# International Telecommunication Union

# ITU-R
## Radiocommunication Sector of ITU

**Recommendation  ITU-R  BS.2094-1**
**(06/2017)**

# Common definitions for the audio definition model

**BS Series**

**Broadcasting service (sound)**

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<table>
<tr><td colspan="2" align="center">**Series of ITU-R Recommendations**</td></tr>
<tr><td colspan="2" align="center">(Also available online at http://www.itu.int/publ/R-REC/en)</td></tr>
<tr><td>**Series**</td><td align="center">**Title**</td></tr>
<tr><td>**BO**</td><td>Satellite delivery</td></tr>
<tr><td>**BR**</td><td>Recording for production, archival and play-out; film for television</td></tr>
<tr><td>**BS**</td><td>**Broadcasting service (sound)**</td></tr>
<tr><td>**BT**</td><td>Broadcasting service (television)</td></tr>
<tr><td>**F**</td><td>Fixed service</td></tr>
<tr><td>**M**</td><td>Mobile, radiodetermination, amateur and related satellite services</td></tr>
<tr><td>**P**</td><td>Radiowave propagation</td></tr>
<tr><td>**RA**</td><td>Radio astronomy</td></tr>
<tr><td>**RS**</td><td>Remote sensing systems</td></tr>
<tr><td>**S**</td><td>Fixed-satellite service</td></tr>
<tr><td>**SA**</td><td>Space applications and meteorology</td></tr>
<tr><td>**SF**</td><td>Frequency sharing and coordination between fixed-satellite and fixed service systems</td></tr>
<tr><td>**SM**</td><td>Spectrum management</td></tr>
<tr><td>**SNG**</td><td>Satellite news gathering</td></tr>
<tr><td>**TF**</td><td>Time signals and frequency standards emissions</td></tr>
<tr><td>**V**</td><td>Vocabulary and related subjects</td></tr>
</table>

*Note*: *This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.*

RECOMMENDATION  ITU-R  BS.2094-1*

# Common definitions for the audio definition model

(2016-2017)

## TABLE OF CONTENTS

**Scope**

This Recommendation contains a set of common definitions for multichannel audio configurations that use the audio definition model (Recommendation ITU-R BS.2076) to describe them.

**Keywords**

ADM, audio, multichannel, channel-based, tracks, metadata, bw64, exchange, audio programme, BWF, immersive, HOA, Higher Order Ambisonics

The ITU Radiocommunication Assembly,

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\*    Radiocommunication Study Group 6 made editorial amendments to this Recommendation in October 2017, in February 2020 and in October 2020 in accordance with Resolution ITU-R 1.

*considering*

*a)*      that storage media based on information technology, including data disks and tapes, have penetrated all areas of audio production for radio broadcasting, namely non-linear editing, on-air play-out and archives;

*b)*      that the adoption of a single file format for signal interchange would greatly simplify the interoperation of individual pieces of equipment, and remote studios, and it would facilitate the desirable integration of editing, on-air play-out, and archiving;

*c)*      that compatibility with currently-available commercial file formats would minimize the industry efforts required to implement a new format in the equipment;

*d)*      that future audio systems will require metadata associated with the audio to be carried in the file;

*e)*      that future audio systems will use a variety of multichannel configurations including channel-, object-, and scene-based audio such as specified in Recommendation ITU-R BS.2051;

*f)*      that future audio systems will use the audio definition model (Recommendation ITU-R BS.2076) to describe the technical format of the audio being delivered and exchanged;

*g)*      that the majority of audio in existence and produced in the short-term future is and will be channel-based using a commonly used set of configurations;

*h)*      that using different metadata descriptions for identical audio configurations will cause compatibility problems and unnecessary overheads,

*recommends*

that, for exchanging any audio that uses the audio definition model (Recommendation ITU-R BS.2076) as the metadata model, a set of common definitions be used to describe any audio configurations as defined in Annex 1.


# Annex 1
# (normative)

# Common definitions for the audio definition model


## 1      Introduction

Recommendation ITU-R BS.2076 – Audio Definition Model, is a metadata model used to describe the technical content and format of audio. It can be used to describe any type of audio signal to allow it to be rendered correctly, whether it be object-, scene-, or channel-based. While the audio definition model (ADM) is extremely flexible and allows any type of audio format to be defined, the vast majority of audio in existence is based on a few commonly used channel-based configurations. Therefore, it is not efficient for these commonly used formats to need to be explicitly defined every time they are used. It would also be problematic for identical formats to be defined in different ways by different organisations or applications.

To provide consistency and efficiency in the use of the ADM, a set of common definitions has been drawn up. These are based on what is commonly used in the audio industry, including those specified in Recommendations ITU-R BS.2051 and ITU-R BS.775 to produce definitions that should be used

when these configurations are used in files and streams. This set of common definitions is intended to be a living resource, with new definitions added in the future should they be required.

## 2      Contents of the common definitions

As the vast majority of existing audio (and in the short-term future) is channel-based, most of the common definitions will be for channel-based audio. The initial set will concentrate on commonly used channel-based configurations. The other assumption used is that the track formats are pulse code modulation (PCM), so it does not include coded audio.

The ADM consists of several different elements used for defining audio. They either describe the content or the format. The set of common definitions is only concerned about the format elements as these can be defined without knowledge of the content of the audio. These elements are:

–      audioTrackFormat

–      audioStreamFormat

–      audioChannelFormat

–      audioBlockFormat

–      audioPackFormat

Apart from audioPackFormat the elements are very closely tied together with one of each used for each channel definition. However, it does not mean that all four of these elements are required to be used at all times. It is perfectly acceptable to use a common audioChannelFormat/ audioBlockFormat definition with custom-made audioTrackFormat and audioStreamFormat definitions.

## 3      Common definitions usage

The common definitions exist as an extensible markup language (XML) file which can be either stored locally with the application that is handling the audio files, or referred to remotely. It is not intended to be carried in the audio file itself, as one of the intentions of it is to reduce the amount of metadata required to be carried in audio files.

Any code that reads audio files that contain ADM-defined audio (so BWF, BW64, RF64 typically) should always aim to read the common definitions first before reading the ADM metadata stored within the audio file itself. The relationship between the audio file and the common definitions file is shown in Fig. 1.

