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# Neuro Sound Technology 2.0

**Simplifying the Complex  
Process of Hearing Better**

**Rachel Barrett, Au.D.**

Education & Training Audiologist



## **How to Ask a Question**

Click Q & A, type your question, and send

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Use the Q&A window

# **Webinar FAQs**

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# Learner Outcomes

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- ① Discuss how Starkey utilizes DNN in their current Edge AI products
- ② Identify at least two updates to the Pro Fit software
- ③ Explain how DNN relates to Artificial Intelligence (AI)



# EDGE<sup>AI</sup>



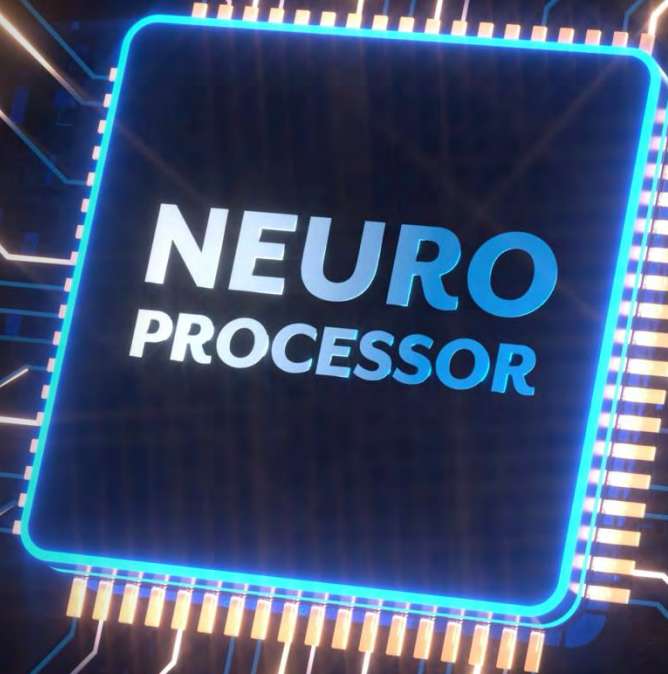


# Listen with *ease*

Enjoy every little sound  
that matters



Integrated  
**Neural Processing Unit**  
embedded in the chip





# Neuro Sound Technology 2.0

Encodes a wearer's acoustic environment, senses movement, digitizes intent and then adapts to it all to deliver a sound experience rivaled only by perfect hearing



**30%**

**MORE ACCURATE  
AT IDENTIFYING SPEECH**

**6dB**

**ADDITIONAL  
REDUCTION  
IN LOW-LEVEL NOISE**

**APPROPRIATELY CLASSIFIES  
MULTI-TALKER BABBLE**

**13<sup>UP TO</sup> dB SNR**

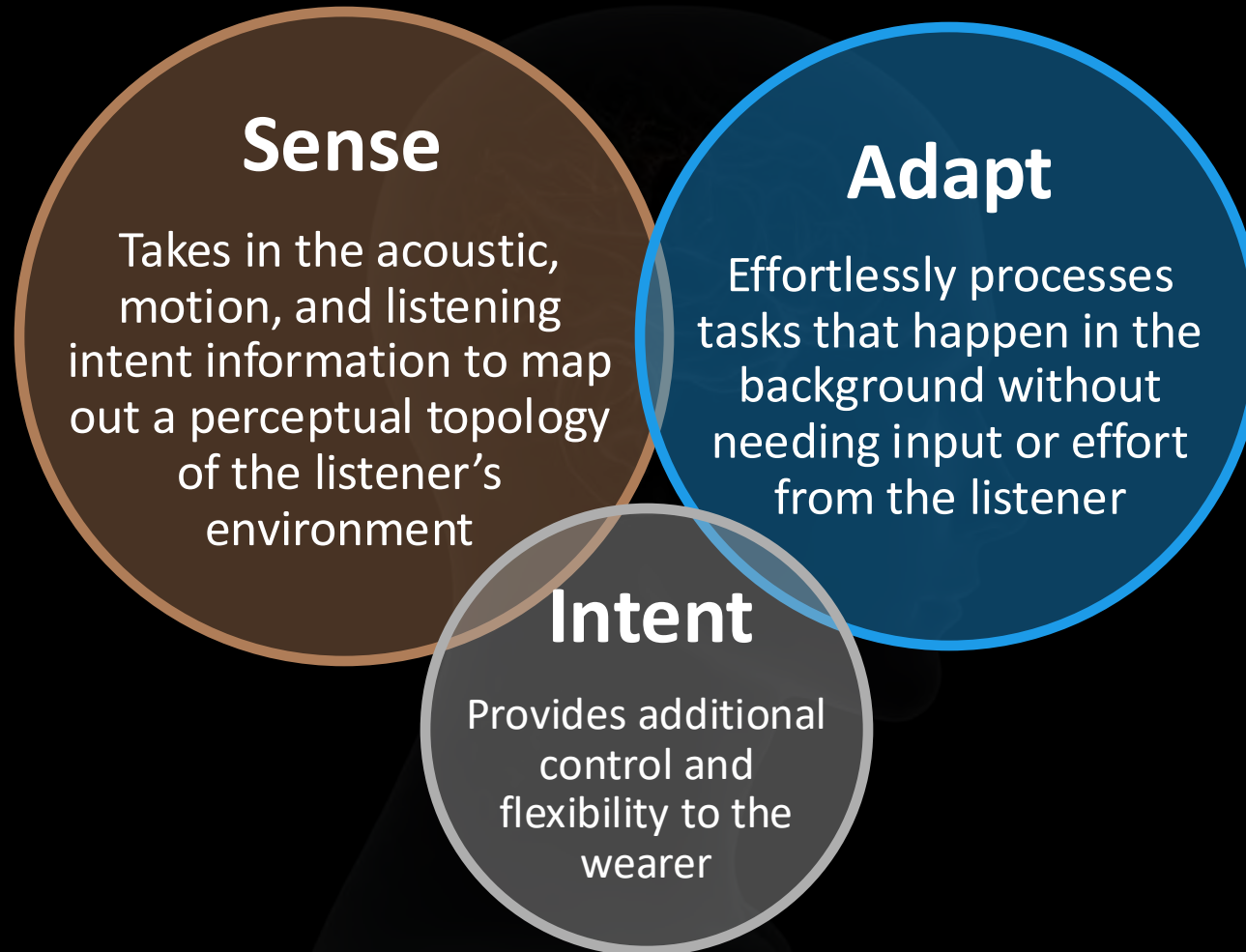
**IMPROVEMENT  
IN NOISY ENVIRONMENTS**

**CLEANER**

**PURER SIGNAL**

# An unrivaled sound experience

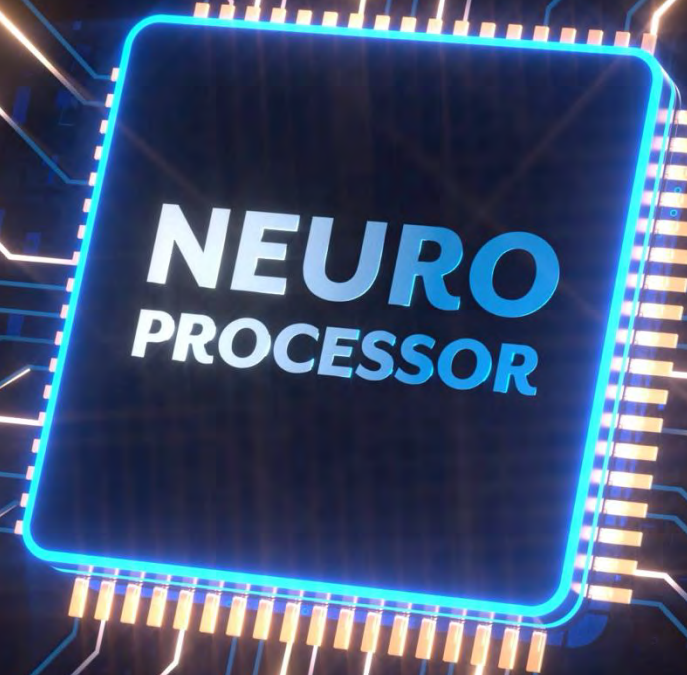
Edge AI mimics the human brain to better replicate how a “normal” hearing system works



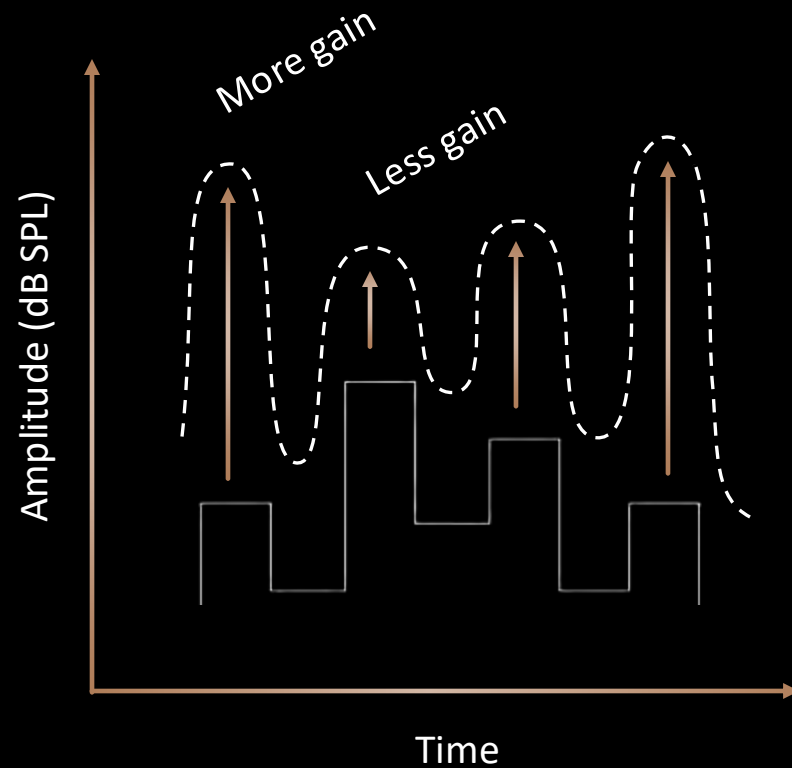
Neuro Sound  
Technology 2.0

# Additive Compressor

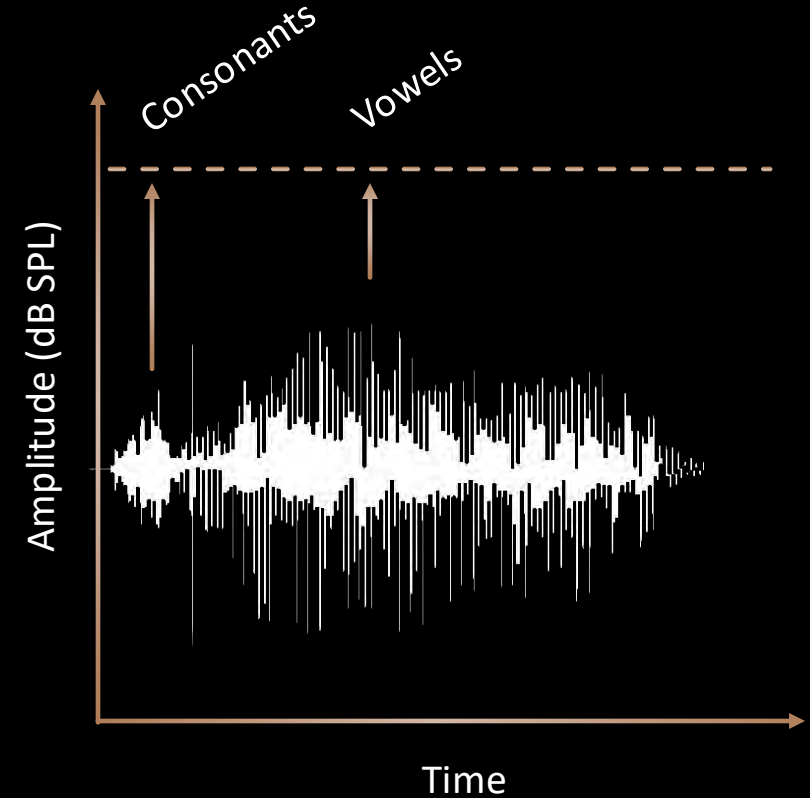
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## Slow Compressor



