

A young woman with brown hair tied back, wearing a light pink patterned sweater, is seated in a lecture hall. She is holding a black smartphone to her ear with her right hand and looking down at it with a slight smile. Other students are visible in the background, some looking forward and others looking down. A blue circular graphic is overlaid on the right side of the image, containing white text. The Sennheiser logo is in the bottom right corner.

White Paper:

Transforming the
University Experience
With **Assistive
Listening Over Wi-Fi**

A young man and woman are walking on a paved path outdoors, likely on a university campus. The man, on the left, is wearing a white t-shirt, dark pants, and a backpack, and is holding a notebook. The woman, on the right, is wearing a white button-down shirt, blue jeans, and glasses, and is holding a smartphone. They are both smiling and looking at each other. A large blue circle is overlaid on the image, containing the text 'Table of Contents'.

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Introduction



Traditional assistive listening technologies are often impractical for today's **hearing-impaired university students** and run contrary to these institutions' inclusion requirements.



Faculty and staff — professors, AV and IT professionals, directors of inclusion and school leadership — are also disadvantaged by the operational difficulties, cost inefficiencies and exclusions associated with legacy assistive listening systems.



The adoption of new technologies such as Sennheiser MobileConnect can help **students and universities** surpass the limitations imposed by induction loops, infrared and FM radio systems.



Universities have the opportunity to benefit their hard-of-hearing students, mitigate health risks, cut down on bottom-line spend and genuinely enrich the campus experience with assistive listening over Wi-Fi.



An opportunity for **improvement**

For students who have hearing thresholds of 25-40 decibels or greater,¹ assistive listening technology is essential to helping them take in sounds at higher dB levels. Unfortunately, the **limitations of traditional assistive listening technology can be a significant hurdle for hearing-impaired students** — an obstacle they should not have to clear.

The world of post-secondary education is constantly evolving. With digital transformation affecting so many aspects of university life, it follows that such evolution should take place in the context of higher education institutions' accommodations for students with disabilities.

Given that evidence suggests easy, reliable access to Wi-Fi is students' most important tech resource for studying,² it's clear that listening solutions utilising **Wi-Fi connectivity and mobile compatibility** are ideal for the future.

These systems provide substantial benefits to students, as well as professors and university staff tasked with ensuring an inclusive, enriching educational experience.

¹<https://www.asha.org/public/hearing/degree-of-hearing-loss/> <https://www.asha.org/public/hearing/degree-of-hearing-loss/> | ²<https://library.educause.edu/resources/2020/10/2020-student-technology-report-supporting-the-whole-student> <https://library.educause.edu/resources/2020/10/2020-student-technology-report-supporting-the-whole-student>



Accommodating hearing-impaired students

Tens of thousands of hearing-impaired students attend universities worldwide. They can do so because of accommodations mandated by laws like the Americans with Disabilities Act³ and regional statutes like the EU Accessibility Directive⁴ and UN Convention on the Rights of Persons with Disabilities (codified in many nations' individual laws⁵).

The World Health Organisation projects a **significant uptick among hearing loss in children** between now and 2050.⁶

Enrollment of hearing-impaired and deaf students has risen in recent decades, particularly the 2010s. It is reasonable to believe that further gains in enrollment could be seen if cutting-edge assistive listening solutions were readily available at more universities.

With the World Health Organisation projecting a significant uptick among hearing loss in children between now and 2050, this issue's importance is only increasing.⁶

³<https://www.accessibilityonline.org/ada-tech/session/?id=110821> | ⁴<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2015%3A0615%3AFIN> | ⁵<https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html> | ⁶<https://www.who.int/en/news-room/fact-sheets/detail/deafness-and-hearing-loss>

Limitations of traditional methods

Discussion is critical to learning,⁷ and it's essential for hearing-impaired students to experience it. Three traditional assistive listening methods are commonly used in universities to meet this need: induction loops, infrared transmission systems and FM systems.

All have notable limitations, starting with limited range.⁸



Beyond that, FM radio signals are **insecure and easily disruptable**.



Infrastructure for induction loops requires **expensive, labour-intensive installation** that limits their hardware to specific parts of the classroom. They cannot be used in adjoining classrooms or those vertically parallel to one another due to significant risk of interference, and each loop offers only one audio channel.



With infrared systems, universities must dedicate **significant time and resources** toward use and maintenance due to their need for line-of-sight reception and limited portability.

The shortcomings of induction and infrared present situations in which hard-of-hearing students feel distinctly ostracised, exacerbating “**feelings of loneliness, isolation and frustration**” that the WHO cites as emotional impacts of hearing loss.⁹ Moreover, in the COVID-19 era, shared devices for assistive listening systems represent a health risk.

