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**AMENDMENT 1**  
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**Information technology — MPEG  
systems technologies —**

**Part 8:  
Coding-independent code points**

**AMENDMENT 1: New audio code points**

*Technologies de l'information — Technologies des systèmes MPEG —  
Partie 8: Points de code indépendants du codage*

*AMENDEMENT 1: .*

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Reference number  
ISO/IEC 23001-8:2013/Amd.1:2015(E)



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## Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Amendment 1 to ISO/IEC 23001-8:2013 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

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# Information technology — MPEG systems technologies — Part 8: Coding independent code points, AMENDMENT 1: Additional audio code points

## 1 Scope

This amendment adds new audio related code points to ISO/IEC 23001-8:2013.

## 2 Amendment Text

In clause 5, amend Table 1 as follow:

**Table 1 — List of code point definitions**

| Name                         | Description                         | Subclause |
|------------------------------|-------------------------------------|-----------|
| [...]                        | [...]                               | [...]     |
| <b>OutputChannelPosition</b> | Audio channel assignment            | 8.2       |
| <b>ChannelConfiguration</b>  | Audio channel configuration         | 8.3       |
| <b>LoudspeakerGeometry</b>   | Audio loudspeaker geometry          | 8.4       |
| <b>LoudspeakerElevation</b>  | Audio loudspeaker elevation         | 8.4       |
| <b>LoudspeakerAzimuth</b>    | Audio loudspeaker azimuth           | 8.4       |
| <b>ProgramLoudness</b>       | Audio program loudness level        | 8.5       |
| <b>AnchorLoudness</b>        | Audio anchor content loudness level | 8.6       |
| <b>LoudnessRange</b>         | Range of loudness                   | 8.7       |
| <b>LoudnessRangeTop</b>      | Top value of loudness range         | 8.8       |
| <b>MomentaryLoudnessMax</b>  | Maximum Loudness (400 ms window)    | 8.9       |
| <b>ShortTermLoudnessMax</b>  | Maximum Loudness (3 s window)       | 8.10      |
| <b>ShortTermLoudness</b>     | Loudness (3s window)                | 8.11      |
| <b>SamplePeakLevel</b>       | Level of sample peak magnitude      | 8.12      |
| <b>TruePeakLevel</b>         | Level of true peak                  | 8.12      |
| <b>DrcCharacteristic</b>     | Index of DRC characteristic         | 8.13      |

In clause 8, replace text and Tables as follows:

### 8.1 Definitions related to audio code points

#### **Loudspeaker** **LS**

a physical loudspeaker with a given geometric position relative to the listener and, if applicable, a label or name

NOTE – Even though the loudspeaker names used in this document each describe one discrete loudspeaker position, some loudspeaker signals may in practice be rendered on a loudspeaker array consisting of multiple loudspeakers which are all driven with the same audio signal, for example in a theatrical setting.

**Loudspeaker Index**  
**OutputChannelPosition**

association of a loudspeaker geometric position to a given index according to 8.2

**Loudspeaker Layout**

set of loudspeakers with a specific constellation of geometric positions meant for authoring or play-back of audio content

**Loudspeaker Layout Index**  
**ChannelConfiguration**

association of a loudspeaker layout to a given index according to 8.3

**Channel**  
**Ch.**

conceptual representation of an audio signal for coding or transmission as it may be used within the digital signal processing chain of an audio codec

NOTE –A channel may correspond directly to one specific loudspeaker or it may carry an audio signal that is meant to be further processed and played back on more than one loudspeaker by some means not further specified here.