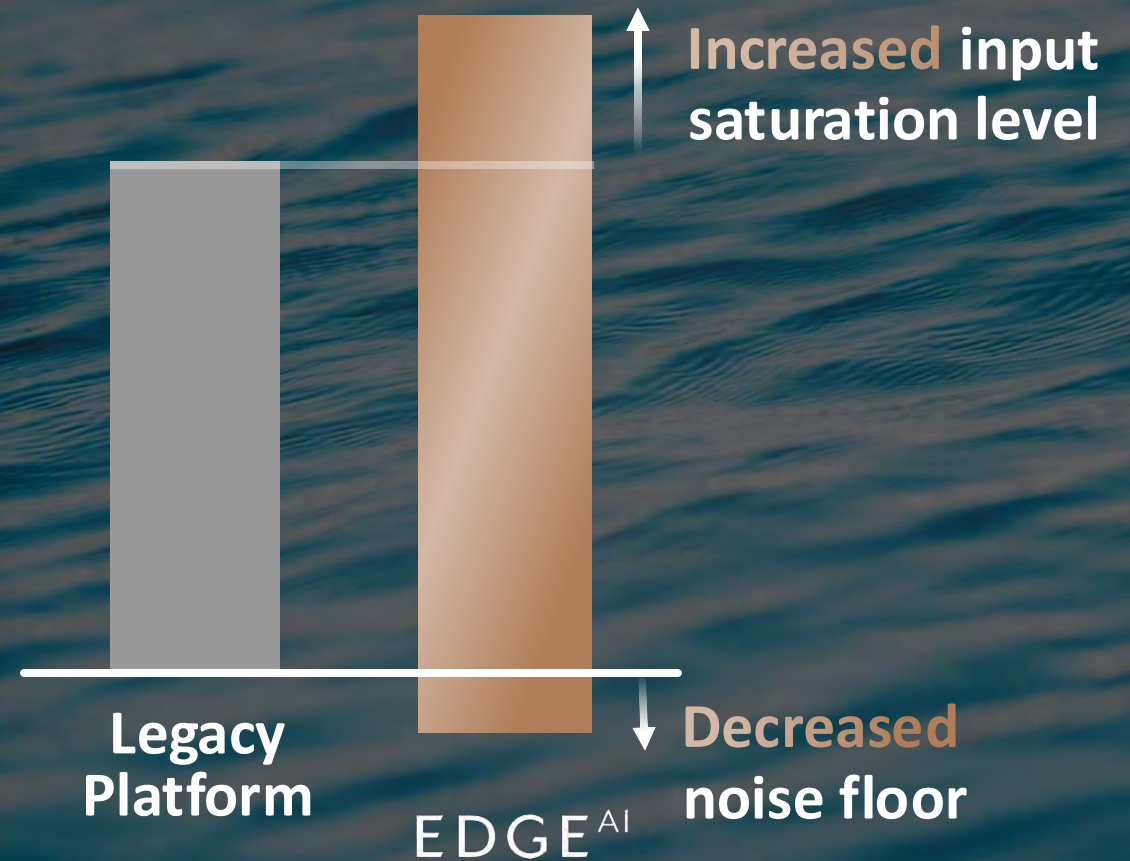
## Fast Compressor



# Additive Compressor

# Dynamic Range

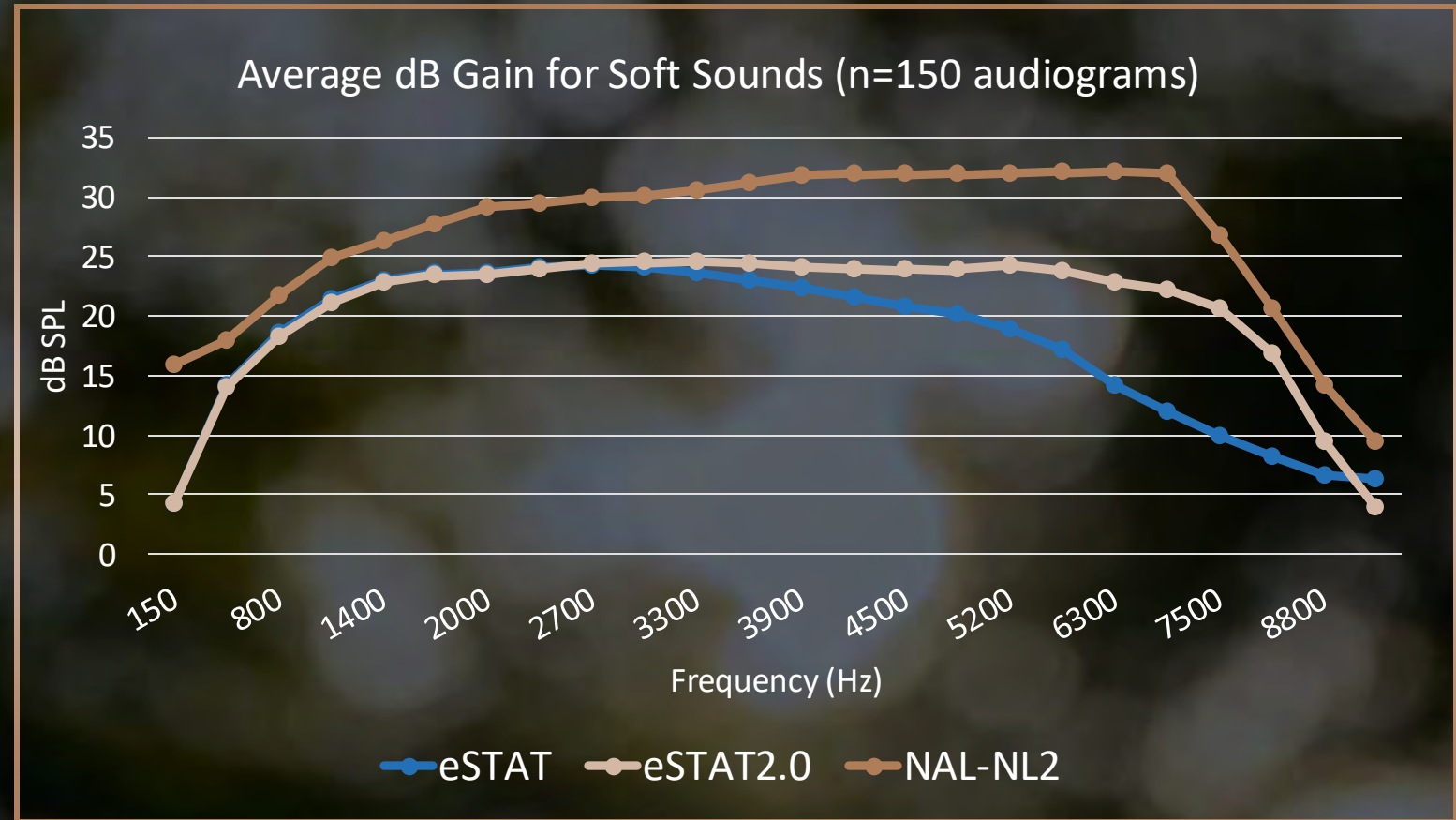
**20 dB improvement** to circuit dynamic range



# eSTAT 2.0

## Proprietary Fitting Formula

e-STAT 2.0, was 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

More gain at higher  
frequencies\*\* (> 3kHz)

Improved vent modeling

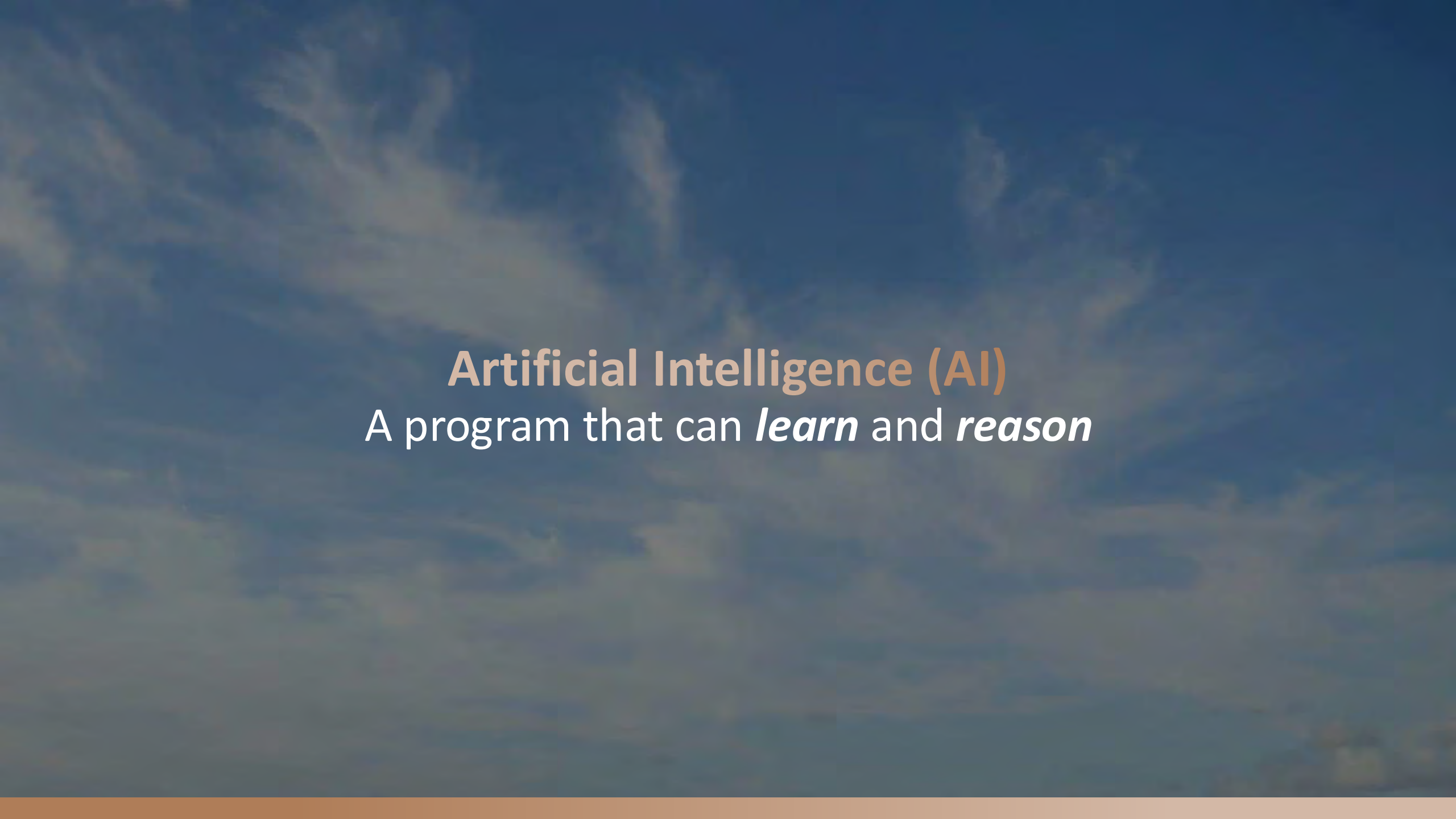
# eSTAT 2.0

## Proprietary Fitting Formula

**Designed to complement  
the compression architecture**

\*Varies with the audiogram and acoustic stimuli

\*\*Varies with audiogram and with frequency



# Artificial Intelligence (AI)

A program that can *learn* and *reason*

## Artificial Intelligence (AI)

A program that can *learn* and *reason*

## Machine Learning (ML)

Algorithms that **improve** given rules and **data** and **make predictions** without being explicitly programmed to do so

## Artificial Intelligence (AI)

A program that can *learn* and *reason*

## Machine Learning (ML)

Algorithms that **improve** given rules and **data** and **make predictions** without being explicitly programmed to do so

## Deep Neural Network (DNN)

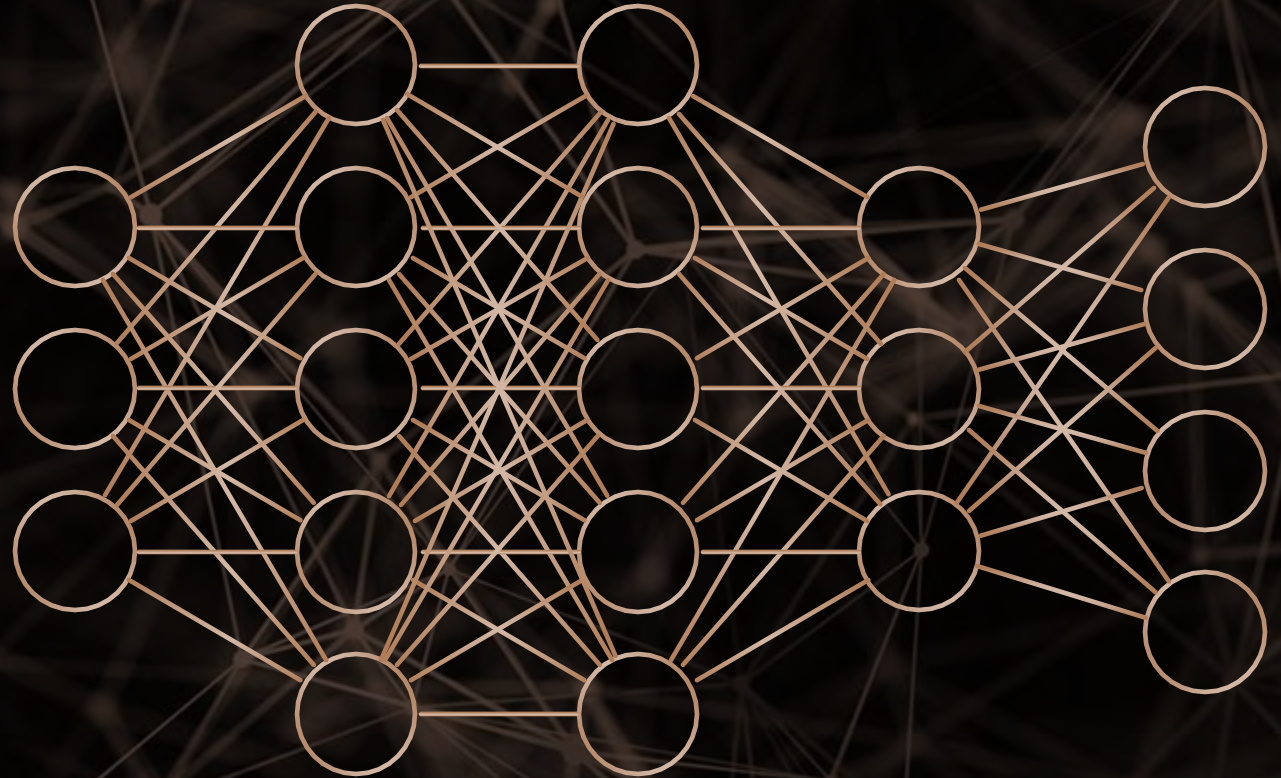
Subset of machine learning algorithms that **can learn by itself** based on vast amounts of data



# Starkey's Deep Neural Network

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DNN processing runs parallel with the sound management system for more efficient processing — both in speed and battery life





# The Next Big Thing in Sound

## Deep Neural Network Enhanced Speech in Noise

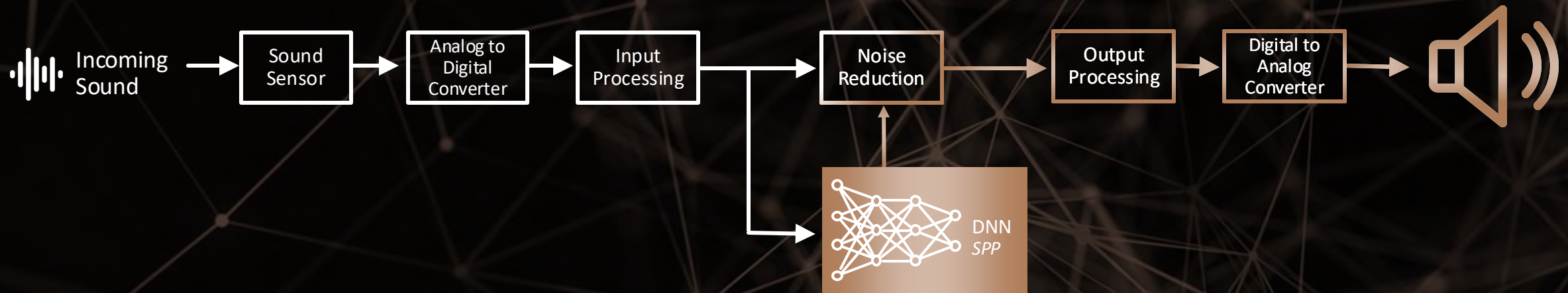
---

Industry's first Speech Probability Predictor

**30%** more accurate  
at identifying speech

# Conventional Edge AI Noise Reduction

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# Edge Mode+

On-demand ability to zero-in on  
speech in challenging environments



On-demand real-time analysis of  
environments for advanced level  
of comfort and clarity

