A New Bluetooth® Audio Scan-to-Listen Experience

Over the last few years, we have seen a major resurgence in the use of the nearly forgotten QR code. During the pandemic, businesses around the world used the QR code to help us communicate during the peak of social distancing. Thankfully, the pandemic is over, but the use of QR codes persists as a seamless tool for everything from viewing restaurant menus to paying for goods and services. Now, they've found a new use, as scanning QR codes can help you find audio in public that you want to hear.

The proliferation of the smartphone being our predominant source of music has drastically changed our relationship with audio devices around us. The innate assumption that all audio should come through your smartphone has isolated listening into a solely personal experience. However, you may not be the only one wanting to listen to music, and you cannot share it with anyone else or listen to what your friends are hearing. Thankfully, all of that is changing.

Author: Market Development

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Table of Contents

A New Generation of Audio Innovation

Auracast™ broadcast audio is a new Bluetooth® capability that lets an audio transmitter broadcast audio to an unlimited number of receivers. A transmitter can be a smartphone, laptop, TV, or even a public address or sound system, and receivers are typically headphones, speakers, earbuds, or even hearing aids. Auracast™ broadcast audio will enable exciting new audio experiences, letting you share your audio with friends and family, unmute silent TVs in public spaces, and hear your best wherever you go.

- **Sharing Your Audio**: With Auracast™ broadcast audio, you will be able to invite friends and family around you to share in your personal Bluetooth audio experience. They will be able to find a broadcast (much in the same way we search for available Wi-Fi networks now) and join in.

- **Unmuting Silent TVs**: Many TVs in public spaces are often silent; you can watch, but you cannot hear the audio that accompanies what you see. Thanks to Auracast™ broadcast audio, you will be able to hear audio from silent TVs like those in airports, gymnasiums, waiting rooms, sports bars, transit centers, and other venues.

- **Hearing Your Best**: When visiting venues like conference centers, theaters, cinemas, lecture halls, places of worship, or airport terminals, Auracast™ broadcast audio will let you hear your best in these noisy spaces. Locations like these will add Auracast™ broadcast audio to their existing public address systems so visitors can hear high-quality audio using their listening devices. And if multi-lingual options are offered by a venue that supports Auracast™ broadcast audio, participants will be able to listen in their preferred language.
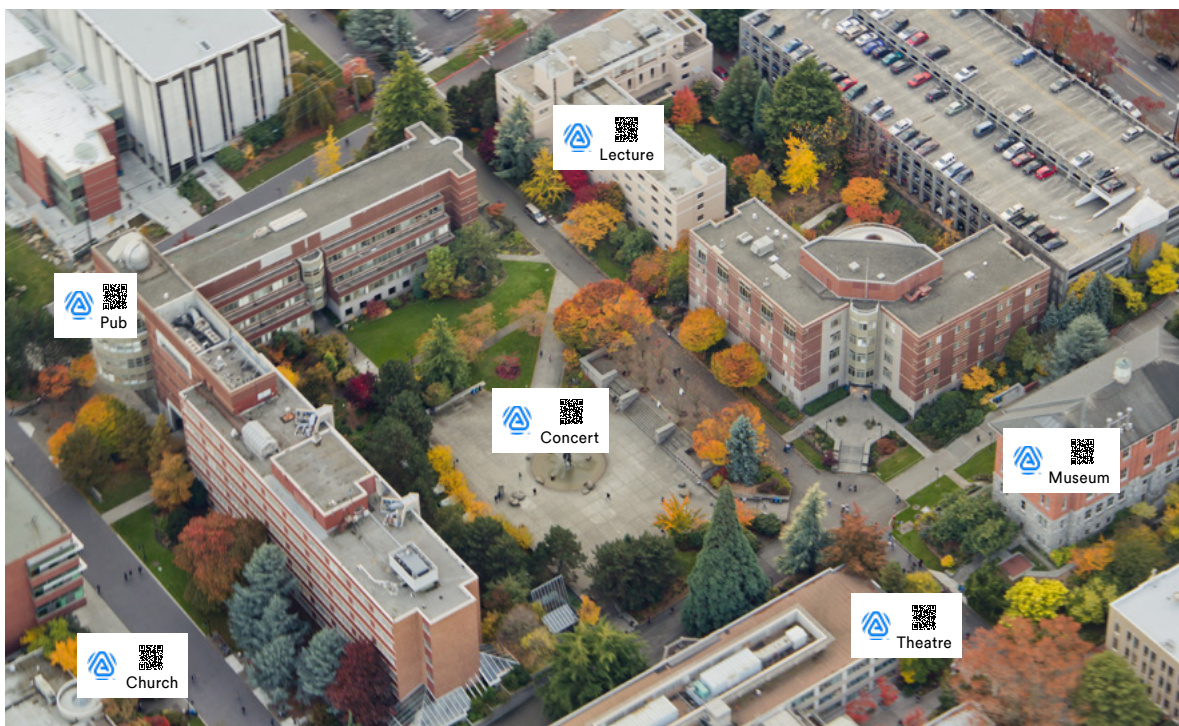
Auracast™ transmitters have a greater range than traditional Bluetooth audio connections. In most cases, a single transmitter will cover a complete venue, whether that's a small pub, restaurant, or concert hall. A recent demonstration in New York's Lincoln Center used a single Auracast™ transmitter, less than half the size of a mobile phone, to successfully cover all 1,085 seats in the Alice Tully Hall's auditorium.