**8.2 Loudspeaker Index, Output Channel Position**

*Type: Unsigned integer, enumeration*

*Range: 0 – 127*

**OutputChannelPosition** indicates the descriptive loudspeaker position in the 3D environment relative to the listener.

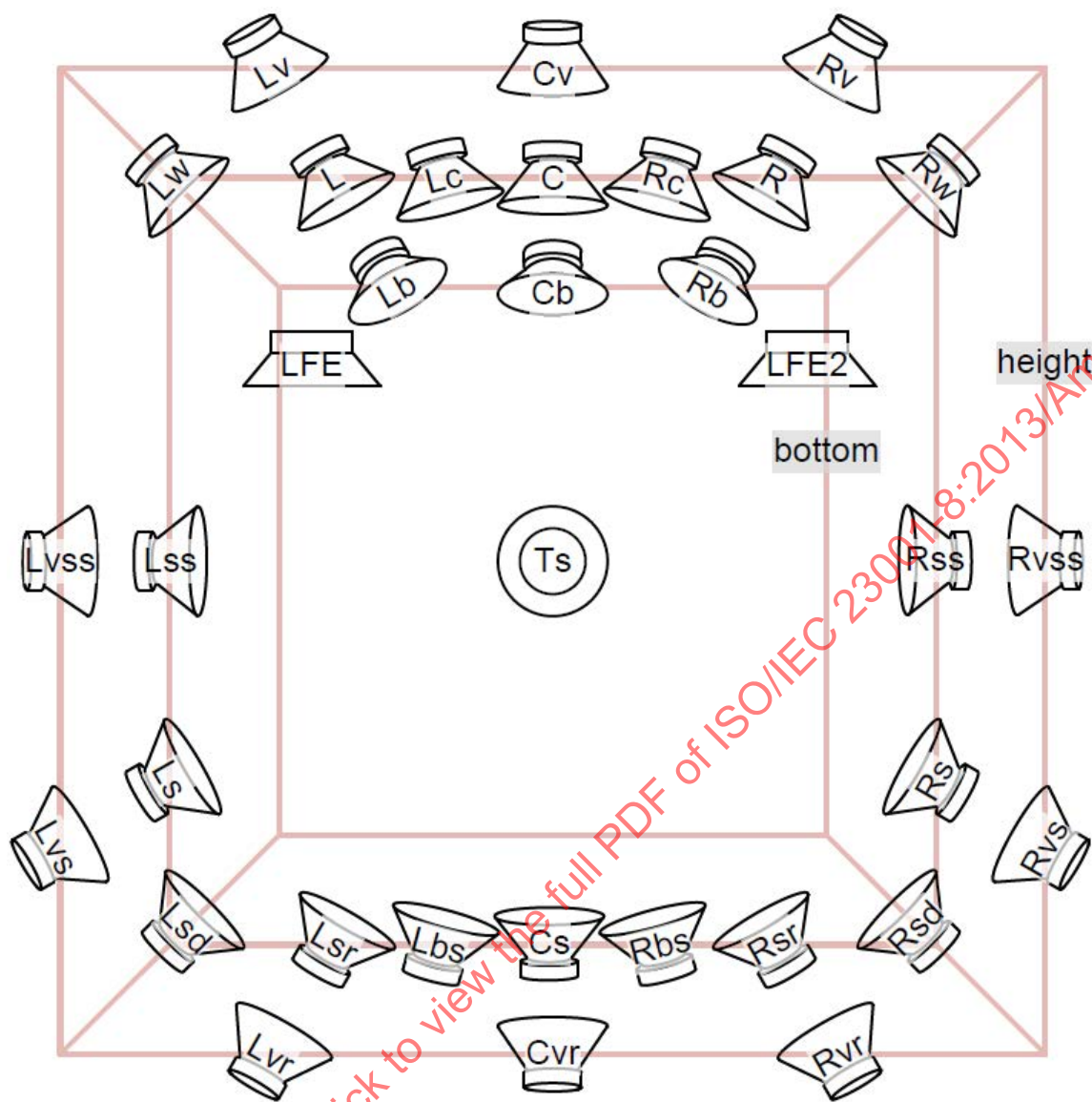
For the purpose of this document the terms “loudspeaker” and “loudspeaker layout” is preferred over the terms “channel” and “channel configuration” because the latter appear to be potentially codec-dependent. Previous editions of this document and certain standards use these terms (channel, channel configuration) and in their respective contexts should be understood synonymously to the terms loudspeaker and loudspeaker layout.

When a speaker is indicated as being at an explicit position, the position is provided by some means outside the scope of this specification. That might include signaling by azimuth, elevation, or distance or by some other suitable means.

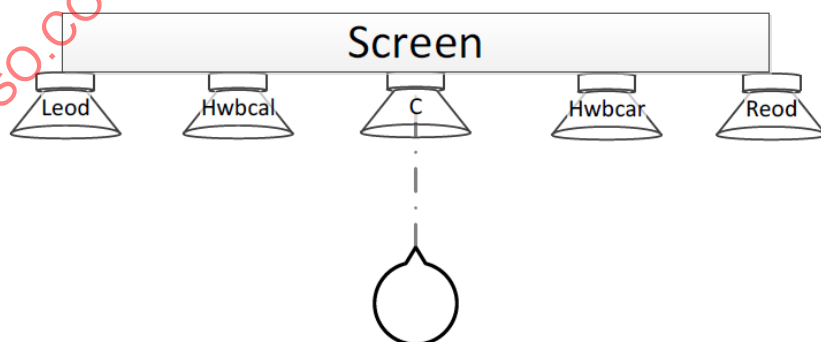
Table 7 — Definition of Loudspeaker Index, OutputChannelPosition