The best adaptation for any  
environment when engaged

My Starkey patient-driven  
controls for listening intent

*Exclusive to 24 & 20 Tiers*

## Edge Mode+

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**Technology Tiers**

24 | 20 | 16



# Automatic Edge Mode+

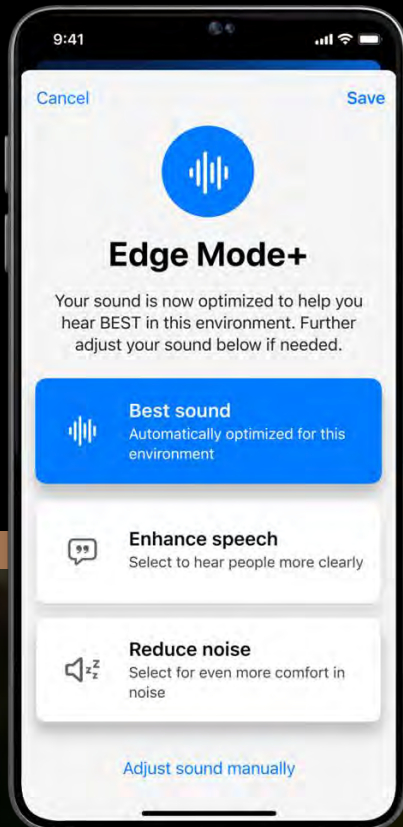
---

Continues to scan, adapt,  
and optimize as the wearer  
changes environments or as  
the environment they are  
in changes

*\*24 tier only*

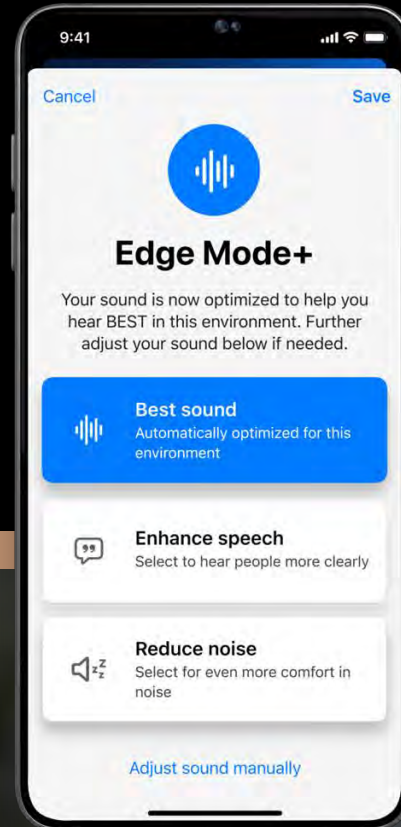


# Edge Mode+ Tech Tier Differences



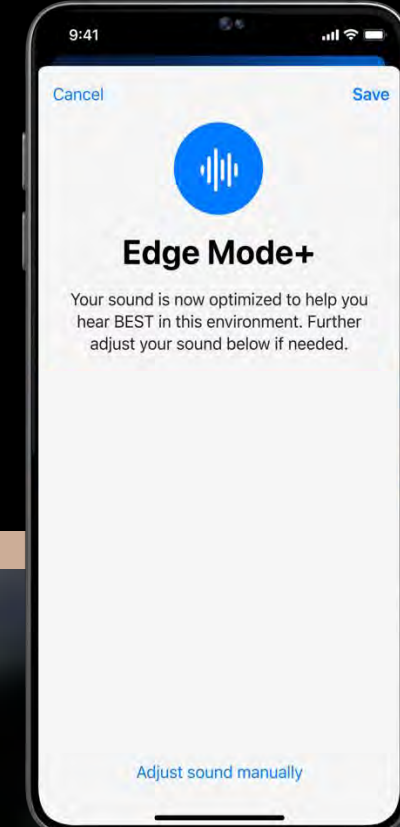
## Edge AI 24

Automatic Edge Mode+ with additional patient-driven controls



## Edge AI 20

Edge Mode+ with additional patient-driven controls

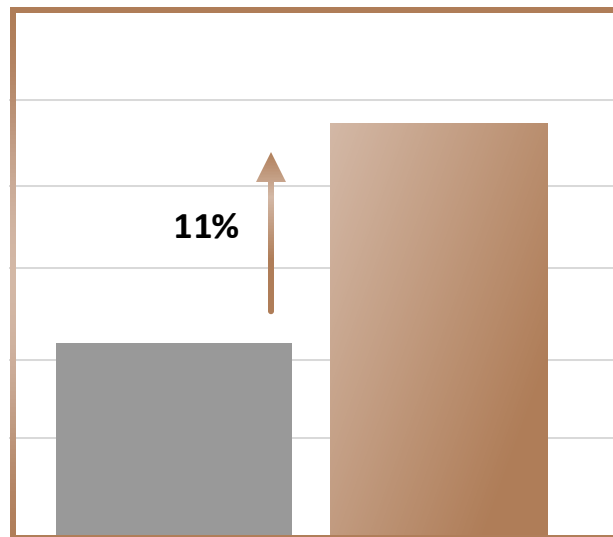


## Edge AI 16

Edge Mode+  
*No further adjustments available*

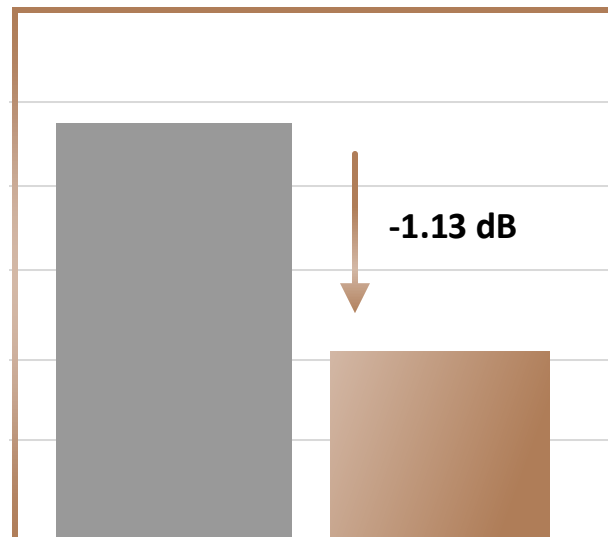
**Edge Mode+ has been shown to improve speech recognition and decrease listening effort**

**Word Recognition Score**



Default Settings      Edge Mode+ Enhance Speech

**Listening Effort SNR**



Default Settings      Edge Mode+ Enhance Speech

**Edge Mode+**

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# Motion-Based Optimization

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Motion detection adaptations improve sound quality and increase spatial awareness



# Motion-Based Optimization

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When activity-based motion, like walking or running, is detected, the microphones will switch to omni-directional to ensure more situational awareness and the best listening experience

**Technology Tiers**

24 | 20



# Motion-Based Optimization

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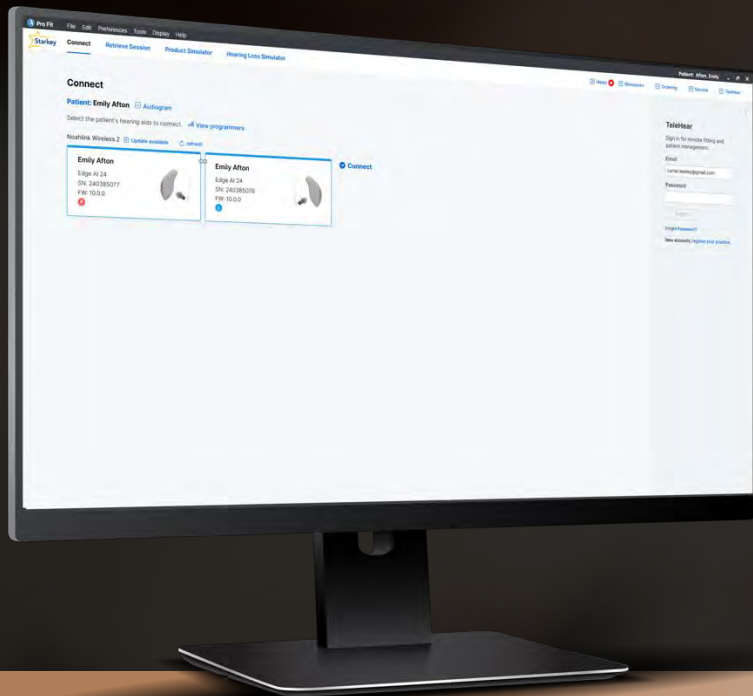
Small movements that impact the hearing aid placement, like chewing or putting on glasses or a hat, will activate our renowned feedback cancellation system to be at its most aggressive

**Technology Tier**

24

# Starkey Pro Fit

## Making the Complex Simple



# Starkey **Pro Fit**



## **Organized**

3 session types providing access to the most used screens



## **Efficient**

Box to best fit in four clicks



## **Intuitive**

No need to assign a hearing aid as right and left



## **Supportive**

Access to tools such as Troubleshooting from any screen



# Smart Connect + Smart Sessions

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## Preparation

Follows Minute Fit

**Experience**

**Programs**

**User Controls**

**Accessories**

## Fitting

Second time hearing aids are connected to Pro Fit

**Feedback Canceller**

**Quick Fit**

**Sound Manager**

**User Controls**

**Indicators**

## Follow Up

Third + times hearing aids are connected to Pro Fit

**Data Log**

**Fine Tuning**

**Sound Manager**

**Indicators**

**User Controls**

# Compatible Programmers

Multiple Programmers may be connected at once

Compatible *wireless*  
programmers include:

Universal 2.4 GHz  
Noahlink Programmer

Universal 2.4 GHz  
Noahlink Wireless 2  
Programmer

Compatible *wired*  
programmers include:

HiPro 2\*

SpeedPort 2

Noahlink

HiPro USB



# Bluetooth

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## First Connection Builds Relationship

Five relationships can exist

Bluetooth MUST be off to establish a relationship

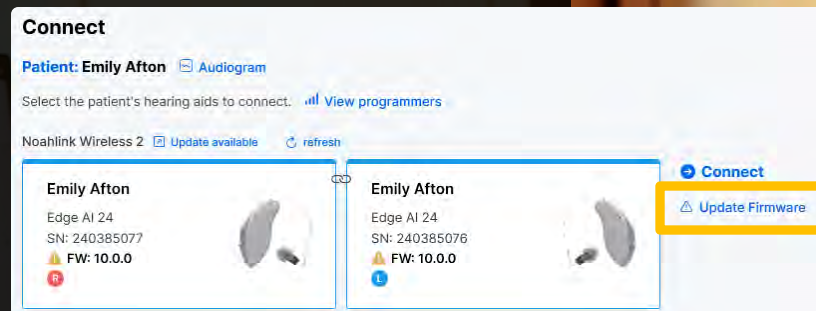
Bluetooth may remain on for future sessions



# Three Ways to Access Firmware Updates

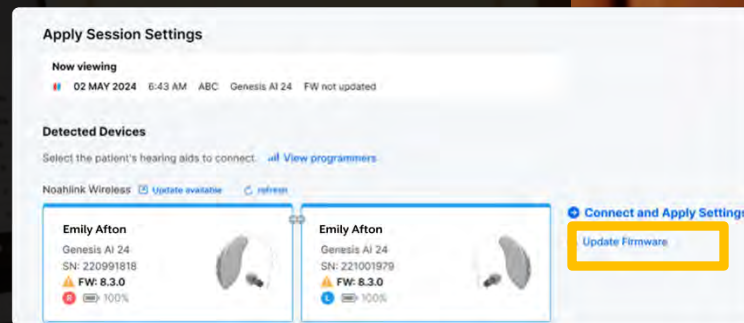
1

Connect Screen



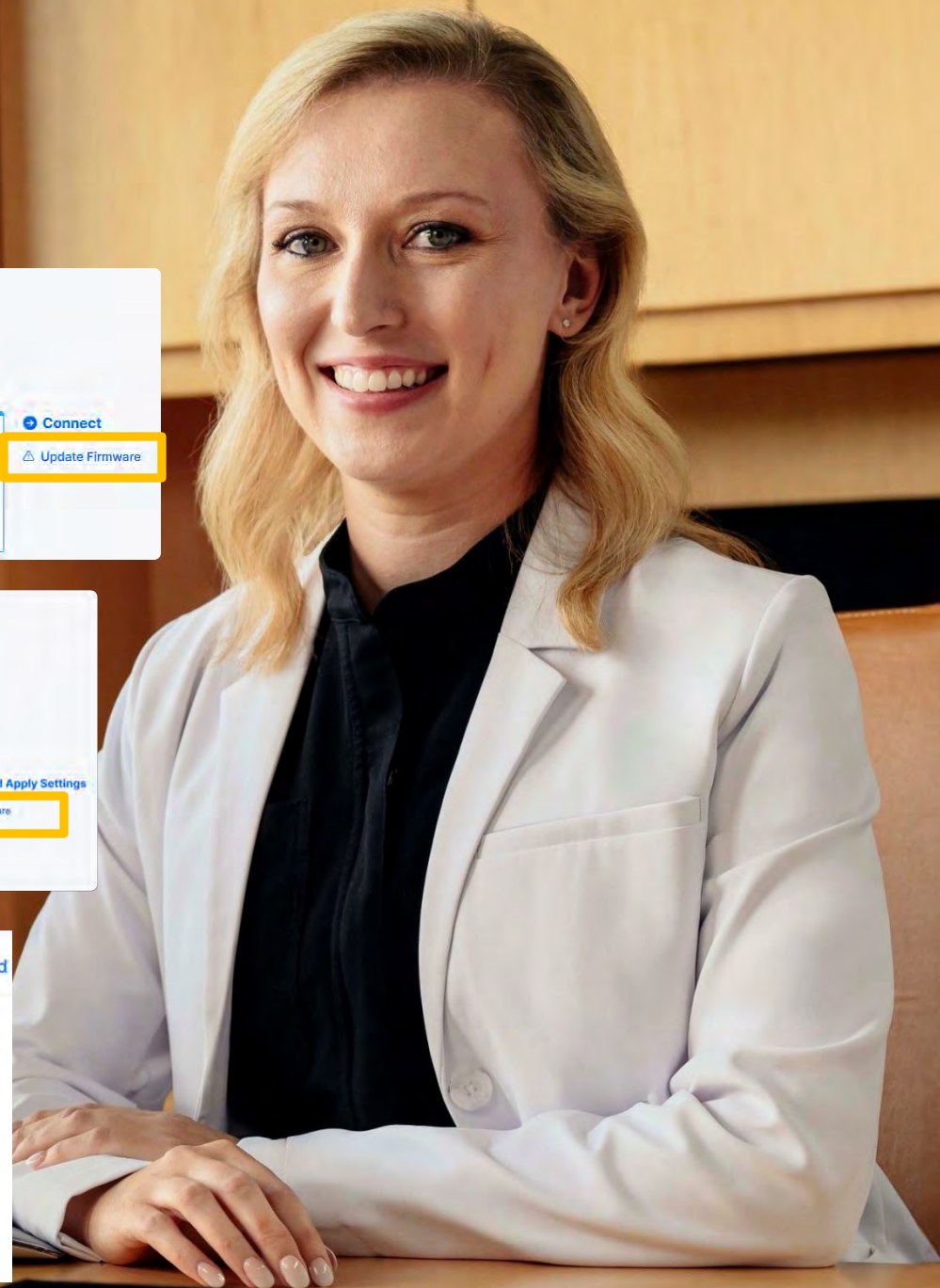
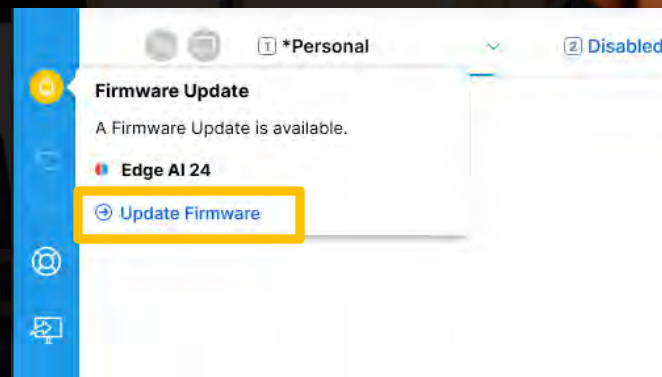
2

