Technical overview

AURACAST
A BLUETOOTH® TECHNOLOGY

An overview of Auracast™ broadcast audio

This document describes the new Bluetooth® LE broadcast topology with specific reference to Auracast™ applications.

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Bluetooth®

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1.0 Introduction

The Bluetooth® LE Audio specifications have been designed to support a whole new range of user experiences.After twenty years of successful audio applications supporting music streaming and telephony applications using A2DP and HFP, the new Bluetooth LE Audio specifications offer a new level of audio performance, as well as provide support for an exciting range of new audio use cases.

To support the many new features, Bluetooth LE Audio has been designed from the ground up. It is not an extension of Bluetooth Classic audio, but it rewrites the rulebook about how Bluetooth audio is implemented. For users, broadcast audio represents the biggest change since stereo replaced mono back in the early 1960s. To make the most of these new experiences, designers need to throw away many of their preconceived ideas about how Bluetooth audio has worked in the past and open their minds to a future of new applications.

Of the many capabilities it supports, the capability which will have the most impact is likely to be broadcast audio, where transmitters can broadcast audio to an unlimited number of receivers at the same time - an innovation which the Bluetooth SIG expects will be widely adopted in public spaces. Broadcast audio was initially designed to complement existing telecoil use cases for people with hearing hearing aids, but it has been enthusiastically supported by consumer electronics companies who see it evolving into and broad set of use cases where anyone can share music, access conference audio systems, hear public announcements, listen to audio from TVs in public spaces, help people hear better with enhance listening, and use audio in ways they have never been able to do before.

In this document, we focus exclusively on the new broadcast audio experience and the use cases of Auracast™ broadcast audio, a set of defined configurations of Bluetooth® broadcast audio designed both to promote deployment in public spaces and ensure the maximum degree of interoperability between Auracast™ compliant products'.

2.0 An introduction to Auracast™ use cases

Anyone who is used to Bluetooth® audio design will be aware of the constraints of Bluetooth Classic audio, where Hands Free Profile (HFP) and Advanced Audio Distribution Profile (A2DP)devices can only talk to other HFP and A2DP devices.

A phone, PC or TV acts as the audio source and the other device - an earbud, headset, or speaker - acts as the audio sink to render that audio. In the case of earbuds with Bluetooth Classic audio, proprietary extensions are used to render audio in both earbuds at the same time. Typically, only one earbud receives the Bluetooth audio signal, relaying it to the second earbud using a different radio. It works, but it can significantly increase the overall latency. With Bluetooth LE Audio, every earbud, speaker, and hearing aid now acts as an independent receiver, accepting the relevant audio stream, along with synchronization information about when to render that stream, so that the user always hears the left and right audio streams at exactly the same time. Now, your left earbud will only receive the left audio stream and your right earbud will only receive the right audio stream. They will also be able to render the audio much sooner than a current A2DP solution, as Bluetooth LE Audio has been designed to support lower latencies.

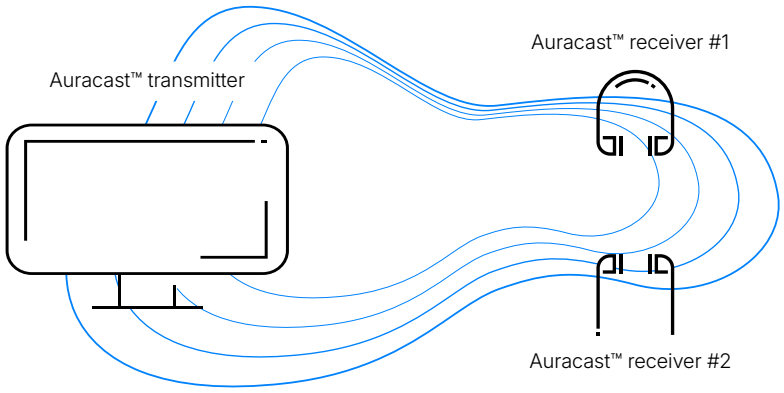

Figure 2.1: A simple example of Bluetooth LE Audio Auracast™ topology

2.1 Simple audio sharing

The simplest example of broadcast is sharing audio, which is illustrated in Figure 2.1, where two users are listening to broadcast audio from a TV. This example involves two of the components of the new Bluetooth broadcast topology, which are an Auracast™ transmitter and Auracast™ receivers[1].

1 The multiple levels of Bluetooth LE Audio specifications use a variety of different role names to describe how the various elements of the broadcast topology work. For ease of understanding, this document uses the three generic terms of Auracastr,.. transmitter, Auracast™ receiver, and Auracast™ assistant to describe both the devices and their operation roles.

