



Auracast™ Simple Transmitter Best Practices Guide

Technical Overview

This document provides recommendations to assist in the creation of uniform user experiences when designing and installing standalone Auracast™ transmitter products.

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1	3 October 2022	Initial Version
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1. Purpose of This Document

The purpose of this document is to provide guidance for developing, deploying, and documenting a simple, Auracast™ broadcast audio transmitter.

Broadcast audio is a new capability included in the Bluetooth® LE Audio set of specifications. It allows multiple devices, which can be earbuds, hearing aids, headphones, or speakers, to receive the same audio streams from a broadcast transmitter. These transmitters can support a variety of audio applications, ranging from low-latency voice to very high-quality music, as well as multiple concurrent audio streams in different languages. The broadcast technology is designed for both personal devices, such as smartphones, tablets, PCs, and domestic TVs, as well as public spaces, like theatres, cinemas, churches, and hospitality venues. Unlike the inductive loop systems currently installed for hearing aids, Bluetooth® LE Audio broadcast transmitters have the potential to bring a shared wireless audio experience to anyone with Auracast™ enabled earbuds or headphones.

To help ensure interoperability and a consistent user experience, the Bluetooth Special Interest Group (SIG) has created the Auracast™ brand program. This imposes certain requirements on broadcast audio devices, including selected audio stream parameters which are common to all products. Applying these requirements to broadcast audio devices helps ensure global interoperability between all kinds of rendering devices and both public and personal Auracast™ transmitters.

Careful consideration about the configuration and deployment of an Auracast™ transmitter is required to ensure the best possible user experience for visitors to a location. This document provides recommendations on settings to use when designing and installing an Auracast™ transmitter, as well as suggestions on the instructions to provide to the person installing the transmitter at a location.

Broadcast audio is a one-way process at the transmitter, which needs to make autonomous decisions, as it does not know how many devices are receiving its transmissions nor their capabilities. This document describes a variety of typical, qualified implementations of Auracast™ transmitters to help explain the decision process necessary to meet the Auracast™ broadcast audio requirements. It also provides recommendations for some simple Auracast™ broadcast audio transmitters, utilizing the Public Broadcast Source (PBS) role from the Public Broadcast Profile (PBP) specification [\[1\]](#).

This document is a tool which is dedicated to supporting broadcast of an audio input signal. There is no assumption made about the source of the audio signal (e.g., TV, A/V system, public address, live audio, etc.). It is assumed that the broadcast transmitter can be configured by a user, but no assumption is made on how this is done. For example, it may be by a Bluetooth® link to a phone app, a wired link, or an integrated user interface.

This document is not intended to provide an exhaustive description of the underlying Bluetooth® specifications used in the creation of Auracast™ products; rather the goal is to provide a set of clear, concise, and useful recommendations for product makers interested in building and deploying Auracast™ transmitter products.

1.1 Nomenclature

The Bluetooth® LE Audio specifications each ascribe different names for the roles taken by the three devices that comprise the Auracast™ ecosystem. To help readability, this document uses the generic, descriptive names of Auracast™ transmitter, Auracast™ receiver and Auracast™ assistant. These are used to describe both the physical devices and their roles. They are based on the definitions of roles in the Basic Audio Profile, but also encompass the roles identified in various higher level specifications which are listed below:

Name	Includes the role of	Specification
Auracast™ transmitter	Broadcast Source	BAP 2.2.2.1 [2]
	Public Broadcast Source	PBP 3.1 [1]
	Initiator	CAP 2.1.1 [10]
	Broadcast Media Sender	TMAP 3.5.2 [11]
Auracast™ receiver	Broadcast Sink	BAP 2.2.2.2 [2]
	Public Broadcast Sink	PBP 3.2 [1]
	Acceptor	CAP 2.1.2 [10]
	Hearing Aid	HAP 3.2 [12]
	Broadcast Media Receiver	TMAP 3.5.2 [11]
Auracast™ assistant	Broadcast Assistant	BAP 2.2.2.3 [2]
	Public Broadcast Assistant	PBP 3.3 [1]
	Commander	CAP 2.1.3 [10]

1.2 Terminology

Auracast™ defines two new terms, which in turn are based on definitions of Standard and High-Quality (SQ and HQ) streams in Sections 4.2 and 4.3 of the Public Broadcast Profile (PBP). As they are used extensively throughout this document, they are introduced here, along with relevant terminology defined in PBP and other Bluetooth® LE Audio specifications.

1.2.1 PBP Broadcast Audio Stream Quality

The Public Broadcast Profile defines two sets of Audio Stream configurations which are exposed in the Public Broadcast Announcement. They are:

1.2.1.1 Standard Quality Public Broadcast Audio

Standard Quality Public Broadcast Audio streams are broadcast streams which are transmitted using the LC3 codec [9] configurations that are mandatory for a Broadcast Sink to support in Table 6.4 of Basic Audio Profile (BAP) [2]. By limiting them to configurations which every Broadcast Sink must support, it ensures that Standard Quality Public Broadcast Audio streams can be received by every Broadcast Sink. Within Auracast™ documents, they are referred to as SQ streams.

These configurations include 16kHz and 24kHz sampling frequencies with 10ms frames, supporting both low latency and high reliability use cases. The 16kHz option would normally only be used for voice applications.

1.2.1.2 High Quality Public Broadcast Audio

High Quality Public Broadcast Audio streams are broadcast streams which are transmitted using the LC3 codec configurations that are defined in Table 4.2 of PBP. Support for these is not mandated in BAP or PBP, so some Auracast™ receivers will not be able to receive and render these streams. They are included to accommodate devices which wish to use the highest 48kHz sampling rate supported by the LC3 codec. These configurations use 48kHz sampling frequencies with 10ms frames, supporting both low-latency and high-reliability use cases. Within Auracast™ documents, they are referred to as HQ streams.

1.2.2 Auracast™ Transmitter Types

Auracast™ transmitters are classified in two categories based on the PBP Audio Stream category they support:

1.2.2.1 Public Auracast™ Transmitter

A Bluetooth® product capable of transmitting a PBP-compliant Standard Quality (SQ) audio broadcast and which is intended for deployment within a public venue, such as commercial public address (PA) systems, televisions, and audio streamers. A device claiming to be a Public Auracast™ transmitter must always transmit at least one Standard Quality Public Broadcast Audio Stream.

1.2.2.2 Personal Auracast™ Transmitter

A Bluetooth® product capable of transmitting a PBP-compliant audio broadcast which is intended for personal use, such as a smartphone, tablet, laptop, PC, home television, or home audio streamer, may be categorized as a Personal Auracast™ transmitter. Personal Auracast™ transmitters may default to transmitting a High Quality (HQ) Public Broadcast Audio stream but must allow the user to select a Standard Quality (SQ) broadcast audio stream so that they can be accessed by devices which are not capable of decoding and rendering a 48kHz sampled stream. This may be accomplished by changing to the lower sampling rates required for SQ or transmitting both HQ and SQ streams concurrently.

1.2.3 Auracast™ Encryption

Auracast™ broadcast audio uses the terminology Open and Closed to categorize devices which use encryption for their broadcast streams.

1.2.3.1 Open Auracast™ Streams

Open Auracast™ streams are not encrypted and do not require a Broadcast_Code to render the streams. It is recommended that Public Auracast™ transmitters are Open.

1.2.3.2 Closed Auracast™ Streams

Closed Auracast™ streams are encrypted and require a Broadcast_Code to allow the received stream to be rendered. Closed streams are typically the default for personal devices but may be used where access to a public stream needs to be limited to a specific area, such as adjacent conference rooms or screens in a cinema multiplex.