Retrieve Session Screen



3

Left Menu Bar



# Fitting Precision

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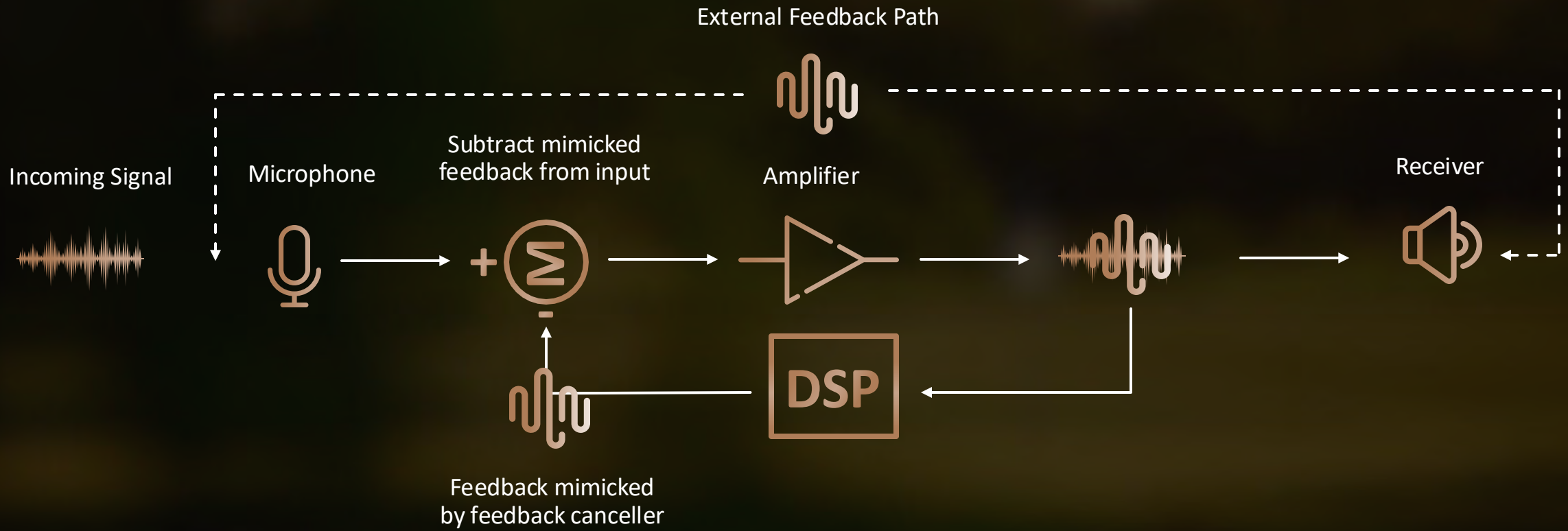


**Feedback  
Cancellation**



**Optimize Acoustic  
Model**

*Personalizing the hearing aid fitting using the  
Feedback Cancellation Initialization (FBCi) measurement*



# Feedback Canceller

Automatically suppresses feedback before it happens with the primary goal of maintaining audibility

Running the feedback canceller initialization is recommended at every first fitting to ensure the personalized settings are unique to that patient's ear canal

# Optimize Acoustic Model

---

**Optimize Acoustic Model initialization side feedback-canceller (FBC) initialization and uses in-situ measurements to estimate acoustic coupling characteristics with the hearing aid or receiver in place in the ear**

## Fitting Targets

Automatically updated to represent leakage; Leakage falls outside of expected parameters; accurately fitting targets are updated to match

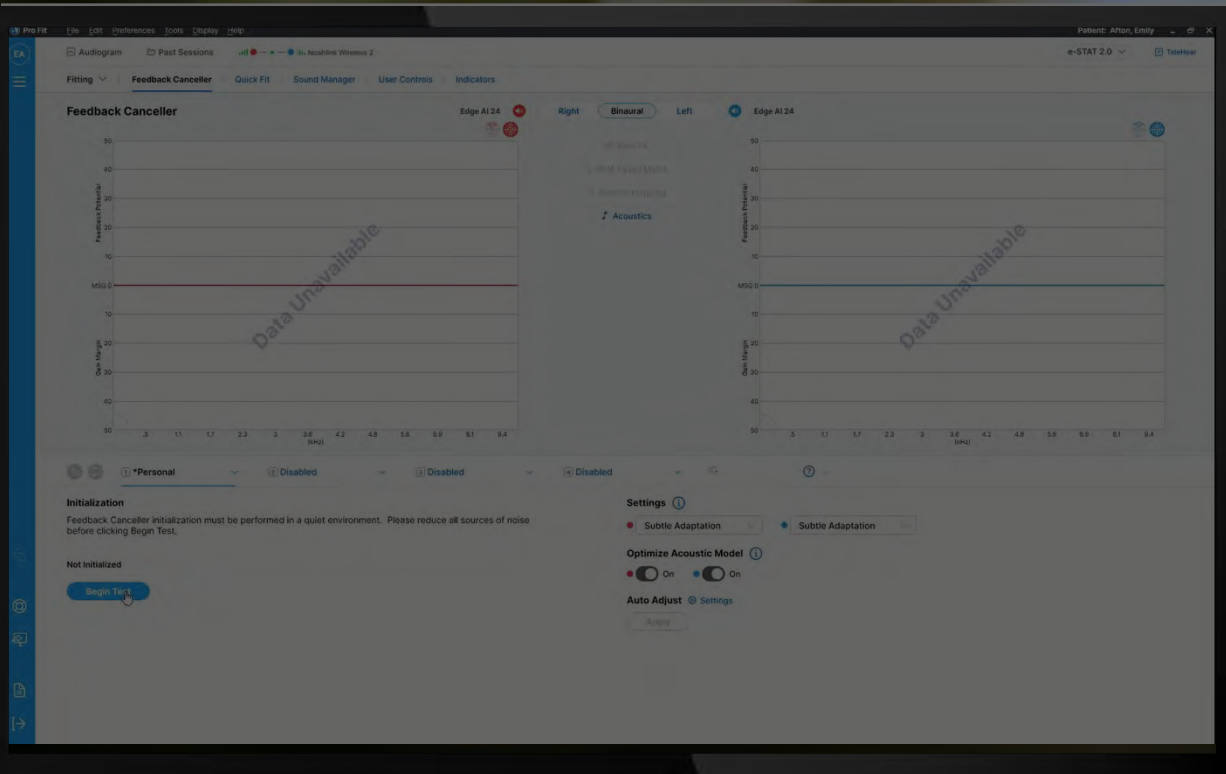
## Provider Driven Adjustments

Allows providers a choice in changing hearing aid frequency response to match newly modeled targets  
Selecting as well

