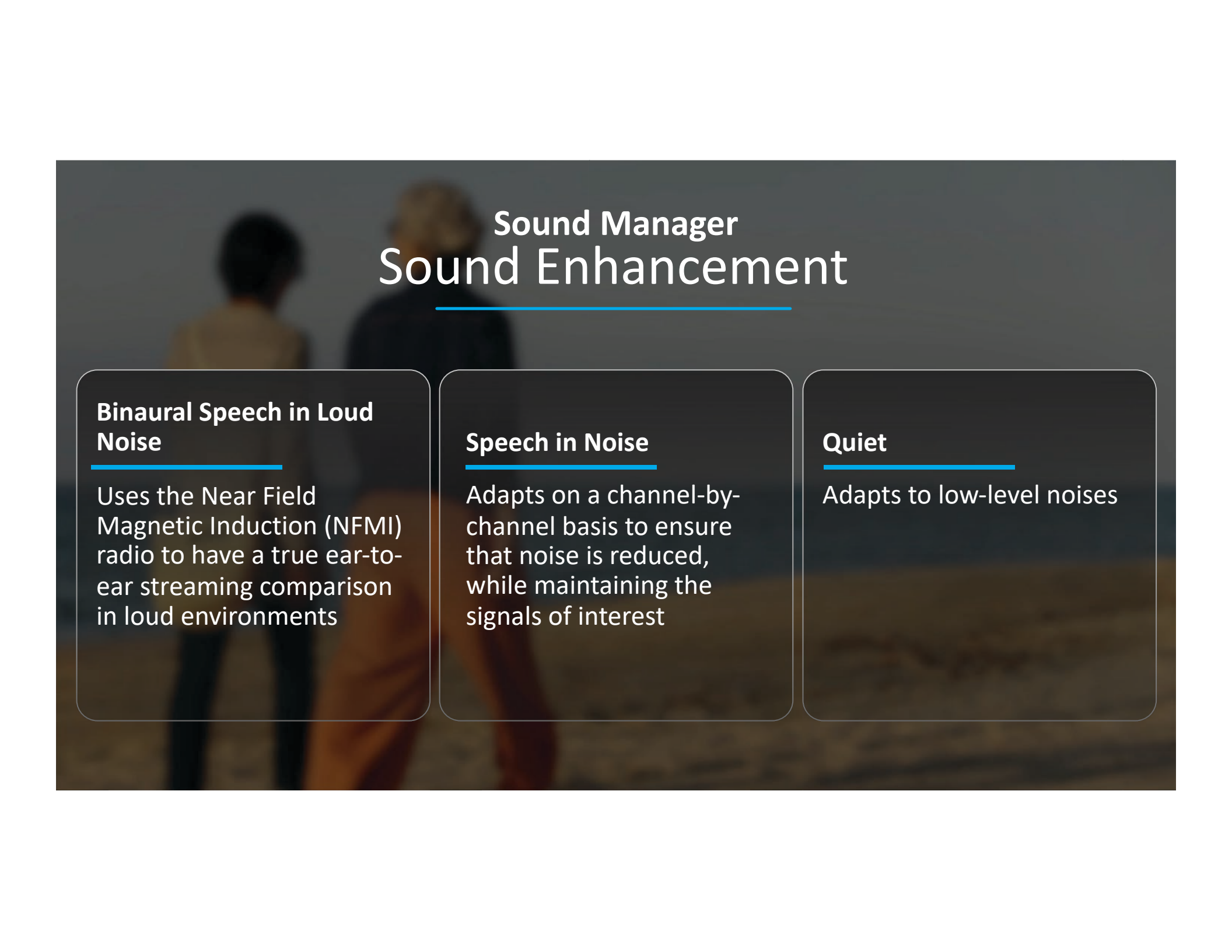
24 Technology Tier

Motion-Based Optimization

Defaults ON

Global control to turn OFF in Sound Manager for all programs





Sound Manager Sound Enhancement

Binaural Speech in Loud Noise

Uses the Near Field Magnetic Induction (NFMI) radio to have a true ear-to-ear streaming comparison in loud environments

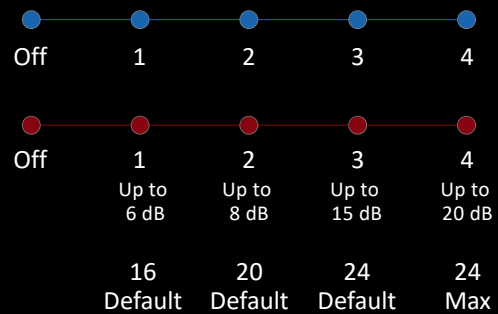
Speech in Noise

Adapts on a channel-by-channel basis to ensure that noise is reduced, while maintaining the signals of interest

Quiet

Adapts to low-level noises

Speech in Noise



System Settings with
Premium Technology



Quiet



System Settings with
Premium Technology



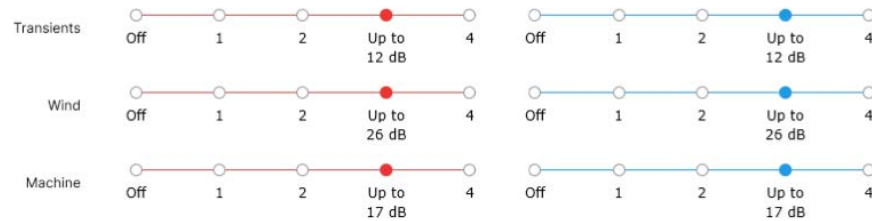
Sound Manager Situational Sound Management



