

Auracast™ Simple Transmitter Best Practices Guide

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Abstract:

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



Version History

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1 Purpose of This Document

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

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 transmission nor their capabilities. This document describes a typical, qualified implementation of a transmitting device to help explain the decision process necessary to meet the Auracast™ broadcast audio requirements. It also provides recommendations for a simple Auracast™ broadcast audio transmitter, utilizing the Public Broadcast Source (PBS) role from the Public Broadcast Profile (PBP) specification [1].

Unless otherwise stated, the example used throughout this document is a device which is dedicated to broadcasting an audio input signal. There is no assumption made about the source of the audio signal. 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 Auracast™ transmitter products.



2 Auracast™ Transmitters

This section provides a brief summary of the intended functions of an Auracast™ transmitter.

2.1 Auracast™ Transmitter Types

Auracast™ transmitters are generally classified in two categories:

Public Auracast™ transmitter: A Bluetooth® product capable of transmitting a PBP-compliant standard-quality audio broadcast and which is intended for deployment within a public venue, such as commercial public address (PA) systems, televisions, and audio streamers. When set to transmit, the default configuration for a public Auracast™ transmitter must include a Standard Quality Broadcast Audio stream.

Personal Auracast™ transmitter: A Bluetooth® product capable of transmitting a PBP-compliant audio broadcast and which is intended for personal use such as a smartphone, tablet, laptop, PC, home television, or home audio streamer. All personal Auracast™ transmitters are required to be able to transmit a Standard Quality Public Broadcast Audio stream but may default to transmitting a High Quality Public Broadcast Audio stream.

2.2 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 for anyone listening to an Auracast™ broadcast. A generic out-of-the-box configuration should include enough information to provide a consistent user experience for the intended audience 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 device, a small box connected with a cable to the output jack of a sound system (as shown in Figure 3.1), or it might be part of a System-on-Chip (SoC) within a consumer electronics device, such as a smartphone, television, or PC.

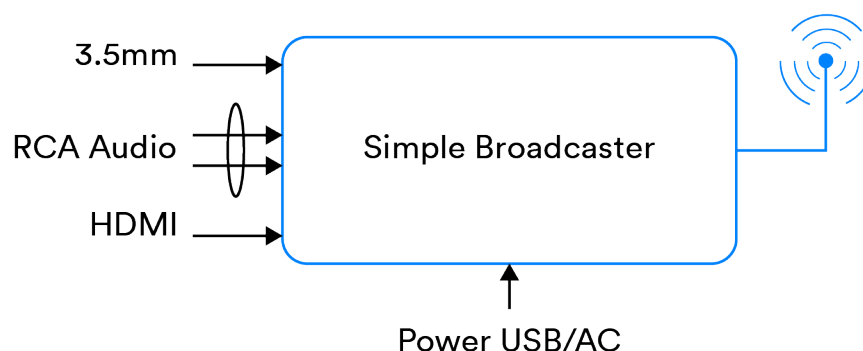


Figure 3.1 An example of a simple Auracast™ transmitter

2.3 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 [2] [8], which is known as Standard Quality Public Broadcast Audio in the underlying Public Broadcast Profile (PBP) specification. In addition to supporting standard quality, support for 48kHz LC3 audio is permitted, which is known as High Quality Public Broadcast Audio.

As identified by the use of Auracast Trademarks in the Brand Guide for Bluetooth Trademarks [8], for all transmitters, the product must be configurable by the end user to broadcast a Standard Quality Public Broadcast Audio stream. Additionally, if the transmitter is marketed 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 hearing aids may only receive 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 packets.

Personal Auracast™ transmitters may default to transmitting a high-quality audio stream but are required to allow a user to select transmission of a standard-quality audio stream [8]. If a standard-quality audio stream is selected for transmission, the decision whether the standard-quality audio stream is transmitted concurrently with a high-quality audio stream, or is transmitted instead of a high-quality audio stream, is determined by the manufacturer.

2.4 Basic Advertising Configuration

All Bluetooth® LE Audio broadcasters use extended and periodic advertisements to provide information about their broadcast streams. For Auracast™ transmitters, the PBP specification mandates inclusion of the Public Broadcast Announcement within the extended advertisements for an audio broadcast, which informs devices looking for broadcast audio streams whether the associated audio broadcast contains standard quality audio and/or high quality audio. This information 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. This reduces the overhead associated with having to retrieve more detailed information from the periodic advertisements and gives them the ability to filter only the streams they want to receive. A resource-constrained device such as a hearing aid or an earbud with a small battery might only be able to receive standard-quality broadcast audio, whereas a less resource-constrained device such as a set of headphones, containing a larger battery, might prefer to prioritize reception of high-quality audio streams.