1.2.4 General Bluetooth® LE Audio Stream Terminology

The structure of broadcast streams is defined in the Bluetooth Core Specification [4]. Each audio stream is carried in a Broadcast Isochronous Stream (BIS) and collections of related BISes are assembled into subgroups within a Broadcast Isochronous Group (BIG). Each BIS will normally carry a single stream, for example, left, right, or mono. The subgroups, which are defined in BAP [2], are used to collect together related BISes, such as streams in different languages or different codec configurations. A BIG typically contains multiple BISes. Auracast™ receivers can decide which of these they wish to receive and ignore the rest based on their own configured preferences.

2. Auracast™ Transmitters

This section provides a brief summary of the intended functions of an Auracast™ transmitter and the recommended configuration settings that may need to be exposed to the end user or installer of a basic Auracast™ transmitter.

2.1 Physical Implementations

Auracast™ transmitters may be installed by people with a wide range of technical knowledge, from novice to expert. Manufacturers should design Auracast™ broadcast audio products with an understanding of the likely installer so that the end-user experience is the same when listening to an Auracast™ broadcast. A simple deployment or commissioning tool and a generic out-of-the-box configuration should include enough information to provide a consistent user experience for the intended audience, along with the ability to tailor it with minimal technical knowledge.

The physical form factor of an Auracast™ transmitter is independent from its function. The Auracast™ transmitter might be a dongle that is plugged into an audio source, such as a phone, tablet, or PC, or a small box connected with a cable to the output jack of a sound system or TV (examples of both are shown in [Figure 2.1](#)). It could equally be a System-on-Chip (SoC) or an embedded module integrating Auracast™ functionality within a consumer electronics device, such as a smartphone, television, or PC.

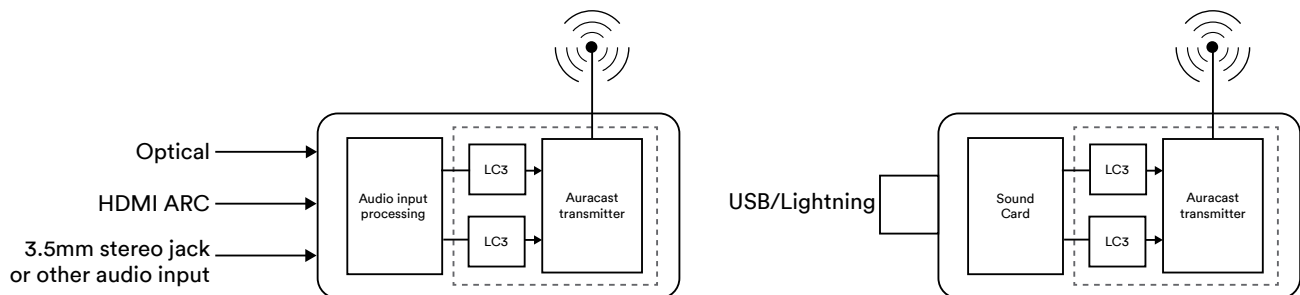


Figure 2.1 Examples of simple Auracast™ transmitters designed as adaptors or dongles

2.2 Required Support for Standard Quality Public Broadcast Audio

All Auracast™ transmitters are required to be able to transmit broadcast audio at 16kHz or 24kHz using the LC3 codec [8]. This is a requirement to comply with the Auracast Trademarks in the Brand Guide for Bluetooth Trademarks [3], which states that all transmitters must be configurable by the end user to broadcast a Standard Quality Public Broadcast Audio stream.

Additionally, if the transmitter is marketed as being intended for use within a public location (where “public location” means any public, private, or commercial venue, building, means of transport, or open space), the product’s default setting when configuring the product to transmit an Auracast™ broadcast must be to broadcast a Standard Quality Public Broadcast Audio stream.

The intent of both of these requirements is to increase the likelihood that all products capable of receiving Auracast™ broadcast audio will be able to do so, as some resource-constrained devices, such as hearing aids, may only be capable of receiving Auracast™ broadcast audio that is configured as a Standard Quality Public Broadcast Audio stream. In practice, what this means is, to support the broadest portfolio of receiver devices in a public location, a Standard Quality Public Broadcast Audio stream must be made available for all audio content provided through Auracast™ broadcast audio by the location. Because the transmitted Standard Quality audio stream packets are smaller, they will typically provide slightly better range and robustness to interference compared to High Quality (HQ) packets.

In contrast, personal Auracast™ transmitters may default to transmitting an HQ audio stream but are required to allow a user to select transmission of an SQ audio stream. If a standard-quality audio stream is selected for transmission, the decision whether the SQ audio stream is transmitted concurrently with a HQ audio stream, or is transmitted instead of a HQ audio stream, is determined by the manufacturer¹. It may also be user configurable.

2.3 Basic Advertising Configuration

All Bluetooth® LE Audio broadcasters use Extended and Periodic Advertisements to provide information about their broadcast streams. Their use for Bluetooth® LE Audio is described in BAP [2] and PBP [1], and is illustrated in Figure 2.2.

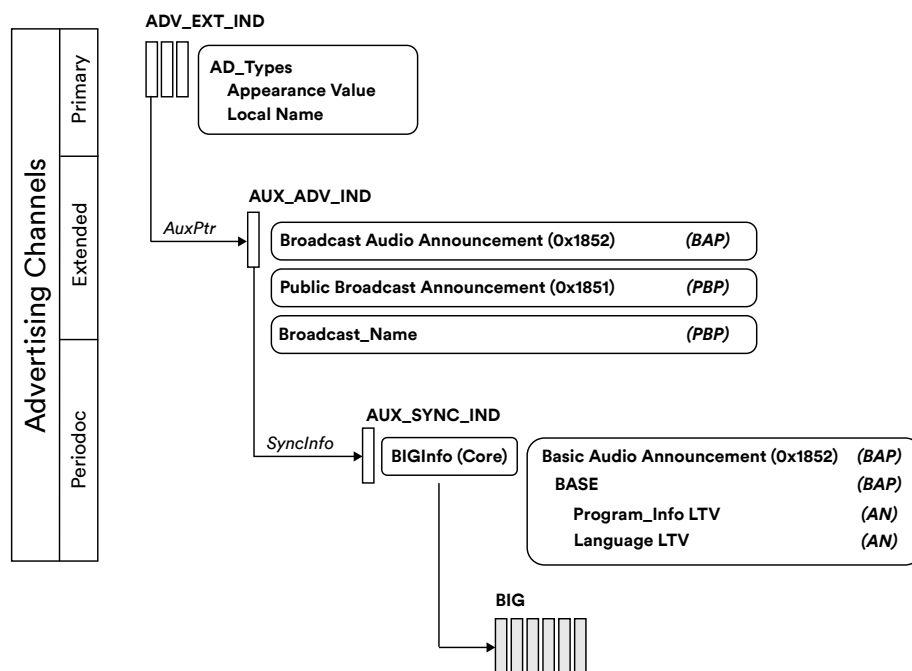


Figure 2.2 The location of Auracast™ broadcast audio related data in Primary, Extended, and Periodic advertisements

¹ Concurrent transmissions of multiple streams may have an impact on airtime requirements and may require the use of multiple BIGs.

For Auracast™ transmitters, the PBP specification mandates inclusion of the Public Broadcast Announcement within the Extended Advertisements that accompany an audio broadcast in addition to the Broadcast Audio Announcement. The Public Broadcast Announcement informs devices looking for broadcast audio streams whether the associated audio broadcast contains a Standard Quality audio stream and/or a High Quality audio stream.

The information in the Public Broadcast Announcement is used to assist devices in determining whether they should attempt to receive the associated periodic advertising data which gives them more information about the broadcast audio streams. If the stream is not relevant, typically because the rendering device does not have the resources to support an HQ stream, it can ignore it and move on to find the next available transmitter. This reduces the overhead associated with having to retrieve more detailed information from the periodic advertisements. It gives devices looking for broadcast transmitters the ability to restrict scanning to just the streams they want to receive. By reading the contents of the Public Broadcast Announcement, they can avoid streams which do not match their requirements.