⁷<http://www.ascd.org/publications/books/108035/chapters/Why-Talk-Is-Important-in-Classrooms.aspx> | ⁸<https://asuspeechandhearingclinic.org/hearing/rehabilitation-services/assistive-listening-devices/what-are-assistive-listening-devices/advantages-and-disadvantages-assistive-listening-devices> | ⁹<https://www.who.int/en/news-room/fact-sheets/detail/deafness-and-hearing-loss>

The advent of assistive listening over **Wi-Fi**

Due to their aforementioned pitfalls, traditional assistive listening solutions don't meet the challenges of hearing-impaired students — who, quite simply, deserve technology that does. By contrast, **assistive listening over Wi-Fi overcomes the limitations that can diminish students' listening experiences and unnecessarily highlight disabilities.**

While the market for assistive listening over Wi-Fi is projected to expand in the years to come,¹⁰ it hasn't quite broken into the mainstream: As yet, neither the National Association of the Deaf¹¹ or the Hearing Loss Association of America¹² list it on their websites' sections regarding assistive listening options (though awareness of the technology is steadily growing).

Modern classroom settings are ideal for assistive listening over Wi-Fi. It's no longer feasible for post-secondary administrators to keep using traditional technologies if they hope to serve their hearing-impaired students (and others who benefit from assistive listening) as effectively and respectfully as possible.

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¹⁰<https://www.openpr.com/news/2164631/global-assistive-listening-market-by-product-type-wi-fi> | ¹¹<https://www.nad.org/resources/technology/assistive-listening/assistive-listening-systems-and-devices/> | ¹²<https://www.hearingloss.org/hearing-help/technology/hat/alds/>

Students' **unique** listening and learning experiences

Assistive listening over Wi-Fi solutions function simply, intuitively and effectively:



Professors speak into **any microphone**.



The resulting signal travels to a station in the AV rack that broadcasts the audio via **existing local Wi-Fi**.



Students **download an app** on their mobile devices and tune into their classroom's channel using headphones, cochlear implants or hearing aids.

Students hear their instructors' lessons in crystal-clear audio using their mobiles as receivers. (This minimises the health risk that shared equipment poses in the context of COVID-19.) Research shows that this BYOD approach offers educational benefits including **increased engagement and reduced anxiety**.¹³

Benefits for faculty and staff

Professors using assistive listening over Wi-Fi can lecture with full confidence that **all students are hearing critical lesson points and can fully participate in discussions**. This also frees instructors to eschew formal classrooms and use alternative learning spaces: student-union lounges, small performance areas, even outdoors on the university quad, with proper preparation!

AV managers have little to worry about with assistive listening over Wi-Fi: The systems are **easily scalable and integrate readily** with existing AV.

Similar benefits apply for IT supervisors. Barring Wi-Fi or power outages, the system should run unimpeded. Performance adjustments for optimal latency and bandwidth can easily be made as needed using a software-based manager—but in many ways, it's a set-it-and-forget-it proposition in terms of deployment, management and troubleshooting.