Here, the TV is broadcasting its audio, a pair of earbuds and a set of headphones are receiving the same stereo stream. The TV may have the Auracast™ transmitter built into it, or the user may have plugged an Auracast™ transmitter adaptor into one of its audio outputs, converting an existing TV into a source of Auracast™ audio streams.

In this simple case, there is only one Auracast™ transmitter within range of the two listeners, so each of the Auracast™ receivers only needs to find that one audio broadcast. Their respective wearers will typically do that by pressing an Auracast™ button on their devices, instructing them to find and start rendering a broadcast stream.

Broadcasting audio from a home TV is likely to be one of the first use cases to appear on the market. However, personal music sharing from a smartphone is predicted to become an even more popular application where users share music and audio with their friends from their personal devices like a smartphone, tablet or PC.

2.2 Broadcasting to multiple users

The power of broadcast audio is that it is scalable, so many devices can listen to the same stream at the same time, as long as they are within range. That range can be surprisingly large, as the Bluetooth® LE Audio broadcast protocol maximizes the link budget between the Auracast™ transmitter and Auracast™ receivers. Typically, one Auracast™ transmitter can cover a medium-sized hall or venue.

Figure 2.2 shows one way that broadcast can be used in a larger space. Here, the Auracast™ transmitter is a microphone which has an integrated broadcast transmitter. At the bottom of the figure, we can see a number of Bluetooth® LE Audio devices which are being used by audience members to listen to the audio. These include headphones, pairs of earbuds, pairs of hearing aids, and one person (Auracast™ receiver #5) with a cochlear implant. All of them can hear the presenter, whose microphone is an Auracast™ transmitter. The number of Auracast™ receivers that can be supported is only limited to the number of people that can fit in the room.

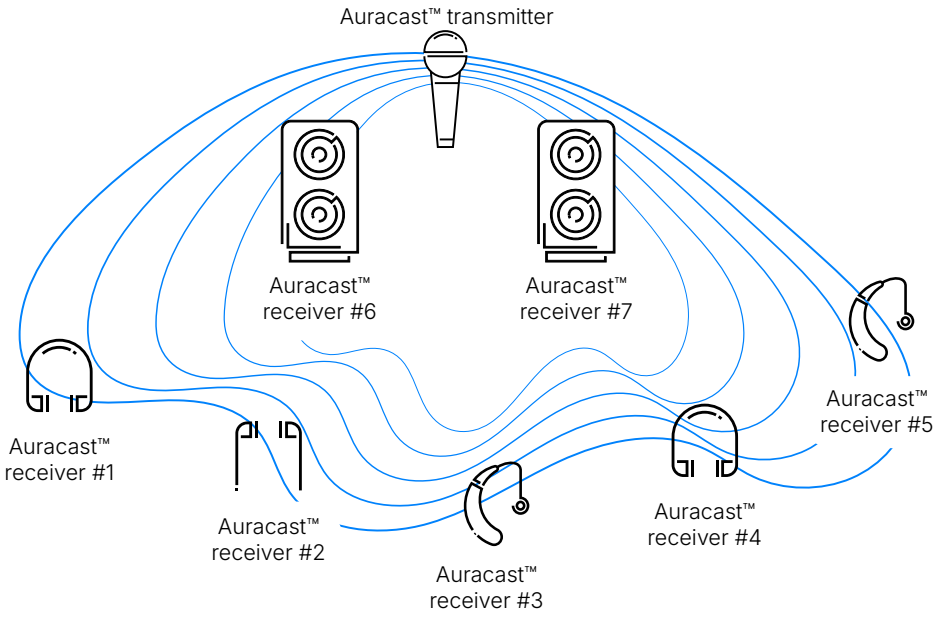

Figure 2.2: An example of Auracast™ usage in a public venue

An important feature of Bluetooth LE Audio is the new LC3 codec, which allows very low latencies to be achieved. This means there is no discernible delay between ambient audio and the sound rendered in the Auracast™ receivers. Therefore, a user with a single hearing aid or a singular cochlear implant (Auracast receiver #5 in this example) will not notice the difference between the ambient sound in their left ear and the Auracast™ stream in their right ear.

Another feature illustrated in Figure 2.2 is the use of Auracast™ broadcast audio for the PA system - the two speakers labeled as Auracast™ receivers #6 and #7. These speakers receive the same audio broadcast and provide an ambient audio output for audience members throughout the hall. The microphone, with its inbuilt Auracast™ transmitter, provides a very elegant and simple audio solution. In this example, the handheld microphone will only be transmitting a single mono stream, so all of the listeners' respective audio devices will render identical audio content.

