

MARKET RESEARCH NOTE

Assistive Hearables

Each year, the Bluetooth SIG publishes insight and trends on Bluetooth® radios, solutions, and markets in the [Bluetooth Market Update](#). Bluetooth Market Research Notes provide in-depth analysis of trends and forecasts highlighted in the annual Bluetooth Market Update. This supplemental report on hearables shares analyst insights, from Juniper Research, into the future of the assistive hearables market and its influence on personal audio and medical hearing corrective device trends.



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Juniper Research provides research and analytical services to the global hi-tech communications sector; providing consultancy, analyst reports, and industry commentary.

Unless otherwise noted, data derived from Juniper Research.

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Introduction

Between 400-500 million wireless headsets and other ear-worn electronics ship every year. These are intended to cater to a variety of aural wants and needs, and they range from headphones for music provision to hearing aids. All of these devices are moving towards various levels of connectivity, most of which depend on Bluetooth® technology. With the addition of sensors and on-device processing, *hearable computing*, or the ability to actively augment or process audio for a variety of purposes, including hearing assistance, has become possible in a variety of markets.

The World Health Organization (WHO) estimates that 6.1% of people worldwide experience disabling hearing loss, but other studies have shown that as many as one in eight people in developed economies have hearing loss to some degree. This means that most of those with hearing loss could be addressed with a hearing-assistive device. The release of LE Audio in early 2020 paved the way for emerging hearing assistance technologies to easily manage the compromise between advanced device capabilities and power requirements, enabling an array of medical and non-medical assistive hearables.

The hearables sector is uniquely positioned to change both the personal audio space and the medical hearing correction market. Being able to successfully navigate this evolving landscape will require both a clear vision on what hearables can achieve and an awareness of what existing technology partners can bring to the table.

466
MILLION
people worldwide experience
disabling hearing loss

Source: World Health Organization

Hearables Definition

Juniper Research defines an ear-based wearable device, or *hearable*, as an ear-mounted device that supplies content or audible information to the wearer, and at least one other function, through the use of on-device computation. Increasingly complex hearing aids and consumer audio products are both becoming hearables.

This definition of hearables excludes simpler Bluetooth headsets and advanced audio headphones. These are both likely to have an attached app, such as devices that primarily relay information from another source rather than processing it on the ear-based device. It also excludes most Personal Sound Amplification Products (PSAPs), as the amplification is not normally adjustable through electronic means.

While there is a broad spectrum of hearable devices, as noted in Figure 1 below, this research note will examine the assistive hearables segment of the hearables market exclusively.