| OutputChannelPosition | Loudspeaker position |                                                         | Loudspeaker position according to IEC 62574 :2011 |                         |
|-----------------------|----------------------|---------------------------------------------------------|---------------------------------------------------|-------------------------|
|                       | Abbr.                | Name                                                    | Abbr.                                             | Name                    |
| 0                     | L                    | Left front                                              | FL                                                | Front left              |
| 1                     | R                    | Right front                                             | FR                                                | Front right             |
| 2                     | C                    | Centre front                                            | FC                                                | Front centre            |
| 3                     | LFE                  | Low frequency enhancement                               | LFE1                                              | Low frequency effects-1 |
| 4                     | Ls                   | Left surround                                           | LS                                                | Left surround           |
| 5                     | Rs                   | Right surround                                          | RS                                                | Right surround          |
| 6                     | Lc                   | Left front centre                                       | FLc                                               | Front left centre       |
| 7                     | Rc                   | Right front centre                                      | FRc                                               | Front right centre      |
| 8                     | Lsr                  | Rear surround left                                      | BL                                                | Back left               |
| 9                     | Rsr                  | Rear surround right                                     | BR                                                | Back right              |
| 10                    | Cs                   | Rear centre                                             | BC                                                | Back centre             |
| 11                    | Lsd                  | Left surround direct                                    | LSd                                               | Left surround direct    |
| 12                    | Rsd                  | Right surround direct                                   | RSd                                               | Right surround direct   |
| 13                    | Lss                  | Left side surround                                      | SL                                                | Side left               |
| 14                    | Rss                  | Right side surround                                     | SR                                                | Side right              |
| 15                    | Lw                   | Left wide front                                         | FLw                                               | Front left wide         |
| 16                    | Rw                   | Right wide front                                        | FRw                                               | Front right wide        |
| 17                    | Lv                   | Left front vertical height                              | TpFL                                              | Top front left          |
| 18                    | Rv                   | Right front vertical height                             | TpFR                                              | Top front right         |
| 19                    | Cv                   | Centre front vertical height                            | TpFC                                              | Top front centre        |
| 20                    | Lvr                  | Left surround vertical height rear                      | TpBL                                              | Top back left           |
| 21                    | Rvr                  | Right surround vertical height rear                     | TpBR                                              | Top back right          |
| 22                    | Cvr                  | Centre vertical height rear                             | TpBC                                              | Top back centre         |
| 23                    | Lvss                 | Left vertical height side surround                      | TpSiL                                             | Top side left           |
| 24                    | Rvss                 | Right vertical height side surround                     | TpSiR                                             | Top side right          |
| 25                    | Ts                   | Top centre surround                                     | TpC                                               | Top centre              |
| 26                    | LFE2                 | Low frequency enhancement 2                             | LFE2                                              | Low frequency effects-2 |
| 27                    | Lb                   | Left front vertical bottom                              | BtFL                                              | Bottom front left       |
| 28                    | Rb                   | Right front vertical bottom                             | BtFR                                              | Bottom front right      |
| 29                    | Cb                   | Centre front vertical bottom                            | BtFC                                              | Bottom front centre     |
| 30                    | Lvs                  | Left vertical height surround                           | TpLS                                              | Top left surround       |
| 31                    | Rvs                  | Right vertical height surround                          | TpRS                                              | Top right surround      |
| 32                    |                      | Reserved                                                |                                                   |                         |
| 33                    |                      | Reserved                                                |                                                   |                         |
| 34                    |                      | Reserved                                                |                                                   |                         |
| 35                    |                      | Reserved                                                |                                                   |                         |
| 36                    | LFE3                 | Low frequency enhancement 3                             |                                                   |                         |
| 37                    | Leos                 | Left edge of screen                                     |                                                   |                         |
| 38                    | Reos                 | Right edge of screen                                    |                                                   |                         |
| 39                    | Hwbcsl               | half-way btw. centre of screen and left edge of screen  |                                                   |                         |
| 40                    | Hwbcar               | half-way btw. centre of screen and right edge of screen |                                                   |                         |
| 41                    | Lbs                  | Left back surround                                      |                                                   |                         |
| 42                    | Rbs                  | Right back surround                                     |                                                   |                         |
| 43-125                |                      | Reserved                                                |                                                   | Reserved                |
| 126                   | Expl                 | Explicit position (see text)                            |                                                   |                         |
| 127                   |                      | Unknown / undefined                                     |                                                   |                         |

Figure 1 shows a subset of the loudspeaker positions in the 3D environment relative to the listener, with each labelled with an abbreviation from Table 7. Loudspeakers lying on the innermost box are in the bottom level, those on the middle box are in the middle level and those on the outermost box are in the top level. The circles labelled Ts represent the top centre loudspeaker directly above the listener's position.



a) General loudspeaker positions



b) Positions of screen-related loudspeakers

Figure 1 — Loudspeaker positions.