FIGURE 1

**Relationship between audio file and common definitions file**
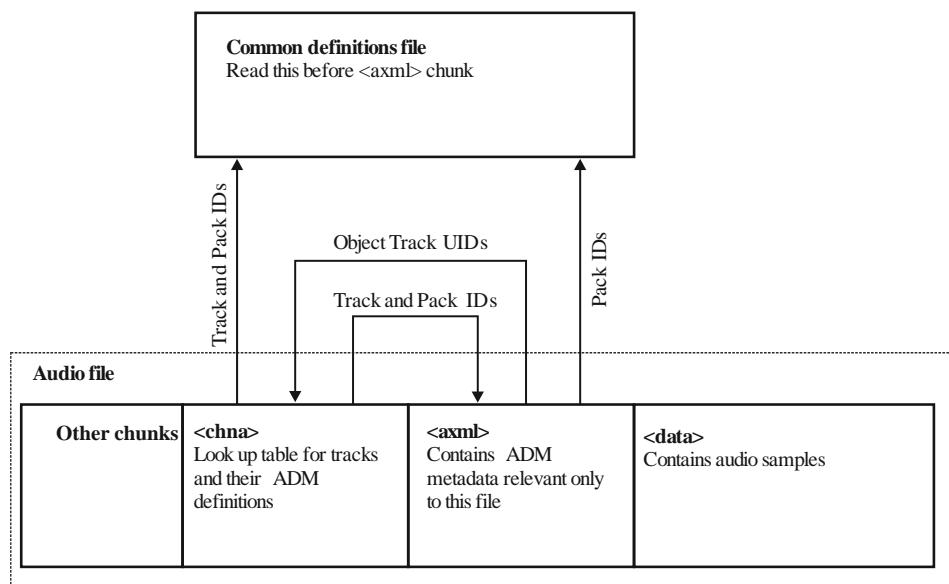


BS.2094-01

The <chna> chunk contains an ID reference to both an audioTrackFormat and an audioPackFormat definition for each track in the file. These references should be looked up in the common definitions file first to see whether that contains the IDs, and if not then the audio file's <axml> chunk should be referred to. When inspecting the content-related ADM metadata in the <axml> chunk, in particular the audioObject elements, it may have references to IDs that exist in the common definitions file, most probably audioPackFormat IDs. This ordering of the chunks is not strict, and it may be preferable to place the <axml> chunk after the <data> chunk.

# 4 Set of common definitions

The set of common definitions consists of commonly used channel-based configurations, some of which are recognised standards and some are common proprietary configurations. The definitions consist of a set of audioChannelFormat definitions for channels associated with many different speaker locations, including all those in Recommendation ITU-R BS.2051. Each of these channel definitions has an associated audioStreamFormat and audioTrackFormat definition for PCM audio signals to cover the most typical use case. The set of audioPackFormat definitions for the various speaker combinations use only channels from this common set.

The audioChannelFormat and the audioPackFormat IDs follow this format:

– audioChannelFormatID: AC_yyyy0xxx

– audioPackFormatID: AP_yyyy0xxx

where the first four hexadecimal digits (yyyy) indicate what the type of audio is. If this value is set to 0001 then the type is 'DirectSpeakers', if it is 0002 then it is 'Matrix', 0003 for 'Objects', 0004 for 'HOA' and 0005 for 'Binaural'. The final four digits (0xxxx) have values below 1000, so belong to the set of common definitions as listed here.

## 4.1 Common definitions for the 'DirectSpeakers' audio type

## 4.1.1 Common audioChannelFormats for 'DirectSpeakers'

TABLE 1

**AudioChannelFormat definitions for 'DirectSpeakers'**

| audioChannelFormatID | audioChannelFormatName | Azimuth | Elevation | speakerLabel |
|---|---|---|---|---|
| AC_00010001 | FrontLeft | 30 | 0 | M+030 |
| AC_00010002 | FrontRight | −30 | 0 | M-030 |
| AC_00010003 | FrontCentre | 0 | 0 | M+000 |
| AC_00010004* | LowFrequencyEffects | 0 | −30 | LFE |
| AC_00010005 | SurroundLeft | 110 | 0 | M+110 |
| AC_00010006 | SurroundRight | −110 | 0 | M-110 |
| AC_00010007 | FrontLeftOfCentre | 22.5 | 0 | M+022 |
| AC_00010008 | FrontRightOfCentre | −22.5 | 0 | M-022 |
| AC_00010009 | BackCentre | 180 | 0 | M+180 |
| AC_0001000a | SideLeft | 90 | 0 | M+090 |
| AC_0001000b | SideRight | −90 | 0 | M-090 |
| AC_0001000c | TopCentre | 0 | 90 | T+000 |
| AC_0001000d | TopFrontLeft | 30 | 30 | U+030 |
| AC_0001000e | TopFrontCentre | 0 | 30 | U+000 |
| AC_0001000f | TopFrontRight | −30 | 30 | U-030 |
| AC_00010010 | TopSurroundLeft | 110 | 30 | U+110 |
| AC_00010011 | TopBackCentre | 180 | 30 | U+180 |
| AC_00010012 | TopSurroundRight | −110 | 30 | U-110 |
| AC_00010013 | TopSideLeft | 90 | 30 | U+090 |
| AC_00010014 | TopSideRight | −90 | 30 | U-090 |
| AC_00010015 | BottomFrontCentre | 0 | −30 | B+000 |
| AC_00010016 | BottomFrontLeftMid | 45 | −30 | B+045 |
| AC_00010017 | BottomFrontRightMid | −45 | −30 | B-045 |
| AC_00010018 | FrontLeftWide | 60 | 0 | M+060 |
| AC_00010019 | FrontRightWide | −60 | 0 | M-060 |
| AC_0001001a | BackLeftMidDiffuse | 135 | 0 | M+135_Diff |
| AC_0001001b | BackRightMidDiffuse | −135 | 0 | M-135_Diff |

TABLE 1 (*end*)

| audioChannelFormatID | audioChannelFormatName | Azimuth | Elevation | speakerLabel |
|---|---|---|---|---|
| AC_0001001c | BackLeftMid | 135 | 0 | M+135 |
| AC_0001001d | BackRightMid | −135 | 0 | M-135 |
| AC_0001001e | TopBackLeftMid | 135 | 30 | U+135 |
| AC_0001001f | TopBackRightMid | −135 | 30 | U-135 |
| AC_00010020* | LowFrequencyEffectsL | 45 | −30 | LFE1 |
| AC_00010021* | LowFrequencyEffectsR | −45 | −30 | LFE2 |
| AC_00010022 | TopFrontLeftMid | 45 | 30 | U+045 |
| AC_00010023 | TopFrontRightMid | −45 | 30 | U-045 |
| AC_00010024 | FrontLeftScreen | Left screen edge (or 25 if unknown) | 0 | M+SC |
| AC_00010025 | FrontRightScreen | Right screen edge (or -25 if unknown) | 0 | M-SC |
| AC_00010026 | FrontLeftMid | 45 | 0 | M+045 |
| AC_00010027 | FrontRightMid | −45 | 0 | M-045 |
| AC_00010028 | UpperTopBackCentre | 180 | 45 | UH+180 |
| * These channels also feature a low pass frequency cut-off of 120 Hz. | | | | |

Each channel definition is listed in Table 1, where the audioChannelFormatID, audioChannelFormatName and speakerLabel elements are listed. The azimuth and elevation columns represent the position that would be specified within the position sub-element (the distance is 1.0 for all these channel definitions). The XML below shows how the first entry in this table is represented in XML.

```
<audioChannelFormat audioChannelFormatID="AC_00010001" audioChannelFormatName="FrontLeft"
typeLabel="0001" typeDefinition="DirectSpeakers">
  <audioBlockFormat audioBlockFormatID="AC_00010001_00000001">
    <speakerLabel>urn:itu:bs:2051:0:speaker:M+030</speakerLabel>
    <position coordinate="azimuth">30.0</position>
    <position coordinate="elevation">0.0</position>
    <position coordinate="distance">1.0</position>
  </audioBlockFormat>
</audioChannelFormat>
```

### 4.1.2    Common audioStreamFormats and audioTrackFormats for 'DirectSpeakers'

The common format type for audioStreamFormat and audioTrackFormat is 'PCM'.