Sound Manager Situational Sound Management

Right Binaural Left

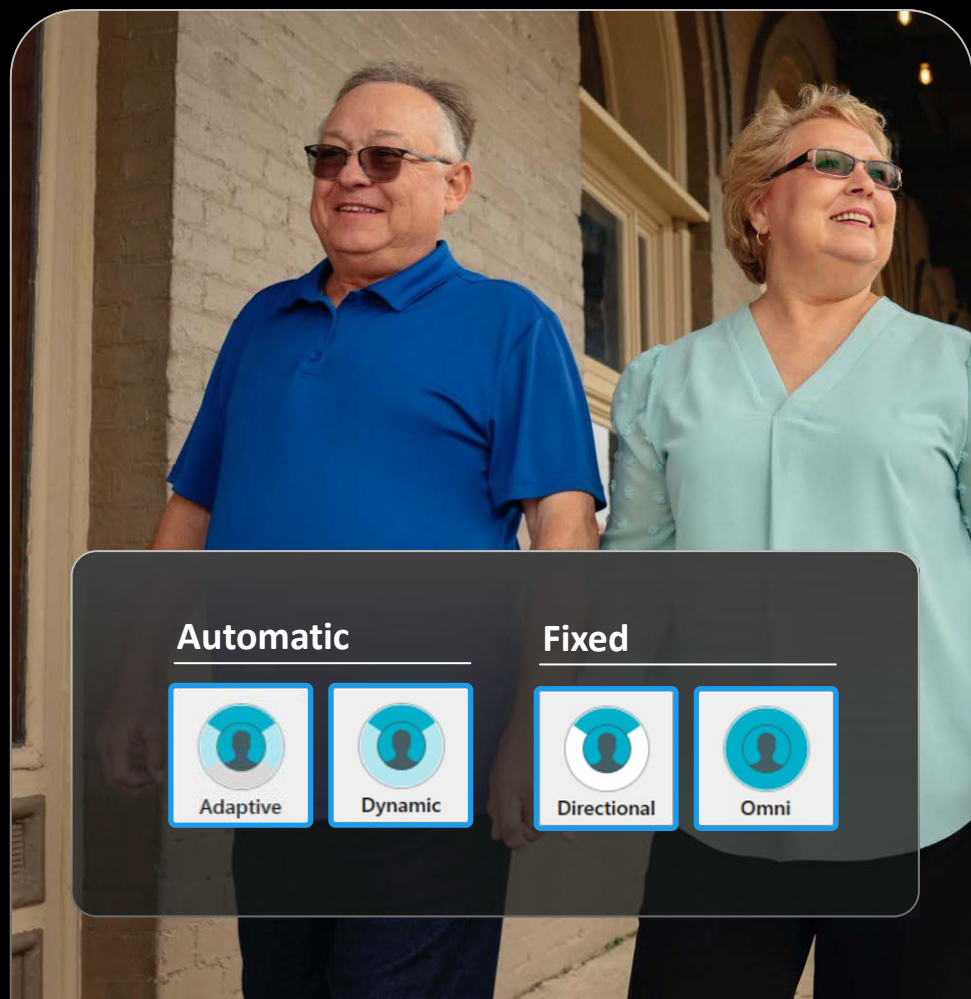
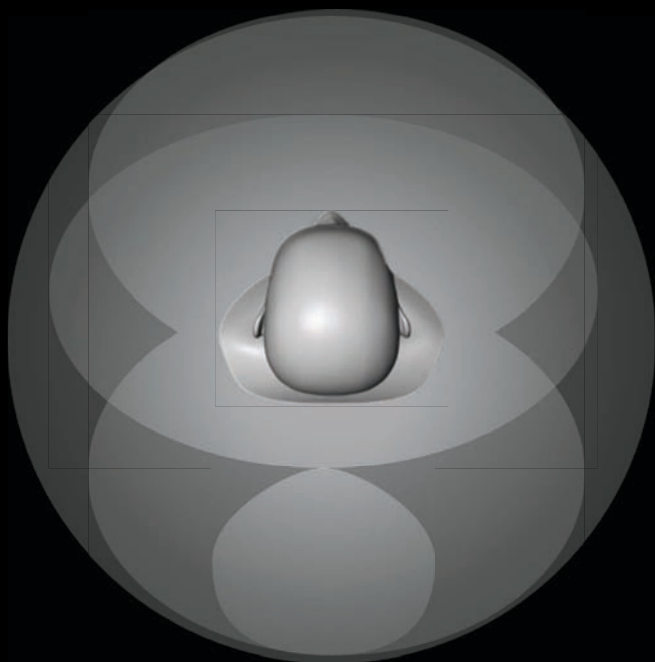
1 *Personal 2 Disabled 3 Disabled 4 Disabled