2.4 Using Metadata

To provide a good user experience, it's important that Auracast™ transmitters provide enough information about their streams to allow them to be unambiguously identified by a user. This is achieved by adding human-readable text strings in the Extended Advertising data and Periodic Advertising data, using LTV² structures that are defined in the specifications. [4]

If metadata is applicable to all broadcast audio streams being transmitted, it should be included in the Extended Advertising data. Metadata that is specific to a subset of audio streams being transmitted, or which may change regularly, should be included in the Periodic Advertising data. The tables in [Section 2.5](#) show recommended settings for a public Auracast™ transmitter broadcasting a single Broadcast Isochronous Group.

2.5 Recommended Default Bluetooth® Settings

This section shows the recommended default Bluetooth® settings for an Auracast™ transmitter. These are defined in BAP [2] and PBP [1]. It lists the recommended data elements which an Auracast™ transmitter should include to ensure a good user experience and explains their usage. Each requirement is identified as being Mandatory (M), Recommended (R), Conditional (C), or Optional (O). Auracast™ receivers and Auracast™ assistants which are scanning for this information will expect the presence of items identified as Mandatory. In general, they will be able to provide an enhanced user experience if Recommended and Optional items are also present in the Auracast™ transmissions.

Some of these values are set automatically as a result of the BIG configuration; others may be set by

² LTV stands for Length | Type | Value, which is a standard way of structuring data. The allowable LTV structures for Bluetooth® LE Audio and Auracast™ applications are defined in the Assigned Numbers document [5].

the manufacturer or the installer or end-user, depending on the use case. It is useful for a customer if some of these are printed on a label on the Auracast™ transmitter, as users may need them to identify or configure the broadcaster. This is similar to the labelling on Wi-Fi access points and broadband routers.

Parameters identified as user-defined are expected to be set when the Auracast™ transmitter is commissioned using an appropriate user interface or application. They will normally be set to a default value at manufacture but may be overwritten by configuration applications when they are installed.

2.5.1 Auracast™ Broadcast Audio Related Data in Primary Advertisements

There are two AD Types which are normally used in all Bluetooth® devices in the primary advertisements. Primary advertisements are the advertisements that use the three fixed advertising channels of Bluetooth® LE, which also contain information about the existence and location of Extended and Periodic advertisements. For Auracast™ devices, the following recommendations for the standard AD Types apply.

AD Type	Defined in	Value	Requirement	Configurable	Description of usage
Local Name	CSS [4]	See description	R	O	<p>A user identifiable, unique name of the device, allowing the Auracast™ transmitter to be identified during processes like pairing, for example, AcmeCorp-A4F7X9. This is normally set by the manufacturer, but may be made configurable, allowing a user or installer to update it.</p> <p>Note that PBP Assistants use the Broadcast_Name for displaying available Auracast™ transmitters, rather than the Local Name.</p>
Appearance Value	Assigned Numbers [5]	0x0885	R	No	<p>The Appearance Value is intended to allow a user interface to select an appropriate generic icon to identify a device. 0x0885 is a generic broadcasting audio source.</p> <p>Other values may be appropriate for specific applications. For example, 0x0889 identifies an auditorium, 0x0040 a phone, 0x0881 a microphone, and 0x0A01 a television.</p> <p>The values for the Appearance Value AD Type are defined in the Assigned Numbers document [5].</p>

Table 2.1 Auracast™ broadcast audio related data in primary advertisements

2.5.2 Auracast™ Broadcast Audio Related Data in Extended Advertisements

The following Announcement UUIDs and AD Types are located in the Extended Advertisements. The tables in this section indicate elements of each which should be considered for an Auracast™ transmitter implementation, but is not exhaustive. Implementers must refer to the BAP and PBP specifications for a complete list.

2.5.2.1 Public Broadcast Announcement Service (Mandatory)

The Bit value in the Public Broadcast Announcement Feature parameter, defined in Table 4.1 of the PBP specification [1], reflects the codec configuration of the BIG that has been set in the Broadcast Audio Announcement, and the encryption status which is set in the BIGInfo.

Parameter	Requirement	Value	Feature	Description of usage
Public Broadcast Announcement Service Features [1] <i>(These bits are set by the system based on the configuration of the BIG)</i>	M	Bit 0	Encryption	Set to 0b1 if the BISes are encrypted and 0b0 if they are not. Note that all BISes in a BIG have the same encryption status. Either all are encrypted or none are encrypted.
		Bit 1	Standard Quality	Set to 0b1 if one or more of the BISes in the BIG are transmitted using the Standard Quality settings. Mandatory for public Auracast™ transmitters.
		Bit 2	High Quality	Set to 0b1 if one or more of the BISes in the BIG are transmitted using the High Quality settings.
Metadata	O	All LTVs described below are optional.		
Audio_Active_State Defined in Assigned Numbers Sect 6.12.6.10				The Audio_Active_State Metadata type is used to assist receiving devices in deciding when to synchronise to a broadcast audio stream. The Audio_Active_State Metadata should be included in the Public Broadcast Announcement in Extended Advertising data if the broadcast audio content is expected to be started or stopped on a regular basis. An example would be intermittent travel announcements at an airport or on a bus or train. If the broadcast audio stream is not regularly interrupted, this LTV should be omitted.

Broadcast_Audio_Immediate_Rendering_Flag	<p>The Broadcast_Audio_Immediate_Rendering_Flag Metadata type is used to inform receiving devices that rendering the broadcast audio prior to the value of Presentation Delay in the BASE may result in a better user experience. Because a broadcast transmitter sets a value of Presentation Delay that it expects every device is to be able to support, it may not be optimum, particularly if the listener can also hear audio from local speakers.</p> <p>Devices acting on the Broadcast_Audio_Immediate_Rendering_Flag will apply a shorter, manufacturer defined Presentation Delay value, reducing the overall latency, in the expectation of providing a better listening experience.</p> <p>The Broadcast_Audio_Immediate_Rendering_Flag should only be used where there is a concern that the streamed audio may arrive later at the listener's ear than direct sound propagated through the air, which could result in an annoying echo or comb filter effect.</p>
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Table 2.2 Auracast™ broadcast audio related data in Primary Advertisements in the Public Broadcast Announcement

2.5.2.2 Broadcast_Name AD Type

The Broadcast_Name AD Type is the primary human readable text string used to identify the broadcast transmitter in user applications. It may often be helpful to indicate the physical broadcasting device by making the Broadcast_Name string visible on the Auracast™ transmitter.

AD Type	Requirement	Value	Description of usage
Broadcast Name [1]	M	User defined	<p>The Broadcast Name should be set by the user when the Auracast™ transmitter is installed to describe its identity in a form that will allow users to recognize and select it. Examples are: Lou's Café, Conference Room A, Gate 41B, TV3. This information is used by Auracast™ assistants to identify nearby Auracast™ transmitters in their User Interfaces. Its usage is similar to Wi-Fi SSIDs, but the Broadcast_Name contains more relevant user information on the stream.</p> <p>It is strongly recommended that this parameter is made available for a user or installer to set to an appropriate name at installation, as described in the PBP specification. At shipment, the default should be set to the same as the Local Name.</p> <p>If multiple BIGs are transmitted by one Auracast™ device, the default values for each BIG should be distinguished by the addition of a separate identifying character. (e.g. TV3-SQ, TV3-HQ)</p> <p>If multiple transmitters are located in the same venue, carrying the same encoded audio content, they should use the same Broadcast_Name.</p>

Table 2.3 Format of the Broadcast_Name for Auracast™ transmitters



2.5.3 Auracast™ Broadcast Audio Related Data in Periodic Advertisements

2.5.3.1 Basic Audio Announcement

The Basic Audio Announcement (defined in Section 3.7.2.2 of BAP [2]) is transmitted in the Periodic Advertising Data. It includes the Basic Audio Announcement UUID, followed by the Broadcast Audio Source Endpoint (BASE) structure, which defines the structure of the Broadcast Isochronous Group (BIG), the arrangement of the individual Broadcast Isochronous streams (BISes) within it, and their properties. Examples of BASE structures are provided in the Appendix. The following table shows example values for some of the main fields in the Basic Audio Announcement data structure. The Level column refers to the feature's position in the BASE structure.