As previously mentioned, the audioStreamFormat and audioTrackFormat, which relate to each audioChannelFormat definition use the same ID prefixes and the same names with 'PCM_' appended, such as 'PCM_FrontLeft'. The XML code below shows both the audioStreamFormat and audioTrackFormat definition for the first entry in the Table.

```
<audioStreamFormat audioStreamFormatID="AS_00010001" audioStreamFormatName="PCM_FrontLeft"
formatLabel="0001" formatDefinition="PCM">
  <audioChannelFormatIDRef>AC_00010001</audioChannelFormatIDRef>
  <audioTrackFormatIDRef>AT_00010001_01</audioTrackFormatIDRef>
</audioStreamFormat>

<audioTrackFormat audioTrackFormatID="AT_00010001_01" audioTrackFormatName="PCM_FrontLeft"
formatLabel="0001" formatDefinition="PCM">
  <audioStreamFormatIDRef>AS_00010001</audioStreamFormatIDRef>
```

```
</audioTrackFormat>
```

### 4.1.3 Common audioPackFormats for 'DirectSpeakers'

The audioPackFormat definitions cover a range of speaker configurations. Table 2 shows the set of configurations that have been defined. The ones that are in Recommendation ITU-R BS.2051 are indicated. The last column gives the references to each channel the pack consists of. Instead of giving the whole ID (e.g. AP_00010001), only the last two digits are listed for clarity; so they would be AP_000100xx where xx is the digits listed to give the full audioPackFormatIDRef.

The audioPackFormat names have been given both a traditional name and the name formatted in the style of Recommendation ITU-R BS.2051 (U+M+L) separated by an underscore. Spaces are not used in the names as they can cause problems.

TABLE 2

**AudioPackFormat definitions**

| audioPackFormatID audioPackFormatName *Recommendation derived from* | audioChannelIDRef | audioChannelName | Channel name in Recommendation | speakerLabel |
|---|---|---|---|---|
| **AP_00010001** mono_(0+1+0) *BS.775* | AC_00010003 | FrontCentre | Centre | M+000 |
| **AP_00010002** stereo_(0+2+0) *BS.775, BS.2051 (A)* | AC_00010001 | FrontLeft | Left | M+030 |
| | AC_00010002 | FrontRight | Right | M-030 |
| **AP_0001000a** 3.0_(0+3+0) *BS.775* | AC_00010001 | FrontLeft | Left | M+030 |
| | AC_00010002 | FrontRight | Right | M-030 |
| | AC_00010003 | FrontCentre | Centre | M+000 |
| **AP_0001000b** 4.0_(0+4+0) *BS.775* | AC_00010001 | FrontLeft | Left | M+030 |
| | AC_00010002 | FrontRight | Right | M-030 |
| | AC_00010003 | FrontCentre | Centre | M+000 |
| | AC_00010009 | BackCentre | Mono Surround | M+180 |
| **AP_0001000c** 5.0_(0+5+0) *BS.775* | AC_00010001 | FrontLeft | Left | M+030 |
| | AC_00010002 | FrontRight | Right | M-030 |
| | AC_00010003 | FrontCentre | Centre | M+000 |
| | AC_00010005 | SurroundLeft | Left Surround | M+110 |
| | AC_00010006 | SurroundRight | Right Surround | M-110 |

TABLE 2 (*continued*)

| audioPackFormatID audioPackFormatName *Recommendation derived from* | audioChannelIDRef | audioChannelName | Channel name in Recommendation | speakerLabel |
|---|---|---|---|---|
| **AP_00010003** 5.1_(0+5+0) *BS.775, BS.2051 (B)* | AC_00010001 | FrontLeft | Left | M+030 |
|  | AC_00010002 | FrontRight | Right | M-030 |
|  | AC_00010003 | FrontCentre | Centre | M+000 |
|  | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
|  | AC_00010005 | SurroundLeft | Left Surround | M+110 |
|  | AC_00010006 | SurroundRight | Right Surround | M-110 |
| **AP_0001000d** 6.1_(0+6+0) *N/A* | AC_00010001 | FrontLeft | Left | M+030 |
|  | AC_00010002 | FrontRight | Right | M-030 |
|  | AC_00010003 | FrontCentre | Centre | M+000 |
|  | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
|  | AC_00010005 | SurroundLeft | Left Surround | M+110 |
|  | AC_00010006 | SurroundRight | Right Surround | M-110 |
|  | AC_00010009 | BackCentre | Center Surround | M+180 |
| **AP_0001000e** 7.1_front_(0+7+0) *N/A* | AC_00010001 | FrontLeft | Left | M+030 |
|  | AC_00010002 | FrontRight | Right | M-030 |
|  | AC_00010003 | FrontCentre | Centre | M+000 |
|  | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
|  | AC_00010005 | SurroundLeft | Left Surround | M+110 |
|  | AC_00010006 | SurroundRight | Right Surround | M-110 |
|  | AC_00010026 | FrontLeftMid | Left Wide | M+045 |
|  | AC_00010027 | FrontRightMid | Right Wide | M-045 |
| **AP_0001000f** 7.1_back_(0+7+0) *BS.2051(I)* | AC_00010001 | FrontLeft | Left | M+030 |
|  | AC_00010002 | FrontRight | Right | M-030 |
|  | AC_00010003 | FrontCentre | Centre | M+000 |
|  | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
|  | AC_0001000a | SideLeft | Left Side Surround | M+090 |
|  | AC_0001000b | SideRight | Right Side Surround | M-090 |
|  | AC_0001001c | BackLeftMid | Left Rear Surround | M+135 |
|  | AC_0001001d | BackRightMid | Right Rear Surround | M-135 |
| **AP_00010004** 7.1_top_(2+5+0) *BS.2051 (C)* | AC_00010001 | FrontLeft | Left | M+030 |
|  | AC_00010002 | FrontRight | Right | M-030 |
|  | AC_00010003 | FrontCentre | Centre | M+000 |
|  | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
|  | AC_00010005 | SurroundLeft | Left Surround | M+110 |
|  | AC_00010006 | SurroundRight | Right Surround | M-110 |
|  | AC_0001000d | TopFrontLeft | Left Top Front | U+030 |
|  | AC_0001000f | TopFrontRight | Right Top Front | U-030 |

TABLE 2 (*continued*)