Close

Transients
Wind
Machine

Directionality



DNN 360

DNN-driven seamless adaptation to the user's environment and intent in real time

Acoustic Analysis
Sensor Information
User Intent



Omnidirectional



ALL NEW
DNN Spatial Awareness



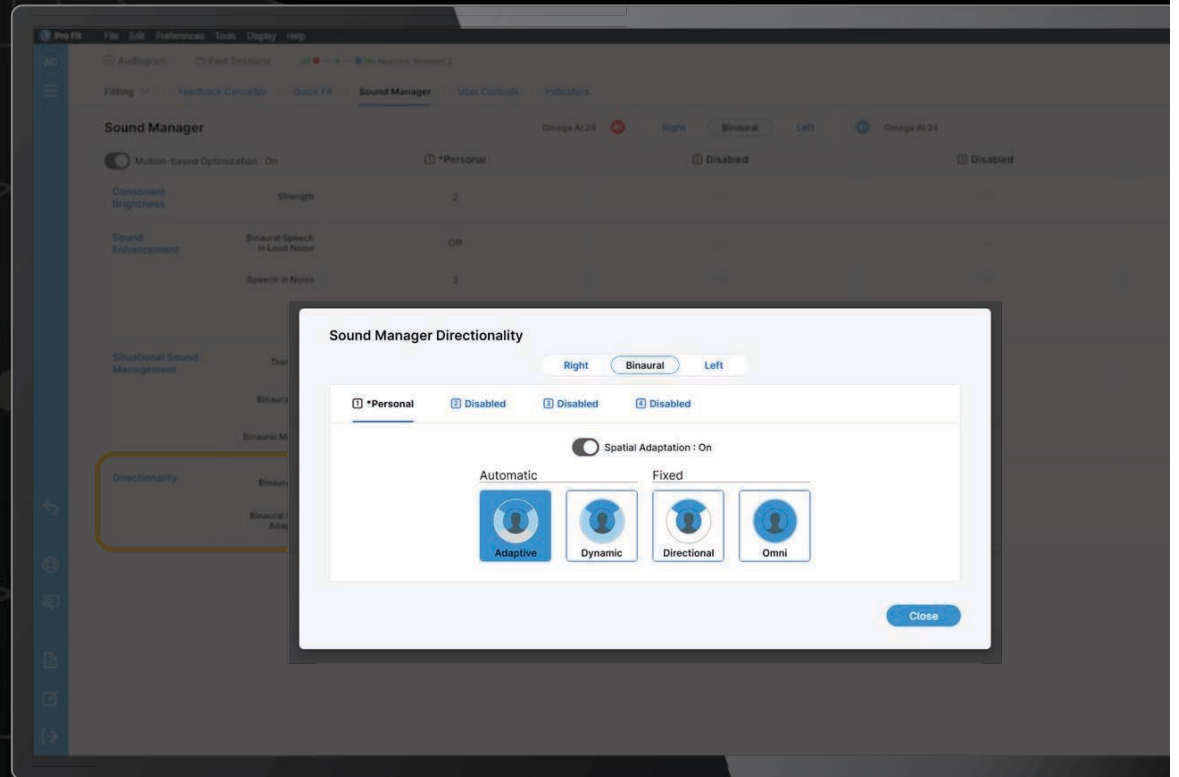
ALL NEW
DNN Directionality



Motion Based
Optimization

Starkey Pro Fit

DNN 360

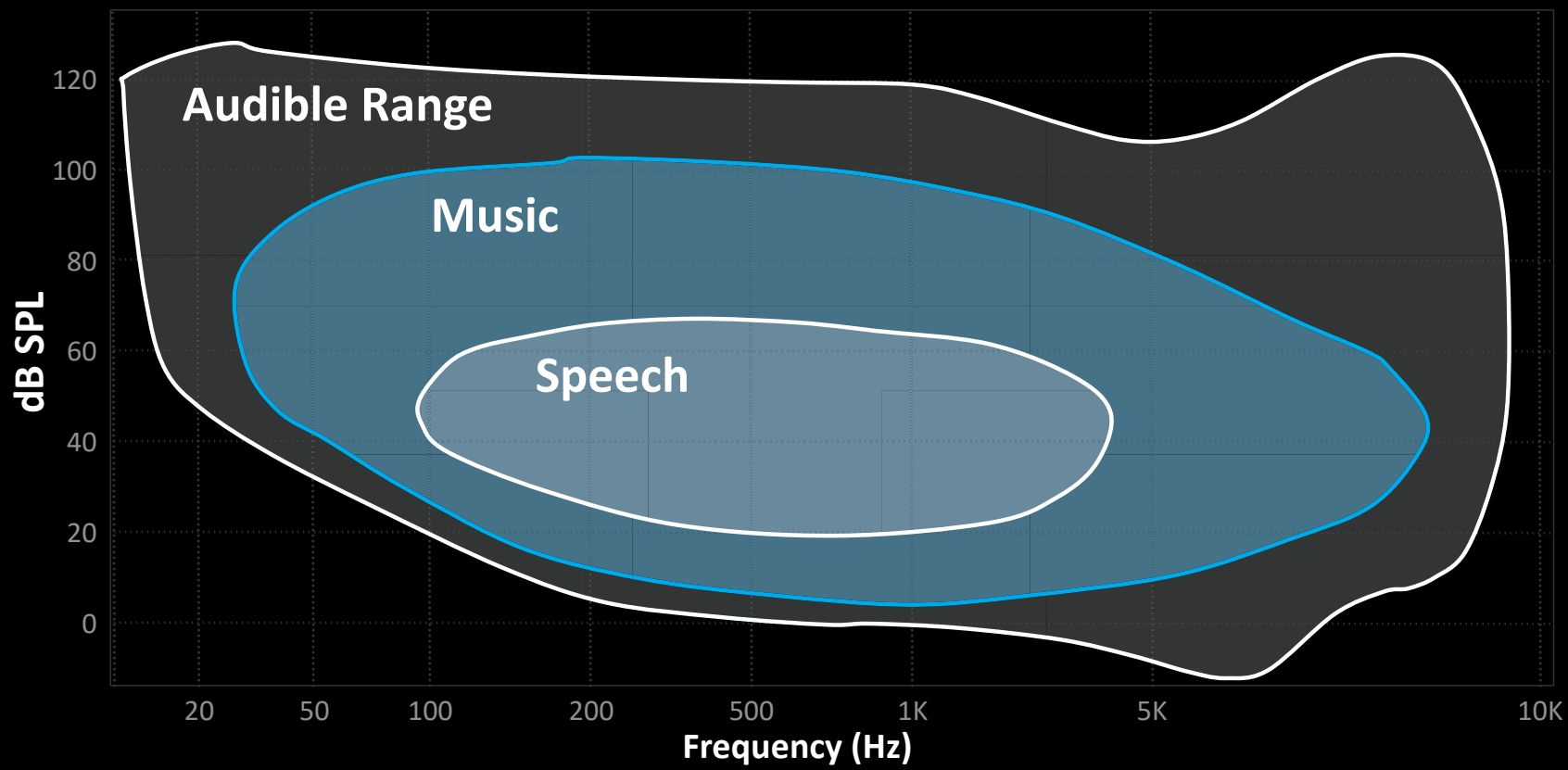


Pending DLC Approval

A photograph of an elderly man with a grey beard and glasses, wearing a blue blazer over a white shirt. He is sitting and playing an acoustic guitar. The background shows a window with greenery outside and a wooden chair.