2.3 Multiple Auracast™ transmitters

We can increase the number of Auracast™ transmitters. Figure 2.3 shows an example where there are three different TVs, each acting as independent Auracast™ transmitters, with their transmissions being received and rendered by a variety of different devices. This situation might be a sports bar or a gym where there are multiple screens showing different TV channels. In this case, the people in the room can listen to any of them using their headphones, earbuds, or hearing aids.

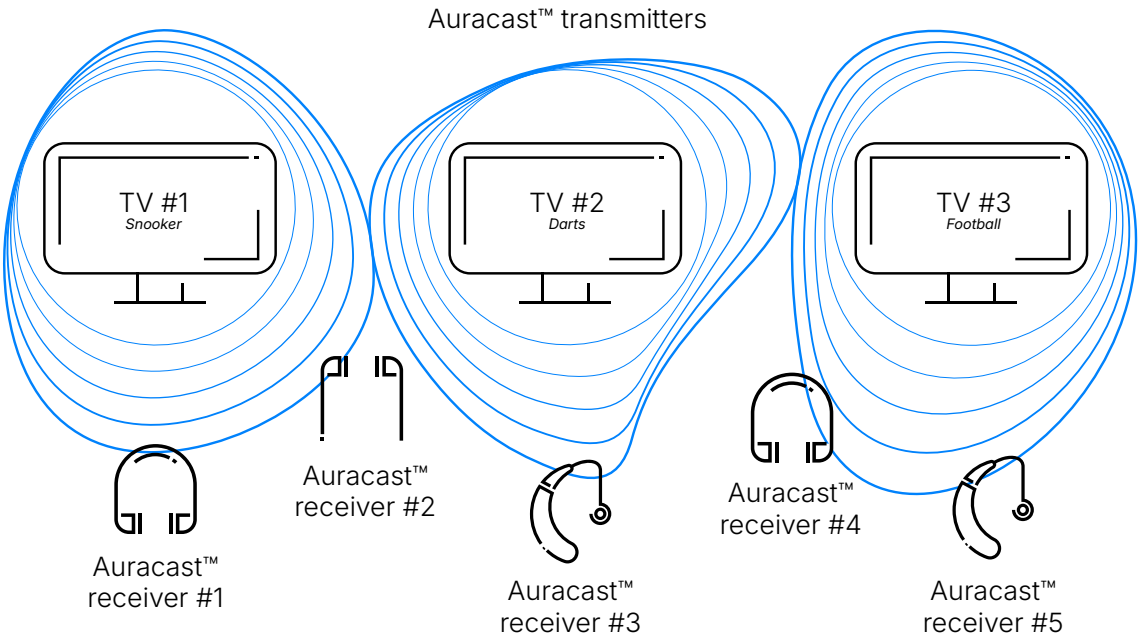

Figure 2.3: An example of multiple Auracast™ transmitters

The first two use cases we looked at in Figure 2.1 and Figure 2.2 may only need a very simple user interface on their Auracast™ receiver. As there was only a single Auracast™ transmitter within range of the Auracast™ receivers, each user could press or tap a button to instruct it to look for and connect to the single broadcast transmissions. However, for the example in Figure 2.3, listeners now have a choice of three or more different transmissions. It's possible that a user could keep on pressing the button on their device until they find the right Auracast™ transmitter, but that's a poor user experience which will get progressively worse as more Auracast™ transmitters are deployed and come within range. To cope with the expanding choices which users will face, the Auracast™ broadcast audio ecosystem has a third element, called the Auracast™ assistant, which helps users make a personal choice about which broadcast they want to hear.

The Auracast™ assistant's job is to look for all of the available Auracast™ transmitters within range and then present them to the user in a way that lets them make a choice. Auracast™ assistants will will normally be implemented on devices which have richer user interfaces than earbuds and hearing aids. Once a user has selected an available broadcast audio stream, the Auracast™ assistant instructs the user's Auracast™ receiver to start receiving the the audio from that transmitter. If the user is wearing a pair of hearing aids or earbuds, it tells each of them where they can find the appropriate left or right streams.

The Auracast™ assistant function can be implemented as an app on a smartwatch, smartphone, dedicated remote control, or any other device with a richer user interface. Figure 2.4 shows how it might look as a smartwatch app that detects the three TVs in Figure 2.3 above, which have been set by the venue owner to identify themselves as Snooker, Darts and Football. The user will scroll through the options until their choice is highlighted, then tap it to select it. As soon as they make the choice on their smartwatch, the Auracast assistant will instruct their earbuds or headphones to start receiving and rendering the appropriate Auracast™ streams from that TV.