| audioPackFormatID audioPackFormatName *Recommendation derived from* | audioChannelIDRef | audioChannelName | Channel name in Recommendation | speakerLabel |
|---|---|---|---|---|
| **AP_00010012** 7.1side_5.1+sc_(0+7+0) *N/A* | AC_00010001 | FrontLeft | Front Left | M+030 |
| | AC_00010002 | FrontRight | Front Right | M-030 |
| | AC_00010003 | FrontCentre | Front Centre | M+000 |
| | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
| | AC_00010005 | SurroundLeft | Left Surround | M+110 |
| | AC_00010006 | SurroundRight | Right Surround | M-110 |
| | AC_00010024 | FrontLeftScreen | Front Left Screen | M+SC |
| | AC_00010025 | FrontRightScreen | Front Right Screen | M-SC |
| **AP_00010013** 7.1topside_5.1.2_(2+5+0) *N/A* | AC_00010001 | FrontLeft | Front Left | M+030 |
| | AC_00010002 | FrontRight | Front Right | M-030 |
| | AC_00010003 | FrontCentre | Front Centre | M+000 |
| | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
| | AC_00010005 | SurroundLeft | Left Surround | M+110 |
| | AC_00010006 | SurroundRight | Right Surround | M-110 |
| | AC_00010013 | TopSideLeft | Top Side Left | U+090 |
| | AC_00010014 | TopSideRight | Top Side Right | U-090 |
| **AP_00010014** 9.1screen_5.1.2+sc_(2+7+0) *N/A* | AC_00010001 | FrontLeft | Front Left | M+030 |
| | AC_00010002 | FrontRight | Front Right | M-030 |
| | AC_00010003 | FrontCentre | Front Centre | M+000 |
| | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
| | AC_00010005 | SurroundLeft | Left Surround | M+110 |
| | AC_00010006 | SurroundRight | Right Surround | M-110 |
| | AC_00010013 | TopSideLeft | Top Side Left | U+090 |
| | AC_00010014 | TopSideRight | Top Side Right | U-090 |
| | AC_00010024 | FrontLeftScreen | Front Left Screen | M+SC |
| | AC_00010025 | FrontRightScreen | Front Right Screen | M-SC |
| **AP_00010016** 9.1_7.1.2_(2+7+0) *N/A* | AC_00010001 | FrontLeft | Front Left | M+030 |
| | AC_00010002 | FrontRight | Front Right | M-030 |
| | AC_00010003 | FrontCentre | Front Centre | M+000 |
| | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
| | AC_0001000a | SideLeft | Left Side Surround | M+090 |
| | AC_0001000b | SideRight | Right Side Surround | M-090 |
| | AC_0001001c | BackLeftMid | Back Left | M+135 |
| | AC_0001001d | BackRightMid | Back Right | M-135 |
| | AC_00010013 | TopSideLeft | Top Side Left | U+090 |
| | AC_00010014 | TopSideRight | Top Side Right | U-090 |

TABLE 2 (*continued*)

| audioPackFormatID audioPackFormatName *Recommendation derived from* | audioChannelIDRef | audioChannelName | Channel name in Recommendation | speakerLabel |
|---|---|---|---|---|
| **AP_00010005** 9.1_5.1.4_(4+5+0) *BS.2051 (D)* | AC_00010001 | FrontLeft | Left | M+030 |
| | AC_00010002 | FrontRight | Right | M-030 |
| | AC_00010003 | FrontCentre | Centre | M+000 |
| | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
| | AC_00010005 | SurroundLeft | Left Surround | M+110 |
| | AC_00010006 | SurroundRight | Right Surround | M-110 |
| | AC_0001000d | TopFrontLeft | Left Top Front | U+030 |
| | AC_0001000f | TopFrontRight | Right Top Front | U-030 |
| | AC_00010010 | TopSurroundLeft | Left Top Rear | U+110 |
| | AC_00010012 | TopSurroundRight | Right Top Rear | U-110 |
| **AP_00010006** 10.1_(4+5+1) *BS.2051 (E)* | AC_00010001 | FrontLeft | Left | M+030 |
| | AC_00010002 | FrontRight | Right | M-030 |
| | AC_00010003 | FrontCentre | Centre | M+000 |
| | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
| | AC_00010005 | SurroundLeft | Left Surround | M+110 |
| | AC_00010006 | SurroundRight | Right Surround | M-110 |
| | AC_0001000d | TopFrontLeft | Left Top Front | U+030 |
| | AC_0001000f | TopFrontRight | Right Top Front | U-030 |
| | AC_00010010 | TopSurroundLeft | Left Top Rear | U+110 |
| | AC_00010012 | TopSurroundRight | Right Top Rear | U-110 |
| | AC_00010015 | BottomFrontCentre | Centre Bottom Front | B+000 |
| **AP_00010007** 10.2_(3+7+0) *BS.2051 (F)* | AC_00010003 | FrontCentre | Centre | M+000 |
| | AC_00010001 | FrontLeft | Left | M+030 |
| | AC_00010002 | FrontRight | Right | M-030 |
| | AC_00010022 | TopFrontLeftMid | Left Height | U+045 |
| | AC_00010023 | TopFrontRightMid | Right Height | U-045 |
| | AC_0001000a | SideLeft | Left Side | M+090 |
| | AC_0001000b | SideRight | Right Side | M-090 |
| | AC_0001001c | BackLeftMid | Left Back | M+135 |
| | AC_0001001d | BackRightMid | Right Back | M-135 |
| | AC_00010028 | UpperTopBackCentre | Centre Height | UH+180 |
| | AC_00010020 | LowFrequencyEffectsL | LowFrequencyEffects-1 | LFE1 |
| | AC_00010021 | LowFrequencyEffectsR | LowFrequencyEffects-2 | LFE2 |

TABLE 2 (*continued*)

| audioPackFormatID audioPackFormatName *Recommendation derived from* | audioChannelIDRef | audioChannelName | Channel name in Recommendation | speakerLabel |
|---|---|---|---|---|
| **AP_00010015** 11.1_5.1.4+sc_(4+7+0) *N/A* | AC_00010001 | FrontLeft | Left | M+030 |
| | AC_00010002 | FrontRight | Right | M-030 |
| | AC_00010003 | FrontCentre | Centre | M+000 |
| | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
| | AC_00010005 | SurroundLeft | Left Surround | M+110 |
| | AC_00010006 | SurroundRight | Right Surround | M-110 |
| | AC_0001000d | TopFrontLeft | Top Front Left | U+030 |
| | AC_0001000f | TopFrontRight | Top Front Right | U-030 |
| | AC_00010010 | TopSurroundLeft | Top Surround Left | U+110 |
| | AC_00010012 | TopSurroundRight | Top Surround Right | U-110 |
| | AC_00010024 | FrontLeftScreen | Front Left Screen | M+SC |
| | AC_00010025 | FrontRightScreen | Front Right Screen | M-SC |
| **AP_00010017** 11.1_7.1.4_(4+7+0) *BS.2051(J)* | AC_00010001 | FrontLeft | Left | M+030 |
| | AC_00010002 | FrontRight | Right | M-030 |
| | AC_00010003 | FrontCentre | Centre | M+000 |
| | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
| | AC_0001000a | SideLeft | Left Side Surround | M+090 |
| | AC_0001000b | SideRight | Right Side Surround | M-090 |
| | AC_0001001c | BackLeftMid | Left Rear Surround | M+135 |
| | AC_0001001d | BackRightMid | Right Rear Surround | M-135 |
| | AC_00010022 | TopFrontLeftMid | Left Top Front | U+045 |
| | AC_00010023 | TopFrontRightMid | Right Top Front | U-045 |
| | AC_0001001e | TopBackLeftMid | Left Top Back | U+135 |
| | AC_0001001f | TopBackRightMid | Right Top Back | U-135 |
| **AP_00010008** 13.1_(4+9+0) *BS.2051 (G)* | AC_00010001 | FrontLeft | Left | M+030 |
| | AC_00010002 | FrontRight | Right | M-030 |
| | AC_00010003 | FrontCentre | Centre | M+000 |
| | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
| | AC_0001000a | SideLeft | Left Side Surround | M+090 |
| | AC_0001000b | SideRight | Right Side Surround | M-090 |
| | AC_0001001c | BackLeftMid | Left Rear Surround | M+135 |
| | AC_0001001d | BackRightMid | Right Rear Surround | M-135 |
| | AC_00010022 | TopFrontLeftMid | Left Top Front | U+045 |
| | AC_00010023 | TopFrontRightMid | Right Top Front | U-045 |
| | AC_0001001e | TopBackLeftMid | Left Top Back | U+135 |
| | AC_0001001f | TopBackRightMid | Right Top Back | U-135 |
| | AC_00010024 | FrontLeftScreen | Left Screen | M+SC |
| | AC_00010025 | FrontRightScreen | Right Screen | M-SC |