Unlike previous Bluetooth audio solutions, your smartphone does not take part in receiving the Auracast™ audio. Instead, it acts as an assistant or remote control, letting you change between different Auracast™ transmitters whenever you want. At any point, you can stop listening to an Auracast™ broadcast to take a call or listen to an app on your smartphone or other device.

Multiple Auracast™ transmitters can coexist in the same location – all broadcasting different audio content. The Assistant app on your phone will show all of the ones around you and let you select the one you want to hear.

Helping Users Recognize and Access Content

Auracast™ transmitters can provide users with a lot of information about the audio content they are transmitting. This is contained within wireless advertisements that accompany the Auracast™ broadcast so that devices that want to receive the broadcast understand what it is and how it was encoded. These advertisements also contain human-readable data that can be displayed in apps on smartphones or smartwatches to help users make their decisions.

Typically, this information includes the name of the transmitter, the type of audio, the specific content (e.g., program or album title), and the language. Earbuds and other receiving devices can examine this to make simple choices, such as recognizing a favorite transmitter, program or language. Smartphone apps can also read this data (the specification calls this scanning) and display relevant information to help a user make an informed choice.

When you decide what you want to listen to, you simply select it, and the app provides your earbuds with all of the information they need to find and start rendering that stream.

The specification describes how the specific information for an Auracast™ transmitter can be described in a string of data, identifying a single set of audio streams from that transmission. That string of data can be represented by a QR code, or used for a near field (NFC) transmission, where you just need to tap your smartphone against a card reader. As soon as you do that, either with your smartphone or smartwatch, they automatically tell your earbuds, hearing aids, or speakers how to find that audio broadcast and start rendering it to your Bluetooth devices.

Auracast™ Applications in Typical Venues

There are a wide range of applications and use cases for this new Bluetooth capability (including use cases that have not yet been conceived), and we cannot possibly include them all. However, three ideal and, likely, soon-to-adopt examples include local bars/restaurants, museums, and public transportation hubs, such as airports and train stations.

A Local Bar or Restaurant

Let us imagine that you and your partner are out at your favorite bar or restaurant which has multiple, silent TV screens showing a variety of sports games or television programs. On the table or printed in the menu there are QR codes like the two shown below.

TV 1

TV 2

After you put in your earbuds and scan the TV1 QR code with an app on your smartphone, your earbuds will instantly pick up the commentary from the match. If your partner prefers the movie, they can scan the TV2 QR code to listen to the film. If you want to change audio streams, you simply need to scan the other QR code and your earbuds will switch to receiving the audio stream associated with that QR code.

