



モバイルコンピューティング推進コンソーシアム
Mobile Computing Promotion Consortium

MCPC-TR-011

**Multi Codec Implementation
Guideline for Bluetooth® AV Profile**

Version 1.0 English

March 25, 2009

**Mobile Computing Promotion Consortium
Technical Committee**

Change History

Date	Version	Description
March 25, 2009	1.00	Base version initial release.

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1. Introduction

The number of devices that play music using Bluetooth® wireless technology has been increasing recently. This is especially true for audio players, mobile phones, and wireless headphones.

Bluetooth® wireless technology is designed for mobile devices such as mobile phones. However with regard to the music playing function, SBC is the mandatory codec in A2DP. All other formats are optional. Therefore, most of the current portable audio players with Bluetooth® wireless technology must convert from the original music data storage format (MP3, AAC, ATRAC, etc) to SBC before transferring the music. But this method needs additional power consumption for SBC encoder/decoder rather than streaming with original codec. In addition, transferring with SBC codec needs transcode from original codec to SBC codec and decode from SBC to PCM data so that the final PCM data may be different between SBC transfer case and original codec transfer case. It means the sound may be different between both cases.

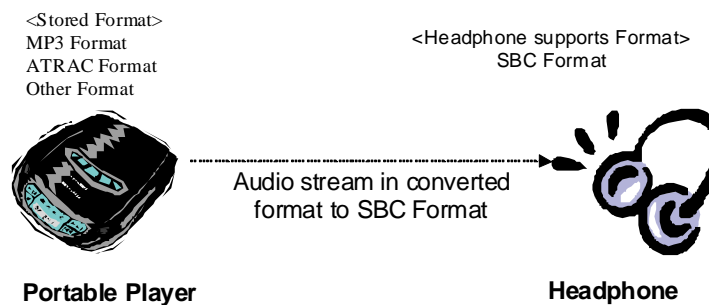


Fig. 1-1 Conversion to SBC format

Meanwhile the Bluetooth® SIG A2DP [2] defines not only SBC but also MPEG-1,2 Audio, AAC, ATRAC family, etc as optional codecs. Recently new audio formats like HE-AAC are being considered for additional optional codecs. By utilizing these codecs effectively, it is possible to improve both the sound quality and the battery life when streaming music with Bluetooth® wireless technology.

In addition, with higher compression codecs, it is possible to use bandwidth more efficiently thereby minimizing radio interference and maximizing overall network capacity.

This document provides guidelines to maintain good interoperability between Bluetooth® devices that take advantage of these optional codecs.

2. Function

The functions described in this document include the following procedures.

1. The Connection Procedure to choose the codec during negotiation of the connection.
2. The Change Procedure to change from one codec to another codec.

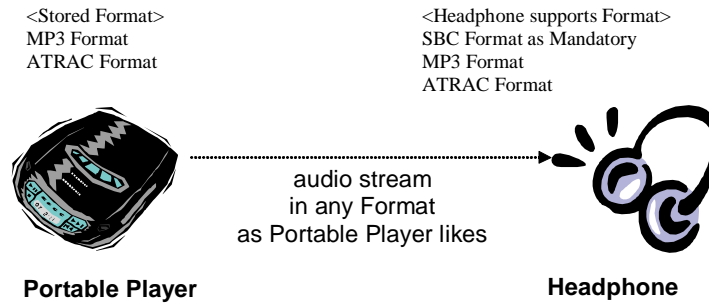


Fig. 2-1 Music streaming defined in this document

In order to describe this document, the primary reference shall be the Bluetooth SIG Advanced Audio Distribution Profile V.1.1.2 [2]. Other documents may also be referred if necessary.

3. Details of procedure

3.1 Connection procedure

This chapter describes the connection procedure for SRC/SNK devices that support multiple codecs.

3.1.1 Connection procedure on SRC (INT), SNK (ACP)

The connection procedure from SRC to SNK is described as follows:

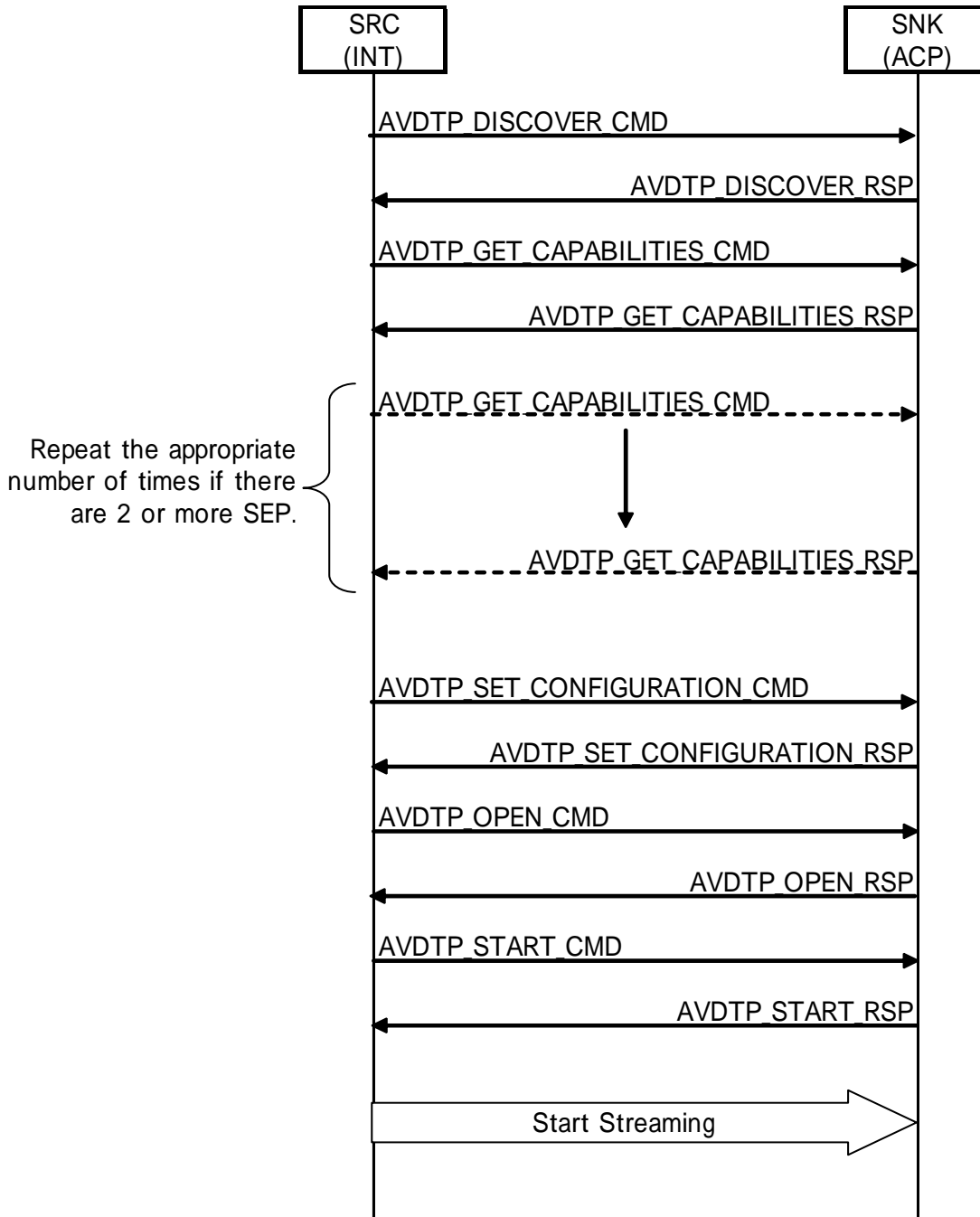
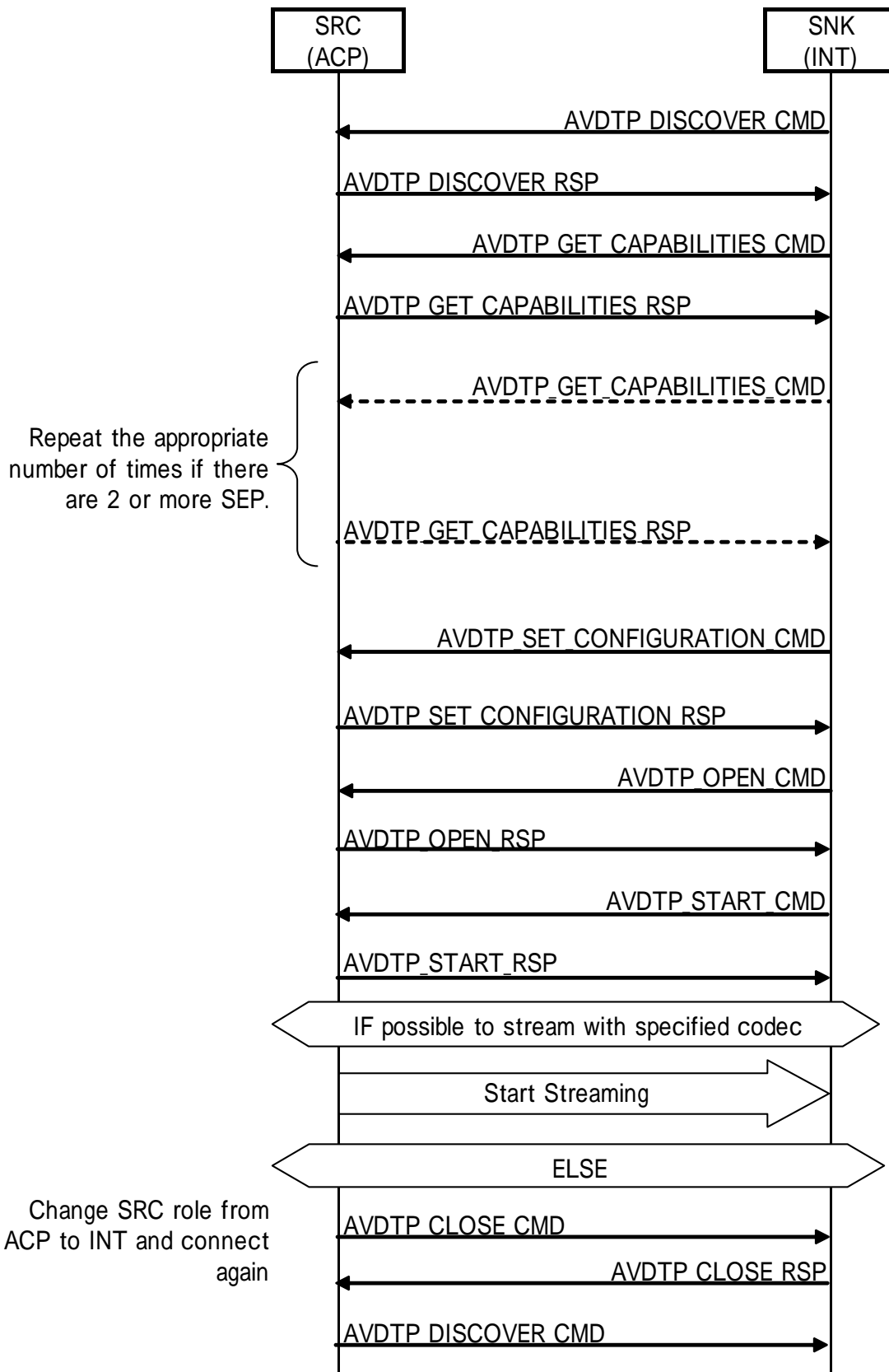