### 8.3 Loudspeaker Layout Index, ChannelConfiguration

*Name: ChannelConfiguration*

*Type: Unsigned integer, enumeration*

*Range: 0 – 63*

The ChannelConfiguration specifies the loudspeaker layout. This defines the number of loudspeakers and their associated positions. The name, abbreviation, and general position of each loudspeaker are informative and can be deduced from Table 8. Due to historical reasons, loudspeaker names may correspond to different geometrical positions or coordinates depending on the loudspeaker layouts in which they have been defined.

Unless otherwise noted, the list of loudspeaker names in Table 8 does not imply any particular order in which corresponding channel signals are stored or transmitted in a certain coding scheme. If such an order is required by a coding scheme, then the corresponding standard should mandate an order of channels within the scope of its own specification.

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**Table 8 — ChannelConfiguration, Loudspeaker Layout Index,  
corresponding number of loudspeakers and  
their associated positions**

| ChannelConfiguration | "Front/<br>Surr.<br>LFE"<br>notation | Loudspeaker Names in<br>Loudspeaker Layout                                                                                              | Loudspeaker<br>abbrev.                       | informative<br>Geometric position<br>Azim., Elev.<br>NOTE 1                 | Ch.<br>is<br>LFE                     |
|----------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------|
| 0                    | -                                    | any setup                                                                                                                               | -                                            | -                                                                           | -                                    |
| 1                    | 1/0.0                                | centre front                                                                                                                            | C                                            | 0, 0                                                                        | 0                                    |
| 2                    | 2/0.0                                | left front,<br>right front                                                                                                              | L<br>R                                       | 30, 0<br>-30, 0                                                             | 0<br>0                               |
| 3                    | 3/0.0                                | centre front,<br>left front,<br>right front                                                                                             | C<br>L<br>R                                  | 0, 0<br>30, 0<br>-30, 0                                                     | 0<br>0<br>0                          |
| 4                    | 3/1.0                                | centre front,<br>left front,<br>right front,<br>rear centre                                                                             | C<br>L<br>R<br>Cs                            | 0, 0<br>30, 0<br>-30, 0<br>180, 0                                           | 0<br>0<br>0<br>0                     |
| 5                    | 3/2.0                                | centre front,<br>left front,<br>right front,<br>left surround,<br>right surround                                                        | C<br>L<br>R<br>Ls<br>Rs                      | 0, 0<br>30, 0<br>-30, 0<br>110, 0<br>-110, 0                                | 0<br>0<br>0<br>0<br>0                |
| 6                    | 3/2.1                                | centre front,<br>left front,<br>right front,<br>left surround,<br>right surround,<br>LFE                                                | C<br>L<br>R<br>Ls<br>Rs<br>LFE               | 0, 0<br>30, 0<br>-30, 0<br>110, 0<br>-110, 0<br>0, -15                      | 0<br>0<br>0<br>0<br>0<br>1           |
| 7                    | 5/2.1                                | centre front,<br>left front centre,<br>right front centre,<br>left front,<br>right front,<br>left surround,<br>right surround,<br>LFE   | C<br>Lc<br>Rc<br>L<br>R<br>Ls<br>Rs<br>LFE   | 0, 0<br>30, 0<br>-30, 0<br>45, 0<br>-45, 0<br>110, 0<br>-110, 0<br>0, -15   | 0<br>0<br>0<br>0<br>0<br>0<br>0<br>1 |
| 8                    | 1+1                                  | channel1<br>channel2                                                                                                                    | N.A.<br>N.A.                                 | N.A.<br>N.A.                                                                | 0<br>0                               |
| 9                    | 2/1.0                                | left front,<br>right front,<br>rear centre                                                                                              | L<br>R<br>Cs                                 | 30, 0<br>-30, 0<br>180, 0                                                   | 0<br>0<br>0                          |
| 10                   | 2/2.0                                | left front,<br>right front,<br>left surround,<br>right surround                                                                         | L<br>R<br>Ls<br>Rs                           | 30, 0<br>-30, 0<br>110, 0<br>-110, 0                                        | 0<br>0<br>0<br>0                     |
| 11                   | 3/3.1                                | centre front,<br>left front,<br>right front,<br>left surround,<br>right surround,<br>rear centre,<br>LFE                                | C<br>L<br>R<br>Ls<br>Rs<br>Cs<br>LFE         | 0, 0<br>30, 0<br>-30, 0<br>110, 0<br>-110, 0<br>180, 0<br>0, -15            | 0<br>0<br>0<br>0<br>0<br>0<br>1      |
| 12                   | 3/4.1                                | centre front,<br>left front,<br>right front,<br>left surround,<br>right surround,<br>rear surround left,<br>rear surround right,<br>LFE | C<br>L<br>R<br>Ls<br>Rs<br>Lsr<br>Rsr<br>LFE | 0, 0<br>30, 0<br>-30, 0<br>110, 0<br>-110, 0<br>135, 0<br>-135, 0<br>0, -15 | 0<br>0<br>0<br>0<br>0<br>0<br>0<br>1 |