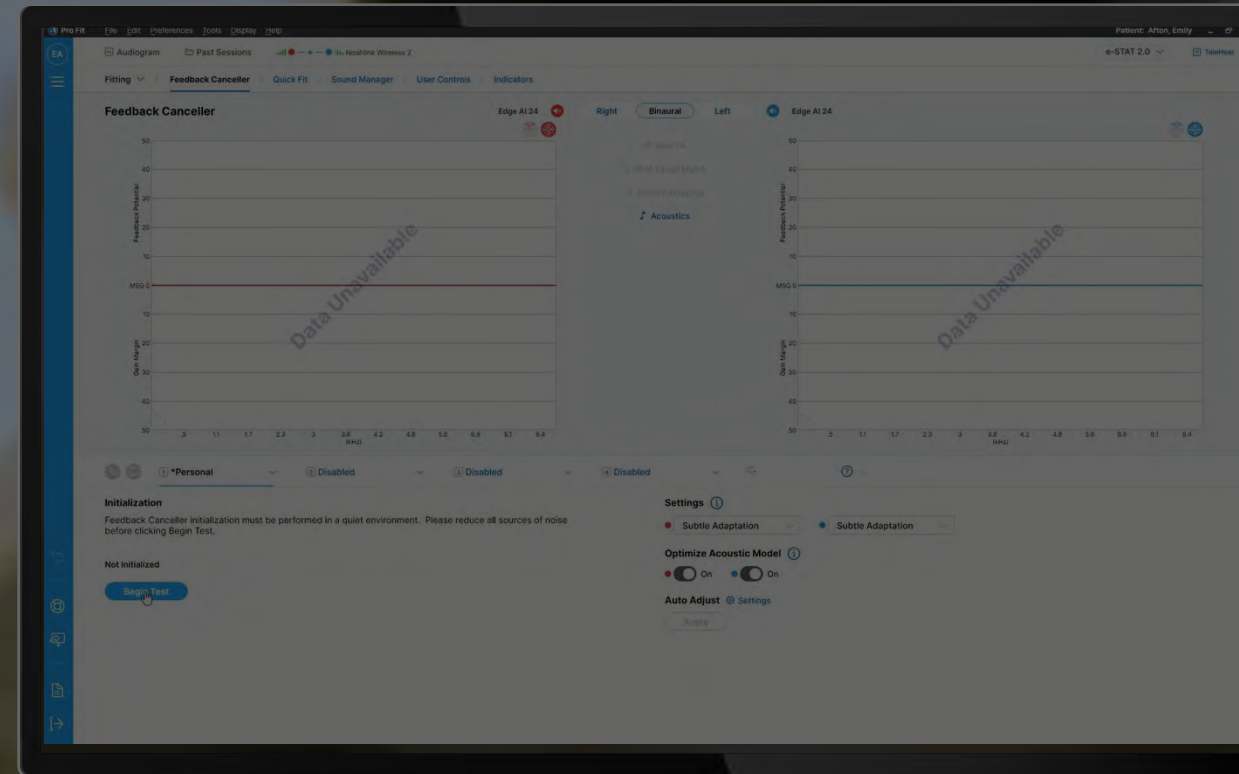
update Hearing Aid  
Frequency Response

update Hearing Aid  
Frequency Response

# Optimize Acoustic Model



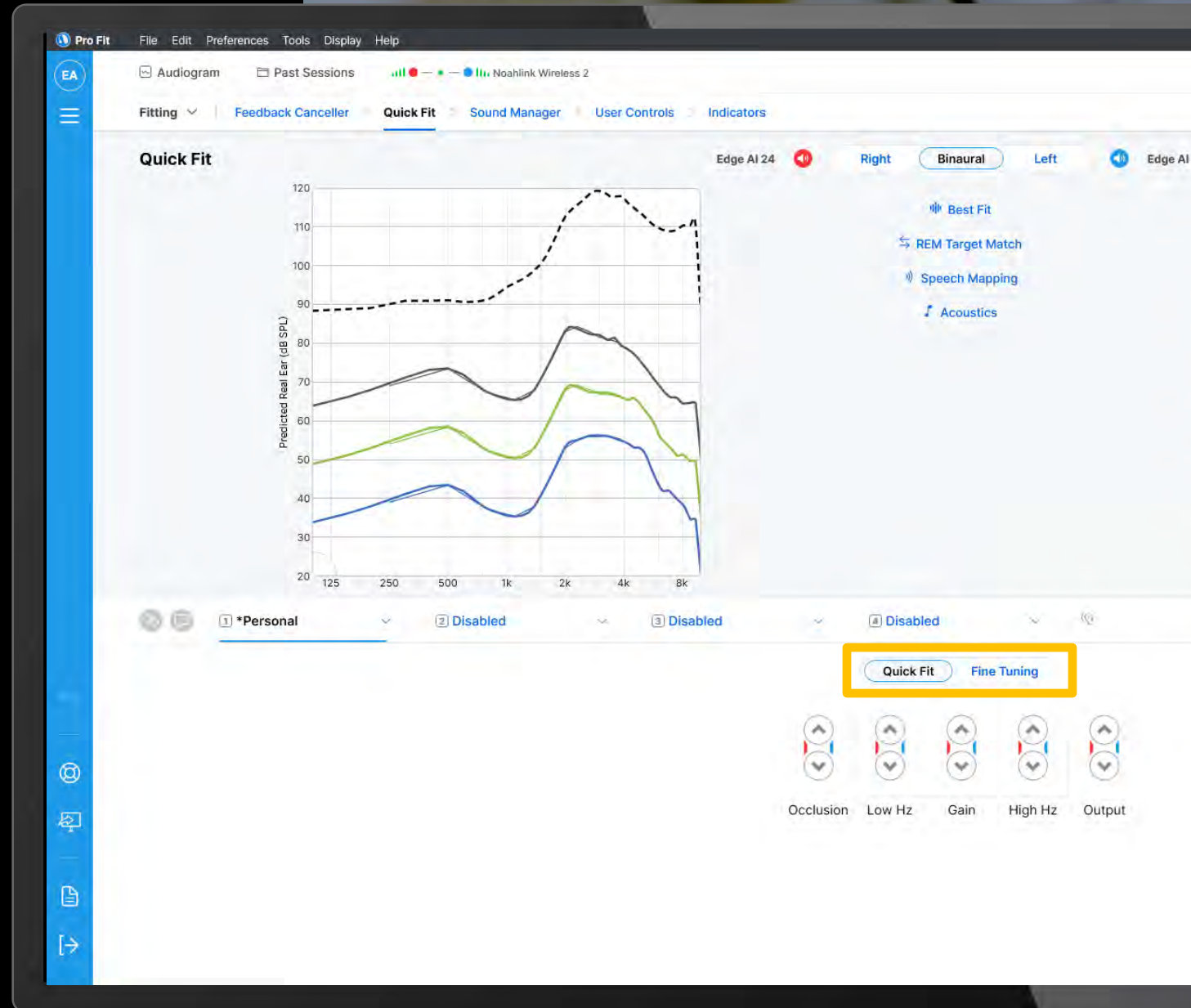
If you select **YES**



If you select **NO**

# Frequency Response Controls

## Quick Fit and Fine Tuning



# Making Better Hearing a No-Brainer

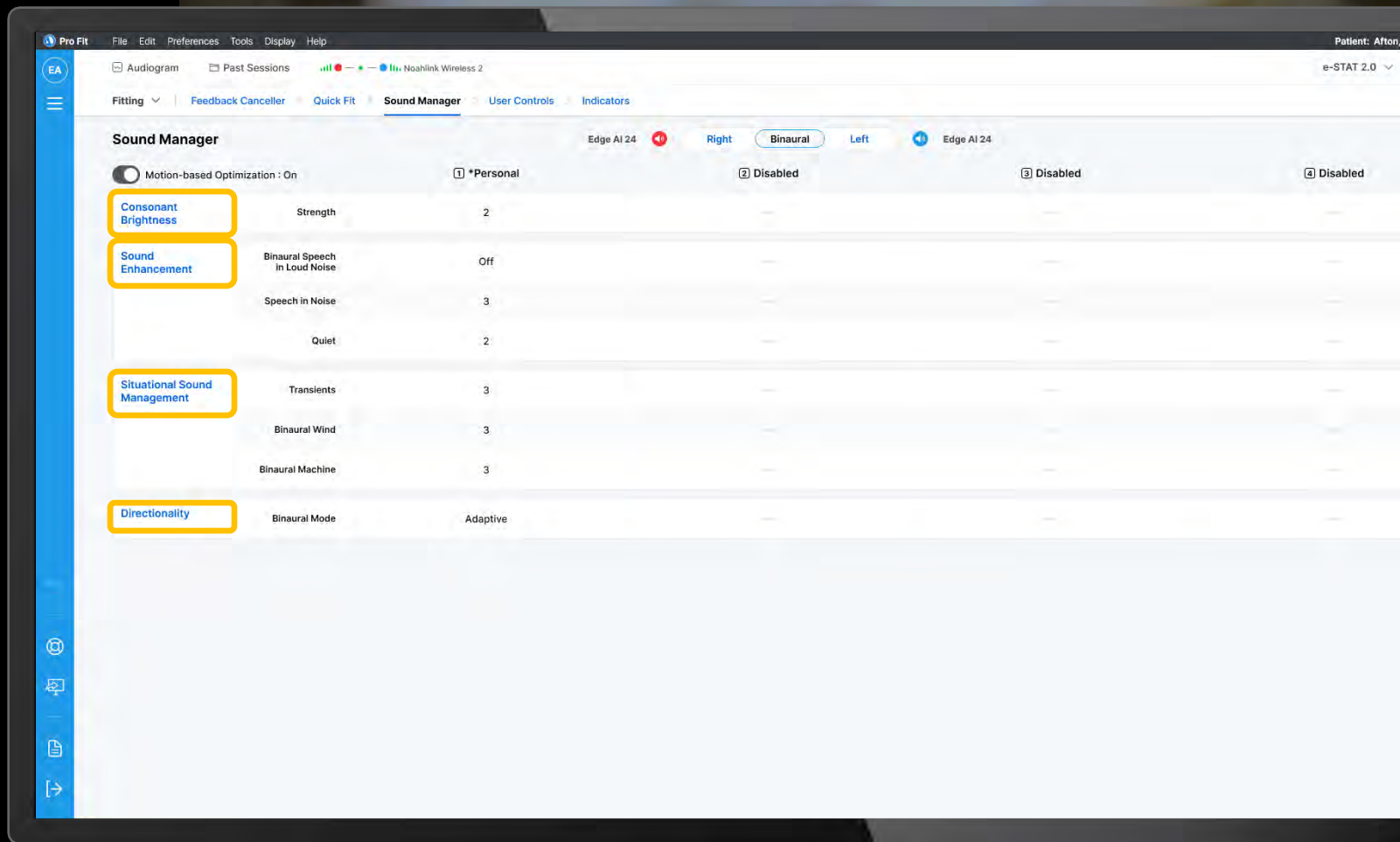
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Enhancing sound processing  
with DNN capabilities



# Sound Manager Screen

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# Sound Manager

## Adjusting the Algorithms

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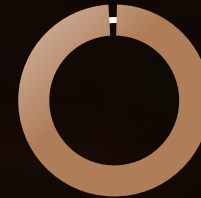


# Sound Manager Defaults

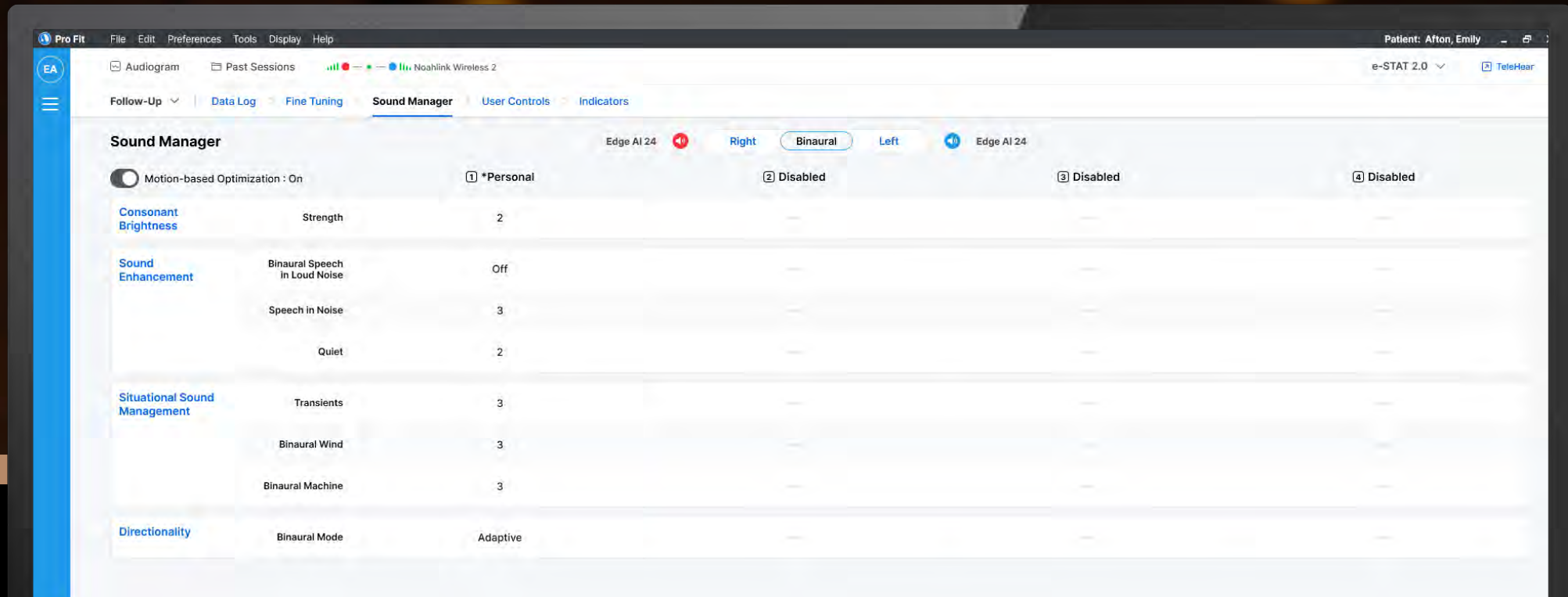
First fit = Best fit



**85% of professionals**  
leave Sound Manager  
settings left at the default



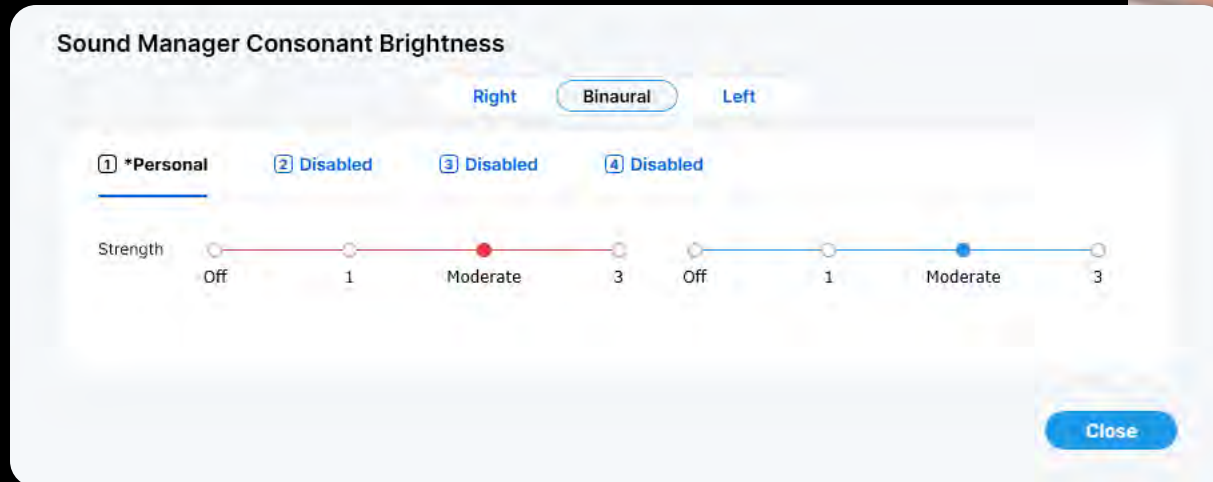
**99% of professionals**  
leave directionality at the default