TABLE 2 (*continued*)

| audioPackFormatID audioPackFormatName *Recommendation derived from* | audioChannelIDRef | audioChannelName | Channel name in Recommendation | speakerLabel |
|---|---|---|---|---|
| **AP_00010009** 22.2_(9+10+3) *BS.2051 (H)* | AC_00010018 | FrontLeftWide | Front Left | M+060 |
| | AC_00010019 | FrontRightWide | Front Right | M-060 |
| | AC_00010003 | FrontCentre | Front Centre | M+000 |
| | AC_00010020 | LowFrequencyEffectsL | LowFrequencyEffects-1 | LFE1 |
| | AC_0001001c | BackLeftMid | Back Left | M+135 |
| | AC_0001001d | BackRightMid | Back Right | M-135 |
| | AC_00010001 | FrontLeft | Front Left Centre | M+030 |
| | AC_00010002 | FrontRight | Front Right Centre | M-030 |
| | AC_00010009 | BackCentre | Back Centre | M+180 |
| | AC_00010021 | LowFrequencyEffectsR | LowFrequencyEffects-2 | LFE2 |
| | AC_0001000a | SideLeft | Side Left | M+090 |
| | AC_0001000b | SideRight | Side Right | M-090 |
| | AC_00010022 | TopFrontLeftMid | Top Front Left | U+045 |
| | AC_00010023 | TopFrontRightMid | Top Front Right | U-045 |
| | AC_0001000e | TopFrontCentre | Top Front Centre | U+000 |
| | AC_0001000c | TopCentre | Top Centre | T+000 |
| | AC_0001001e | TopBackLeftMid | Top Back Left | U+135 |
| | AC_0001001f | TopBackRightMid | Top Back Right | U-135 |
| | AC_00010013 | TopSideLeft | Top Side Left | U+090 |
| | AC_00010014 | TopSideRight | Top Side Right | U-090 |
| | AC_00010011 | TopBackCentre | Top Back Centre | U+180 |
| | AC_00010015 | BottomFrontCentre | Bottom Front Centre | B+000 |
| | AC_00010016 | BottomFrontLeftMid | Bottom Front Left | B+045 |
| | AC_00010017 | BottomFrontRightMid | Bottom Front Right | B-045 |
| **AP_00010011** Auro-3D_(9+9+0) *N/A* | AC_00010001 | FrontLeft | Left | M+030 |
| | AC_00010002 | FrontRight | Right | M-030 |
| | AC_00010003 | FrontCentre | Centre | M+000 |
| | AC_00010004 | LowFrequencyEffects | Low Frequency Effects | LFE |
| | AC_00010005 | SurroundLeft | Left Surround | M+110 |
| | AC_00010006 | SurroundRight | Right Surround | M-110 |
| | AC_0001000a | SideLeft | Left Side | M+090 |
| | AC_0001000b | SideRight | Right Side | M-090 |
| | AC_0001001a | BackLeftMidDiffuse | Left Rear Surround | M+135_Diff |
| | AC_0001001b | BackRightMidDiffuse | Right Rear Surround | M-135_Diff |
| | AC_0001000d | TopFrontLeft | Height Left | U+030 |
| | AC_0001000f | TopFrontRight | Height Right | U-030 |

TABLE 2 (*end*)

| audioPackFormatID<br>**audioPackFormatName**<br>*Recommendation<br>derived from* | audioChannelIDRef | audioChannelName | Channel name in<br>Recommendation | speakerLabel |
|---|---|---|---|---|
| | AC_0001000e | TopFrontCentre | Height Centre | U+000 |
| | AC_00010010 | TopSurroundLeft | Height Left Surround | U+110 |
| | AC_00010012 | TopSurroundRight | Height Right Surround | U-110 |
| | AC_00010013 | TopSideLeft | Height Left Side | U+090 |
| | AC_00010014 | TopSideRight | Height Right Side | U-090 |
| | AC_0001001e | TopBackLeftMid | Height Left Rear Surround | U+135 |
| | AC_0001001f | TopBackRightMid | Height Right Rear Surround | U-135 |

To show how an audioPackDefinition is represented in XML the following code shows the stereo pack definition.

```
<audioPackFormat audioPackFormatID="AP_00010002"
audioPackFormatName="urn:itu:bs:2051:0:pack:stereo_(0+2+0)" typeLabel="0001"
typeDefinition="DirectSpeakers">
  <audioChannelFormatIDRef>AC_00010001</audioChannelFormatIDRef>
  <audioChannelFormatIDRef>AC_00010002</audioChannelFormatIDRef>
</audioPackFormat>
```

## 4.2    Common definitions for the 'Matrix' audio type

Currently, there are no common definitions for the 'Matrix' audio type. However, in future revisions relevant information may be added to this section for common matrix configurations used.

## 4.3    Common definitions for the 'Objects' audio type

Currently, there are no common definitions for the 'Objects' audio type. However, in future revisions relevant information may be added to this section.

**4.4      Common definitions for the 'HOA' audio type**

**4.4.1    Common audioChannelFormats for 'HOA'**

TABLE 3

**AudioChannelFormat definitions for 'HOA'**

| audioChannelFormatID | audioChannelFormatName | Order | Degree | Normalization |
|---|---|---|---|---|
| AC_00040001 | SN3D_ACN_0 | 0 | 0 | SN3D |
| AC_00040002 | SN3D_ACN_1 | 1 | -1 | SN3D |
| AC_00040003 | SN3D_ACN_2 | 1 | 0 | SN3D |
| AC_00040004 | SN3D_ACN_3 | 1 | 1 | SN3D |
| AC_00040005 | SN3D_ACN_4 | 2 | -2 | SN3D |
| AC_00040006 | SN3D_ACN_5 | 2 | -1 | SN3D |
| … | … | … | … | … |
| AC_00040079 | SN3D_ACN_120 | 10 | 10 | SN3D |
| AC_00040101 | N3D_ACN_0 | 0 | 0 | N3D |
| AC_00040102 | N3D_ACN_1 | 1 | -1 | N3D |
| AC_00040103 | N3D_ACN_2 | 1 | 0 | N3D |
| AC_00040104 | N3D_ACN_3 | 1 | 1 | N3D |
| AC_00040105 | N3D_ACN_4 | 2 | -2 | N3D |
| AC_00040106 | N3D_ACN_5 | 2 | -1 | N3D |
| … | … | … | … | … |
| AC_00040179 | N3D_ACN_120 | 10 | 10 | N3D |
| AC_00040201 | FuMa_W | 0 | 0 | FuMa |
| AC_00040202 | FuMa_X | 1 | 1 | FuMa |
| AC_00040203 | FuMa_Y | 1 | -1 | FuMa |
| AC_00040204 | FuMa_Z | 1 | 0 | FuMa |
| AC_00040205 | FuMa_R | 2 | 0 | FuMa |
| AC_00040206 | FuMa_S | 2 | 1 | FuMa |
| AC_00040207 | FuMa_T | 2 | -1 | FuMa |
| AC_00040208 | FuMa_U | 2 | 2 | FuMa |
| AC_00040209 | FuMa_V | 2 | -2 | FuMa |
| AC_0004020a | FuMa_K | 3 | 0 | FuMa |
| AC_0004020b | FuMa_L | 3 | 1 | FuMa |
| AC_0004020c | FuMa_M | 3 | -1 | FuMa |
| AC_0004020d | FuMa_N | 3 | 2 | FuMa |
| AC_0004020e | FuMa_O | 3 | -2 | FuMa |
| AC_0004020f | FuMa_P | 3 | 3 | FuMa |
| AC_00040210 | FuMa_Q | 3 | -3 | FuMa |