A Museum

After spending some time at the bar, you and your partner decide to check out a new exhibit at a nearby museum. The same principle as with the bar can be used wherever there are location-specific audio streams. As depicted in the image above, specific exhibits and areas or rooms in the museum each display a QR code. By scanning the QR code with the app on your smartphone, you can access audio information about a specific piece or exhibit directly in your earbuds. This eliminates the need for venues to provide audio tour headsets. Any visitors can use their existing earbuds, hearing aids, or headsets to choose what they want to hear.

Public Transportation

After the museum, you and your partner decide it is time to head home. Fortunately, there's a bus stop not too far away. Using the app on your smartphone, you can scan the QR code posted at the bus stop to get updates about any changes/delays in bus schedules and/or routes. And, thanks to the efficient voice encoding of the LC3 codec, multiple languages can be supported by a single Auracast™ transmitter, providing this information in the language of your choosing.

In many countries, hearing accessibility is provided in buses, trains, and taxis using telecoils. These give hearing aid users the ability to hear the route progress or cab driver. Adding Auracast™ QR codes extends this functionality to anyone with an Auracast™ enabled earbud or hearing aid, bringing these advantages to everyone.

Auracast™ Ticketing Applications

Applications like those highlighted above are simple to deploy. All they need is for the venue to install the necessary number of Auracast™ transmitters, configure them with an installation app to set the relevant name for a customer to see, and then print out the QR codes. With a little more systems

integration, it is possible to further streamline the experience and use Auracast™ broadcast audio for theatre or travel tickets.

Auracast™ QR Codes on Theatre Tickets

Royal Academy Opera: Albert Herring

Thursday 14th March
7:00 PM

Venue: The Susan Sainsbury Theatre
Stalls B14
Full Price - £50

To show an example of how this can work, we mocked up a theatre ticket with an Auracast™ QR code.

The QR code combines both the ticket code, which can be read by the theatre, and the Broadcast Audio URI code, which your smartphone can scan to connect your earbuds or hearing aids to the performance's live stream. As the theatre will know all of the Auracast™ details in advance, they can be incorporated into your ticket at the point of download. The theatre is also likely to display the Auracast™ portion of the QR code at each entrance to the auditorium.

And there is a simple step to make it even easier. If you have an app on your smartphone for that theatre, and you prefer not to print the ticket, then your ticket download can contain both the QR code (which you show the usher) and the Broadcast Audio URI information that your smartphone can send directly to your earbuds, removing the need to scan a QR code. This requires a bit more work for the ticket app provider to transfer the information to the Bluetooth API within your smartphone, but that will happen as developers become more familiar with the capabilities of integrating Auracast™ functionality.

Accessing Auracast™ Broadcast Audio When Traveling

The same principle applies to travel tickets. When you download a boarding pass into your airline app, it will contain the internal Broadcast Audio URI information to connect your earbuds to flight-specific information, such as the departure gate and any messages about gate changes, boarding times, or delays. Apps should be able to integrate with other audio applications on your smartphone to allow these announcements to interrupt other audio streams.

Dynamic Auracast™ Applications

For many Auracast™ applications, the audio content is public and should be available to everyone at any time. Bars, restaurants, gyms, public TVs, transportation apps, etc. should allow anyone to find and join the broadcast. And though the content may change, these installations can use a static QR code that always corresponds to the audio stream from a specific transmitter.

However, there are other applications where a venue might want to restrict access to the audio or change who can gain access. Cinemas, theatres, and concert halls may wish to limit the broadcast to

paying audience members for a specific showing. Similarly, conferences and lecture halls may choose to restrict who can listen to the people in the room.

Auracast™ broadcast audio can support this by encrypting the audio broadcast, requiring any device that renders it to obtain a security code to decrypt it. The Broadcast Audio URI specification allows this to be embedded in a QR code or NFC transmitter so that scanning it provides all the information for your earbuds to start receiving and decoding an encrypted stream.

For many of these applications – such as business meetings, conferences, and lecture halls – this may change frequently as different sets of people use a room. In these cases, the QR code can be displayed on a screen, allowing it to dynamically update with each new use.