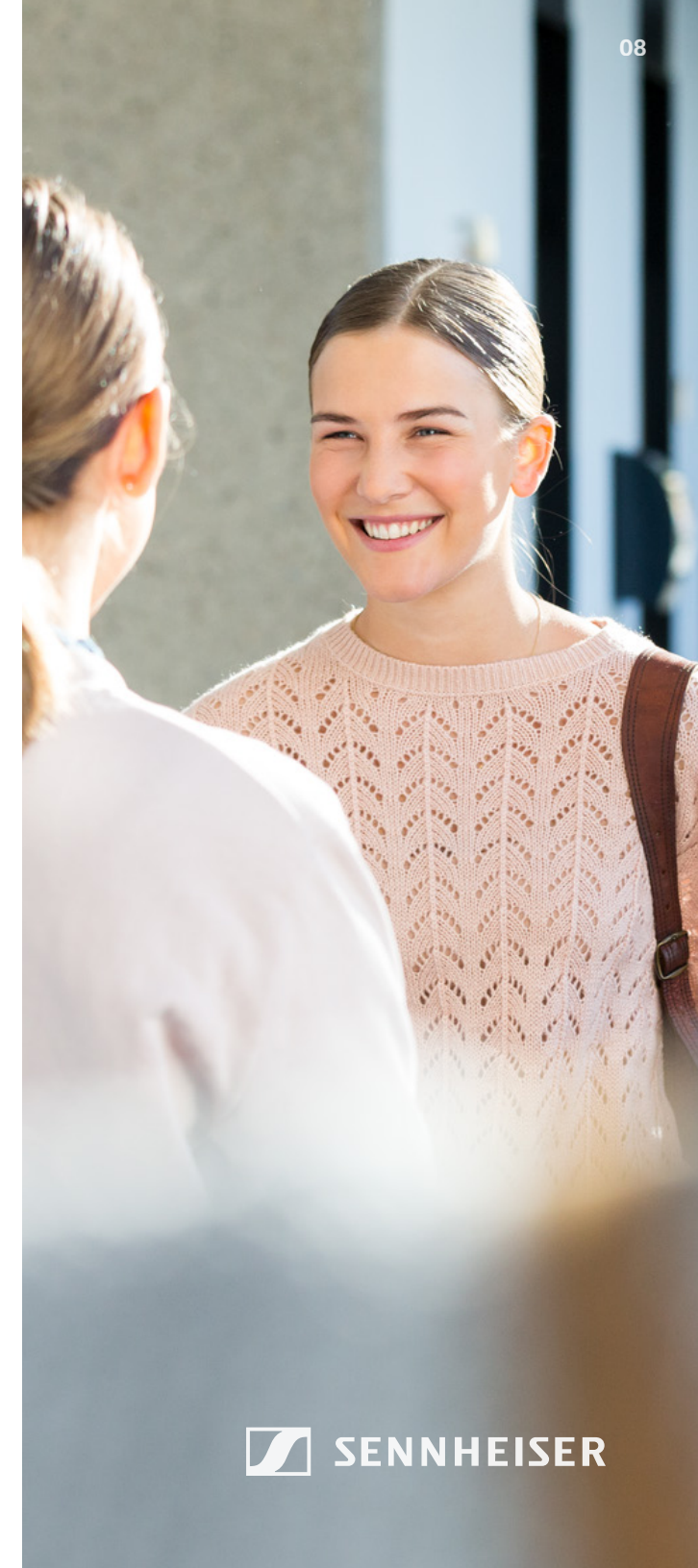
The potential for long-term advantages

The real impact of assistive listening over Wi-Fi is far greater than its immediate benefits.

Universities' diversity and inclusion directors can have the confidence of knowing that cutting-edge assistive listening technology makes the classroom experience so much more **rewarding for hearing-impaired students on multiple levels**. Giving aid and comfort to students in this way exemplifies the essence of what inclusion directors do.

Meanwhile, senior leadership — deans of students, chancellors and so on — can enjoy pragmatic advantages, such as **low cost of installation and maintenance of the Wi-Fi-based technology** (and minimisation of touch-based health risk).

Further, the school's development of a good reputation for excellent assistive listening accommodations can **boost enrollment of hearing-impaired students**.



Sennheiser delivers assistive listening excellence with **MobileConnect**

MobileConnect from Sennheiser is the **definitive assistive listening over Wi-Fi solution for the campus infrastructure of modern universities.**

Students hear lecture audio using the MobileConnect app, with up to two classroom sessions broadcast simultaneously from the system's station.

Unique QR codes grant access to class sessions, ensuring security.

The MobileConnect app allows students to adjust the audio settings to suit their individual hearing needs.

The system's low-latency audio routinely stays **at or below 50 milliseconds**, even when handling up to 100 simultaneous users. According to Cisco, this latency is below the threshold at which lip-sync breaks up.¹⁴

In a learning environment where digital transformation is as essential as meeting the needs of a highly diverse student body, **MobileConnect is a logical, advantageous choice.**

MobileConnect success stories & awards won



Christian-Albrechts-University

The AV responsables of the University of Kiel went looking for a system to transmit audio signals from one lecture theatre to another. Another aim was to use the new system to remove barriers for students and guests with a hearing disability. The University of Kiel opted for Sennheiser's MobileConnect system. It is easy to integrate into the existing Wifi and comes with an app that students can use on their own mobile device to receive the audio signal via headphones, their hearing aids or cochlea implants.

“We were all amazed by the app. It is completely intuitive in its use and allows everyone to **adapt the sound to their personal needs.**”

-Stefan Paeth
Specialist for event technology, University of Kiel, Germany



Royal Society of Medicine

The Royal Society of Medicine has a need for a high quality assistive listening system in a 300 seater auditorium – with an easy-to install set up that doesn't tamper with the existing infrastructure of the auditorium. Sennheiser MobileConnect has been installed. A completely flexible, easy-to install system for assistive listening over Wifi. It works on the Bring Your Own Device (BYOD) concept and can be integrated in the existing wireless infrastructure.

“Being the Royal Society of Medicine, we want to be more than just compliant with the Equality Act 2010, we want to show that **we're going the extra mile.**”

-Kevin McLoughlin
AV Manager, Royal Society of Medicine



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