*“Music is
the universal language
of mankind”*

– Henry Wadsworth Longfellow





Dedicated Music Program

A Program environment that can be selected

A package of functionality including:

A fitting rationale optimized for music

Compression optimized for music

Controls in Pro Fit optimized for music adjustment

Music Proprietary Fitting Formula

Designed to complement the
Omega AI compression architecture

Unique music-centric
fitting prescription

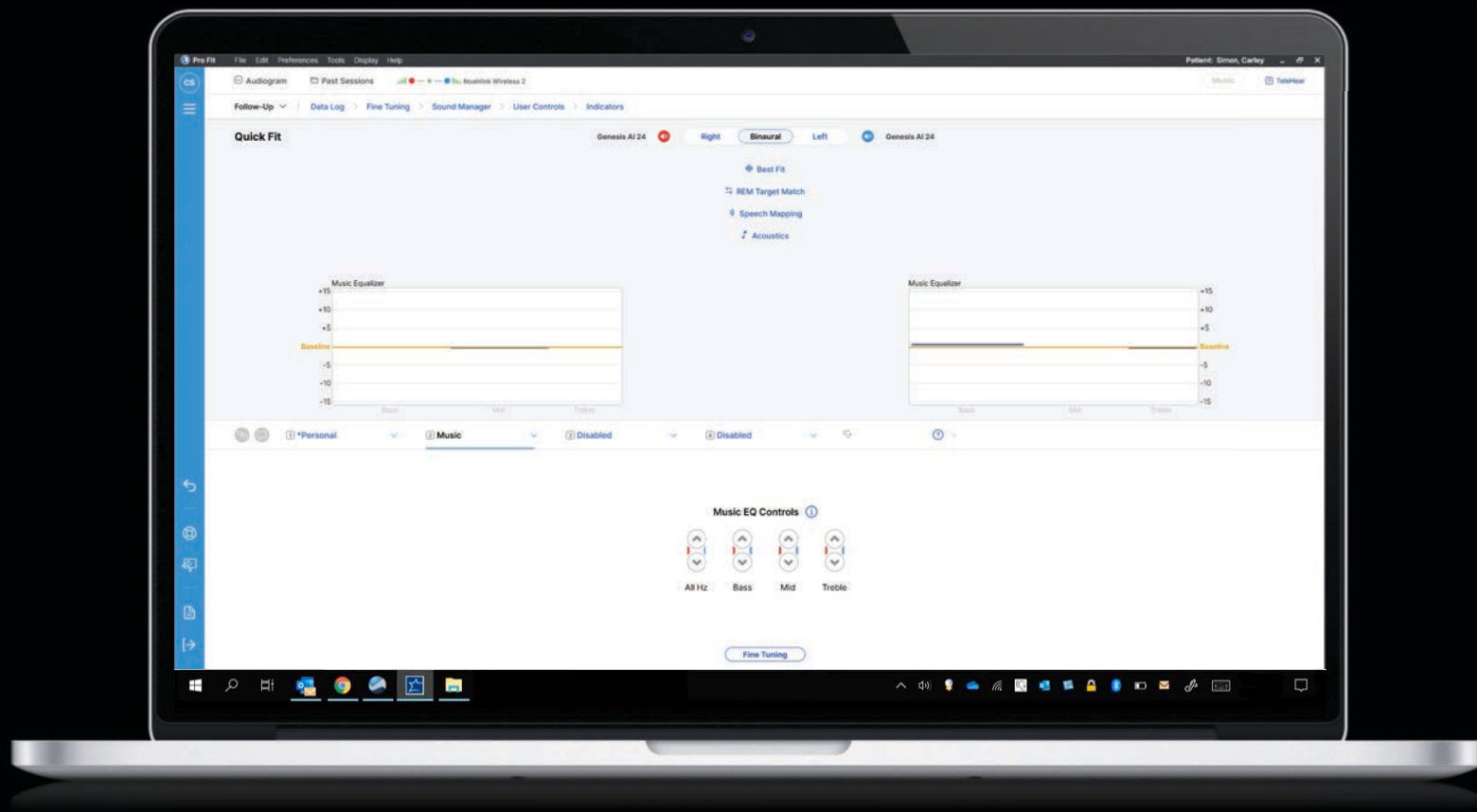
Shaped gain according to
hearing loss for quiet music