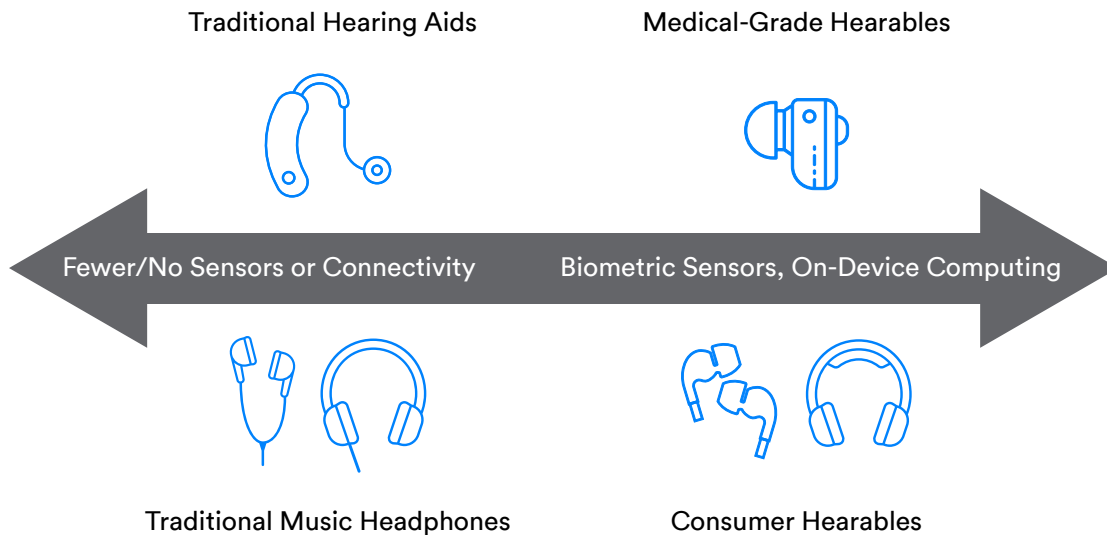


Figure 1: Spectrum of ear-based wearable device types, ranging from traditional hearing aids to consumer hearables

Assistive hearables are those hearables that are intended to support hearing enhancement for people with hearing loss at all levels. They have the primary purpose of providing hearing support. This can be either prescribed or over the counter (OTC) in nature. Juniper Research further defines *assistive hearables* as hearables that have the primary purpose of providing hearing support.

The Assistive Hearables Market

The assistive hearables market began when traditional hearing aids began to incorporate advancements like Bluetooth® technology that allowed them to connect directly to a smartphone to provide additional functionality. These connected hearing aids currently make up the majority of devices available on the market. They are joined by direct-to-consumer, sensor-equipped devices that provide hearing enhancement and are based on headphones, intended for situational use, and analogous to OTC reading glasses. These consumer-grade hearables have emerged in recent years with MEMS (microelectrical mechanical systems) sensors. They have

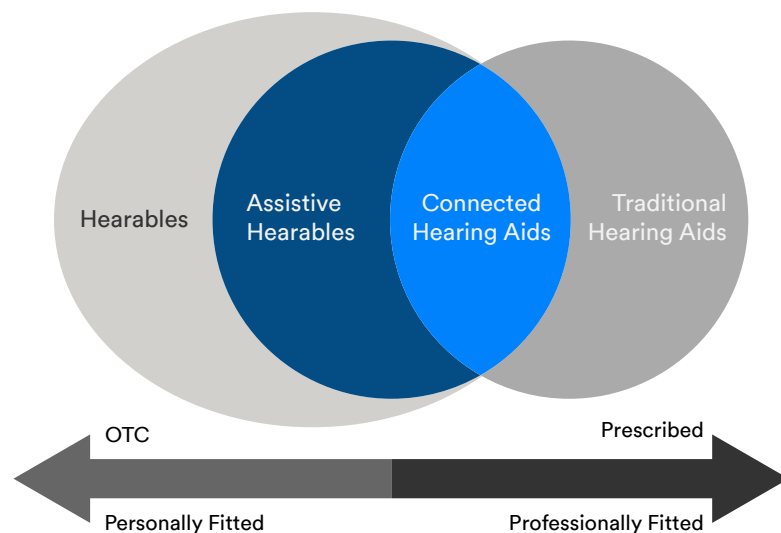


Figure 2: Level of testing needs and sales channels.
Note: The size of the circles do not correspond to the proportion of device types in the market

declined in price and power requirement as connectivity technologies become more efficient. Some vendors of consumer-grade hearables are also looking to move into the medical space, meaning that, ultimately, the difference between a connected hearing aid and a medical-grade assistive hearable will be market positioning, design, and price rather than differences in technical capabilities.

This divergence in origin has resulted in different market design principles, as well as different sales channels for these devices (see Figure 2).

OTC Assistive Hearables

OTC assistive hearables that offer adjustable hearing augmentation can be bought in stores or online and support other functions like music streaming. Hearing augmentation that provides active noise cancellation requires on-device digital signal processing. The array of

MEMS microphones typically enables active noise cancellation by offsetting the frequency profile of the noise. In this case, MEMS microphones will also amplify the sound coming in with a positive feedback signal amplification technique.

