

NTT sonority's Pursuit of Innovation—New Businesses That Leverage PSZ and MAGIC FOCUS VOICE Technologies

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Abstract

NTT sonority aims to create new lifestyle standards by leveraging two core sound technologies: Personalized Sound Zone (PSZ) technology, which confines sound to the ear without blocking the ears, and NTT's patented MAGIC FOCUS VOICE technology that cuts out ambient sounds to deliver only the user's voice. This article describes the foundation of our company, introduces our brand "nwm (pronounced noom)," showcases our flagship on-ear-speaker lineup, explores the dynamic landscape of the open-ear earphone market, and unveils our endeavors to develop the next-generation voice digital transformation service business, which began in 2024.

Keywords: PSZ technology, nwm, on-ear speaker

1. PSZ technology—from concept to a new business

NTT sonority was established in September 2021 to expand the application of Personalized Sound Zone (PSZ) technology, which confines sound to the user's ear without blocking the ear. PSZ technology originated from innovative thinking at NTT Computer and Data Science Laboratories and leverages inverted sound waves to minimize noise spillage outside the ear. PSZ technology uses noise-cancellation principles to create an inverted sound wave (reverse phase) layered over a sound wave to neutralize the sound. Driven to meet the needs of automotive and aircraft manufacturers, ongoing research has been dedicated to building individual acoustic environments where sound is heard only by the individual, and seamless communication with the individual's surroundings is made possible without the need for devices such as earphones or headphones.

The demonstration of aircraft seats equipped with PSZ technology at the NTT R&D Forum in Novem-

ber 2020 became the catalyst for the commercialization of this technology. The business plan initially targeted corporate clients in the automotive and aviation industries. However, NTT Chairman Jun Sawada (then President) emphasized the importance of bringing PSZ technology to the consumer sooner. This push led to the establishment of a consumer-focused venture, and the company was founded within less than a year of the demonstration. To establish the company as a full-service audio manufacturer from planning and development to manufacturing, quality assurance, distribution, and sales, we actively recruited talent from outside the NTT Group. In addition to experts in the fields of acoustic and mechanical engineering, we also hired professionals with backgrounds in advertising, media, and retail industries. The new hires constitute 80% of the company's workforce (**Fig. 1**).

2. Applying PSZ technology to earphones

In 2021, as the pandemic continued, new lifestyles,



Fig. 1. Embracing talent from diverse fields.

such as remote work, became increasingly prevalent. With the rise of digital content-mediated communication, headphones emerged as essential accessories. However, new challenges also emerged, such as discomfort from prolonged headphone use and the inability to hear ambient sounds when ears are blocked. Recognizing these needs, we began developing headphones equipped with PSZ technology.

Our first challenge was to minimize sound leakage while maintaining sound pressure in the ear and preserving audio quality. Countering inverted sound waves from the rear posed a significant challenge in product development as it was an unprecedented concept. We conducted countless simulations to determine the balance of various elements affecting sound quality, such as the placement size of the ports for emitting the sound waves, as well as the cavity space and volume within the enclosure. We also iterated hundreds of hardware improvements to ensure a design that looks great regardless of race or gender. The resulting product is a testament to the craftsmanship of NTT sonority engineers, who combined NTT's research technology with advanced expertise in acoustic design (Fig. 2).

2.1 Audio brand “nwm”

To promote the practicality of PSZ technology to consumers, we have been concurrently considering

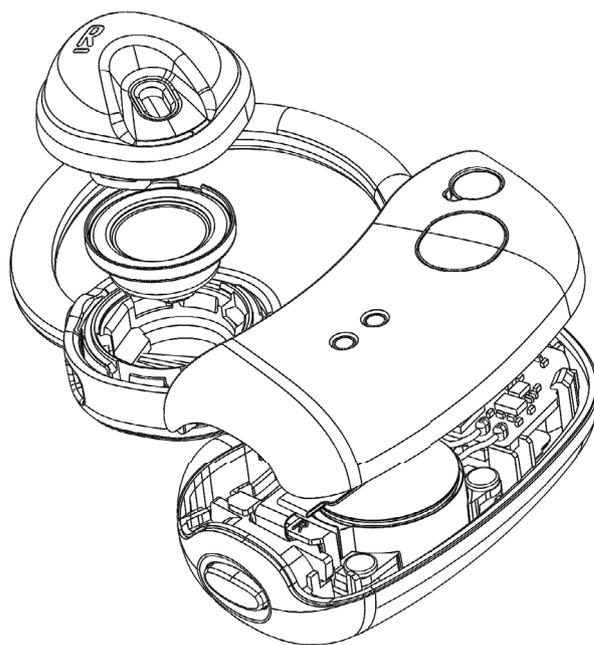


Fig. 2. A product refined through continuous trial and error.