These applications can be further enhanced when combined with dynamic QR codes supported by Bluetooth® Electronic Shelf Labels. Electronic shelf labels (ESL) are small, battery-powered electronic displays that present information. ESLs use wireless technology to communicate with a central hub to form a dynamic automation network.

By using a Bluetooth® ESL solution, locations that support Auracast™ broadcast audio can manage rotating Auracast™ connections and passwords. Imagine going to see a movie and, just inside the auditorium door, there is a dynamic QR code that changes with every showing. By scanning the QR code for your showtime, you have access to the audio broadcast for only the movie you paid to see.

Banks and pharmacies, for example, could improve customer experiences by taking advantage of Bluetooth® ESL technology. Dynamic QR codes on countertops would allow you to scan the code and have a private conversation with the teller or pharmacist via an Auracast™ connection, using your Auracast™ earbuds or hearing aids. After your business is concluded, the QR code would change so the next customer is afforded the same level of privacy.

Personal Auracast™ Transmissions

Although your smartphone doesn't normally receive the Auracast™ audio stream, it can become an Auracast™ transmitter. This new feature lets you share your music with your friends. The upcoming generation of audio applications on smartphones will include an Auracast™ sharing option. Once you select Auracast™ sharing, your device not only starts transmitting your audio stream to your earbuds, hearing aids, or headphones, but it is simultaneously available on your friends' audio devices. Your device can also display a QR code so your friends can scan it to join in and listen to your music.

Unlike Auracast™ streams in public locations, personal audio, such as your smartphone or TV will encrypt the audio streams so that unauthorized users cannot listen to what you are hearing. The QR code shown in the illustration above includes that encryption code. When your friends scan it from your smartphone, their device will transfer it to their

← Now Playing

Dresden Dolls
Coin-Operated Boy

Scan to listen to Amy's audio

earbuds or speakers, allowing them to render your audio stream.

A similar approach applies to Auracast™ TVs. For example, imagine inviting friends over to watch a movie or see the big game. When you enable the Auracast™ feature on your TV, a QR code will appear on your screen. Your friends can scan it with their phones and listen in via the Auracast™ broadcast. Your TV app can also generate the same QR code on your smartphone or smartwatch, so your friends don't need to go up to the screen.

Each time the TV is turned off, or your device stops streaming, it can automatically select a different, random encryption code, keeping your audio secure.

Once you understand the concept, it becomes easy to envisage multiple applications that scan the Broadcast Audio URI information in a QR code to select or change the reception of an Auracast™ broadcast. It is a whole new paradigm where you point your smartphone at a QR code and audio starts playing in your earbuds, hearing aids, or headphones. Each time you scan a new code, you hear a new audio stream.

You can use this new Bluetooth® capability to listen to a friend's audio stream, as we described above, or to hear the sound from one of multiple video screens in a gym, bar, restaurant, or airport. If you are at the cinema, Auracast™ broadcast audio lets you select a different language soundtrack for the film, or, if you have difficulty hearing, you can select a specific enhanced audio track to make it more intelligible (generally by reducing the volume of the non-verbal sounds).

Limitless Possibilities

The examples described above only scratch the surface of how Auracast™ broadcast audio can be used to enhance your listening experience. Auracast™ QR codes in classrooms, conference rooms, meeting rooms, and lecture halls will give people the option to use their earbuds for secure listening. With Auracast™ broadcast audio, you can also set up instant silent discos or use an Auracast™ transmitter built into a personal microphone for calmer, quieter yoga and meditation classes. And this is just the beginning. The possibilities are endless.

Ultimately, the ability to use a QR code with Auracast™ broadcast audio will make it easier for you to choose what you want to hear. As new products come to market, Auracast™ broadcast audio will provide enormous scope for developers to devise completely new user experiences. So, next time you consider buying a new smartphone, TV, headset, hearing aids, or earbuds, look out for the Auracast™ logo, as it is the gateway to a whole new world of audio experiences.

To learn more about Auracast™ broadcast audio, visit bluetooth.com/auracast.