Feature	Level	Value	Requirement	Description of usage
Presentation Delay	1	40,000	M	Sets the Presentation Delay to 40ms, which is supported by all Auracast™ devices. If a lower latency is desired the Broadcast_Audio_Immediate_Rendering_Flag can be included in the Public Broadcast Announcement.
Codec_Specific_Configuration	2			
Sampling Frequency		See Table 2.5	M	A public Auracast™ transmitter must transmit at least one BIS with a Codec_Specific_Configuration that represents one of the 16_2_1, 16_2_2, 24_2_1 or 24_2_2 configurations from Table 6.4 of BAP. For a public Auracast™ transmitter, the default QoS setting is generally 16_2_1 for voice applications and 24_2_1 or 24_2_2 for music. See PBP [1] for more details. Personal Auracast™ transmitters may select a codec configuration for one of the 48kHz option specified in PBP.

Feature	Level	Value	Requirement	Description of usage
Number of Subgroups	2	Normally 1 or 2	M	
Number of BISes	2	Application defined	M	<p>Many Auracast™ applications will have only one subgroup with either a single mono BIS or two BISes representing left and right stereo streams. If a hearing enhanced mono stream is available, this should generally be transmitted as a third BIS, contained in a separate subgroup from left or right streams. At least one Standard Quality audio stream should be available for each independent audio input to the transmitter.</p> <p>Where both 24kHz and 48kHz audio streams are being simultaneously transmitted, these are enabled as separate subgroups, or as separate BIGs. The choice is largely dependent on the airtime requirements.</p> <p>The use of multiplexed streams is discouraged, as their support is not mandated in HAP or PBP and they will increase the power consumption of hearing aids and earbuds compared to using individual BISes for each stream.</p>
Level 2 Metadata	2			Level 2 metadata applies to all BISes in that subgroup.
Streaming_Audio_Contexts LTV		Application dependent	R	<p>If supported, this field should reflect the use case, which may be based on the implementation, the intended application, or be user configurable. Typical values are Live for microphone inputs, or Media where the audio is output with video, such as a TV, cinema, or is a music stream. In most cases, this will be selected at the initial commissioning, but more complex devices may set this automatically.</p> <p>Auracast™ transmitters designed for general purpose deployment may also use the Unspecified option.</p> <p>The values for the Streaming_Audio_Contexts LTV are defined in the Assigned Numbers document [5].</p>

Program_Info LTV		Application dependent	R	<p>If supported, this LTV provides metadata describing the current audio stream. It is often dynamic data which is updated by metadata in incoming content, for example, from a TV's EPG data. It may also be configurable by a user.</p> <p>The values for Program_Info LTV may differ across subgroups. For example, if two subgroups contain audio streams in different languages, this may be reflected in the language strings for the Program_Info LTVs.</p>
Feature	Level	Value	Requirement	Description of usage
Language LTV [5]		Application dependent	R	<p>This should be set to reflect the language, where that information is known. For simple Auracast™ transmitters, which only have an audio input, with no metadata to identify the language used, it can be omitted. The value applies to all BISes in that subgroup.</p> <p>The values for the Streaming_Audio_Contexts LTV are defined in the Assigned Numbers document [5].</p>
Codec_Specific_Configuration	3			
Audio_Channel_Allocation LTV		Implementation dependent	C	<p>Set to indicate at which audio location each stream is intended to be rendered. This is used by Auracast™ receivers and Auracast™ assistants to select the correct audio streams.</p> <p>In most Auracast™ use cases, the following values should be used:</p> <p>0x00000001 – Left (Front Left)</p> <p>0x00000002 – Right (Front Right)</p> <p>The Audio_Channel_Allocation LTV shall be present unless the stream is mono / unspecified, in which case no Audio_Channel_Allocation LTV shall be present in the Codec_Specification_Configuration at either Level 2 or Level 3.</p> <p>The use of multiplexed stereo streams is not recommended, as it results in unnecessary power consumption on Auracast™ receivers which only render a single audio stream.</p>

Table 2.4 Auracast™ broadcast audio related data in the Broadcast Audio Announcement and BASE

2.5.3.2 Codec Specific Configurations

A Public Auracast™ transmitter must transmit at least one BIS with a Codec_Specific_Configuration that represents one of the 16_2_1, 16_2_2, 24_2_1 or 24_2_2 configurations from Table 6.4 of BAP.

LTV Structure	16_2_1 / 16_2_2	24_2_1 / 24_2_2
Codec_ID (LC3 Coding Format)	0x06	0x06
Sampling_Frequency LTV	16000 kHz	24000 kHz
Frame_Duration	10 ms	10 ms
Octets_Per_Codec_Frame	40 octets	60 octets

Table 2.5 Codec Configuration settings for public Auracast™ transmitters

2.5.4 Broadcast_Code

If the Auracast™ streams are encrypted, the encryption bit of the Public Broadcast Announcement will be set, and a Broadcast_Code must be made available to users. The value of the Broadcast_Code for a public Auracast™ transmitter is generally static for the life of the device. For personal Auracast™ transmitters, the Broadcast_Code may be changed at the start of each new session, i.e., whenever the BIG is started. In this case a mechanism needs to be provided to communicate this change to the user's devices.

Public Auracast™ devices do not normally support encryption, in which case no value is set for Broadcast_Code.

Feature	Value	Requirement	Configurable	Description of usage
Broadcast_Code	Factory default	M for encrypted streams	R	<p>The factory default value of Broadcast_Code should be a unique string that a user can input into an Auracast™ assistant, comprised of between 4 and 16 characters. Recommendations on allowable characters are given in the Core Vol 3, Part C, Section 3.2.3.3. The Broadcast_Code should be different to any other password or access code used on the device.</p> <p>The Broadcast_Code may be a fixed string, supplied with the device, a user configurable string, or a code which can change with each session. The factory default value should be provided with the device.</p> <p>Personal Auracast™ devices are likely to change the Broadcast_Code on a per session basis. Where session based codes are used, a mechanism must be provided to inform the user of each new value. This is implementation specific.</p>

Table 2.6 Broadcast_Code requirements for Auracast™ transmitters

For most public Auracast™ transmitters, the Broadcast_Code is supplied to the user using an Out of Band method. This will often be accomplished by a public display of the code, which a user can enter using an application on an Auracast™ assistant, which will convey it to the Auracast™ receiver. An example of a simple, printed notice is shown below.

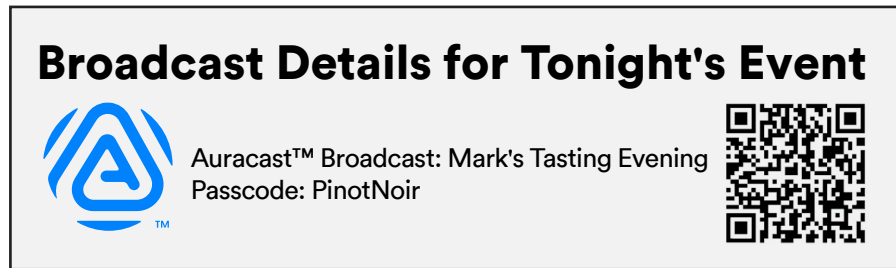


Figure 2.3 Example of a public Auracast™ broadcast audio notice with a Broadcast_Code

Auracast™ transmitter manufacturers should be aware of the constraints of Auracast™ assistants that are on the market in their intended sales geographies, which may have language specific input requirements.

2.6 Recommended Advertising Data Intervals

The advertising intervals used for Extended Advertising and Periodic Advertising should be chosen with regard to the speed of acquisition that best suits the use case. Setting the values too high will increase the time between advertisements, which may increase the time it takes for a device to discover and acquire a broadcast audio stream, causing it to expend unnecessary power.