OTC assistive hearables are likely to be used as leisure devices as much as hearing devices, and so they need to be able to transmit quality audio from devices with low latency and high-quality audio codec support is often an expectation. This will be supported by the forthcoming Low Complexity Communications Codec (LC3) in Bluetooth® LE Audio. LE Audio capabilities will also allow for synchronized streams between devices, meaning that true wireless hearables do not need to include additional technology like NFMI (near-field magnetic induction). Typically, connections to other devices (such as TV audio enhancers) will be managed through an associated smartphone rather than the hearables themselves.

OTC and direct-order assistive hearables currently make up over 40% of the assistive hearables market and will grow to 70% of the overall market by 2025. However, only 10% of these will be purchased in physical stores. According to Juniper Research, the vast majority of OTC assistive hearables will be ordered direct from the manufacturer or available through online retail distribution (e.g. Amazon.com).

Assistive Hearable Device Types

■ Over-the-Counter Hearables ■ Connected Hearing Aids

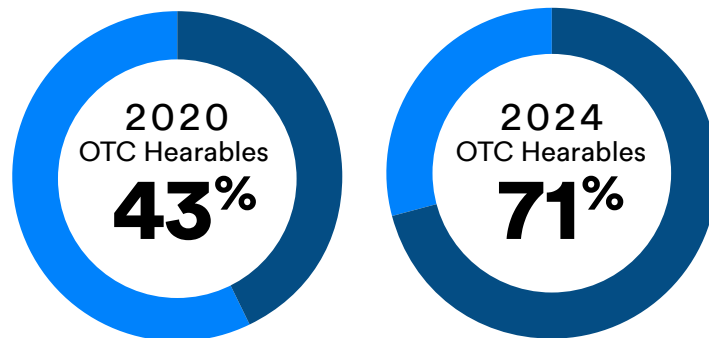


Chart 1: Percentage of assistive hearable device types

Medical-Grade Assistive Hearables

The medical-grade assistive hearables category covers both those OTC hearables approved for hearing loss treatment and hearing aids that have the connectivity and processing to be defined as hearables. With medical-grade assistive hearables, the hearing augmentation needs to incorporate a medical grade hearing test in the app in order to satisfy prescription requirements. The tests will vary from country to country, but standards from one nation will often be accepted in other countries.

In addition to specific testing regimes, these devices will often need to be classified as a medical device, which will bring additional challenges and regulation to the manufacturer. The U.S. FDA standards are typically the first to be applied, as this is the largest single market for many international device companies.

The predominance of hearing aids that are hearables in the current space means that they make up over 50% of the assistive hearables market in 2020. However, as the consumer market and availability of OTC devices take off, this will decline to under 30% by the end of 2025.

Connected Hearing Aids

Connected hearing aids are primarily focused on hearing correction and have the conventional hearing aid form factor. They connect to smartphones or other digital devices using Bluetooth® technology. Typically, this has been at its smoothest with iOS devices. The vast majority of Android smartphones need additional peripherals to enable connection.

Connected hearing aids will not necessarily need the same level of independent testing capability as some hearables, as it is expected they will be fitted and adjusted by an audiologist. While the ability to adjust sound profiles and levels through a connected app will be an expectation, the baseline will be measured by professional audiologists.

Thanks to the nascent nature of the consumer and OTC hearables market, connected hearing aids will make up over 50% of the hearables shipped in 2020 but will decline to 29% by 2025 as the consumer market expands. Juniper Research expects hearing aid shipments to grow more slowly, thanks to their controlled sales channel, with less than 25 million hearing aids of all types shipping in 2025. Connected hearing aids are already the majority of these devices and will account for over 90% of them by the end of Juniper Research's forecast period.

Assistive Hearables Market Forecast

Juniper Research anticipates that over 92 million assistive hearables will ship in 2024, showing a 46% CAGR between 2020 and 2024.

Juniper Research expects the majority of these devices to last between five and six years, given the relatively standard functions that the devices perform and the historically high lifespans of hearing aids relative to many consumer electronics.