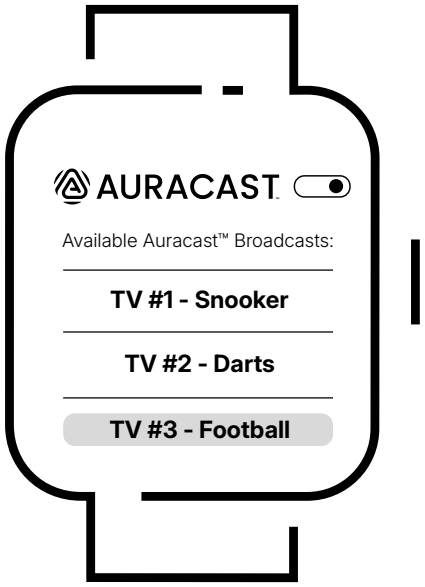

Figure 2.4: An Auracast™ assistant implemented as a smartwatch app

In this example, the venue owner would have configured the three TVs to identify the sport they are dedicated to showing, so the choice is very obvious. The identification string which the Auracast™ assistant displays will reflect whatever the owner has set up. It can be a TV channel name, specific program information, an airport gate number, airport gate number, a cinema film, etc. - anything that is relevant to help a user identify it[2].

Finding an Auracast™ transmission will be viewed by users as a similar process to finding a Wi-Fi access point. However, unlike Wi-Fi access points, which connect you to the same internet, each Auracast™

2 More sophisticated TVs can send further information about a current program extracted from their Electronic Program Guide.

transmitter provides a different audio stream, so it is very important to make it easy to connect to the right one. That's the reason why an Auracast™ assistant displays a name which means something to the user, as it helps to ensure they make the right choice each time.

2.4 The complete Auracast™ ecosystem

If we put all of this together, we see how the Auracast™ ecosystem is built up. In Figure 2.5, the three TVs showing Snooker, Darts, and Football are shown on the left. As well as continuously streaming their audio as an Auracast™ stream, they also advertise what they are and what they're doing, which includes the displayed names of Football, Snooker, or Darts that have been set by the venue owner. This is indicated by the dashed lines. An Auracast™ assistant (in this case the smartwatch) listens for these advertisements, which contain information about each Auracast™ transmitter. They pick out the human-readable portions of this information and display it for the user to make a choice.

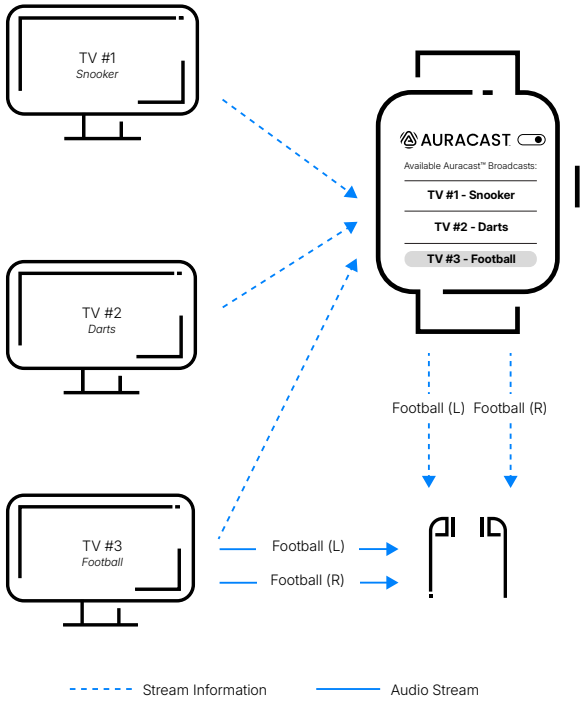

Figure 2.5: The Auracast™ topology for the sports bar example

In this example, the user has decided that they want to listen to the football match, so they select Football on their smartwatch. The smartwatch then separately tells the left and right earbuds where they can find the relevant Auracast™ stream and which part of it (i.e., the left or right audio channel) each earbud should render, which is represented by the two solid arrows. This highlights another difference from the example in Figure 2.3 where every Auracast™ receiver received the same mono audio stream from the microphone. There is intelligence in both the Auracast™ assistant and Auracast™ receivers to ensure each device always renders the correct stream. Once they receive this command, they can find and reproduce the appropriate audio stream.

An important point to note here is that the Auracast™ assistant takes no part in the audio stream. It neither receives nor transmits audio - it only deals with the information about the broadcasts. Once the Auracast™ receivers are told what to listen to, the Auracast™ assistant will normally stop looking for any more Auracast™ transmitters to conserve its battery life. It is only used at the point that a user wants to find out what is available and choose what to listen to.

3.0 Other Auracast™ features

As well as the topology and roles described above, there are some other important features of Auracast™ broadcast audio which developers need to know about to make the best use of its features. These include support for multiple different streams, flexible codec and latency configurations, and encryption of the broadcast audio.