the development of our in-house audio brand alongside product development. As mentioned above, amidst the COVID-19 pandemic, we recognized emerging communication challenges from the prevalence of



Fig. 3. Brand tagline & statement.

digital content-mediated communication. Considering that PSZ technology is aimed at constructing individual acoustic spaces for uninterrupted communication, we conceptualized a brand that seamlessly connects an individual's world with their surroundings, embodying the concept of “coexistence.”

In November 2022, we announced the launch of our audio brand “nwm (pronounced noom),” which stands for the “New Wave Maker” and is NTT Group’s first audio brand. With a brand tagline “Seamless sound for a seamless world,” we aim to connect people to their world and co-create new ways of working and enjoying life by listening to the consumer’s real voices (Fig. 3).

The statement is as follows.

“Mom is in a remote meeting, Dad is on the phone, and the kids are watching videos. What if the whole family could be connected seamlessly, without being interrupted from their activities? With nwm, we want to work together with you to create the future of living and working and realize this with audio technology.

What we aim for is not immersion, but to connect and bring you closer to your world. Let’s realize the future of sound, together with nwm.”

2.2 new nwm on-ear speakers

As of January 2024, the lineup consists of three products: the wireless model “nwm MBE001,” wired model “nwm MWE001,” and wireless neckband model “nwm MBN001” with two color variations for

two of the models. Although they belong to open-ear earphones, they stand out from competitors by minimizing sound leakage with PSZ technology, addressing the common issue with open-ear earphones (Fig. 4).

Taking into account the nwm concept, the design also visually communicates the idea that “unblocked ears = liberates communication,” enabling others to know that the wearer can engage in communication. The on-ear speakers are worn by hooking them along the contours of the ears.

Thanks to PSZ technology, which minimizes sound leakage, users can enjoy their audio content comfortably whether in an office setting or quiet public spaces. By incorporating a 12-mm-diameter driver, the on-ear speakers provide a balanced and natural listening experience as if listening to background music. Equipped with a built-in microphone for calls, the user can speak and hear their voice clearly with the ears fully open. The lightweight, and comfortable fit with no added pressure on the ears allows for a stress-free listening experience even during long hours of remote work or online meetings. Whether enjoying music or watching videos, the user can hear the sounds of doorbells ringing as well as family members and pets in the next room and enjoy natural conversation while wearing the on-ear speakers. Our products are designed to facilitate seamless coexistence in all aspects of daily life.

The wireless-earphone market is on an expanding trajectory, with forecasts predicting a market size of



Fig. 4. nwm on-ear speaker lineup.

approximately 4 trillion yen globally by 2025. A survey conducted by NTT sonority in June 2023, targeting 2165 men and women nationwide, regarding prolonged usage of earphones and headphones, revealed that over 30% of respondents reported an increase in earphone usage. This underscores the transition of earphones into essential lifestyle products. Further internal research indicates that approximately 10% of users in the wireless-earphone market experience discomfort with earphones that block the ears, suggesting a latent demand for open-ear earphones.

2.3 nwm vision

We aim to provide a novel auditory experience through our on-ear speakers, and are engaging in exciting collaborations in entertainment, art, and culture. In September 2023, the nwm MWE001 (wired model) was used as part of an advanced physical performance using cutting-edge technology by a music/DJ artist with amyotrophic lateral sclerosis. The MWE001 was used to detect the DJ's brainwaves stimulated by the sounds of the music and ambient sounds of the venue, which was essential in the futuristic performance, enabling the DJ to be one with the audience.