Fig. 3-1 MSC for the connection procedure between SRC (INT) and SNK (ACP)

3.1.2 Connection procedure on SRC (ACP), SNK (INT)

The connection procedure from SNK to SRC when the SRC is ready for streaming is described as follows:



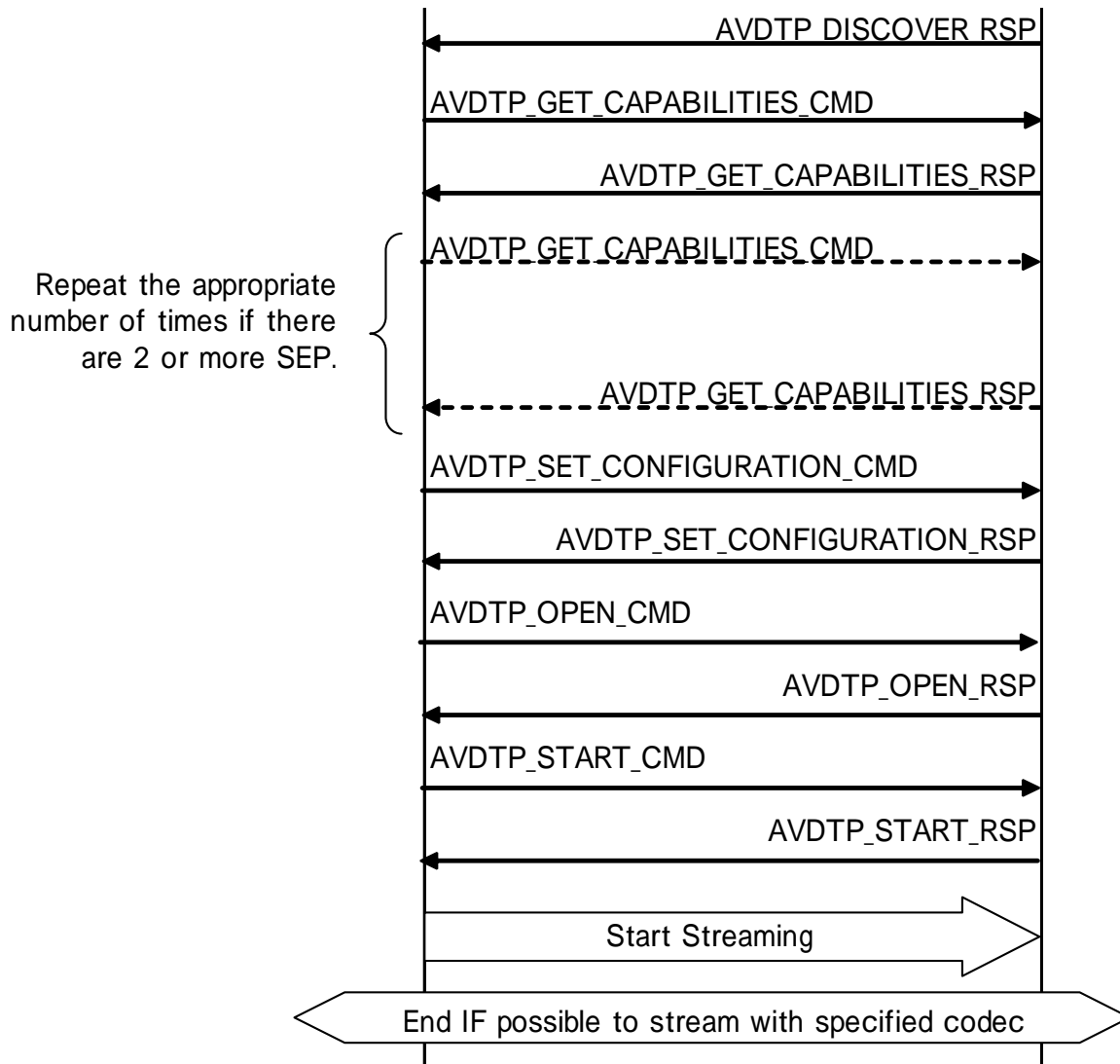


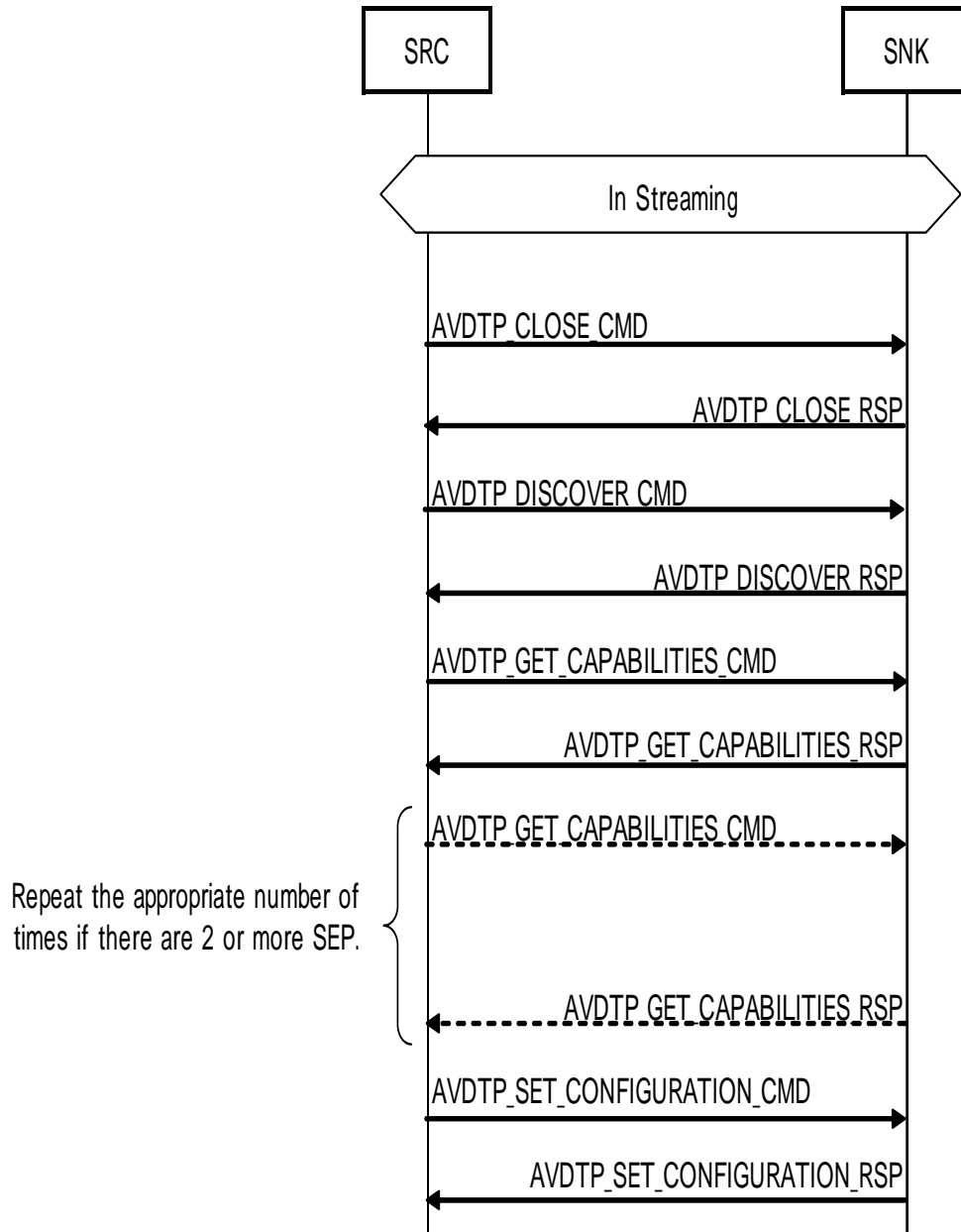
Fig. 3-2 MSC for the connection procedure between SRC (ACP) and SNK(INT)