3.1 Multiple audio streams

In the example from Figure 2.2, we assumed that the microphone would transmit a single, mono stream. In the other two examples, the TVs were assumed to be transmitting stereo streams. We may assume that everyone listening to the TV is listening to the same audio. This thinking and assumption replicates how developers think about what is available with the A2DP profile in Bluetooth® Classic Audio today. Auracast™ broadcast audio removes that limitation. Devices are no longer limited to transmitting a single stereo stream. With Auracast™ broadcast audio, an Auracast™ transmitter can transmit multiple audio streams at the same time. Examples may include alternate language, dialog enhancement, or other alternate audio programming available from the source.

This means that TVs can be designed to transmit program sound in multiple different languages in any mix of mono or stereo, limited only by the available radio airtime. The TV can also transmit a combination of stereo and mono, which is useful when there is a dialogue-boosted mono channel to help listeners with hearing loss. If you look at the audio options for today's video streaming services, you'll see that many of them come with multiple language streams. As an example of how the streaming industry is supporting this, most Amazon programs have a Dialogue Boost stream with audio tracks adapted for people with hearing difficulties[3] TV manufacturers can use the multiple audio channels of Bluetooth LE Audio to introduce TVs which can simultaneously support multiple Auracast™ streams for listeners wanting different languages or families where some of the listeners would appreciate a dialogue-boosted stream.

Figure 3.6 shows two examples of how this is likely to be used in the next generation of TVs. On the left, we have a TV that is transmitting two different language streams for the same program; in this case, one in English and one in Spanish. The two listeners can each listen to the language they prefer without disturbing anyone else around them.

On the right, the TV is using its internal speakers or a sound bar to provide the ambient soundtrack for the program. At the same time, it is also transmitting a hearing-enhanced Auracast™ audio stream for a user who is wearing a hearing aid. It solves a long-standing problem in many households where one partner develops hearing loss, resulting in a constant battle as one person keeps on turning the volume up with the other turning it down again. An added advantage is that each Auracast™ receiver, whether that's a pair of earbuds

3 For more details, see Amazon's blog Prime Video launches a new accessibility feature that makes it easier to hear dialogue in your favorite movies and series

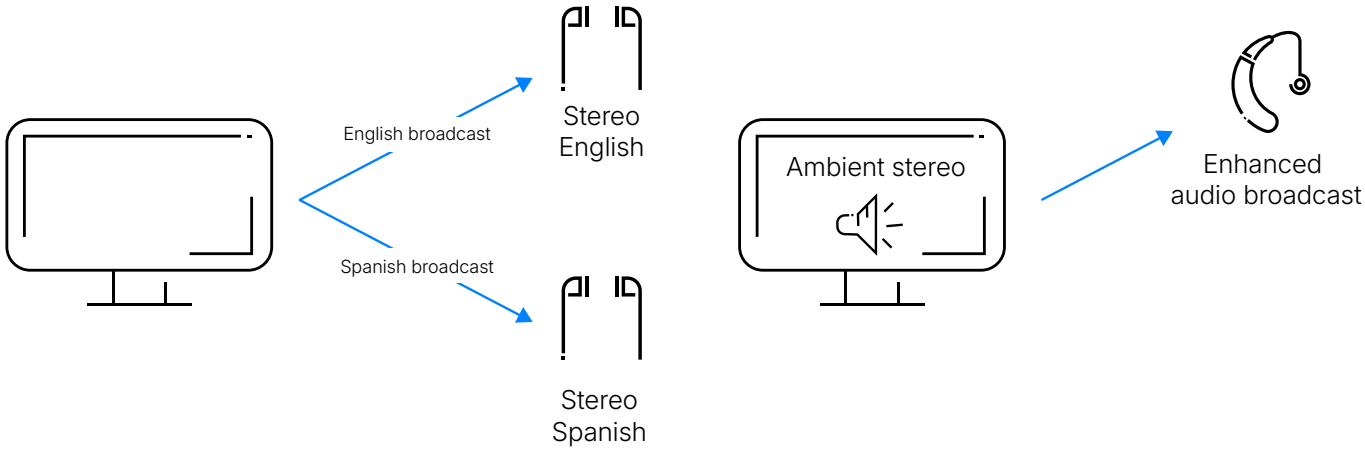

Figure 3.6: Examples of multi-stream operation in TVs

or headphones, can individually control its own volume, so everyone listening to the TV can set the volume to exactly what they need.