Each channel definition is listed in Table 1, where the audioChannelFormatID, and audioChannelFormatName elements are listed. The order, degree, and normalization columns

represent the settings that would be specified within the audioBlockFormat sub-elements. The XML below shows how the first entry in this table is represented in XML.

```
<audioChannelFormat audioChannelFormatID="AC_00040001" audioChannelFormatName="SN3D_ACN_0"
typeLabel="0004" typeDefinition="HOA">
  <audioBlockFormat audioBlockFormatID="AB_00040001_00000001">
    <normalization>SN3D</normalization>
    <order>0</order>
    <degree>0</degree>
  </audioBlockFormat>
</audioChannelFormat>
```

### 4.4.2 Common audioPackFormats for 'HOA'

The audioPackFormat definitions cover HOA configurations where all channels have the same normalization scheme and a complete series of channels up to a given order. Table 4 shows the set of configurations that have been defined.

As audioPackFormats can be nested, this allows the higher order packs to contain the lower order pack it contains plus the higher order channels. This reduces the size of each pack, and allows for flexibility in systems where different orders may require different processing.

The audioPackFormat names consist of the order, normalization and type. Spaces are not used in the names as they can cause problems.

audioPackFormatID scheme:

for type 0-1:  AP_00040<type><normalization><order>

for type 2-3:  AP_00040<type><normalization><order combination>

TABLE 4

**HOA type values**

| <type> | Value |
|--------|-------|
| 0 | 3D / periphonic |
| 1 | 2D / pantophonic / horizontal-only |
| 2 | pantophonic and periphonic superimposed (#H#P) |
| 3 | Complete mixed-order sets (#H#V) |

TABLE 5

**HOA normalization values**

| <normalization> | Value |
|-----------------|-------|
| 0 | SN3D |
| 1 | N3D |
| 2 | FuMa |

TABLE 6

**HOA order combination values**

| \<type\> | \<order combination\> | Value |
|:---:|:---:|:---:|
| 2 | 0 | 2H1P |
| 2 | 1 | 3H1P |
| 3 | 0 | 2H1V |

TABLE 7

**AudioPackFormat definitions**

| audioPackFormatID audioPackFormatName | audioChannelIDRef | audioChannelName | Order | Degree | Norm. |
|---|---|---|:---:|:---:|:---:|
| **AP_00040001** 3D_order1_SN3D _ACN | AC_00040001 | SN3D_ACN_0 | 0 | 0 | SN3D |
| | AC_00040002 | SN3D_ACN_1 | 1 | -1 | SN3D |
| | AC_00040003 | SN3D_ACN_2 | 1 | 0 | SN3D |
| | AC_00040004 | SN3D_ACN_3 | 1 | 1 | SN3D |
| **AP_00040011** 3D_order1_N3D _ACN | AC_00040101 | N3D_ACN_0 | 0 | 0 | N3D |
| | AC_00040102 | N3D_ACN_1 | 1 | −1 | N3D |
| | AC_00040103 | N3D_ACN_2 | 1 | 0 | N3D |
| | AC_00040104 | N3D_ACN_3 | 1 | 1 | N3D |
| **AP_00040021** 3D_order1_FuMa | AC_00040201 | FuMa_W | 0 | 0 | FuMa |
| | AC_00040202 | FuMa_X | 1 | 1 | FuMa |
| | AC_00040203 | FuMa_Y | 1 | −1 | FuMa |
| | AC_00040204 | FuMa_Z | 1 | 0 | FuMa |
| **AP_00040002** 3D_order2_SN3D _ACN | **audioPackFormatIDRef: AP_00040001** | | | | |
| | AC_00040005 | SN3D_ACN_4 | 2 | −2 | SN3D |
| | AC_00040006 | SN3D_ACN_5 | 2 | −1 | SN3D |
| | AC_00040007 | SN3D_ACN_6 | 2 | 0 | SN3D |
| | AC_00040008 | SN3D_ACN_7 | 2 | 1 | SN3D |
| | AC_00040009 | SN3D_ACN_8 | 2 | 2 | SN3D |
| **AP_00040012** 3D_order2_N3D _ACN | **audioPackFormatIDRef: AP_00040011** | | | | |
| | AC_00041005 | N3D_ACN_4 | 2 | −2 | N3D |
| | AC_00041006 | N3D_ACN_5 | 2 | −1 | N3D |
| | AC_00041007 | N3D_ACN_6 | 2 | 0 | N3D |
| | AC_00041008 | N3D_ACN_7 | 2 | 1 | N3D |
| | AC_00041009 | N3D_ACN_8 | 2 | 2 | N3D |

TABLE 7 (*continued*)

| audioPackFormatID<br>audioPackFormatName | audioChannelIDRef | audioChannelName | Order | Degree | Norm. |
|---|---|---|---|---|---|
| **AP_00040022**<br>3D_order2_FuMa | audioPackFormatIDRef: AP_00040021 | | | | |
| | AC_00040205 | FuMa_R | 2 | 0 | FuMa |
| | AC_00040206 | FuMa_S | 2 | 1 | FuMa |
| | AC_00040207 | FuMa_T | 2 | −1 | FuMa |
| | AC_00040208 | FuMa_U | 2 | 2 | FuMa |
| | AC_00040209 | FuMa_V | 2 | −2 | FuMa |
| **AP_00040003**<br>3D_order3_SN3D _ACN | audioPackFormatIDRef: AP_00040002 | | | | |
| | AC_0004000a | SN3D_ACN_9 | 3 | −3 | SN3D |
| | AC_0004000b | SN3D_ACN_10 | 3 | −2 | SN3D |
| | AC_0004000c | SN3D_ACN_11 | 3 | −1 | SN3D |
| | AC_0004000d | SN3D_ACN_12 | 3 | 0 | SN3D |
| | AC_0004000e | SN3D_ACN_13 | 3 | 1 | SN3D |
| | AC_0004000f | SN3D_ACN_14 | 3 | 2 | SN3D |
| | AC_00040010 | SN3D_ACN_15 | 3 | 3 | SN3D |
| **AP_00040013**<br>3D_order3_N3D _ACN | audioPackFormatIDRef: AP_00040012 | | | | |
| | AC_0004010a | N3D_ACN_9 | 3 | −3 | N3D |
| | AC_0004010b | N3D_ACN_10 | 3 | −2 | N3D |
| | AC_0004010c | N3D_ACN_11 | 3 | −1 | N3D |
| | AC_0004010d | N3D_ACN_12 | 3 | 0 | N3D |
| | AC_0004010e | N3D_ACN_13 | 3 | 1 | N3D |
| | AC_0004010f | N3D_ACN_14 | 3 | 2 | N3D |
| | AC_00040110 | N3D_ACN_15 | 3 | 3 | N3D |
| **AP_00040023**<br>3D_order3_FuMa | audioPackFormatIDRef: AP_00040022 | | | | |
| | AC_0004020a | FuMa_K | 3 | 0 | FuMa |
| | AC_0004020b | FuMa_L | 3 | 1 | FuMa |
| | AC_0004020c | FuMa_M | 3 | −1 | FuMa |
| | AC_0004020d | FuMa_N | 3 | 2 | FuMa |
| | AC_0004020e | FuMa_O | 3 | −2 | FuMa |
| | AC_0004020f | FuMa_P | 3 | 3 | FuMa |
| | AC_00040210 | FuMa_Q | 3 | −3 | FuMa |
| **AP_00040004**<br>3D_order4_SN3D _ACN | audioPackFormatIDRef: AP_00040003 | | | | |
| | AC_00040011 | SN3D_ACN_16 | 4 | −4 | SN3D |
| | AC_00040012 | SN3D_ACN_17 | 4 | −3 | SN3D |
| | AC_00040013 | SN3D_ACN_18 | 4 | −2 | SN3D |
| | AC_00040014 | SN3D_ACN_19 | 4 | −1 | SN3D |
| | AC_00040015 | SN3D_ACN_20 | 4 | 0 | SN3D |
| | AC_00040016 | SN3D_ACN_21 | 4 | 1 | SN3D |
| | AC_00040017 | SN3D_ACN_22 | 4 | 2 | SN3D |
| | AC_00040018 | SN3D_ACN_23 | 4 | 3 | SN3D |
| | AC_00040019 | SN3D_ACN_24 | 4 | 4 | SN3D |