For example, a personal Auracast™ transmitter, such as a phone, might be used to provide a shared audio experience to a small group of friends. In this use case, the acquisition time of the broadcast audio need not be immediate, as the phone owner can tell them that the transition to broadcast is in progress. Designers of earbuds, hearing aids, speakers, and headphones as well as Auracast™ assistants need to consider the user experience and how it will reflect these trade-offs.

In a typical use case, a receiving device using a scanning interval of 1.28s (the period between the start of consecutive scans), and a scanning window of 11.25ms (the length of the scan) should normally be able to acquire Extended Advertising data sent at 30ms intervals within 8 seconds with 95 percent confidence. The period and length of the scan used by the receiving device can have a significant impact on power consumption of the device and the transmitting device should attempt to provide this data as frequently as possible within its own power budget to both maximize the speed of acquisition and minimize the power consumption of the receiver. To preserve battery, scanning will normally only take place as a result of a user action, and should cease after 30 – 60 seconds, unless refreshed by the user.

[Table 2.7](#) shows recommended Bluetooth® settings for the broadcaster's advertising data. These settings help scanning devices discover the presence of Auracast™ broadcast audio streams in a timely manner.

Feature	Value
Extended Advertising data interval	30ms

Table 2.7 Recommended values for advertising the presence of a public Auracast™ transmitter

2.7 Additional Settings for a Public Auracast™ Transmitter

In addition to the information described above, [Table 2.8](#) shows recommendations for Bluetooth® LE characteristics for an Auracast™ transmitter. These characteristics, which are part of the Device Information Service (DIS) [9], enable a user to identify the transmitter for maintenance and commissioning. These are included as a reminder of good practice to help installers configure and maintain products and are not specific Auracast™ requirements. If the features in [Table 2.8](#) are made accessible through the Bluetooth® LE characteristics, it allows their use in diagnostic and configuration applications which may help the installer. These characteristics are defined in the Device Information Service [9].

Feature	Description	UUID ¹	Value	Printed on label	Configurable
Manufacturer Name String	Name of manufacturer	0x2A29	Product specific	YES	NO
Model Number String	Name of the specific model	0x2A24	Product specific	YES	NO
Serial Number String	Unique Serial Number	0x2A25	Product specific	YES	NO

1. UUIDs are defined in the Assigned Numbers document [5].

Table 2.8 General settings for a public Auracast™ transmitter

2.8 User Configurable Fields

It is good practice to protect any user configurable fields by implementing a username and password that needs to be entered to access the configuration utility before any changes to the settings can be made. This should be independent of the method used to access the configuration application, which may be a wired or wireless connection depending on the device implementation.

2.9 Advanced Design Settings for an Auracast™ Transmitter

This section discusses implementation decisions which should be considered during the specification and design of an Auracast™ transmitter.

2.9.1 Output Transmit Power Level

The transmitter should provide the ability to configure the output power level. At its simplest, the transmitter may provide a Low, Medium or High transmit power setting. This setting helps installers optimize the transmitter power for the size of the intended coverage area, good coexistence with other uses of the 2.4 GHz band (e.g., Wi-Fi networks) and any signal obstructions in the coverage area (thick walls, metal structures, water, etc.).

It is possible to design an Auracast™ transmitter that satisfies regulations worldwide to transmit at an output power up to +20 dBm. Care must be taken at both application and chipset level to comply with all applicable regulatory requirements for operation in the 2.4 GHz band, which differ between markets (North America, the European common market, Japan, China, etc.). For more information please refer to the [Bluetooth® Low Energy Regulatory Aspects Document \(RAD\)](#), published by the Bluetooth SIG.

2.9.2 Broadcast Audio Volume Level

Having a common reference level for the signal in an Auracast™ transmission is important to secure the best user experience when switching to Auracast™ streaming. The Auracast™ transmitter should therefore operate at the reference level which is a long-term average level of -35 dB FS, equivalent to 70 dB SPL and a maximum level of -3 dB FS. If needed, end users can adjust the personal volume level for their device, either directly on the device, or using a personal remote control or application.

These values are derived from the reference levels for inductive loop systems, EBU standards and comparisons to other input sources in hearing aids. The 70 dB SPL reference level at -35 dB FS means that levels up to 102 dB SPL can be transmitted in Auracast™ broadcast audio, which should be fine for most situations except live events where the SPL can go above 102 dB SPL. The LC3 [8] codec can handle a dynamic range of 115 dB because of the 24-bit internal signal representation in the codec, but if it is configured for 16 bits, the useful dynamic range will be limited to around 90 dB. Setting the reference level to -35 dB FS, while maintaining the -3 dB FS as the maximum allows transmissions up to 102 dB SPL while still maintaining a good signal to noise ratio.

In some use cases, it may be necessary to adjust the default audio reference signal level of the transmitter to a level other than 70 dB SPL to achieve optimum performance, but this will normally be limited to professional installations.

2.9.3 Handling Stereo Audio

Bluetooth® LE Audio was designed to minimize the power demands of hearing aids and earbuds so that they can maximize their battery life. An important factor in achieving that is that Auracast™ transmitters should only send them the data that they need to render. Where the Bluetooth® Classic A2DP profile transmits joint stereo streams to devices, Bluetooth® LE Audio can send independent left and right streams so that each earbud only needs to listen for a shorter amount of time. The Bluetooth® LE Audio specification allows a device to transmit a multiplexed stereo stream, but it is not mandatory for a BAP or PBP compliant receiver to be able to receive or decode it.

For this reason, Auracast™ transmitters should not transmit multiplexed audio streams as their only transmission.

Auracast™ transmitters should not assume that receiving devices are capable of performing stereo to mono conversion. This would require them to receive two audio streams and perform additional processing. As an Auracast™ transmitter will almost always have more resources, especially in terms of power, the Auracast™ transmitter should process the stereo stream locally and then transmit a separate mono stream. This means that any such transmission is only done once.

Depending on the application, Auracast™ transmitters may wish to include a configuration option to convert an incoming stereo signal to mono only, particularly if the intended recipients of the stream are hearing aids. Examples may be live audio at a lecture, conference room, or classroom.

2.10 Other Recommendations

This document covers the use case of individual Auracast™ transmitters. If Auracast Trademarks are publicly displayed, other recommendations and/or requirements may apply.

3. Considerations for Installer and Administrator

Product Documentation

This section includes guidance that a manufacturer may wish to include in their product documentation to guide administrators and installers through the commissioning process. It is not intended that these are reproduced exactly, but the areas described below should be covered to ensure the best user experience.

3.1 Locating the Transmitter

To provide your visitors with a good Auracast™ broadcast audio experience within the intended coverage area, it is essential to choose the best location for the transmitter. Please follow these basic guidelines when deciding where to place the Auracast™ transmitter:

- **Centralize:** Install the transmitter in a location that is as central as possible within the intended coverage area.
- **Height:** Install the transmitter in the highest possible location relative to the habitable area of the venue, ideally on a ceiling, lowest high beam, or high on a wall.
- **Avoid obstructions:** Install the transmitter in a location that is free from obstructions, such as beams, rafters, or other electrical equipment. Avoid installing the transmitter within enclosures such as cupboards, or behind metal partitions or counters.

3.2 Configuring the Broadcast Transmitter

To ensure the best visitor experience, please customize the following broadcast configuration settings:

- **Broadcast Name:** It is important to name the broadcast so that visitors can easily identify its contents and differentiate it from other broadcasts that may be available in the same area. This is normally achieved using a user configuration process or application which should be supplied with the Auracast™ transmitter. For example, if the transmitter is being used with a public television, the Broadcast Name should be set to help visitors identify it as TV audio as well as to identify the correct TV with which it is associated (e.g., “Strikers Pub TV1”, “Strikers Pub TV2”, etc.). If the transmitter is being used with a PA system in a hotel conference room, the broadcast name should help the user identify the correct room with which the broadcast is associated (e.g., “Hilton Ballroom Audio”, “Hilton Boardroom Audio”, etc.).