In entertainment, the nwm audio technology was also used in events leveraging high-speed, high-capacity communication via extremely high frequency waves to offer a participatory augmented reality

gaming experience. This enabled participants to enjoy both the sounds of the game content while strategizing with team members, significantly enhancing the sense of unity among players. In December 2023, "Hanakurabe Senbonzakura," a production that fused traditional Kabuki with cutting-edge technology, was held. This integration enabled audiences to enjoy the immersive sounds of the stage while listening to the simultaneous guided commentary to enhance the overall experience of the performance.

On the basis of current use cases, we are confident that the on-ear speakers will evolve into indispensable devices for new forms of communication, merging real and virtual spaces.

We are strengthening partnerships with various industries to meet the needs of individual acoustic spaces, especially with automobile and aircraft manufacturers, which are the foundation of PSZ-technology development, to drive business development.

Products equipped with MAGIC FOCUS VOICE technology are also being marketed under the brand. In October 2023, we launched the Beam Mic Speaker "LinkShell," a high-quality speaker specialized for meetings. By cutting out ambient noise and delivering only the necessary voices to the participants, it provides stress-free communication in an online environment, whether for remote work in a living room, in a noisy office, or in an online meeting during a workcation (Fig. 5).



Fig. 5. MAGIC FOCUS VOICE integrated Beam Mic Speaker “LinkShell.”

3. Next steps: industry solution business

As the next step, in 2024, we launched a next-generation voice digital transformation (DX) service for businesses leveraging PSZ technology and MAGIC FOCUS VOICE, marking our entry into the industry solution market. As NTT sonority’s first service business, we are collaborating with a domestic startup, BONX Inc., to provide a comprehensive solution for on-site communication called “BONX WORK,” targeting industries with “deskless workers” who are engaged in activities other than desk work.

In Japan, the number of deskless workers is estimated to exceed 40 million in industries, such as retail, hospitality, caregiving, and construction, that rely mainly on vocal communication. While transceivers are essential tools, they face challenges such as ear fatigue from prolonged headphone use, the burden of carrying multiple devices, and communication breakdown in noisy environments. We believe that PSZ technology and MAGIC FOCUS VOICE are the optimal solutions for addressing these needs.

BONX was born from the founder’s passion to enhance the sense of togetherness and fun among friends who snowboard together, and their vision of valuing communication in every setting aligns well with NTT sonority’s goals to advance human communication.

In April 2024, we launched NTT’s OnSite DX: Zero to Transformation, a next-generation transceiver service that combines NTT sonority’s audio technology, including on-ear speakers, with the BONX



Fig. 6. BONX intro knot 3.5M.

WORK app. The BONX WORK app incorporates voice-activity-detection technology that instantly distinguishes between human voices and other sounds, enabling clear communication with simplicity and flexibility, even among a small number of users. Transcription, text, and photo-sharing features are also available on the app. Together with BONX, we also developed the BONX intro knot 3.5M, a single-ear model of wired ear speakers catering to specific use cases in various industries (Fig. 6).

The integration of apps, earphones, and networks alone is expected to bring about a dramatic improvement in communication within work environments. In the fall of 2024, we plan to release a push-to-talk device featuring MAGIC FOCUS VOICE, which enables clear communication even in high-noise environments (Fig. 7).

By incorporating these advancements into the next-generation transceiver service, we anticipate further expansion of its use cases (Fig. 8).

An entry campaign is also planned with NTT Group companies to facilitate service expansion into deskless-work industries. Building upon the advancements in artificial intelligence, we also aim to enhance existing features, such as voice-data analysis, and develop new functionalities such as simultaneous translation and guidance. We are also considering offering on-premises service options and providing industry-specific solutions that are also linked with third-party services.



Fig. 7. MAGIC FOCUS VOICE integrated push-to-talk device.

4. Final thoughts

The nwm brand was developed to foster communication between people under the concept of coexistence. Our voice DX services deliver solutions that value the individual's identity by effectively convey-



Fig. 8. The next-generation transceiver service in use.

ing the subtlest nuances in the voice. Both businesses resonate with NTT's vision for IOWN (Innovative Optical and Wireless Network). As we mark the third year since NTT sonority's founding, we are committed to advancing the evolution of interpersonal communication through the innovative application of sound technology.



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