Note that the SRC knows the codec of the playing content. Therefore, if the codec specified by SNK does not match with the codec of the playing content, then the connection should be re-established by SRC. (SRC becomes INT.)

3.2 Change procedure of Media Payload Formats (Codecs)

This chapter describes the codec change procedure if the media payload codecs are changed. In this scenario, the codec of contents in media player does not matter and only apply in case of changing the media payload codecs.

3.2.1 Change procedure from SRC



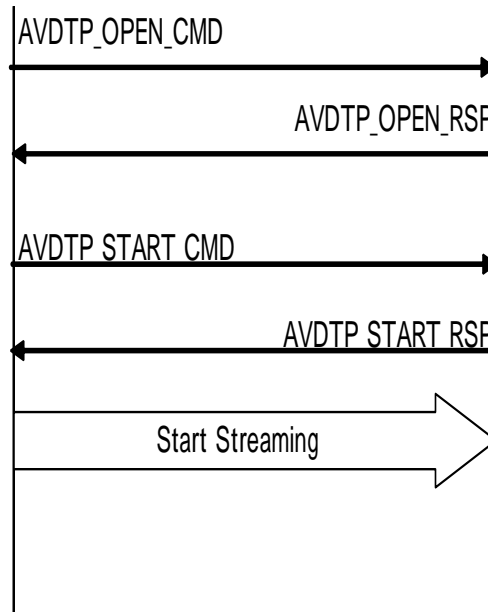


Fig. 3-3 MSC showing how the SRC initiates a codec change procedure

3.2.2 Change procedure from SNK

Since only SRC knows the content type, it is difficult for SNK to set up the proper codec. Therefore, the codec of the playing content should only be changed by SRC, and the procedure to change the codec from SNK is not described in this document.

Appendix A The list of references

A.1 The list of references

- [1] Bluetooth SIG Audio & Video Distribution Transport Protocol V.1.2
(URL <https://www.bluetooth.org/>)
- [2] Bluetooth SIG Advanced Audio Distribution Profile V.1.2
(URL <https://www.bluetooth.org/>)
- [3] Bluetooth SIG Generic Audio Video Distribution Profile V.1.2
(URL <https://www.bluetooth.org/>)
- [4] Simultaneous use of HFP, A2DP, and AVRCP Profiles Whitepaper
(URL <https://www.bluetooth.org/>)

Appendix B Terms and Abbreviations

B.1 Terms and Abbreviations

A2DP: Advanced Audio Distribution Profile
AVDTP: Audio / Video Distribution Transport Protocol
GAVDP: Generic Audio Video Distribution Profile.
AVRCP: Audio Video Remote Control Profile
SNK: Sink
SRC: Source
SBC: Low Complexity Subband Codec
MP3: MPEG Audio Layer-3
AAC: Advanced Audio Coding
ATRAC: Adaptive TRansform Acoustic Coding

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