- **Broadcast Quality:** Auracast™ broadcast audio supports two audio quality levels, Standard Quality and High Quality. Not all receiving devices (e.g., hearing aids) can receive High Quality broadcasts. In public locations, the transmitter should default to Standard Quality. If the location wishes to promote the availability of Auracast™ broadcast audio, they are required to make available a Standard Quality version of any audio.
- **Broadcast Security:** Auracast™ broadcasts can be configured to be Open, where anyone with an Auracast™ receiver will be able to join, or Closed (encrypted), where visitors will be required to enter the Broadcast_Code string to join the broadcast. In situations where the transmitter is being installed in a public location, it is likely the broadcast will be configured to be Open and not require a Broadcast_Code. In those situations where the broadcast needs to be Closed, you will need to set a Broadcast_Code as well as implementing a method for the location to share the Broadcast_Code with authorized users. If registered as an Auracast™ location with encryption enabled, the Broadcast_Code should be displayed in a prominent location to help end users discover and join an Auracast™ broadcast audio stream.
- **Broadcast Range:** You can adjust the power level of the transmitter to adjust its coverage area. The higher the power level, the larger the physical area it will cover. The best practice is to set the power level to the lowest level that meets the intended coverage area. Determining the correct power level to use may take some experimentation. It is recommended that you start by configuring the broadcast to the lower power level and then use an Auracast™ receiver to walk throughout the intended coverage and test the audio quality. If the quality of reception is not sufficient, increase the power to the next higher level and retest the area. Continue this process until the audio reception is consistent throughout the intended coverage area. Be aware that the presence of people in the room and the location of the transmitter may affect the range, so repeat the coverage check when the room is being used or the transmitter location has changed. Placing the Auracast™ transmitter above head level will minimize this effect.

After installation and commissioning, the broadcast transmissions should be checked with earbuds or headphones. It is recommended that for installations where no speakers are included, regular checks should be made to confirm that broadcasts are available for public reception.

We hope these guidelines will help you provide the best possible Auracast™ broadcast audio experience for visitors to your location.

3.3 Location Registration

Once you have installed an Auracast™ transmitter for public use, you are encouraged to register the location with the Bluetooth SIG using the [Auracast Location Registration Tool](#). Registering your location will allow you to show your support of Auracast™ broadcast audio to the global community of consumers looking for audio accessibility and new audio experiences in public spaces. Locations that register will:

- Appear in an upcoming, consumer-searchable database of Auracast™ broadcast audio locations, managed by the Bluetooth SIG.
- Receive a welcome packet of brand resources for your location, including a window sticker for you to display.
- Gain additional access to the Auracast Trademarks and promotional materials. Stay up-to-date on necessary requirements to ensure global accessibility of Auracast™ broadcast audio.

The Bluetooth SIG encourages public locations who have completed the registration process and met the licensing requirements to use the Auracast Trademarks to promote the availability of Auracast™ broadcast audio at their locations, on their websites, and throughout their promotional materials.

4. Use of the Auracast Trademarks

Use of the Auracast word mark, figure mark, and combination mark (collectively, the Auracast Trademarks) is only permitted under license from the Bluetooth SIG. Licensees may use the Auracast Trademarks in association with products that have completed the Bluetooth® Qualification Process and indicated in the submission to the Bluetooth® Qualification Process that the products implement and meet the requirements for the Public Broadcast Source (PBS) role, the Public Broadcast Sink (PBK) role, or the Public Broadcast Assistant (PBA) role as defined in the Public Broadcast Profile (PBP) Specification.

The requirements of use for the Auracast Trademarks are located in the Brand Guide for Bluetooth Trademarks. This guide can be found on the bluetooth.com website:

<https://www.bluetooth.com/develop-with-bluetooth/marketing-branding/>

In addition to detailing the licensing requirements for using the Auracast Trademarks, the Public Location Brand Guide for Auracast Trademarks [7] also provides rules and guidelines when displaying the Auracast Trademarks at your location and in supporting promotional materials.

5. References

- [1] [Public Broadcast Profile, version 1.0 or later](#)
- [2] [Basic Audio Profile 1.0 or later](#)
- [3] [Brand Guide for Bluetooth Trademarks](#)
- [4] [Core Specification Supplement, version 10 or later](#)
- [5] [Assigned Numbers](#)
- [6] [Bluetooth® Core Specification, version 5.2 or later](#)
- [7] [Public Location Brand Guide for Auracast Trademarks](#)
- [8] [Low Complexity Communication Codec \(LC3\), version 1.0 or later](#)
- [9] [Device Information Service](#)
- [10] [Common Audio Profile](#)
- [11] [Telephony and Media Audio Profile](#)
- [12] [Hearing Access Profile](#)

6. Appendix – Configuration Examples

This appendix contains examples of the BASE structure within the Broadcast Audio Announcement (see [Section 2.5.3.1](#)) and Public Broadcast Announcements (see [Section 2.5.2.1](#)) for a variety of common Auracast™ transmitter implementations.

6.1 Single stream mono Auracast™ transmitter

This example is for a simple transmitter which has a single, mono audio input. A typical implementation is a broadcast microphone, which could be a handheld microphone with an integrated Auracast™ transmitter. The device and its BASE structure are illustrated in [Figure 6.1](#).

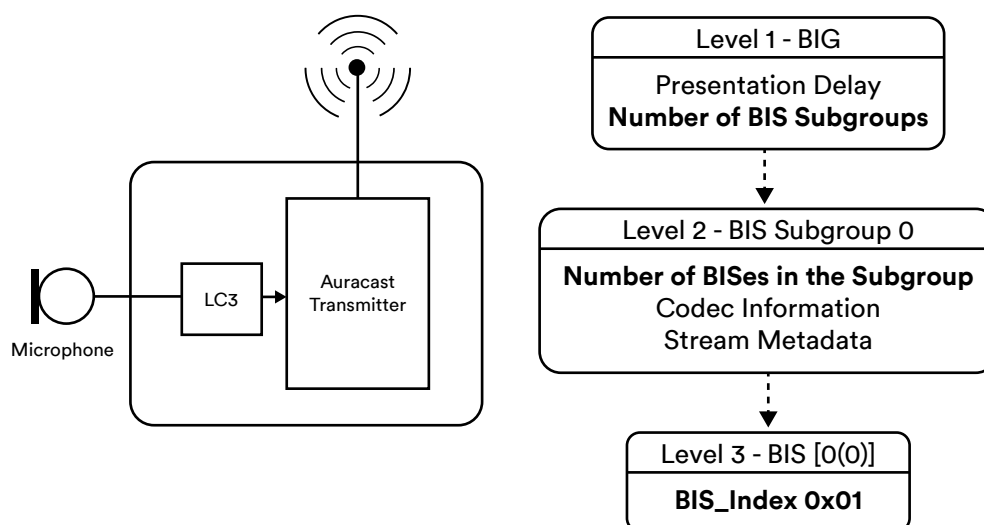


Figure 6.1 Example implementation and BASE structure for a mono Auracast™ transmitter

6.1.1 BASE for a single stream mono Auracast™ transmitter

The following table shows an example of a BASE for the single stream mono Auracast™ transmitter described above.