Flat, linear insertion gain
for loud music

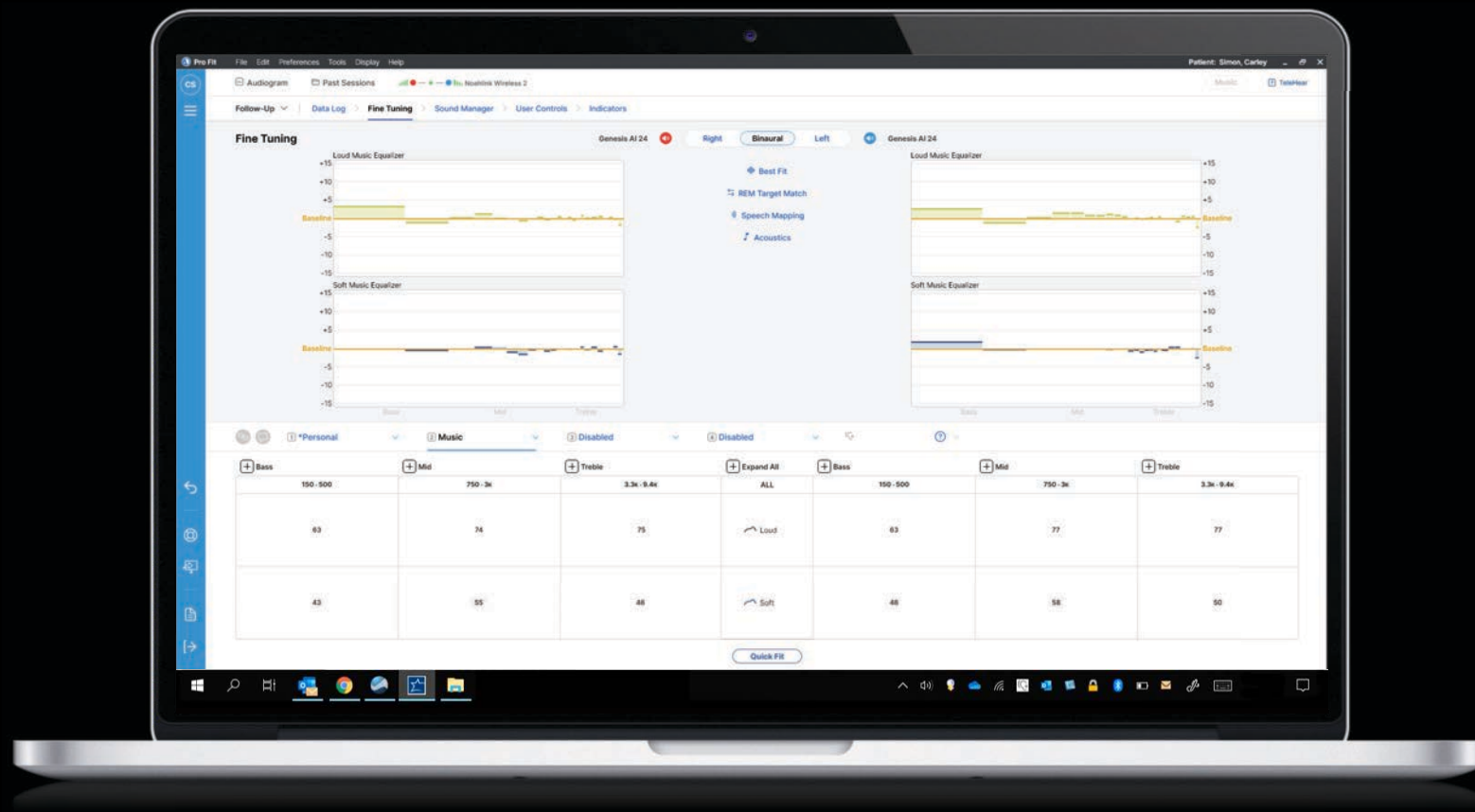
*Varies with the audiogram and acoustic stimuli