Unlike other categories, the relatively international nature of hearing aid companies means that the distribution of assistive hearables will be less skewed to North America and West Europe. However, these markets will receive a far higher proportion of devices that are consumer hearables rather than connected hearing aids.

Despite the passage of the OTC Hearing Aid Act and similar initiatives, there will still be a stigma attached to hearing loss for some time. This will both limit the number of people seeking treatment for hearing loss and particularly impact the number of devices that will sell through OTC channels.

92
MILLION
assistive hearables will ship
in 2024

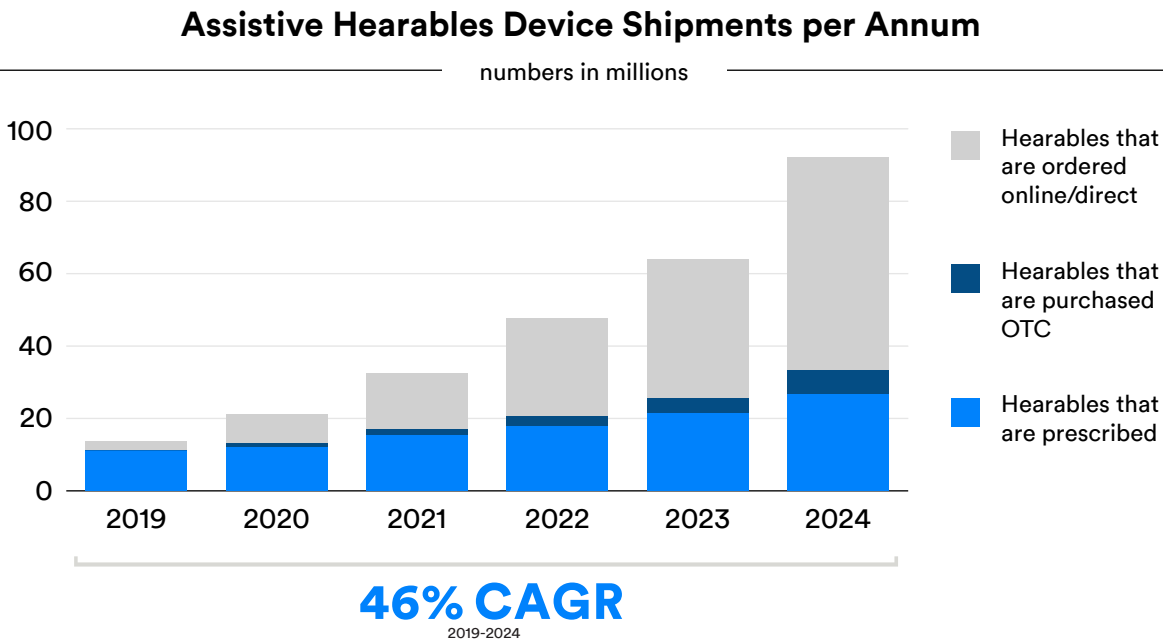


Chart 2: Number of assistive hearables device shipments per annum

As a result, the proportion of the population seeking treatment will be under 50% for most countries forecasted. Juniper Research expects the largest increases in countries where hearables can add a *cool factor* to the market, as well as broadening access to hearing care. As this will be somewhat fragmented, we expect an increase of less than 10% in the proportion of those with hearing loss seeking treatment between 2020 and 2024.

Key Use Cases

The breadth of devices and capabilities in the hearables ecosystem encourage a wide range of uses. Those important to the development and deployment of assistive hearables are outlined below.

Conversational Understanding

The biggest use of hearing aids in general, and therefore assistive hearables, is to understand conversational audio better. This is something that can be largely situational, such as in a noisy restaurant or an echoey room. As a result, the sound profile of assistive hearables needs to be adjustable. This is typically supported by an app from the device manufacturer and is often a manual process. Automatic adjustment, performed by several hearing aids already, can be done if the devices' processing power is increased. If this is not practical, then connecting to a smartphone to do the processing on the hearables' behalf could have much the same impact. This is enabled through more constant and lightweight Bluetooth® connections that can support a degree of location processing happening on an attached smartphone. The challenge then becomes one of programming an AI algorithm to make the right adjustments rather than how to manage the data requirements of the connection.