Bluetooth® LE Audio solves an additional problem that has limited the use of Bluetooth technology with TVs, which is reducing the end-to-end latency. The low latency of Auracast™ broadcast audio removes lipsync or echo issues so that a hearing aid or earbud wearer hears both the ambient stream and the Auracast™ stream at the same time. These enhancements provide a major step forward for the home TV experience, which TV manufacturers are embracing

3.2 Flexible codec and latency configurations

Bluetooth LE Audio utilizes a new, state-of-the-art codec called the Low Complexity Communications Codec (LC3). This codec allows Bluetooth audio applications to manage the Quality of Service and latency of the audio connection. All Auracast™ transmissions must support the Standard Quality4 configuration of the LC3, providing mono or stereo quality that is comparable to today's Bluetooth Classic audio experience. For the highest audio requirements, the performance can be increased to a High Quality[4] configuration, supplying exceptional audio quality to multiple Auracast™ receivers.

The Bluetooth LE Audio specifications allow Auracast™ transmitters to adjust the latency - the delay between the audio input at the Auracast™ transmitter and what a listener hears in their ears. Latency has always been an issue with wireless audio solutions, giving rise to echo and lip-synch issues. Bluetooth LE Audio has been designed to minimize latency with extremely low values possible, almost an order of magnitude lower than those commonly experienced with Bluetooth Classic audio. That allows listeners with a transparency feature, or open-fitting hearing aids or earbuds, to listen to both the ambient sound and the broadcast audio stream with no discernable delay between the two. For the first time, it is possible to listen to live audio using Bluetooth earbuds without any echo.

4 Standard and High Quality configurations are defined in the Auracast™ transmitter recommendations.

In larger venues, where the owners also use Auracast™ broadcast audio to feed audio to the speakers distributed around the space, they can fine tune the rendering time at each speaker to make sure they are exactly aligned with the ambient audio that you hear wherever you are in the venue.

3.3 Encryption

In most public applications of Auracast™ broadcast audio, there is no need for the audio streams to be encrypted, as the information is public. In the examples of the gym or the bar we used above, the audio is just associated with the TV and would be publicly heard by everyone if the speakers were unmuted. Auracast™ broadcast audio allows anyone to listen without bombarding everyone else with the sound of multiple TV speakers. The same is true for many other public information broadcasts, such as travel announcements, where the Auracast™ stream is repeating or reinforcing an ambient audio stream.

Equally, there are applications where the audio stream may be private. For our first example in Section 2.1, where two people were listening to their own TV, they would not want anyone else to be able to hear what they're listening to. As Bluetooth technology supports a wireless signal, which can go through walls, floors, and ceilings, their neighbors could potentially hear which channel they're listening to. For this reason, all Bluetooth LE Audio streams can be encrypted so that only authorized listeners can render them.

Users can use their Auracast™ assistant to obtain the necessary key to decrypt the audio streams, which is known as the Broadcast_Code. Well-established methods are likely to be the most popular, such as the one commonly used for Wi-Fi access points, where the code is an alphanumeric string. Venues using encrypted streams can print out the Broadcast_Code for users to enter into their Auracast™ assistant. They could also provide it as a QR code, which could be scanned by an app on a smartphone acting as an Auracast™ assistant. If a user purchases a ticket to an event, such as a cinema or theatre or entry to a sporting event, the Broadcast_Code could be included in the electronic ticket download. The Bluetooth LE Audio specifications define how the Broadcast_Code is transferred from the Auracast™ assistant to Auracast™ receivers which use it to decrypt the audio stream. However, the method of entering the Broadcast_Code is left to implementation.

Figure 3.7: The use of QR codes to enable encrypted audio for hotel TVs

A good example of where this is likely to be used is in hotel TVs - a use case that often results in problems because of the disturbance loud TVs can cause in adjacent rooms. Figure 1.7 shows the welcome screen of a hotel TV displaying the QR code for its Auracast™ streams. Once the user has scanned this with their phone, it will be applied automatically every time they use their Auracast™assistant to select the TV during their stay. Guests in neighboring rooms will not be able to eavesdrop on what you are listening to, nor will they be disturbed by loud TV programs.

The Broadcast_Code (the encryption/decryption key) can be static for life or changed on a regular basis. For the hotel room example, it would be different for every room and updated each time a new guest checks in. As with cinema and theatre tickets, it could be part of the booking or hotel loyalty app so that a guest's phone would be issued with the Auracast™ credentials along with their room entry key.

For home users, the usage model is subtly different. They will want their TV audio to be secured, but they will also want to allow friends to be able to listen as well. For a good user experience, the owners will not want to have to scan a QR code every time they turn their TV on.

The Bluetooth® LE Audio specifications make this easy by incorporating an Auracast™ assistant into the TV to automate a connection. Family members can associate their devices with the Auracast broadcast of their TV, and each time they come into the room, the TV will automatically send the current Broadcast_Code to their earbuds or hearing aids so that they can start listening whenever they want. When friends visit, they can be granted temporary access by asking the TV to display a QR code that they can scan with their own Auracast™ assistant.