**Varies with audiogram and with frequency

Dedicated Music Program



Dedicated Music Program



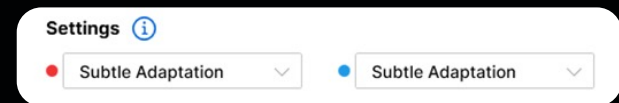
Unique Adjustments for Music



Omni Mic



No Noise Reduction



**Feedback Sensitivity
Reduced**



Best-in-class Streaming Sound Experience

Streaming configuration
for all streamed inputs

Customize the streaming
frequency response through
Pro Fit or the My Starkey App

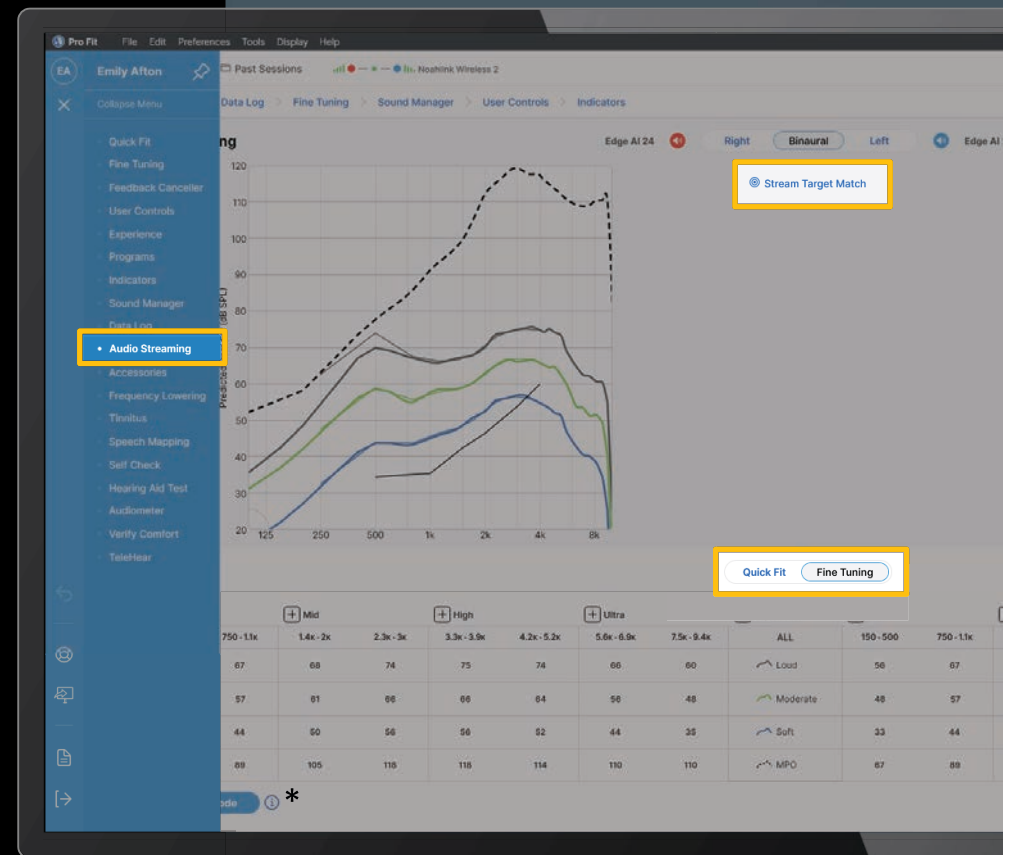
Audio Streaming Configuration

Accessed via:
Fly Out Menu
Accessories Screen

Quick Fit and Fine Tuning Controls

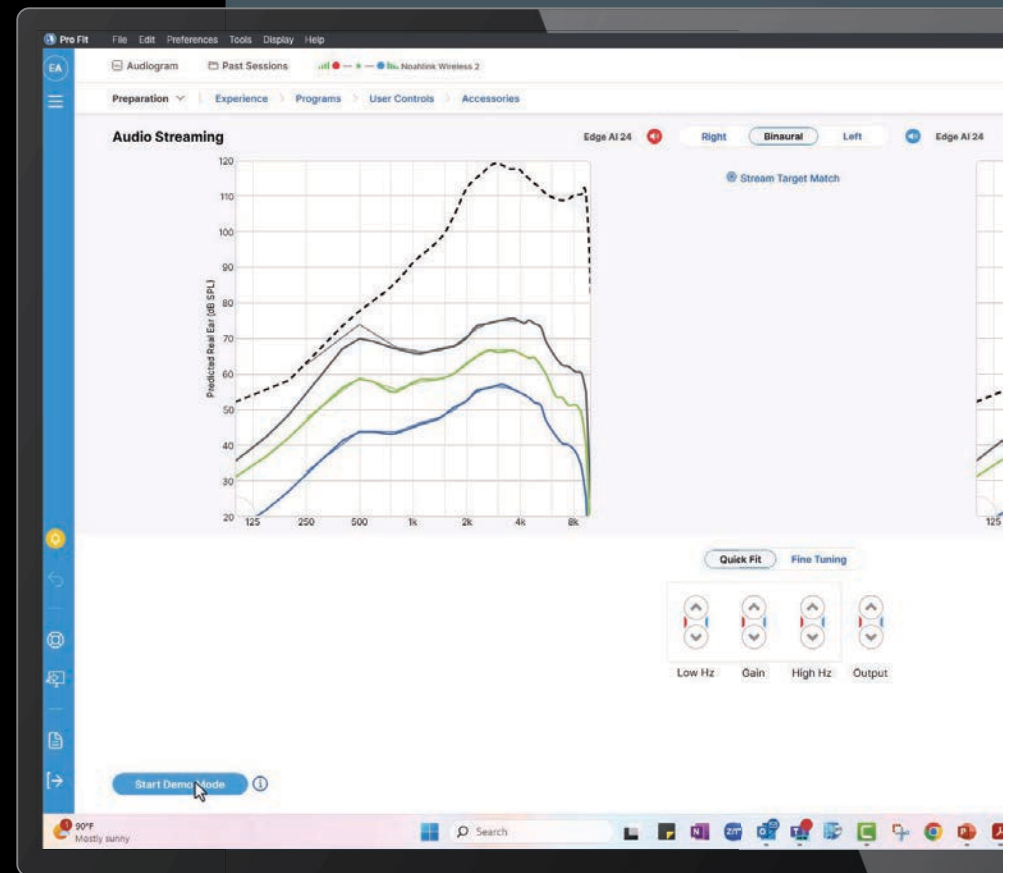
Stream Target Match

Target matches audio streaming configuration



Demo Stream

Stream from a paired mobile phone or paired TV Streamer while connected to Pro Fit and customize the streaming frequency response while actively streaming