## Control of the fast compressor

Move towards 3 increases fast compressor

Move towards 1 decreases fast compressor



Sound Manager  
Consonant  
Brightness

# Sound Manager Controls

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## **Sound Enhancement**

Binaural Speech in  
Loud Noise  
Speech in Noise  
Quiet

## **Situational Sound Management**

Transients  
Binaural Wind  
Binaural Machine

## **Directionality**

Adaptive  
Dynamic  
Directional  
Omni

# Sound Manager Sound Enhancement



## **Speech in Noise**

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

## **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

## **Quiet**

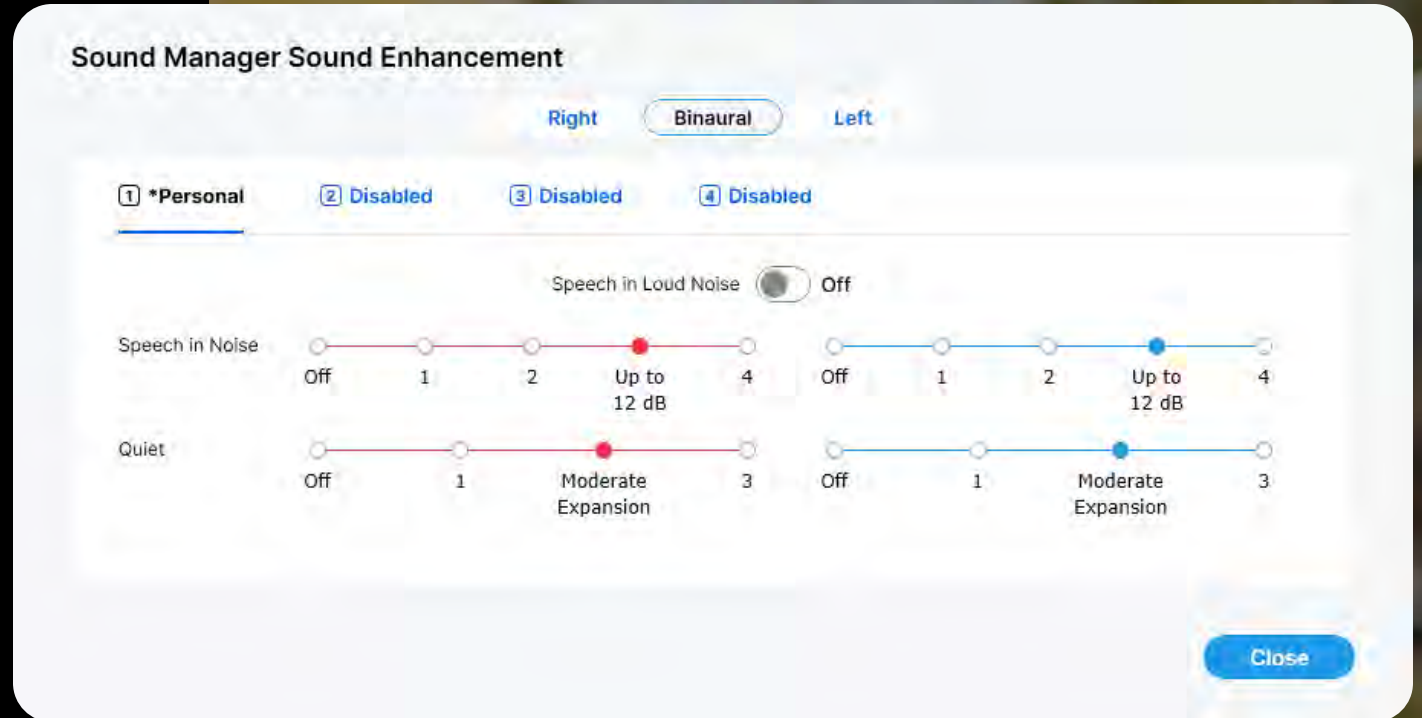
Adapts to low-level noises

# Sound Enhancement

Binaural Speech in Loud Noise

Speech in Noise

Quiet



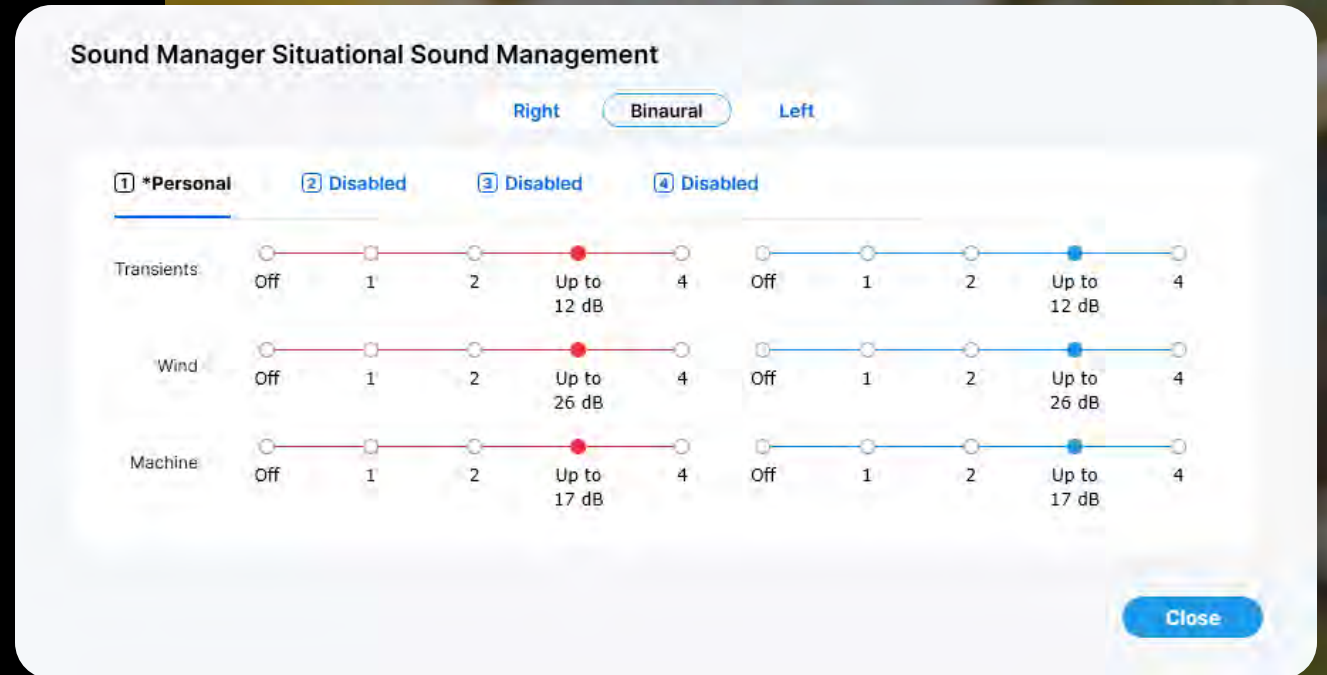
# Situational Sound Management

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Transients

Binaural Wind

Binaural Machine

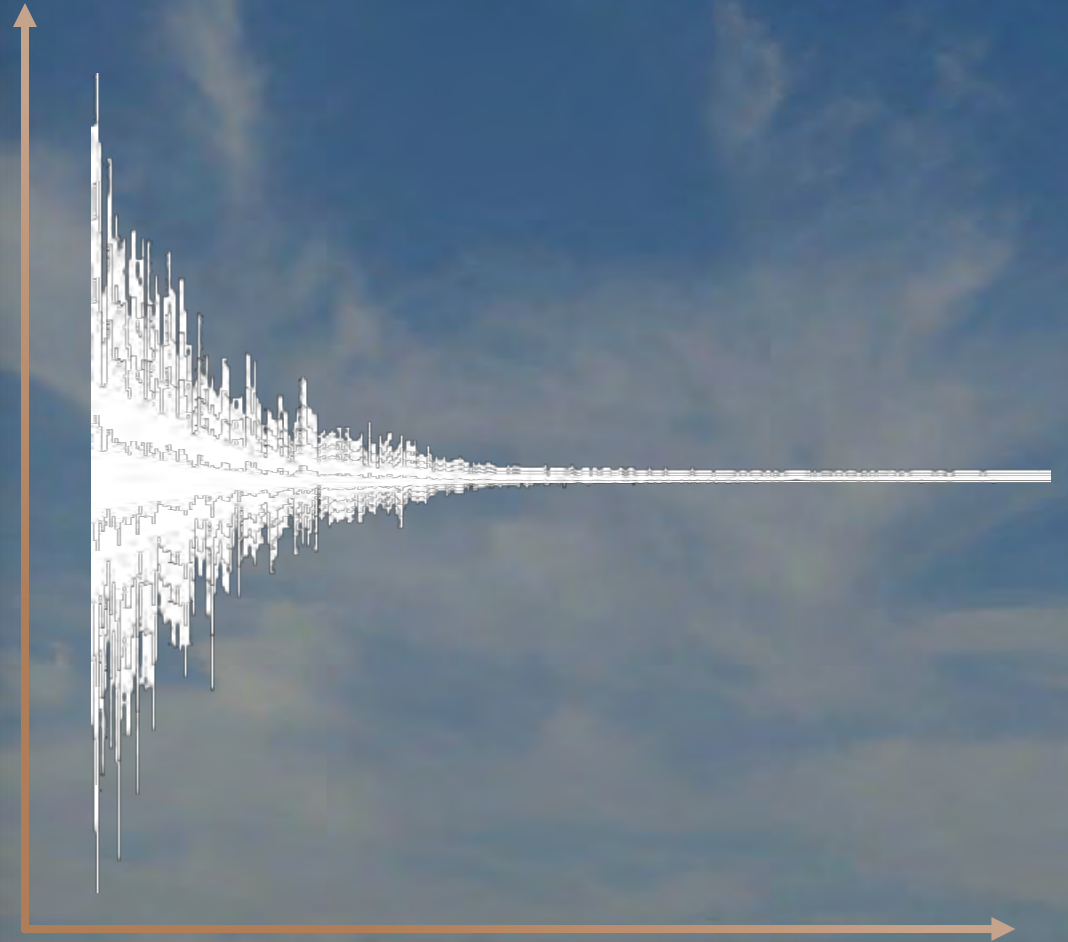


# Sound Manager Situational Sound Management

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## Transients

Made to combat sharp, sudden sounds



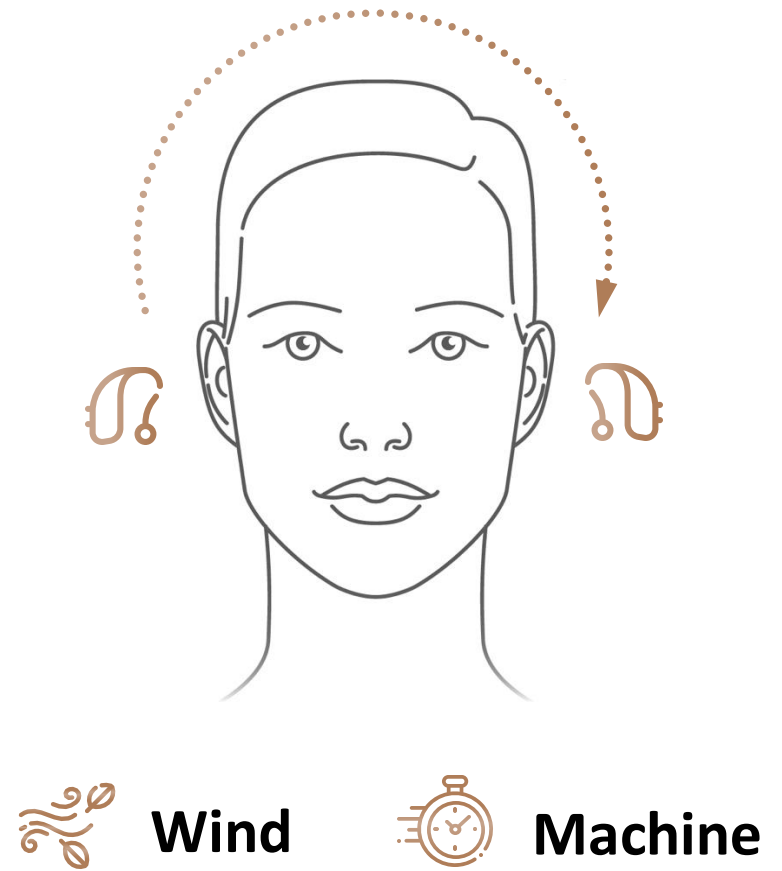
# Sound Manager Situational Sound Management

## Binaural Wind

Quickly identifies and tackles continuous wind noise

## Binaural Machine

Identifies steady-state, repetitive noise like road noise, and provides a reduction

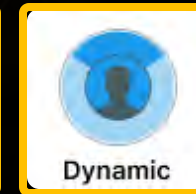
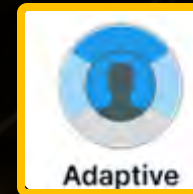


*Ear-to-ear communication for these systems ensures coordination between the two ears for a cohesive listening experience*

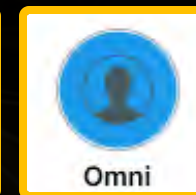
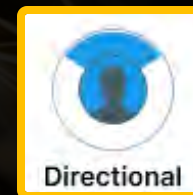
# Directionality

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## Automatic



## Fixed



Louder, more  
challenging  
listening  
environment

**Tech tiers**  
24 | 20 | 16

Quieter, easier  
listening  
environment



# Pro Fit Updates

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Supports **new family** of products  
and associated new features:

Accessory Screen layout update

Expanded tinnitus masking options

New Audio Streaming screen



# Accessories and Pro Fit

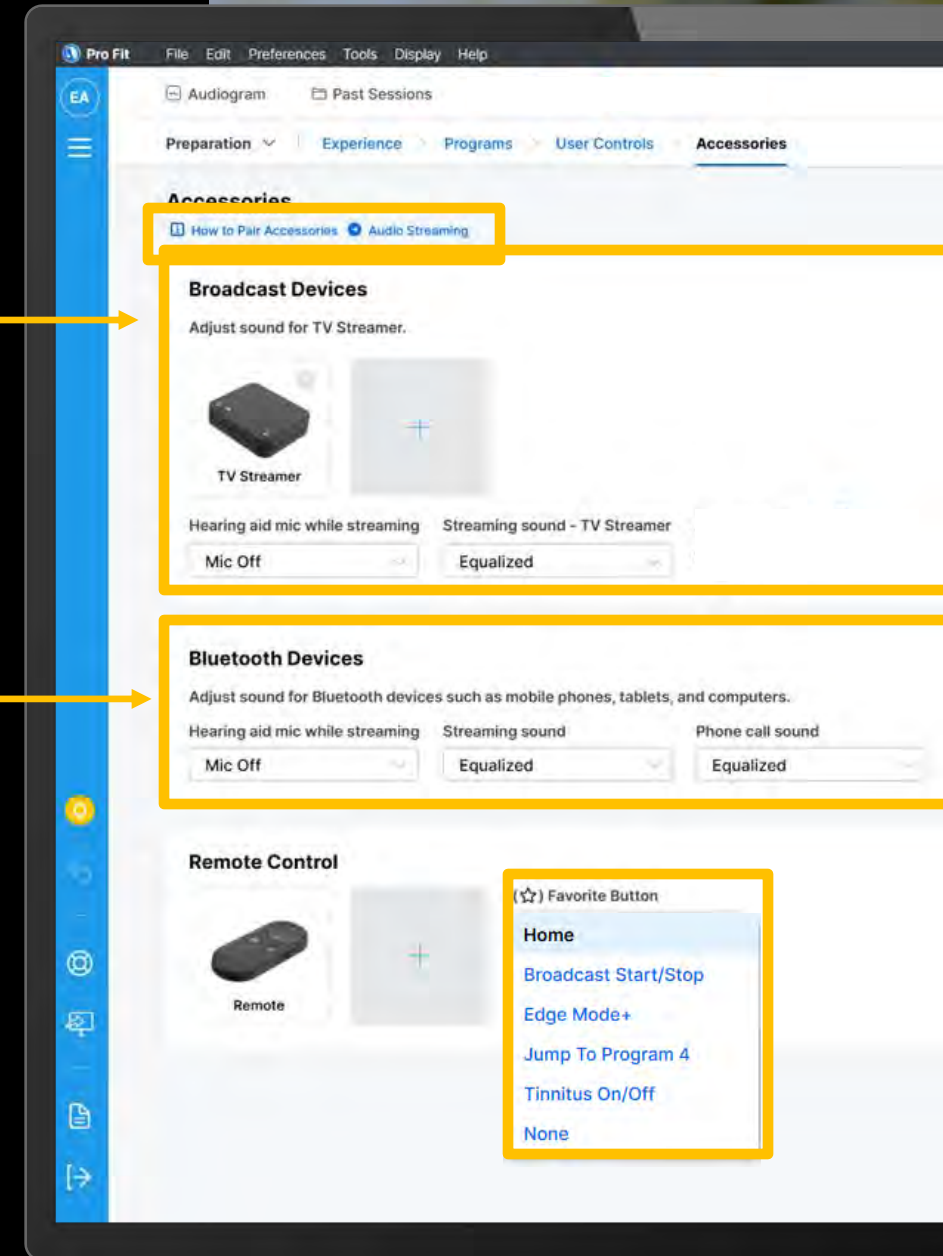
## Accessory Sections

Broadcast Devices

Bluetooth Devices

Remote Favorite Smart Options\*

*\*Remote options are based on hearing aid configuration*



# Audio Streaming

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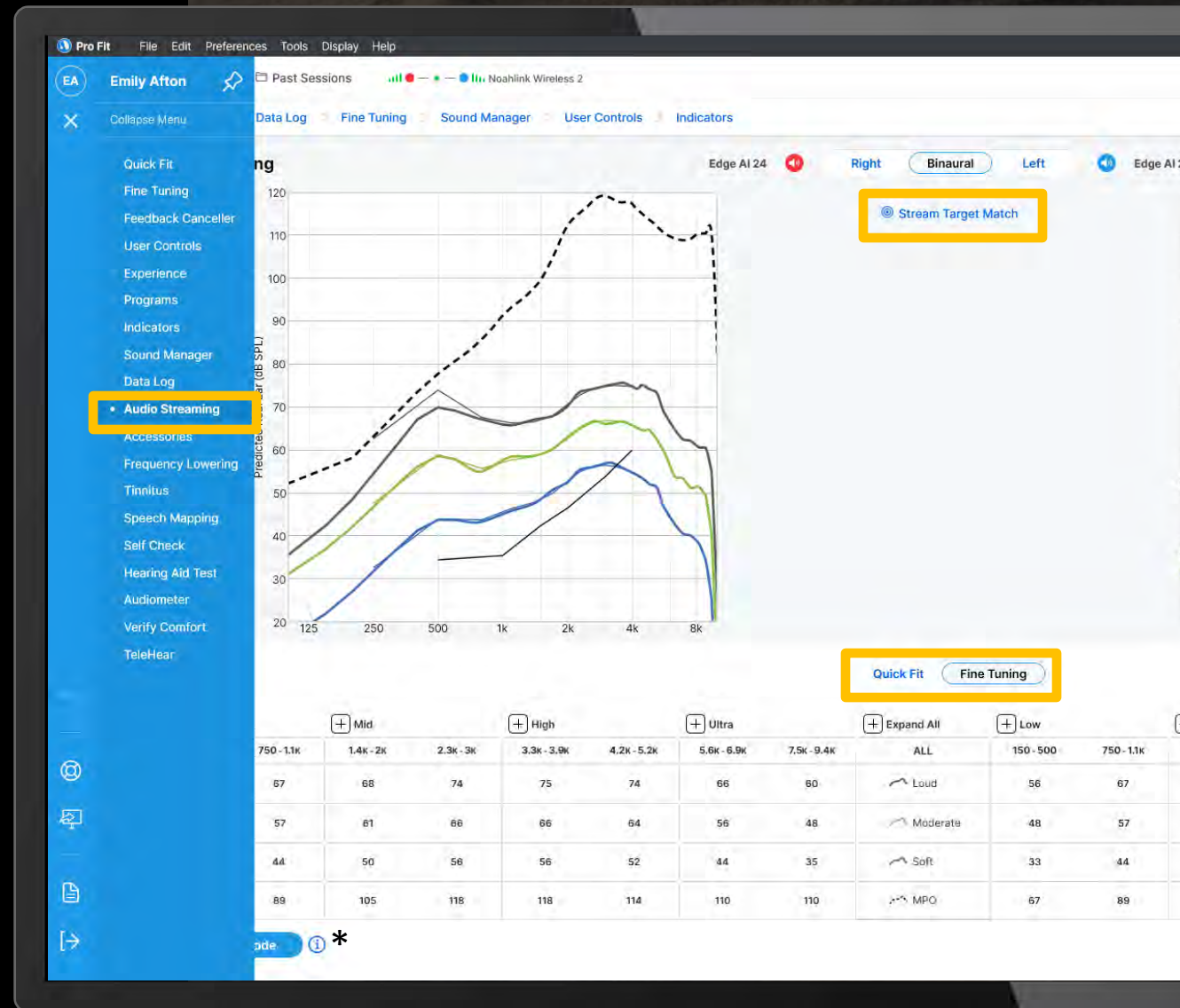
# Pro Fit Audio Streaming Configuration