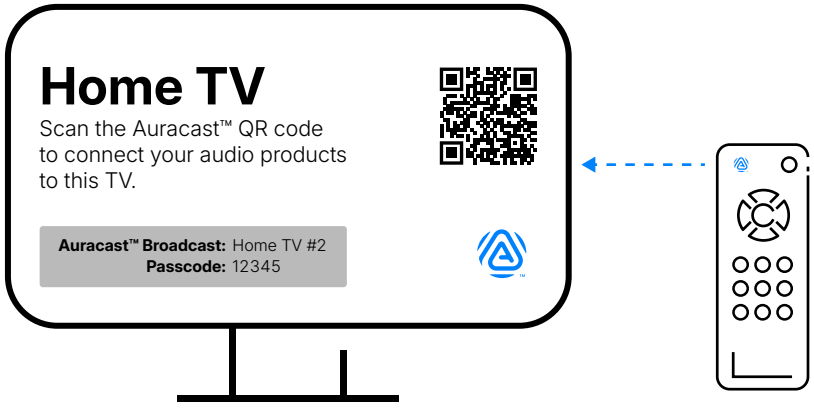

Figure 3.8: Tiered access for home TV usage

Figure 3.8 shows these two options, both of which would be accessible from the TV 's menu. To make it easy to give friends access, we're likely to see the appearance of an Auracast™ button on TV remote controls, which will instantly display a QR code for the current session.

For many applications where secure audio is required, the encryption key will automatically be changed each time the Auracast™ transmitter is turned on or off. For a personal TV, that may be several times per day. In a business meeting room, that would be every time a new meeting is started. This ensures that unauthorized people can't listen in to someone else's conversations, making the Auracast™ stream secure for any application.

The same principle applies to the other major use case of Auracast™ broadcast audio, which is sharing music from your phone or tablet. In normal use, most phones will use unicast for personal listening but also give users the ability to change to Auracast™ broadcast audio to share the music with friends. All they would need to do

Figure 3.9: An example of a music-sharing app on a smartphone

is ask their audio application to switch to Auracast™ broadcast audio, which would replace the unicast stream with a broadcast one and display a QR code on the phone's screen. Figure 3.9 gives an example of what this might look like on a smartphone app.

Any friend wanting to listen to your music would just need to scan the QR code to gain access to the audio stream, which would include the necessary Broadcast_Code to decrypt it. As many friends as you want can join in - they just need to be within range. If one of them wants to take over with their preferred stream, they just need to select a share my music function, displaying a QR code on their phone for anyone who wants to listen to them. In this use case of music-sharing, friends can move can move fluidly between multiple different Auracast™ groups as they desire.

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4.0 Form factors

We've already introduced some functionality which is different from what is expected in traditional audio applications. That's just the start of the possibilities that arise from Auracast™ implementations, especially when we add in the power of Auracast™ assistants. The Bluetooth® LE Audio specifications should be viewed as a toolbox for audio, allowing a far wider range of possibilities than has ever been possible before. Here, we'll look at a few examples of what that means for product designs.

4.1 Auracast™ receivers

Auracast™ receivers are probably the most obvious devices, as products which render audio are already well known. They are mostly devices that render sound directly into our ears, such as hearing aids, earbuds, and headphones or devices that amplify sound within a larger space, i.e., speakers and soundbars. The broadcast nature of Auracast™ broadcast audio will open up new opportunities for infrastructure speakers and PA systems where we are likely to see enormous uptake for devices like ceiling speakers and small PA speakers, removing the need for audio cabling.

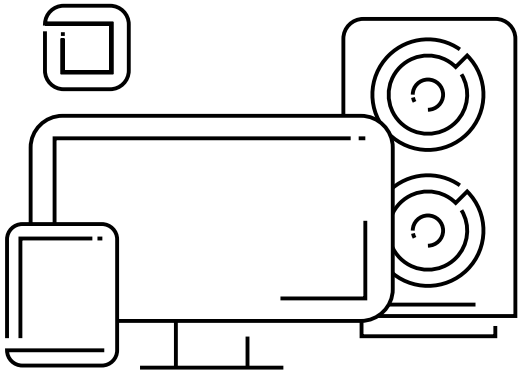

Figure 4.10: Examples of products that add Auracast™ capability to existing audio sources

4.2 Auracast™ transmitters

Auracast™ transmitters provide the broadcast audio streams. Many will be exactly the same as the devices that supply audio today - TVs, smartphones, PCs, tablets, and A/V systems. These will be joined by a wide range of infrastructure transmitters, which will evolve from today's telecoil loop transmitters as Auracast™ broadcast audio opens up new audio opportunities to everyone.