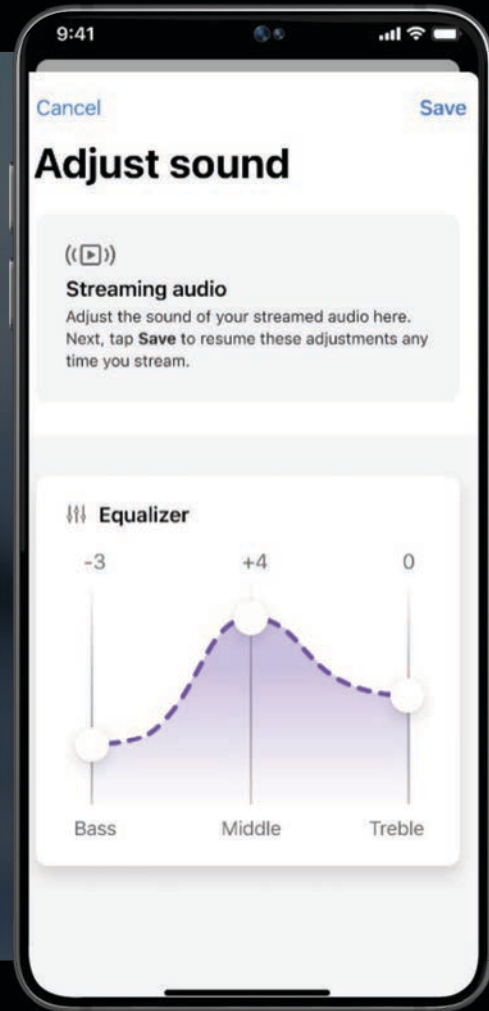


Streaming

Automatically switches to a streaming response when streaming

Adjust streaming volume independently of the hearing aid volume

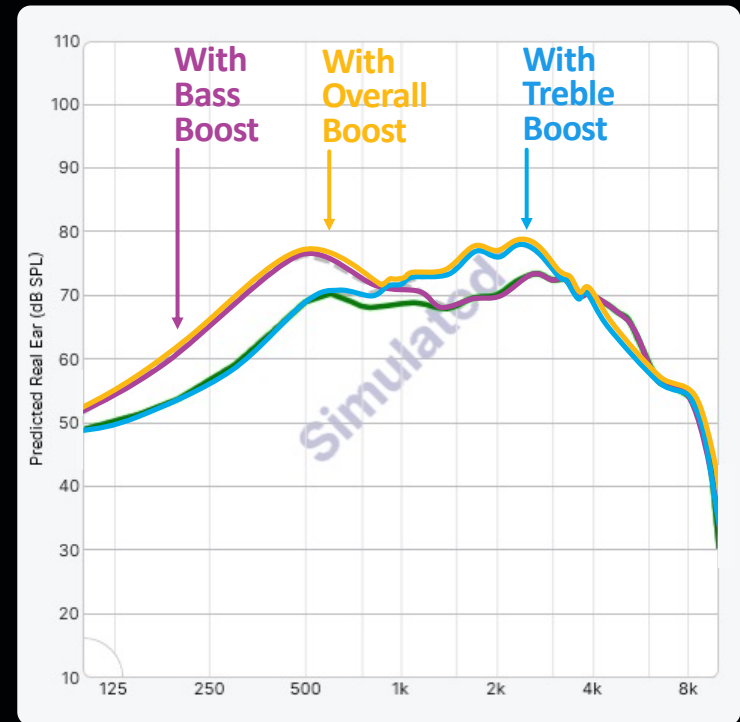
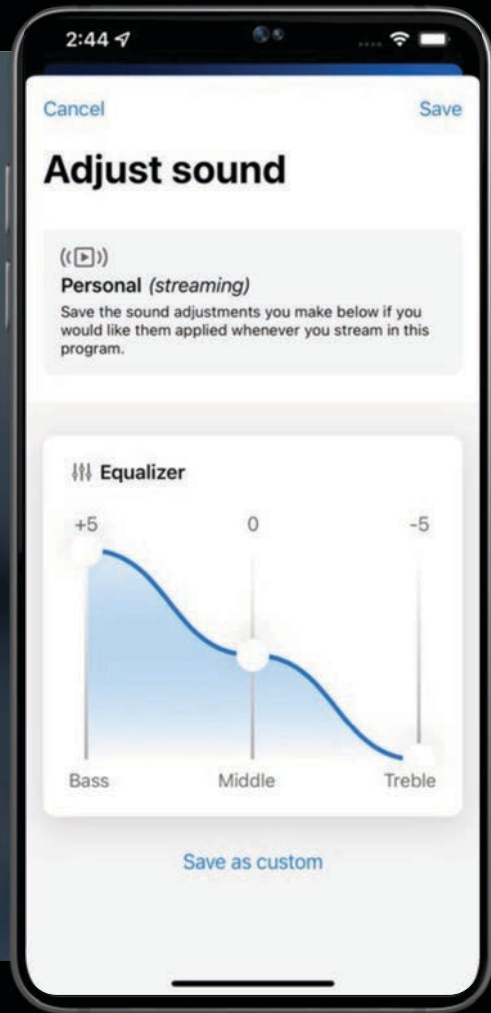
Allows access to Adjust Sound and My Hearing