2.4.1 Using Metadata

Auracast™ transmitters have the option of augmenting the audio experience by transmitting multiple different types of information about the audio broadcast, using extended advertising data and periodic advertising data. 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 following tables show recommended settings for a public Auracast™ transmitter broadcasting a single Broadcast Isochronous Group.

2.4.2 Recommended Default Bluetooth® Settings

Table 3.1 shows recommended default Bluetooth® settings for the device. These are defined in BAP [6] or PBP [1]. Some of these values are set by the configuration; others may be set by the manufacturer or the installer depending on the use case. It is useful for a customer if some of these are printed on a label, 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 Installer 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.

Feature	Description	Mandatory / Recommended/ Optional	Value	Printed on label	Configurable
Local_Name [3]	User identifiable, unique name of the device	R	Installer defined ¹	YES	Optional
Public Broadcast Announcement [1]	Required to identify an Auracast™ broadcast	M		n/a	NO
Public Broadcast Announcement features bit values ²	Encrypted	O	0 ³	n/a	n/a
	Standard Quality	M	1 ⁴	n/a	n/a
	High Quality	O	0 ⁴	n/a	n/a ³
Public Broadcast Announcement Metadata	Metadata: Program_Info	R	Installer defined	n/a	YES ⁵
Broadcast_Code [7]	A Broadcast_Code is required to decrypt encrypted streams	M if the streams are encrypted	Unique ³	YES	Optional ³
BASE [6] values	Presentation Delay	M	20,000	O	Optional ⁶
	QoS configuration	M	16_2_1 or 24_2_1 ⁷	O	n/a
	Number of BISes (also in BIGInfo) [7]	M	See note 8	n/a	n/a
	Metadata: Streaming_Audio_Contexts [5]	M	Installer defined ⁹	n/a	Optional ⁹
Appearance Value [4]	Audio Source Broadcasting Device	R	0x0885 ¹⁰	n/a	NO
Broadcast_Name [5]	User identifiable, unique name of the broadcast audio (if multiple transmitters are located in the same venue, carrying the same encoded audio content, they should use the same Broadcast_Name.)	M	Installer defined ¹¹	O	Optional ¹¹
<i>References [x] indicate the Bluetooth® Specification where these items are defined.</i>					

Notes:

1. The default shipment value should be a unique name, allowing the Auracast™ transmitter to be identified, for example, AcmeCorp-A4F7X9. It is recommended that a means is provided for the user to change it to a more friendly string.
2. These values are set by the system based on the current configuration of the Auracast™ transmitter.
3. If the encryption bit of the PBA is set, then a Broadcast_Code must be supported. The value of Broadcast_Code for a Public Auracast™ transmitter is generally static for the life of the device. Personal Auracast™ devices may change the Broadcast_Code on a per-session basis.
4. A public Auracast™ transmitter is required to always transmit a standard-quality audio stream [8] which will set the standard-quality bit in the PBA. A personal Auracast™ transmitter may transmit a standard-quality or high-quality stream.
5. If supported, this field should be writable by the user.
6. The Presentation Delay should only be writable for Auracast™ transmitters intended for professional installation. For consumer products, the default value is 20,000.
7. For a public Auracast™ transmitter, the default QoS setting is generally 16_2_1 for voice applications and 24_2_1 for music. See PBP [1] for more details.
8. If a single mono input is provided, the broadcaster should transmit a single BIS. If a stereo input is provided, the value will be 2 unless a composite mono BIS is also transmitted, in which case it will be 3. More BISes may be transmitted if multiple languages are supported, but at least one standard-quality stream should be transmitted for each independent audio input.
9. Other values may also be appropriate. For example, with live voice applications, “Live” may be appropriate. “Media” may also be relevant for personal Auracast™ transmitters. In most cases, this will be set by the installer, but more complex devices may set this automatically.
10. 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. Other values may be appropriate. For example, 0x0889 identifies an auditorium, 0x0040 a phone, and 0x0A01 a television. Appearance Values are defined in the Appearance Values Assigned Numbers Document [4].
11. It is strongly recommended that this parameter be 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. If multiple BIGs are transmitted by one device, the default values should be distinguished by the addition of a separate identifying character for each BIG.

Table 3.1 Recommended Bluetooth® parameter values for a public Auracast™ transmitter

2.4.3 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 may increase the time it takes for a device to discover and acquire a broadcast audio stream or require it to expend unnecessary power in discovering the presence of broadcast streams.