Real-World Audio Mixing

The ability to mix and adjust the sound coming in from the real world, from noise cancelling while at work to adjusting the EQ balance of a live concert, is a use case that has been promoted by several hearing aid manufacturers. While the category is termed assistive hearables and OTC hearing aids, these features can change the conversation from hearing correction to hearing enhancement, producing a world of customized audio and the ability to enhance non-conversational audio. This has, to date, been a niche use case, but as the amount of data that can be transmitted to and from devices is increased by the more power-efficient signal processing allowed by the LC3 codec in LE Audio, it is becoming a feature of more products.

Control Device

The advent of voice assistants has meant that all forms of devices are now being used as audio interfaces, and hearables are no different. Voice assistant support and integration is now becoming a common feature, and the devices will need to be able to send different forms of data back and forth simultaneously so that any ongoing audio experience is not disrupted by the use of a voice assistant. This is one of the key features for Bluetooth® LE Audio, and will make these experiences much smoother on newer products.

Market Drivers & Market Outlook

There are several external factors in play that will increase the adoption and production of hearables. These range from acceptance of regulatory requirements from manufacturers for hearables to become medical devices to changing trends and reliance on mobile technology for assistive hearing devices.

Hearing Aids Transition to Hearables

The hearing aid market is increasingly becoming a part of the broader hearables market.

Most major hearing aid manufacturers are now producing devices that fall under the hearables definition, typically by integrating Bluetooth® technology and app-based functionality for the user (See Chart 3). This will take some time to get into the mainstream of hearing aid usage, however, particularly in markets which have public health services as these typically provide devices that are some way behind the state of the art. The key for these devices is reducing the barriers to the technology's usage so that it becomes commonplace enough to be standard in a variety of settings.

Percentage of Hearing Aid Manufacturer Products Classified as Hearables

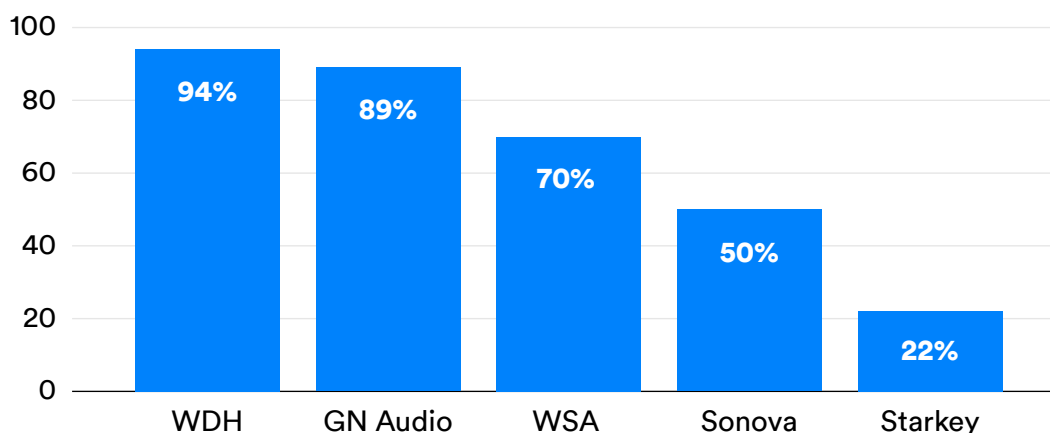


Chart 3: Proportion of hearing aid companies' portfolios that are hearables

This indicates that, for most of these companies, the key is not necessarily integrating technology to make hearing aids itself, but what other functionalities can be added to the devices, as well as how to scale these devices to the point where they become affordable. The development of hearables that act like *audio reading glasses* is key here, providing situational hearing enhancement alongside other capabilities that low-power and low-cost connectivity can provide. However, these will typically not be provided by traditional

hearing aid brands that wish to maintain their more specialized businesses but by electronics companies offering similar solutions at a lower price point.