Streaming

Automatically switches to a streaming response when streaming

Allows access to Adjust Sound, My Hearing, and hearing aid volume



OMEGA^{AI}

Better hearing **all around**



Resources

Feature Summary

Edge Mode+

Giving patients control of what they want to hear when it matters most

How it helps

Edge Mode+ is Starkey's second generation intelligent, on-demand feature that enables instant, powerful speech audibility and noise management adjustments when patients need it most. Edge Mode+ gives patients the ability to automatically select when they need more help, eliminating the need for manual programs.

How it works

Once activated, Edge Mode+ instantly conducts an acoustic analysis of the listener's environment and harnesses Deep Neural Network computing to make automatic adjustments to gain, noise management, and directionality. With Genesis AI, patients can now select their listening intent—enhance speech or reduce noise—to further personalize their Edge Mode+ setting. When the patient moves out of that environment, they simply deactivate Edge Mode+ and enjoy the automatic noise management adjustments that the hearing aids provide.

Perceived Benefit

Benefit	Percentage
Enhancing Listener Volume	91%
Reducing Listener Volume	91%

Figure 2: Clinical testing responses that indicated a benefit of Edge Mode+ (n=44) and reducing listening effort (n=22).

Where to find it

Where to find it	Percentage
User Control	24
Personalization	20
App Control	16
App Control	12

Patient Feedback

“Edge Mode+ is impressive. It worked so good. It was almost unsettling at first because I felt like I wasn't hearing well, and then what I realized is I wasn't hearing the noise well, but I was understanding voices perfectly.”

White Papers

Enhancing Directionality with Deep Neural Networks

Dr.-Ing. Daniel Marquardt, Jinjun Xiao, Ph.D., Al Ganeskumar Larissa Taylor, Ph.D., Martin McKinney, Ph.D.

Key takeaways:

- Starkey's Omega AI is the world's first multi-channel deep neural network directionality system for hearing aids, designed to enhance preserving spatial awareness.
- It features two DNN models that intelligently adapt to compensate for traditional systems in both speech clarity and audibility of environmental sounds, especially for off-axis to engage more naturally with their environments.

Introduction

Modern hearing aids leverage advanced signal processing techniques to help individuals with hearing loss navigate complex and dynamic listening environments. Among these techniques, directionality algorithms are critical for enhancing speech understanding in noisy settings by focusing on sounds originating from specific directions—most often in front of the listener. While this directional focus improves frontal clarity in noisy situations, maintaining awareness of sounds from all directions is equally important. Broader auditory awareness supports both social engagement and safety, enabling users to participate in group discussions and navigate their environment with confidence.

Striking the right balance between directional focus and spatial awareness is a nuanced challenge. Overemphasizing directionality can diminish important spatial cues, leading to an unnatural and potentially disorienting listening experience where listeners may struggle to localize sounds.

Leading the industry in speech intelligibility

Dr. Ing. Daniel Marquardt, Jinjun Xiao, Ph.D., Al Ganeskumar Larissa Taylor, Ph.D., Martin McKinney, Ph.D.

Best-fit accuracy with Starkey's Acoustic Model Optimization 2.0: Lab evaluations

Christopher Mcheyl, Ph.D., Jumaana Marwan, Au.D., Jennifer Anfinson, Au.D., Meg Introvita-Williams, B.Sc., Larissa Taylor, Ph.D., Daniel Smitig, M.Sc., Laura Woodworth, Au.D.

Key takeaways:

- Starkey continues to offer faster and more accurate hearing aid fittings with Acoustic Model Optimization 2.0.
- With this advancement, AMO 2.0 uses the feedback cancellation initialization process to create a predicted real-ear model, which accounts for individual differences and helps improve the first fit accuracy.
- This potentially helps reduce the number of adjustments needed when matching targets with Real-Ear Measurements.

Introduction

Gain-prescription rules such as Starkey's a-SAT 2.0 or the National Acoustic Laboratories (NAL) N2 provide a convenient starting point for hearing aid fittings. In Starkey's fitting software, hearing aid gains computed in accord with the chosen prescription rule are automatically programmed into the hearing aid with a single click on "Target Match." Its apply gains only or "Best Fit" to apply gains and other hearing aid settings at once.

Ideally, gain settings applied at the start of a fitting would yield real-ear responses or gains that always match prescription targets precisely. In this ideal scenario, gain adjustments would no longer be required to match targets in real-ear measures (REM). In practice, real-ear responses and gains generated using automated gain settings may deviate from targets. A common reason for such deviations is that real-ear acoustics can vary markedly across individual fittings (Figure 1).

However, at the start of a fitting (prior to any in-situ measure), the fitting software lacks any individual real-ear data and must rely on a non-individualized acoustic model to predict real-ear effects.