TABLE 7 (*continued*)

| audioPackFormatID<br>audioPackFormatName | audioChannelIDRef | audioChannelName | Order | Degree | Norm. |
|---|---|---|---|---|---|
| **AP_00040014**<br>3D_order4_N3D _ACN | **audioPackFormatIDRef: AP_00040013** | | | | |
| | AC_00040111 | N3D_ACN_16 | 4 | −4 | N3D |
| | AC_00040112 | N3D_ACN_17 | 4 | −3 | N3D |
| | AC_00040113 | N3D_ACN_18 | 4 | −2 | N3D |
| | AC_00040114 | N3D_ACN_19 | 4 | −1 | N3D |
| | AC_00040115 | N3D_ACN_20 | 4 | 0 | N3D |
| | AC_00040116 | N3D_ACN_21 | 4 | 1 | N3D |
| | AC_00040117 | N3D_ACN_22 | 4 | 2 | N3D |
| | AC_00040118 | N3D_ACN_23 | 4 | 3 | N3D |
| | AC_00040119 | N3D_ACN_24 | 4 | 4 | N3D |
| **AP_00040005**<br>3D_order5_SN3D _ACN | **audioPackFormatIDRef: AP_00040004** | | | | |
| | AC_0004001a | SN3D_ACN_25 | 5 | −5 | SN3D |
| | AC_0004001b | SN3D_ACN_26 | 5 | −4 | SN3D |
| | AC_0004001c | SN3D_ACN_27 | 5 | −3 | SN3D |
| | AC_0004001d | SN3D_ACN_28 | 5 | −2 | SN3D |
| | AC_0004001e | SN3D_ACN_29 | 5 | −1 | SN3D |
| | AC_0004001f | SN3D_ACN_30 | 5 | 0 | SN3D |
| | AC_00040020 | SN3D_ACN_31 | 5 | 1 | SN3D |
| | AC_00040021 | SN3D_ACN_32 | 5 | 2 | SN3D |
| | AC_00040022 | SN3D_ACN_33 | 5 | 3 | SN3D |
| | AC_00040023 | SN3D_ACN_34 | 5 | 4 | SN3D |
| | AC_00040024 | SN3D_ACN_35 | 5 | 5 | SN3D |
| **AP_00040015**<br>3D_order5_N3D _ACN | **audioPackFormatIDRef: AP_00040014** | | | | |
| | AC_0004011a | N3D_ACN_25 | 5 | −5 | N3D |
| | AC_0004011b | N3D_ACN_26 | 5 | −4 | N3D |
| | AC_0004011c | N3D_ACN_27 | 5 | −3 | N3D |
| | AC_0004011d | N3D_ACN_28 | 5 | −2 | N3D |
| | AC_0004011e | N3D_ACN_29 | 5 | −1 | N3D |
| | AC_0004011f | N3D_ACN_30 | 5 | 0 | N3D |
| | AC_00040120 | N3D_ACN_31 | 5 | 1 | N3D |
| | AC_00040121 | N3D_ACN_32 | 5 | 2 | N3D |
| | AC_00040122 | N3D_ACN_33 | 5 | 3 | N3D |
| | AC_00040123 | N3D_ACN_34 | 5 | 4 | N3D |
| | AC_00040124 | N3D_ACN_35 | 5 | 5 | N3D |

TABLE 7 (*continued*)

| audioPackFormatID audioPackFormatName | audioChannelIDRef | audioChannelName | Order | Degree | Norm. |
|---|---|---|---|---|---|
| **AP_00040006** 3D_order6_SN3D _ACN | **audioPackFormatIDRef: AP_00040005** | | | | |
| | AC_00040025 | SN3D_ACN_36 | 6 | −6 | SN3D |
| | AC_00040026 | SN3D_ACN_37 | 6 | −5 | SN3D |
| | AC_00040027 | SN3D_ACN_38 | 6 | −4 | SN3D |
| | AC_00040028 | SN3D_ACN_39 | 6 | −3 | SN3D |
| | AC_00040029 | SN3D_ACN_40 | 6 | −2 | SN3D |
| | AC_0004003a | SN3D_ACN_41 | 6 | −1 | SN3D |
| | AC_0004003b | SN3D_ACN_42 | 6 | 0 | SN3D |
| | AC_0004002c | SN3D_ACN_43 | 6 | 1 | SN3D |
| | AC_0004002d | SN3D_ACN_44 | 6 | 2 | SN3D |
| | AC_0004002e | SN3D_ACN_45 | 6 | 3 | SN3D |
| | AC_0004002f | SN3D_ACN_46 | 6 | 4 | SN3D |
| | AC_00040030 | SN3D_ACN_47 | 6 | 5 | SN3D |
| | AC_00040031 | SN3D_ACN_48 | 6 | 6 | SN3D |
| **AP_00040016** 3D_order6_N3D _ACN | **audioPackFormatIDRef: AP_00040015** | | | | |
| | AC_00040125 | N3D_ACN_36 | 6 | −6 | N3D |
| | AC_00040126 | N3D_ACN_37 | 6 | −5 | N3D |
| | AC_00040127 | N3D_ACN_38 | 6 | −4 | N3D |
| | AC_00040128 | N3D_ACN_39 | 6 | −3 | N3D |
| | AC_00040129 | N3D_ACN_40 | 6 | −2 | N3D |
| | AC_0004013a | N3D_ACN_41 | 6 | −1 | N3D |
| | AC_0004013b | N3D_ACN_42 | 6 | 0 | N3D |
| | AC_0004013c | N3D_ACN_43 | 6 | 1 | N3D |
| | AC_0004013d | N3D_ACN_44 | 6 | 2 | N3D |
| | AC_0004013e | N3D_ACN_45 | 6 | 3 | N3D |
| | AC_0004013f | N3D_ACN_46 | 6 | 4 | N3D |
| | AC_00040140 | N3D_ACN_47 | 6 | 5 | N3D |
| | AC_00040141 | N3D_ACN_48 | 6 | 6 | N3D |
| **AP_00040111** 2D_Order1_N3D_ACN | AC_00040101 | N3D_ACN_0 | 0 | 0 | N3D |
| | AC_00040102 | N3D_ACN_1 | 1 | −1 | N3D |
| | AC_00040104 | N3D_ACN_3 | 1 | 1 | N3D |
| **AP_00040112** 2D_Order2_N3D_ACN | **audioPackFormatIDRef: AP_00040111** | | | | |
| | AC_00040105 | N3D_ACN_4 | 2 | −2 | N3D |
| | AC_00040109 | N3D_ACN_8 | 2 | 2 | N3D |
| **AP_00040210** 2H1P_N3D_ACN | **audioPackFormatIDRef: AP_00040011** | | | | |
| | AC_00040105 | N3D_ACN_4 | 2 | −2 | N3D |
| | AC_00040109 | N3D_ACN_8 | 2 | 2 | N3D |