Level	Parameter	Size (Octets)	Value and Description
	Length	1	Length of Type and Value fields for AD data type: 0x1E = 30 octets
	Type: «Service Data - 16-bit UUID»	1	0x16 (Defined in Bluetooth® Assigned Numbers [5])
	Value		(2-octet Service UUID followed by additional service data)
	Basic Audio Announcement Service UUID	2	0x1851 (Defined in Bluetooth® Assigned Numbers [5])
1	Presentation_Delay	3	40 ms

Level	Parameter	Size (Octets)	Value and Description
1	Num_Subgroups	1	0x01: 1 Subgroup
2	Num_BIS[0]	1	0x01: 1 BIS in Subgroup[0]
2	Codec_ID[0]	5	Octet 0: 0x06 = LC3 Coding_Format Octet 1–2: 0x0000 Octet 3–4: 0x0000
2	Codec_Specific_Configuration_Length[0]	1	Length of the Codec_Specific_Configuration for Subgroup[0]: 10 octets – 0x0A
2	Codec_Specific_Configuration[0]	10	3 LTV structures for Subgroup[0] defining: LTV 1: Sampling_Frequency: 24000 Hz LTV 2: Frame_Duration: 10 ms LTV 3: Octets_Per_Codec_Frame: 60 octets
2	Metadata_Length[0]	1	Length of Subgroup[0] Metadata: 4 octets
2	Metadata[0]	4	1 LTV structure for Subgroup[0], defining: LTV 1: Streaming_Audio_Contexts [0x02]: Live 0x0040
3	BIS_index[0[0]]	1	0x01

Note that there is no Audio_Channel_Allocation LTV structure in the Level 2 or 3 Cocec_Specific_Configuration, as the stream is Mono.

Table 6.1: BASE entries for example of a mono Auracast™ transmitter as shown in [Figure 6.1](#).

6.1.2 Public Broadcast Announcement

[Table 6.2](#) shows the values for the Public Broadcast Announcement for this example, which is transmitted in the Extended Advertisements.

In this example, the optional metadata includes the Broadcast_Audio_Immediate_Rendering_Flag, which informs Broadcast Receivers that they can ignore the value of Presentation Delay if they are able to render the audio earlier.

Parameter	Size (Octets)	Value	Description
Length	7	0x07	Length of Type and Value fields for AD data type
Type: «Service Data»	1	0x16	16 bit UUID Service Data [5]
Value			2-octet Service UUID followed by additional service data

Parameter	Size (Octets)	Value	Description
Public Broadcast Announcement Service UUID	2	0x1856	Defined in Bluetooth® Assigned Numbers [5]
Public Broadcast Announcement features	1	0x02	Bit 0 = 0b0 (Not encrypted) Bit 1 = 0b1 (Standard Quality present) Bit 2 = 0b0 (High Quality not present)
Metadata_Length	1	0x02	Length of the Metadata field
Metadata	2	0x01 0x09	LTV structure defining: LTV 1: Broadcast_Audio_Immediate_Rendering_Flag (0x09)

Table 6.2: Advertising data format for the Public Broadcast Announcement shown in Figure 6.1.

6.2 Stereo Auracast™ Transmitter

This example is for a Auracast™ transmitter in the form of a dongle which transmits a stereo signal as two separate BISes – one for left and one for right. It could be plugged into a phone or PC to provide a stereo broadcast stream. The device and its BASE structure are illustrated in Figure 6.2.

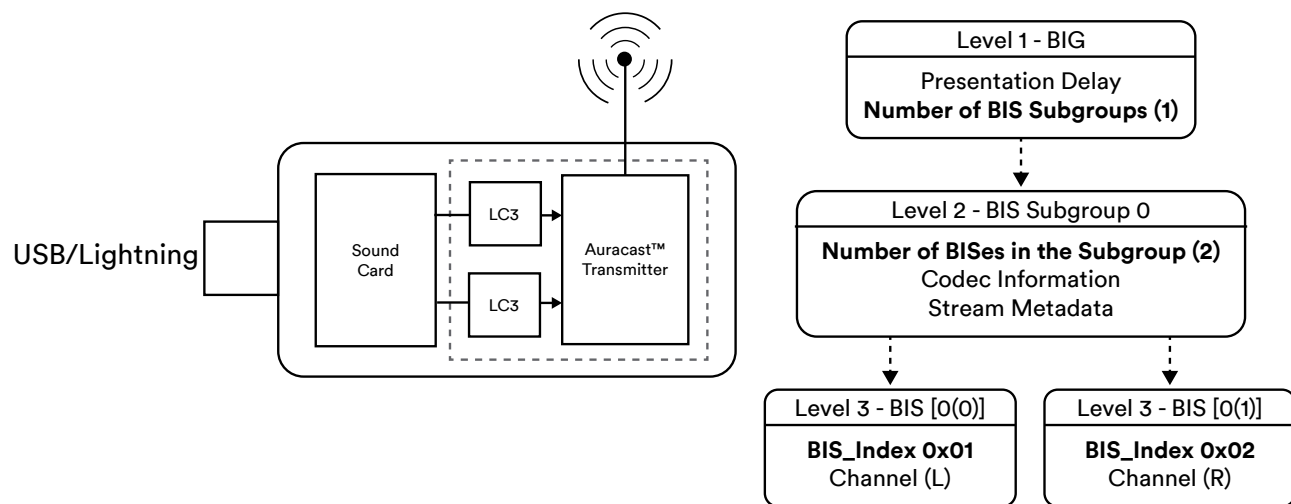


Figure 6.2 Example implementation and BASE structure for a stereo Auracast™ dongle

6.2.1 BASE for a Stereo Auracast™ Transmitter

The following table shows an example of a BASE for the stereo stream Auracast™ transmitter described above.

Level	Parameter	Size (Octets)	Value and Description
	Length	1	Length of Type and Value fields for AD data type: 0x2D = 43 octets
	Type: «Service Data - 16-bit UUID»	1	0x16 (Defined in Bluetooth® Assigned Numbers [5])
	Value		2-octet Service UUID followed by additional service data
	Basic Audio Announcement Service UUID	2	0x1851 (Defined in Bluetooth® Assigned Numbers [5])
1	Presentation_Delay	3	40 ms
1	Num_Subgroups	1	0x01: 1 Subgroup
2	Num_BIS[0]	1	0x02: 2 BISes in Subgroup[0]]
2	Codec_ID[0]	5	Octet 0: 0x06 = LC3 Coding_Format Octet 1–2: 0x0000 Octet 3–4: 0x0000
2	Codec_Specific_Configuration_Length[0]	1	Length of the Codec_Specific_Configuration for Subgroup[0]: 10 octets - 0x0A
2	Codec_Specific_Configuration[0]	10	3 LTV structures for Subgroup[0] defining: LTV 1: Sampling_Frequency: 24000 Hz LTV 2: Frame_Duration: 10 ms LTV 3: Octets_Per_Codec_Frame: 60 octets
2	Metadata_Length[0]	1	Length of Subgroup[0] Metadata: 6 octets
2	Metadata[0]	4	1 LTV structure for Subgroup[0], defining: LTV 1: Streaming_Audio_Contexts: Media
3	BIS_index[0[0]]	1	0x01
3	Codec_Specific_Configuration_Length[0[0]]	1	Length of the Codec_Specific_Configuration for BIS_index 0x01: 0x06 octets
3	Codec_Specific_Configuration[0[0]]	6	1 LTV structure for BIS_Index 0x01, defining: LTV 1 = Audio_Channel_Allocation: FL
3	BIS_index[0[1]]	1	0x02
3	Codec_Specific_Configuration_Length[0[1]]	1	Length of the Codec_Specific_Configuration for BIS_index 0x02: 0x06 octets
3	Codec_Specific_Configuration[0[1]]	6	1 LTV structure for BIS_Index 0x02, defining: LTV 1 = Audio_Channel_Allocation: FR

Table 6.3: BASE structure for the example shown in [Figure 6.2](#).

6.2.2 Public Broadcast Announcement

[Table 6.4](#) shows the values for the Public Broadcast Announcement for this example, which is transmitted in the Extended Advertisements.