Found on the Flyout Menu

Access to Quick Fit and Fine-Tuning  
screens

Stream Target Match: Target matches  
Audio Streaming Program

*\* Verbiage subject to change*



# Audio Streaming Configuration

When Audio Streaming is manipulated within Pro Fit, Equalizer settings within My Starkey will be overridden

The screenshot displays the Pro Fit software interface. At the top, there is a menu bar with options: File, Edit, Preferences, Tools, Display, and Help. Below the menu bar, there is a toolbar with icons for Audlogram, Past Sessions, and a status bar showing 'Noahlink Wireless 2'. The main window is titled 'Audio Streaming' and features a graph with a dashed line representing a frequency response. A modal window is open in the center, titled 'Audio Streaming', with the following text: 'The patient has customized their audio streaming equalizer settings. Starting Demo Mode or adjusting Audio Streaming creates a new streaming baseline and resets the streaming equalizer in the mobile app.' Below the text is an 'OK' button. At the bottom of the main window, there is a table of frequency response settings.

| Low       |            | Mid       |           | High        |             | Ultra       |             | Expand All |           | Low        |           | Mid       |  |
|-----------|------------|-----------|-----------|-------------|-------------|-------------|-------------|------------|-----------|------------|-----------|-----------|--|
| 150 - 500 | 750 - 1.1k | 1.4k - 2k | 2.3k - 3k | 3.3k - 3.9k | 4.2k - 5.2k | 5.6k - 6.9k | 7.5k - 9.4k | ALL        | 150 - 500 | 750 - 1.1k | 1.4k - 2k | 2.3k - 3k |  |
| 56        | 67         | 68        | 74        | 75          | 74          | 66          | 60          | Loud       | 56        | 67         | 68        | 74        |  |
| 48        | 57         | 61        | 66        | 66          | 64          | 56          | 48          | Moderate   | 48        | 57         | 61        | 66        |  |
| 33        | 44         | 50        | 56        | 56          | 52          | 44          | 35          | Soft       | 33        | 44         | 50        | 56        |  |
| 67        | 89         | 105       | 118       | 118         | 114         | 110         | 110         | MPO        | 67        | 89         | 105       | 118       |  |

At the bottom of the interface, there is a 'Start Demo Mode' button and an information icon.



## Edge AI Streaming Options

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**When Streaming:**

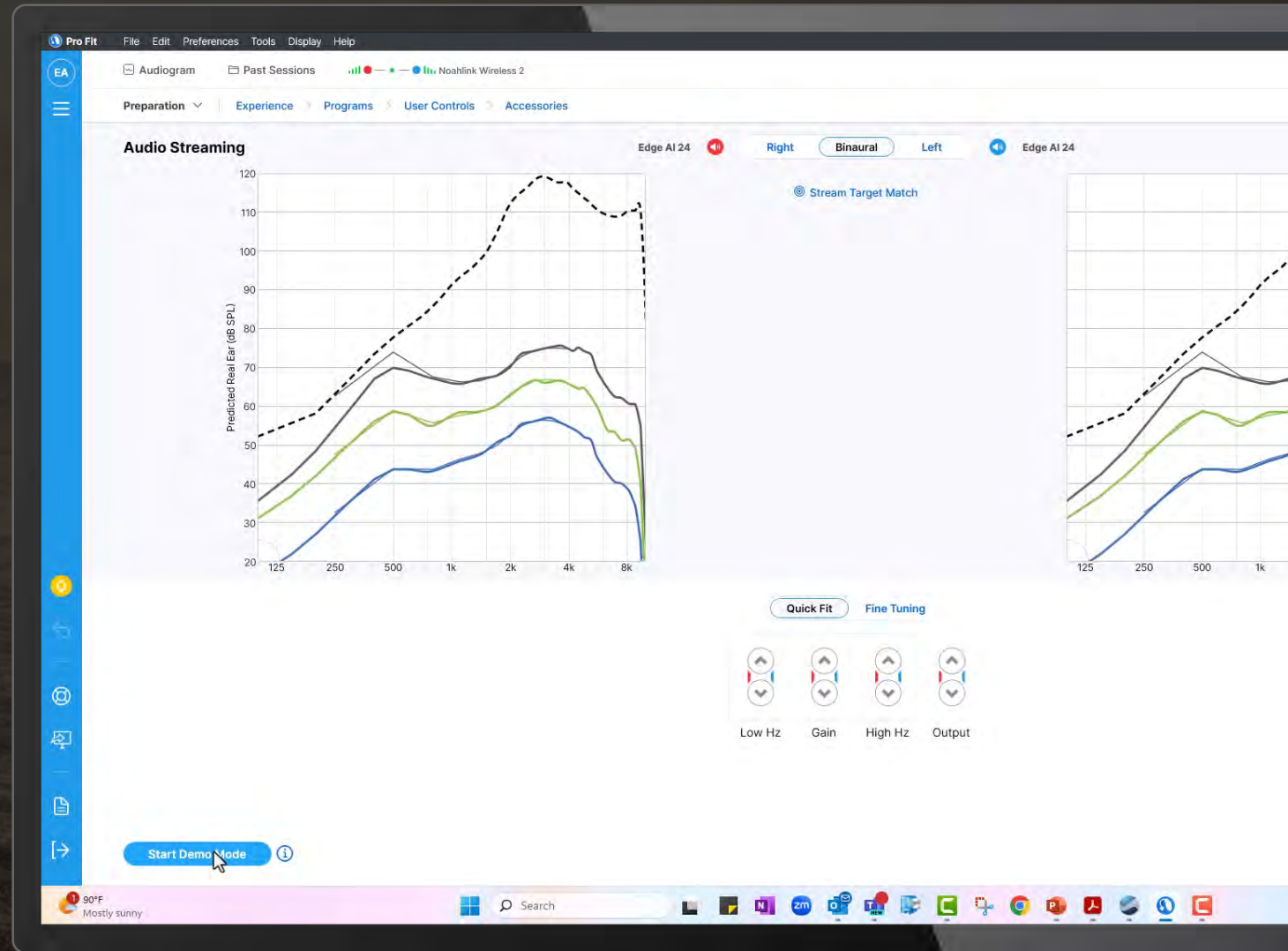
**Home Screen → Streaming Audio**

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



# 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





# How To Use Demo Stream

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Start streaming and then click 'Start Demo Mode'

Select 'Mute Stream' to enable hearing aid microphones for conversation

You may not access other screens in Pro Fit until you end Demo Stream

## Good to Know

# Demo Stream

For best results, ensure the stream from the phone is set to a comfortable volume

While in Demo Stream, My Starkey cannot communicate with the Hearing Aids

Hearing Aid user controls are disabled during Demo Stream





# Multiflex Tinnitus Pro

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**Delivering personalized relief  
for each individual**

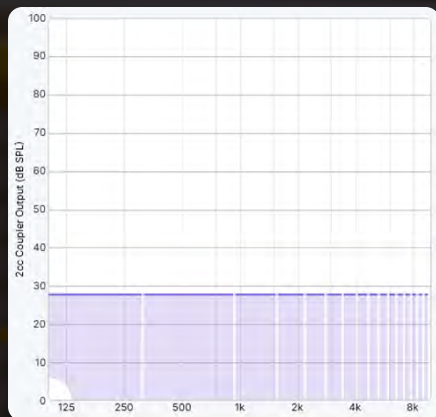
Five new ready-to-fit masking stimuli  
are now available in Pro Fit





# Multiflex Tinnitus Pro

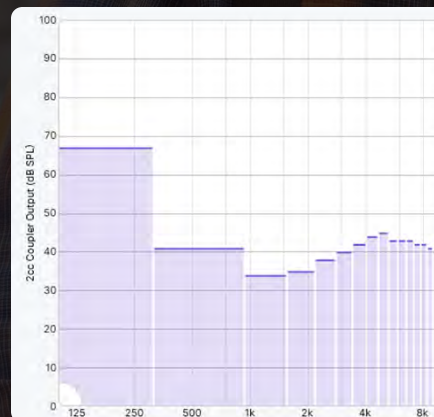
*Personalized Sound Therapy for Tinnitus Management*



## WHITE NOISE

Signal level based on PTA and comprised of equal energy distribution across frequencies

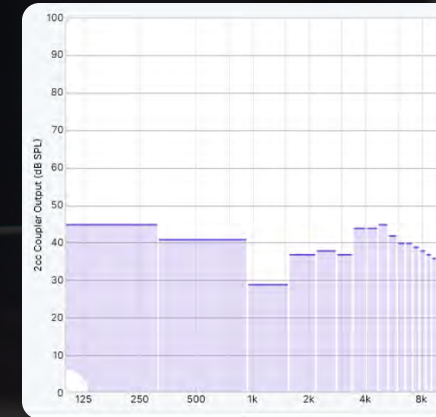
All Styles and Technology Tiers



## AUDIOGRAM-SHAPED NOISE

Automatic shaping of the tinnitus stimulus based on the hearing loss

All Styles of the 24, 20 and 16 Technology Tiers



## CUSTOM NOISE

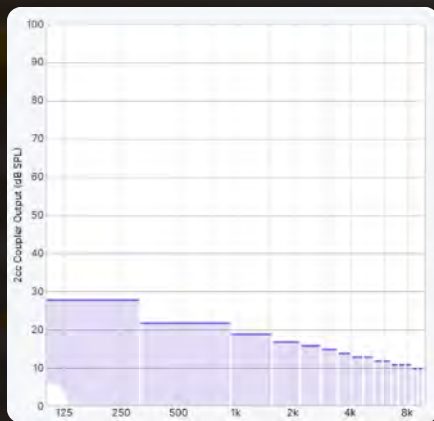
Custom shaping of the tinnitus stimulus based on MDLs and MMLs

All Styles of the 24 & 20 Technology Tiers



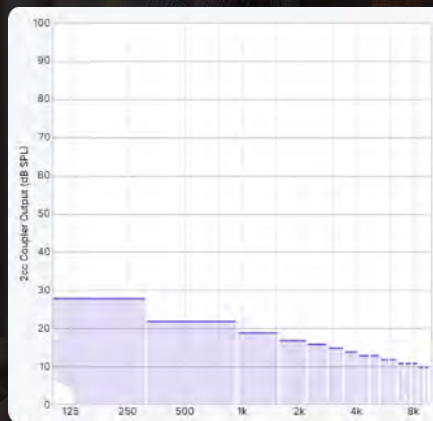
# Multiflex Tinnitus Pro

*Low-frequency weighted options*



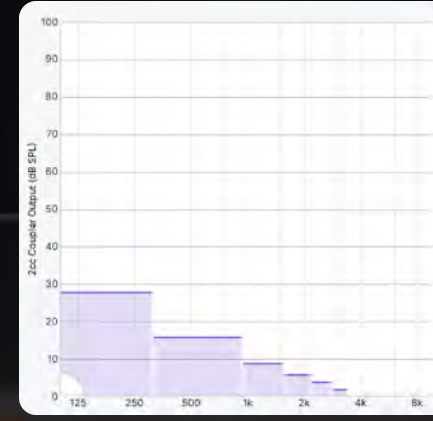
## OCEAN NOISE

Mimics the sound of the ocean for an alternative masker to traditional options



## PINK NOISE

Comprised of less high-frequency energy compared to White Noise



## RED NOISE

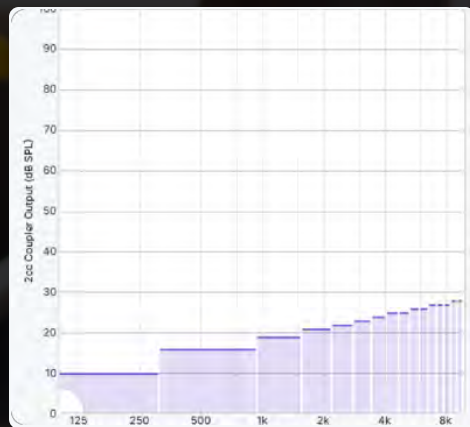
Comprised of less high-frequency energy compared to Pink Noise

All Styles and Technology Tiers of Edge AI and Signature Series



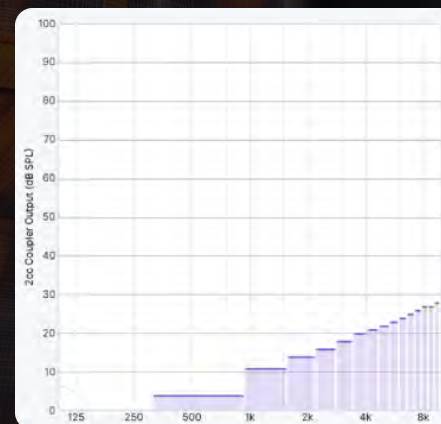
# Multiflex Tinnitus Pro

*High-frequency weighted options*



## BLUE NOISE

Comprised of less low-frequency energy compared to White Noise



## PURPLE NOISE

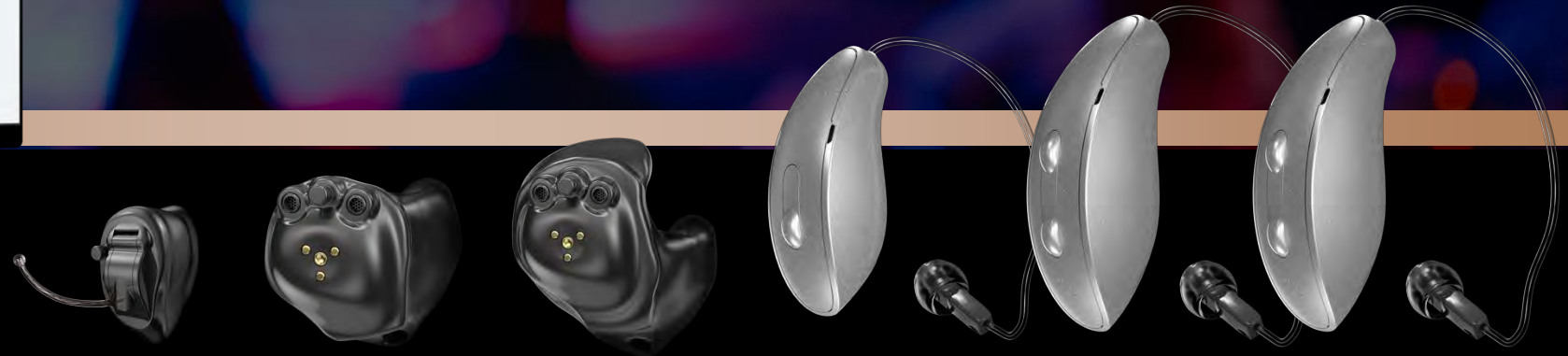
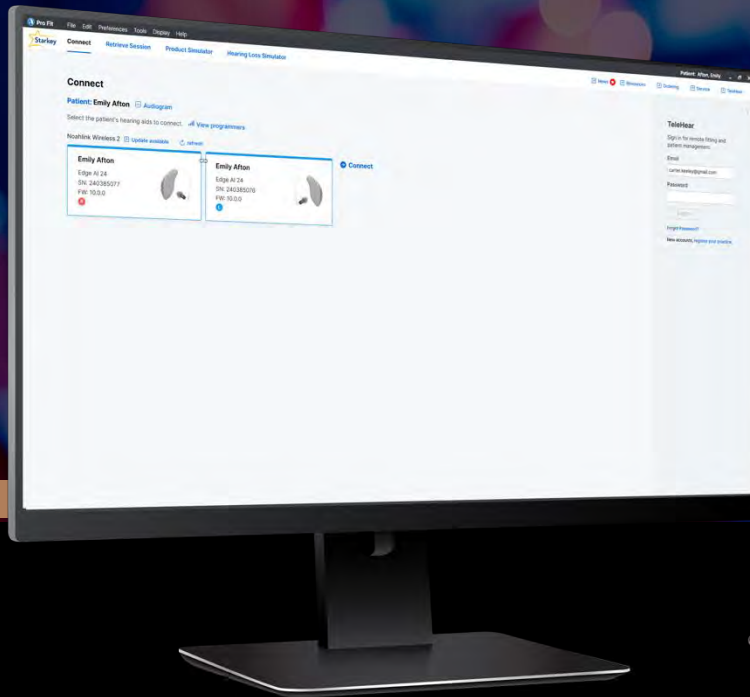
Comprised of less low-frequency energy compared to Blue Noise