In addition to audio playback features from within assistive hearables and hearing aids, biometric sensors will become more common over time, requiring more intensive data transfer over an existing Bluetooth® connection. Such features will be promoted by market-driven healthcare, but those countries with universal healthcare are unlikely to adopt them in the short-to-medium term.

This will be an area where traditional hearing aids have an advantage, as their more advanced models are already expected to be on a daily charge, while battery life is more of a concern for many general electronics devices.

Expansion of Non-Medical Suppliers and Sales Channels

The inability to have in-person testing because of COVID-19 will boost OTC hearables in the short term. Sales of medical hearables will still have to contend with social convention, meaning not all new sales channels will be effective.

Assistive hearables produced by non-hearing aid vendors will continue to proliferate; Juniper Research expects more devices to be launched as the OTC Hearing Aid Act comes into effect this year. However, with the economic impact of COVID-19, Juniper Research does not expect many to be launched by new players before the end of 2020. Juniper Research expects that these will sell relatively low volumes as they target the same demographic as hearing aids, while manufacturers and audiologists have been vigorously defending the current custom fit model in an effort to safeguard their market share.

With that model of distribution, Juniper Research also expects that medical-grade hearables will take the biggest hit due to the COVID-19 outbreak. As device fitting and testing by an audiologist requires physical appointments, these will decline sharply in 2020. Only those that are comfortable with ordering and adjusting their own hearing aids, or with aids that offer a built-in functionality for doing so, will be in a position to purchase these hearing aids during pandemic lockdown measures.

Even when in-person testing is possible, Juniper Research expects strong online sales for hearables. The stigma of taking a hearing test in person will dissuade people from buying assistive hearables in-store, while online testing can maintain that privacy. However, hearables makers must ensure that the tests are trustworthy, otherwise consumers may believe they are being told they need a hearable just to push device sales.

Regulatory Acceptance

The OTC Hearing Aid Act in the U.S. and the acceptance of hearables as a medical category in parts of the NHS signal broad regulatory acceptance of hearables is on the way.

The U.S. OTC Hearing Aid Act of 2017 took effect in 2020. This allows some hearables to qualify as OTC hearing aids where they can provide audio adjustment the same way retail reading glasses provide visual adjustment. This means that brands like Nuheara and Bose can extend their sales channels to places that offer medical treatment for hearing loss. This has already been borne out by the acceptance of the hearable category into NHS Scotland and Northern Ireland's audiology framework.

Retirement of the 3.5mm Audio Jack

The decline in premium phones offering 3.5mm audio jacks has increased interest in wireless audio. The price gap between wireless audio and hearables is smaller than wired audio and hearables.

With many top-tier smartphone vendors producing flagship phones without a 3.5mm audio jack, mobile wired audio is losing its main standard. Apple only offers Lightning connectors for its phones, and 23% of phone models announced or released in 2020 will not feature a 3.5mm jack. Given the tendency for flagship phones to dominate sales in several markets, the market penetration of jackless phones will be higher than this. Bluetooth® technology is, therefore, becoming a common standard for smartphone audio connections of all types.

Conclusion

An affordable alternative to medical-grade hearing aids, hearables and assistive hearables are well placed to address the growing market demand among those with some level of hearing loss, or in need of hearing augmentation. Advancements in wireless technologies like Bluetooth LE Audio will lead the evolution of the assistive device market and help drive innovation for devices that fall on a broad spectrum of features and capabilities.

Bluetooth Market Research Community

Join the Bluetooth Market Research Community to receive early access to market data highlighting the latest Bluetooth technology trends and forecasts. You'll also have the chance to weigh in on what data is collected and shared to ensure you receive the research that's most valuable to you and your business.

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