Many of these will be audio sources for public information with applications for public transport information, bus and train times, and flight gates. We expect them to appear quickly in public infrastructures, as well as be fitted into the transport itself, whether that's a bus, train, or taxi. Smaller,

encrypted units will appear at reception desks, ticket offices, and banks, letting people with hearing loss communicate more easily. We'll also see them appearing in theatres, offices, and conference venues to provide audio access to large audiences.

While many companies are working on integrating Auracast™ transmitters into their future products, many users and companies will want to upgrade their existing A/V equipment earlier than that to support Auracast™ transmissions. This opens up a market for Auracast™ adapters which can plug into existing audio output ports to add Auracast™ functionality. Figure 4.10 shows two examples of these products - one with a USB interface, which can be plugged into existing phones and PCs, with the larger one accepting standard audio inputs from the rear of a TV or other A/V system. These are equally applicable in the home, office, or public venues, letting users upgrade their existing equipment at minimal cost.

Auracast™ broadcast audio also opens up opportunities to add broadcast audio to products which have not traditionally been wireless. We saw one of these above, which is the microphone with an integrated Auracast™ transmitter. This is ideal for meetings when there is a single speaker, as no other audio equipment or wiring is required to provide wireless audio for an audience. It's also great for silent discos and dance parties. The same technology in slightly different form factors, such as table or lanyard microphones, is also .AURACAST invaluable for hearing aid wearers, helping them to pick up the conversations they need.

Figure 4.10: Examples of products that add Auracast™ capability to existing audio sources

4.3 Auracast™ assistants

The most interesting opportunity for new form factors comes with Auracast™ assistants, which can be totally new devices. In time, this functionality will appear in smartphones and smartwatches, as illustrated in Figure 4.11. It will take time for smartphones and smartwatches to integrate this native functionality, and, for many users, it may not be the optimum product to control their audio.

The Bluetooth® LE Audio specifications allow designers total freedom to integrate the Auracast™ assistant functionality into any product they want. Figure 4.12 shows three examples of how the functionality can be implemented, showing the integration of an Auracast™ assistant into a battery box of a pair of earbuds, a simple keyfob device, and a credit-card sized display that can easily be attached to a lanyard for conferences or hospitality events.

The options for implementing Auracast™ assistant are endless, giving enormous flexibility to product designers to adapt the form factor and functionality to whatever is best suited to their target market or service model. In Figure 4.12, the two devices on the right can be very simple implementations of an Auracast assistant, yet would be compatible with any Auracast™ receiver. It provides enormous scope for companies to develop innovative new products and user scenarios.

Figure 4.12: Example of different form factors to provide Auracast™ assistant functionality

5.0 Conclusion

The new Bluetooth® LE Audio broadcast capability which underpins Auracast™ broadcast audio offers a wide range of possibilities for designers of audio products and services. Over the past twenty years, Bluetooth® technology has brought wireless audio to over a billion users. With Auracast™broadcast audio, that number will continue to grow.

For the first time, audio can be shared using Bluetooth® technology; at a personal level with friends or as a social experience as multiple people share their love of music together. Auracast™ broadcast audio removes the barrier of one-to-one connections, which often isolates people from their surroundings, opening up the opportunity to interact in many different ways. It will transform the way audio products are designed, as well as the way we use them. By making high-quality audio available to everyone, it has the potential to impact hearing health, as technology and usage models are shared between the consumer audio and hearing aid sectors.

In the workplace and wider environment, the benefits of broadcast transmission that hearing aid users have enjoyed will become available to everyone, making our world more intelligible, both from more relevant information about our surroundings, as well as enhancing what we hear. It opens up new markets for audio infrastructure, where PA systems and ceiling speakers benefit from the ease of installation and configuration, and managed audio services become the norm in business and hospitality settings.

The first Auracast™ products are already shipping with many more manufacturers well advanced in their development. Now is the time to grasp the potential of this new technology which will radically change the the way people interact with each other and the world around them.

6.0 References

You can learn more about the details of how to design products in the accompanying guides published by the Bluetooth SIG. The following Auracast™ documents provide further overviews of how the Auracast™ ecosystem works and how to design compliant products.

1. Auracast™ simple transmitter best practices guide
2. How to design Auracast™ transmitters
3. How to design Auracast™ earbuds
4. How to design Auracast™ assistants

Version History

Version	Date	Changes
1	3 October 2022	Initial Version
2	8 January 2024	Update to the initial version. Includes updated guidance based on implementation feedback. Also includes guidance on installer and administrator configuration settings and documentation