All Styles\* and Technology Tiers

# EDGE<sup>AI</sup>

Wireless Hearing  
Aid Family

Tech tiers  
24 | 20 | 16



Starkey **ProFit**

CIC

ITC/HS R

ITE R

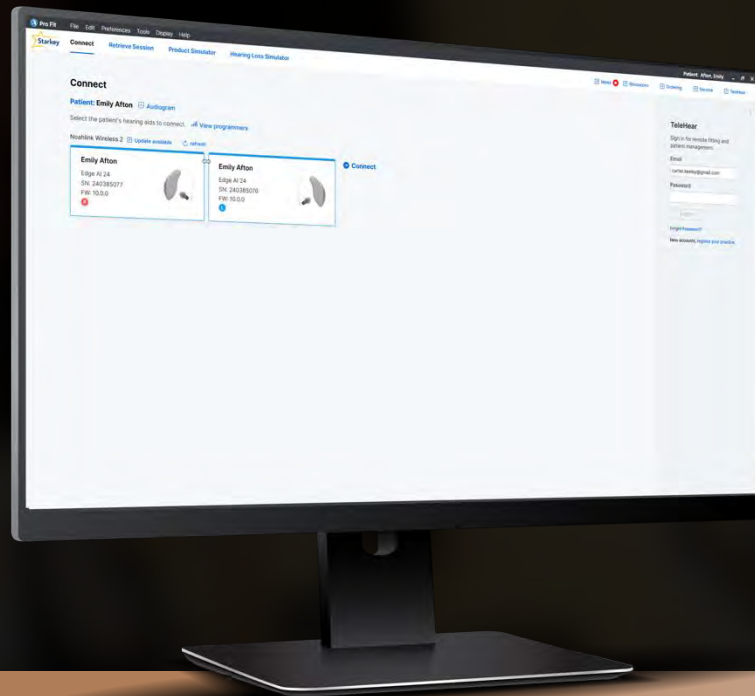
mRIC R

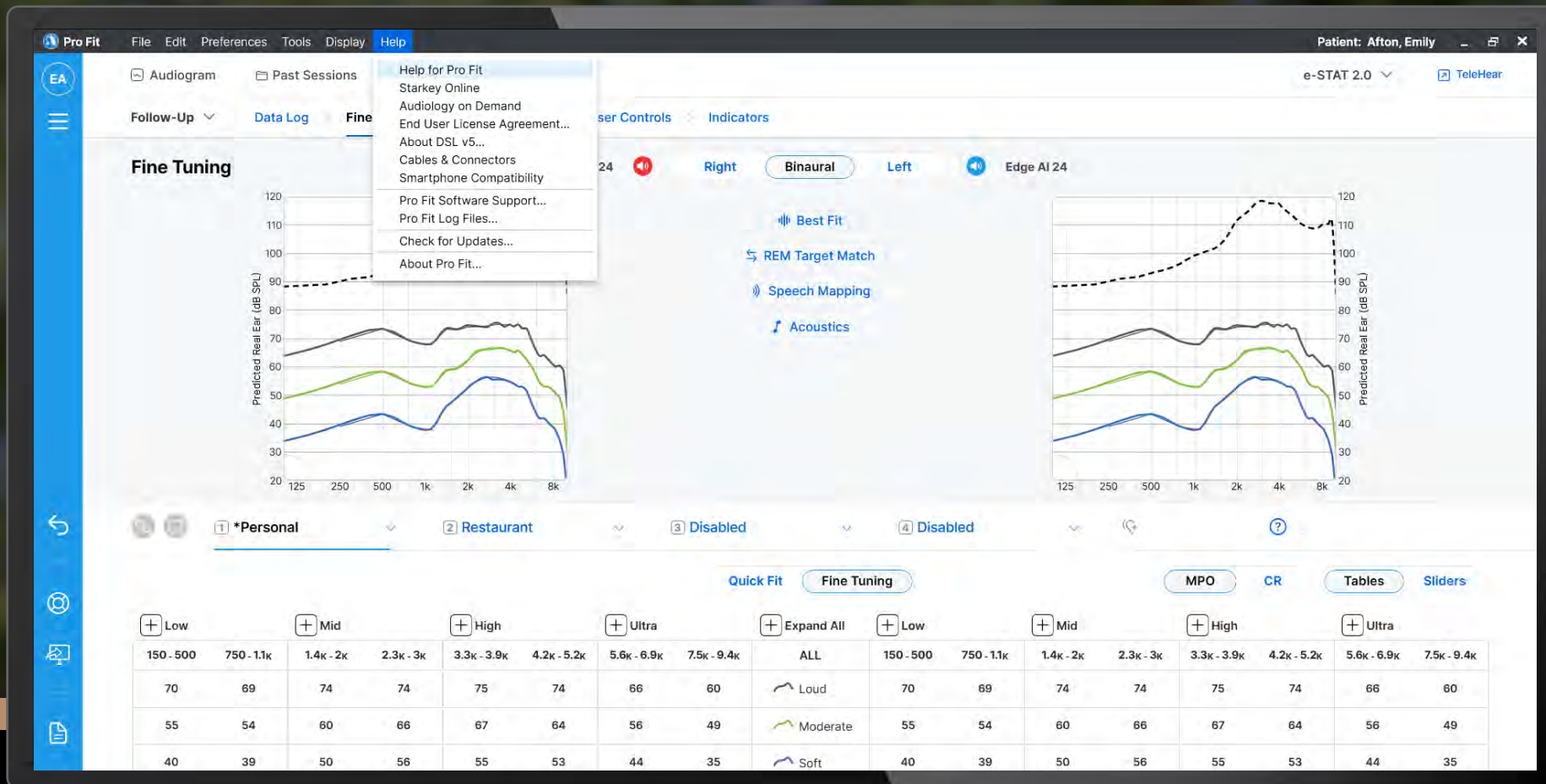
RIC RT

RIC 312

# Pro Fit Tips

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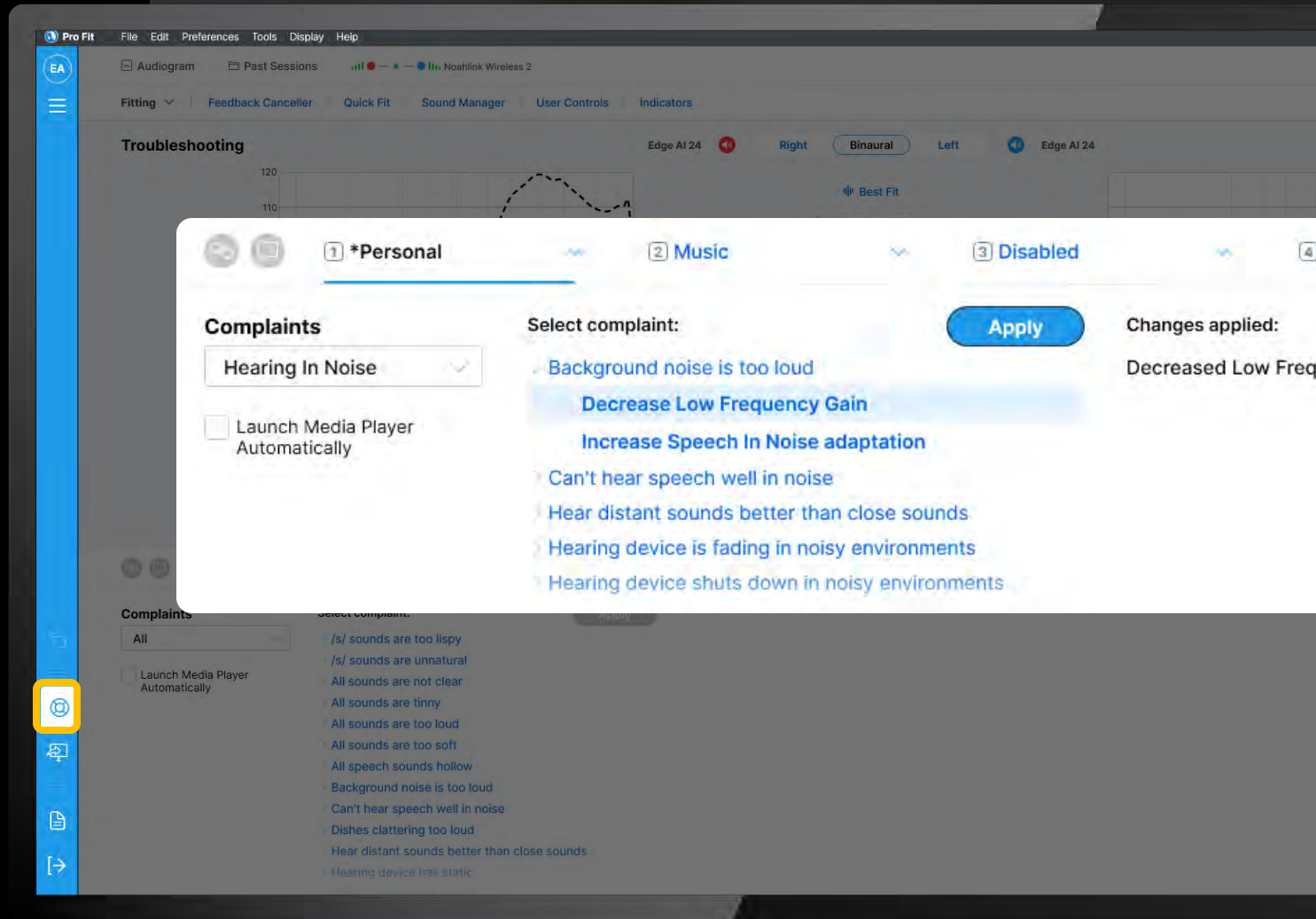


# Help for Pro Fit Updates

# Troubleshooting

‘Troubleshooting’  
is available from  
every screen

Apply and  
undo changes



# Audiology on Demand

Link directly to  
the Audiology on  
Demand webpage

Available from  
every screen



## Live Remote Assistance

Do you need a quick solution to a technical problem? With our live remote-assistance tool, a member of our support team can view your desktop and share control of your mouse and keyboard to get you on your way to a solution.

### How To Get Support

A member of our support team will talk with you first to determine the nature of the problem. You will find the answers to security questions and system configuration requirements on our [FAQ page](#).

### How It Works

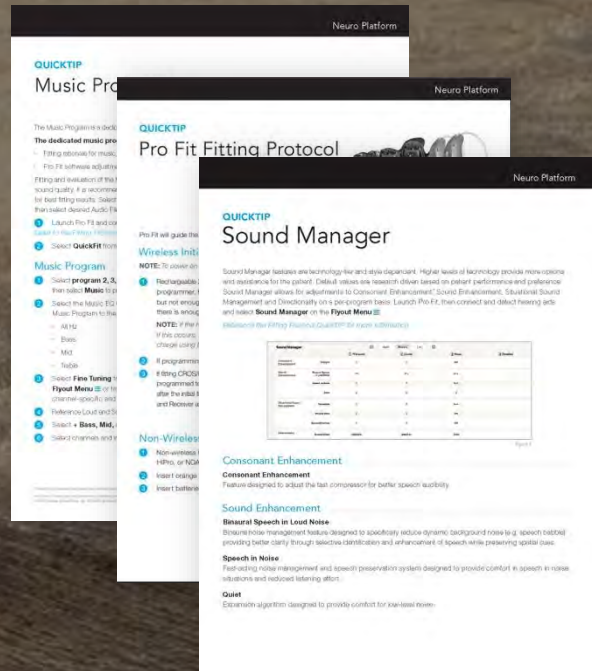
- 1 Call a support team representative.
- 2 Once you are on the phone with a member of our support team, you will be directed back to this page to initiate the screen-sharing session by entering the 7-digit PIN code.
- 3 You are prompted to download a small virus-free plug-in.
- 4 With your permission, your support representative can view your screen and share control of your mouse and keyboard.
- 5 You are in full control of your computer at all times. You always have overriding control of your mouse and keyboard, and you can end the screen-sharing session at any time.

## Connect with a representative

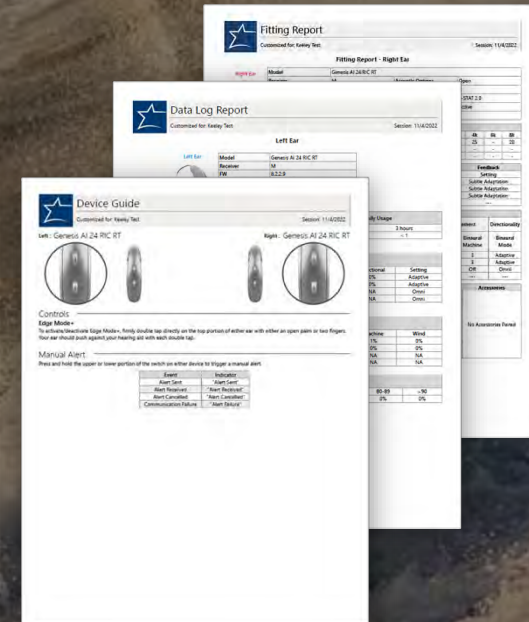
Please contact your support team at (800) 328-8602 for your 7-digit PIN code.

**PIN Code:**

Submit



QuickTips



Reports

Resources

# Starkeypro.com

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White Papers

Quick Tips

Videos

Training Opportunities