For example, a personal Auracast™ transmitter, such as a phone, might be used to provide a shared audio experience to a small set of receivers where video or visual synchronization is not required, like listening to music. In this use case, the acquisition time of the broadcast audio need not be immediate as the playback of the audio can be delayed by the phone user until all of their friends have acknowledged that they are ready to receive the broadcast audio stream, at which point the phone owner presses play. In other real-time use cases, such as in listening for a flight announcement at an airport, it might be important to acquire the advertising data quickly so you can synchronize to the broadcast audio stream



without losing a significant amount of audio data that cannot be replayed, i.e., the start of a conversation or the start of an announcement.

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.

Table 3.2 shows recommended Bluetooth® settings for the broadcaster’s advertising data. These settings are derived to optimize the ability of scanning devices to discover the presence of Auracast™ broadcast audio streams in a timely manner.

Feature	Value
Extended advertising data interval	30ms

Table 3.2 Recommended values for advertising the presence of a public Auracast™ transmitter

2.4.4 Additional Advertising Settings for a Public Auracast™ Transmitter

Table 3.3 shows recommendations for Bluetooth® LE characteristics for a broadcast transmitter. These characteristics enable a user to identify them for maintenance and commissioning. These are included as a reminder of good practice to help installers configure and maintain products. If the features in table 3.3 are made accessible through the Bluetooth LE characteristics, it allows their use in diagnostic and configuration applications which may help the installer.

Feature	Description	Value	Printed on label	Configurable
Manufacturer	Name of manufacturer	Product specific	YES	NO
Model Number	Name of the specific model	Product specific	YES	NO
Serial Number	Unique Serial Number	Product specific	YES	NO
Product Name	Name to allow the Auracast™ transmitter to be identified by the customer	Unique ¹	YES	YES
Configuration Username	Username to access the configuration utility	Implementation specific	YES	Recommended ²
Configuration password	Unique password to access the configuration utility	Implementation specific	YES	Recommended ²

References [x] indicate the Bluetooth® specification where these items are defined.

Notes:

1. This should be a unique name allowing the Auracast™ transmitter to be identified, for example, AcmeCorp-A4F7X9. At shipment, it should be the same as the Local_Name (see Table 3.1). The product should revert to this name if a factory reset is performed.
2. It is recommended that a unique username and password are used to access the device for configuration.

Table 3.3 General (non Bluetooth®) settings for a public Auracast™ transmitter



2.4.5 Managing Encryption for Auracast™ transmitters

For public Auracast™ transmitters, unencrypted broadcast audio streams are recommended. If encryption for conditional access to the broadcast audio is required, a Broadcast_Code is used to encrypt the audio streams. The Broadcast_Code can be a random, static value that is set at manufacture and printed on the label. Generation and distribution of non-static Broadcast_Code values is left to the implementation but should follow well-established norms such as displaying the Broadcast_Code at the user interface on a device equipped with a screen like a television or smartphone.

2.5 Metadata Use Recommendations and Definitions

Optional metadata can be used to augment the mandatory metadata in *Table 3.1, Recommended Bluetooth parameter values for a public Auracast™ transmitter*. This section provides recommendations for the inclusion of such metadata.

2.5.1 Program_Info

The Program_Info Metadata type can be used to provide information specific to an audio broadcast such as Electronic Program Guide (EPG) information for televisions or track information for music. PBP recommendations are included in the BASE in periodic advertisements.

2.5.2 Audio_Active_State

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.

2.5.3 Broadcast_Audio_Immediate_Rendering_Flag

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 able support, it may not be optimum, particularly if the listener can also hear audio from local speakers. The Broadcast_Audio_Immediate_Rendering_Flag allows devices with faster processing capabilities to revert to a shorter, manufacturer set value, providing a better listening experience.

2.6 Considerations for Auracast™ Location Deployment and Registration

A Standard Quality Public Broadcast Audio stream is made available for all audio content provided through Auracast™ broadcast audio by the location.

If registered as an Auracast™ location, the Broadcast_Code should be displayed in a prominent location to help end users discover and join an Auracast™ broadcast audio stream.



2.7 Other Recommendations

This document covers the use case of single Auracast™ transmitters. If Auracast Trademarks are publicly displayed, other recommendations and/or requirements may apply. Developers and installers should be aware of the recommendation in other documents, including the Auracast™ Location Deployment Best Practices Guide [9].



3 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/>



4 References

- [1] Public Broadcast Profile, version 1.0 or later
- [2] Low Complexity Communication Codec (LC3), version 1.0 or later
- [3] Core Specification Supplement, version 10 or later
- [4] Assigned Numbers – Appearance Values
- [5] Assigned Numbers – Generic Audio
- [6] Bluetooth® Core Specification, version 5.2 or later
- [7] Brand Guide for Bluetooth Trademarks
- [8] Auracast™ Location Deployment Best Practices Guide