Parameter	Size (Octets)	Value	Description
Length	4	0x04	Length of Type and Value fields for AD data type
Type: «Service Data»	1	0x16	16 bit UUID Service Data
Value			2-octet Service UUID followed by additional service data
Public Broadcast Announcement Service UUID	2	0x1856	Defined in Bluetooth® Assigned Numbers [5]
Public Broadcast Announcement features	1	0x02	Bit 0 = 0b0 (Not encrypted) Bit 1 = 0b1 (Standard Quality present) Bit 2 = 0b0 (High Quality not present)
Metadata_Length	1	0x00	No Metadata

Table 6.4: Advertising data format for the Public Broadcast Announcement as shown in [Figure 6.2](#).

6.3 Three Channel Auracast™ Transmitter

This example is for an Auracast™ transmitter in the form of module for a TV or set-top box, which is designed to simultaneously transmit a stereo channel comprising a Left and Right BIS, along with a mono channel containing dialogue enhanced audio for a listener with hearing loss. The Streaming_Context_Type is set to Media.

A similar device is also applicable to theatres and similar venues, where audio streams are produced for audience members both with and without hearing issues. For these applications, the Streaming_Contexts_Type should be set to “Live” rather than “Media”, as ambient sound will be available alongside the Bluetooth® stream. As “Live” use cases generally benefit from lower latencies, the Broadcast_Audio_Immediate_Rendering_Flag should be included in the Public Broadcast Announcement metadata section.

Although the Hearing Enhanced stream contains the same content and is rendered at the same time, it is placed into a separate subgroup. This allows it to be identified by an Auracast™ assistant using the Assisted Listening Stream LTV in the Level 2 stream metadata.

The device and its BASE structure are illustrated in [Figure 6.3](#).

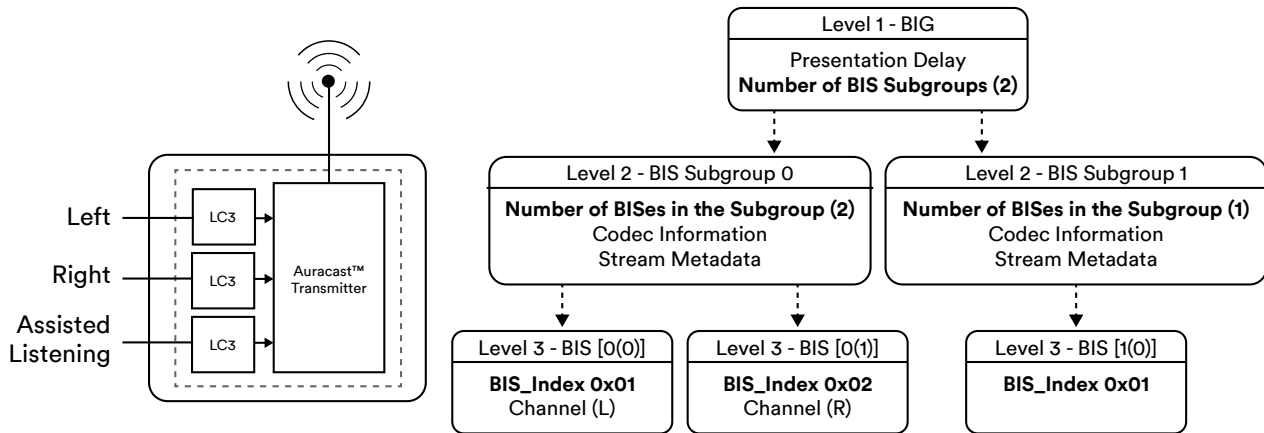


Figure 6.3 Example implementation and BASE structure for a stereo Auracast™ dongle

6.3.1 BASE for a three channel Auracast™ transmitter

The following table shows an example of a BASE for the three channel Auracast™ transmitter described above.

Level	Parameter	Size (Octets)	Value and Description
	Length	1	Length of Type and Value fields for AD data type: $0 \times 47 = 71$ octets
	Type: «Service Data - 16-bit UUID»	1	0×16 - Defined in Bluetooth® Assigned Numbers [5]
	Value		(2-octet Service UUID followed by additional service data)
	Basic Audio Announcement Service UUID	2	0×1851 (Defined in Bluetooth® Assigned Numbers [5])
1	Presentation_Delay	3	40 ms
1	Num_Subgroups	1	0×02 : 2 Subgroups
2	Num_BIS[0]	1	0×02 : 2 BISes in Subgroup[0]
2	Codec_ID[0]	5	Octet 0: $0 \times 06 = \text{LC3 Coding_Format}$ Octet 1–2: 0×0000 Octet 3–4: 0×0000
2	Codec_Specific_Configuration_Length[0]	1	Length of Subgroup[0] Metadata: 4 octets

Level	Parameter	Size (Octets)	Value and Description
2	Codec_Specific_Configuration[0]	10	3 LTV structures for Subgroup[0] defining: LTV 1: Sampling_Frequency: 24000 Hz LTV 2: Frame_Duration: 10 ms LTV 3: Octets_Per_Codec_Frame: 60 octets
2	Metadata_Length[0]	1	Length of Subgroup[0] Metadata: 4 octets
2	Metadata[0]	4	1 LTV structure for Subgroup[0], defining: LTV 1: Streaming_Audio_Contexts: Media
3	BIS_index[0[0]]	1	0x01
3	Codec_Specific_Configuration_Length[0[0]]	1	Length of the Codec_Specific_Configuration for BIS_index 0x01: 0x06 octets
3	Codec_Specific_Configuration[0[0]]	6	1 LTV structure for BIS_Index 0x01, defining: LTV 1 = Audio_Channel_Allocation: FL
3	BIS_index[0[1]]	1	0x02
3	Codec_Specific_Configuration_Length[0[1]]	1	Length of the Codec_Specific_Configuration for BIS_index 0x02: 0x06 octets
3	Codec_Specific_Configuration[0[1]]	6	1 LTV structure for BIS_Index 0x02, defining: LTV 1 = Audio_Channel_Allocation: FR
2	Num_BIS[1]	1	0x01: 1 BIS in Subgroup[1]
2	Codec_ID[1]	5	Octet 0: 0x06 = LC3 Coding_Format Octet 1–2: 0x0000 Octet 3–4: 0x0000
2	Codec_Specific_Configuration_Length[1]	1	Length of the Codec_Specific_Configuration for Subgroup[0]: 10 octets
2	Codec_Specific_Configuration[1]	10	3 LTV structures for Subgroup[1] defining: LTV 1: Sampling_Frequency: 24000 Hz LTV 2: Frame_Duration: 10 ms LTV 3: Octets_Per_Codec_Frame: 60 octets
2	Metadata_Length[1]	1	Length of Subgroup[0] Metadata: 7 octets
2	Metadata[1]	26	2 LTV structures for Subgroup[1], defining: LTV 1: Streaming_Audio_Contexts: Media LTV2: Assisted Listening Stream ⁵
3	BIS_index[1[0]]	1	0x03

Note that there is no Audio_Channel_Allocation LTV structure in the Codec_Specific_Configuration at Levels 2 or 3 for Subgroup[1], as the stream is Mono.

Table 6.5: BASE structure for the logical BASE structure example shown in [Figure 6.3](#).

6.3.2 Public Broadcast Announcement

[Table 6.6](#) shows the values for the Public Broadcast Announcement for this example, which is transmitted in the Extended Advertisements.

Parameter	Size (Octets)	Value	Description
Length	4	0x04	Length of Type and Value fields for AD data type
Type: «Service Data»	1	0x18	16 bit UUID Service Data [5]
Value			2-octet Service UUID followed by additional service data
Public Broadcast Announcement Service UUID	2	0x1856	Defined in Bluetooth® Assigned Numbers [5]
Public Broadcast Announcement features	1	0x02	Bit 0 = 0b0 (Not encrypted) Bit 1 = 0b1 (Standard Quality present) Bit 2 = 0b0 (High Quality not present)

Table 6.6: Advertising data format for the Public Broadcast Announcement as shown in [Figure 6.3](#).