TABLE 7 (*end*)

| audioPackFormatID audioPackFormatName | audioChannelIDRef | audioChannelName | Order | Degree | Norm. |
|---|---|---|---|---|---|
| **AP_00040211** 3H1P_N3D_ACN | **audioPackFormatIDRef: AP_00040210** | | | | |
| | AC_0004010a | N3D_ACN_9 | 3 | −3 | N3D |
| | AC_00040110 | N3D_ACN_15 | 3 | 3 | N3D |
| **AP_00040310** 2H1V_N3D_ACN | **audioPackFormatIDRef: AP_00040011** | | | | |
| | AC_00040105 | N3D_ACN_4 | 2 | −2 | N3D |
| | AC_00040106 | N3D_ACN_5 | 2 | −1 | N3D |
| | AC_00040108 | N3D_ACN_7 | 2 | 1 | N3D |
| | AC_00040109 | N3D_ACN_8 | 2 | 2 | N3D |

To show how an audioPackDefinition is represented in XML the following code shows the first-order SN3D ACN (AmbiX) pack definition.

```
<audioPackFormat audioPackFormatID="AP_00040001" audioPackFormatName="3D_order1_SN3D_ACN"
typeLabel="0004" typeDefinition="HOA">
  <audioChannelFormatIDRef>AC_00040001</audioChannelFormatIDRef>
  <audioChannelFormatIDRef>AC_00040002</audioChannelFormatIDRef>
  <audioChannelFormatIDRef>AC_00040003</audioChannelFormatIDRef>
  <audioChannelFormatIDRef>AC_00040004</audioChannelFormatIDRef>
</audioPackFormat>
```

## 4.5      Common definitions for the 'Binaural' audio type

Currently, there are no common definitions for the 'Binaural' audio type. However, in future revisions relevant information may be added to this section.

### 4.5.1      Common audioChannelFormats for 'Binaural'

TABLE 8

**AudioChannelFormat definitions for 'Binural'**

| audioChannelFormatID | audioChannelFormatName |
|---|---|
| AC_00050001 | LeftEar |
| AC_00050002 | RightEar |

Each channel definition is listed in Table 1, where the audioChannelFormatID, and audioChannelFormatName elements are listed. The XML below shows how the first entry in this table is represented in XML.

```
<audioChannelFormat audioChannelFormatID="AC_00050001" audioChannelFormatName="LeftEar"
typeLabel="0005" typeDefinition="DirectSpeakers">
  <audioBlockFormat audioBlockFormatID="AC_00050001_00000001">
  </audioBlockFormat>
</audioChannelFormat>
```

### 4.5.2      Common audioStreamFormats and audioTrackFormats for 'Binaural'

The common format type for audioStreamFormat and audioTrackFormat is 'PCM'.

As previously mentioned, the audioStreamFormat and audioTrackFormat, which relate to each audioChannelFormat definition use the same ID prefixes and the same names with 'PCM_' appended,

such as 'PCM_LeftEar'. The XML code below shows both the audioStreamFormat and audioTrackFormat definition for the first entry in the table.

```
<audioStreamFormat audioStreamFormatID="AS_00050001" audioStreamFormatName="PCM_LeftEar"
formatLabel="0001" formatDefinition="PCM">
  <audioChannelFormatIDRef>AC_00050001</audioChannelFormatIDRef>
  <audioTrackFormatIDRef>AT_00050001_01</audioTrackFormatIDRef>
</audioStreamFormat>

<audioTrackFormat      audioTrackFormatID="AT_00050001_01"      audioTrackFormatName="PCM_LeftEar"
formatLabel="0001" formatDefinition="PCM">
  <audioStreamFormatIDRef>AS_00050001</audioStreamFormatIDRef>
</audioTrackFormat>
```

### 4.5.3    Common audioPackFormats for 'Binaural'

The audioPackFormat definition covers a single configuration. Table 2 shows the configuration that has been defined. The last column gives the references to each channel the pack consists of. Instead of giving the whole ID (e.g. AP_00010001), only the last two digits are listed for clarity; so they would be AP_000100xx where xx is the digits listed to give the full audioPackFormatIDRef.

TABLE 9

**AudioPackFormat definitions**

| audioPackFormatID audioPackFormatName | audioChannelIDRef | audioChannelName |
|---|---|---|
| **AP_00050001**<br>Binaural | AC_00050001<br>AC_00050002 | LeftEar<br>RightEar |

To show how an audioPackDefinition is represented in XML the following code shows the binaural pack definition.

```
<audioPackFormat  audioPackFormatID="AP_00050001"  audioPackFormatName="Binaural"  typeLabel="0001"
typeDefinition="DirectSpeakers">
  <audioChannelFormatIDRef>AC_00050001</audioChannelFormatIDRef>
  <audioChannelFormatIDRef>AC_00050002</audioChannelFormatIDRef>
</audioPackFormat>
```

### 4.6    Using URIs

As the set of common definitions may increase in the future, it helps to have a method of provenance for particular elements. In the channel definitions the speakerLabel elements correspond to those used in Recommendation ITU-R BS.2051, which use the L+aaa style of naming. To clarify which common the label corresponds to it prefixed with a URI to reference the common used. This method was suggested in ITU-R contribution 6B/282 ("Comment On Audio-Related Metadata: ADM (Audio Definition Model) And MDA (Multi-Dimensional Audio)").

The two places that use URIs are the speakerLabel element (within audioBlockFormat) and the audioPackFormatName attribute (part of audioPackFormat). For Recommendation ITU-R BS.2051 the URI prefix is given as: *urn:itu:bs:2051:0*. Examples of code using the URIs are shown below:

```
<speakerLabel>urn:itu:bs:2051:0:speaker:M+030</speakerLabel>
<audioPackFormat audioPackFormatID="AP_00010002"
audioPackFormatName="urn:itu:bs:2051:0:pack:stereo_(0+2+0)" typeLabel="0001"
typeDefinition="DirectSpeakers">
```

After each *urn:itu:bs:2051:0* prefix follows a string to classify what is being named (so either *speaker* or *pack* in this case), and then this is followed by the actual name.

**5 Attachments**

This file is a Microsoft Excel spreadsheet containing both the channel definitions and pack definitions:

Copy of common
adm v9.xlsx

The following file contains the Common Definitions using the Recommendation ITU-R BS.2076 model in XML. It has been automatically generated from the spreadsheet. Due to the limitations of Word, an XML file cannot be embedded. So this is a Word document containing just the XML as text. To use, open the file, select all, then copy into a plain ASCII text file (using a text editor) and save it as "common_adm_def_v9.xml".

Copy of common
adm def v9.docx