|    |         |                                       |      |       |     |   |
|----|---------|---------------------------------------|------|-------|-----|---|
| 13 | 11/11.2 | centre front,                         | C    | 0,    | 0   | 0 |
|    |         | left front centre,                    | Lc   | 30,   | 0   | 0 |
|    |         | right front centre,                   | Rc   | -30,  | 0   | 0 |
|    |         | left front,                           | L    | 60,   | 0   | 0 |
|    |         | right front,                          | R    | -60,  | 0   | 0 |
|    |         | left side surround,                   | Lss  | 90,   | 0   | 0 |
|    |         | right side surround,                  | Rss  | -90,  | 0   | 0 |
|    |         | rear left surround,                   | Lsr  | 135,  | 0   | 0 |
|    |         | rear right surround,                  | Rsr  | -135, | 0   | 0 |
|    |         | rear centre,                          | Cs   | 180,  | 0   | 0 |
|    |         | left front LFE,                       | LFE  | 45,   | -15 | 1 |
|    |         | right front LFE,                      | LFE2 | -45,  | -15 | 1 |
|    |         | centre front vertical height,         | Cv   | 0,    | 35  | 0 |
|    |         | left front vertical height,           | Lv   | 45,   | 35  | 0 |
|    |         | right front vertical height,          | Rv   | -45,  | 35  | 0 |
|    |         | left vertical height side surround,   | Lvss | 90,   | 35  | 0 |
|    |         | right vertical height side surround,  | Rvss | -90,  | 35  | 0 |
|    |         | top centre surround,                  | Ts   | 0,    | 90  | 0 |
|    |         | left surround vertical height rear,   | Lvr  | 135,  | 35  | 0 |
|    |         | right surround vertical height rear , | Rvr  | -135, | 35  | 0 |
|    |         | centre vertical height rear,          | Cvr  | 180,  | 35  | 0 |
|    |         | centre front vertical bottom,         | Cb   | 0,    | -15 | 0 |
|    |         | left front vertical bottom,           | Lb   | 45,   | -15 | 0 |
|    |         | right front vertical bottom           | Rb   | -45,  | -15 | 0 |
| 14 | 5/2.1   | centre front,                         | C    | 0,    | 0   | 0 |
|    |         | left front,                           | L    | 30,   | 0   | 0 |
|    |         | right front,                          | R    | -30,  | 0   | 0 |
|    |         | left surround,                        | Ls   | 110,  | 0   | 0 |
|    |         | right surround,                       | Rs   | -110, | 0   | 0 |
|    |         | LFE,                                  | LFE  | 45,   | -15 | 1 |
|    |         | left front vertical height,           | Lv   | 30,   | 35  | 0 |
|    |         | right front vertical height           | Rv   | -30,  | 35  | 0 |
| 15 | 5/5.2   | centre front,                         | C    | 0,    | 0   | 0 |
|    |         | left front,                           | L    | 30,   | 0   | 0 |
|    |         | right front,                          | R    | -30,  | 0   | 0 |
|    |         | left side surround,                   | Lss  | 90,   | 0   | 0 |
|    |         | right side surround,                  | Rss  | -90,  | 0   | 0 |
|    |         | left surround,                        | Ls   | 135,  | 0   | 0 |
|    |         | right surround,                       | Rs   | -135, | 0   | 0 |
|    |         | left front vertical height,           | Lv   | 45,   | 35  | 0 |
|    |         | right front vertical height,          | Rv   | -45,  | 35  | 0 |
|    |         | centre vertical height rear,          | Cvr  | 180,  | 45  | 0 |
|    |         | LFE1,                                 | LFE  | 45,   | -15 | 1 |
|    |         | LFE2                                  | LFE2 | -45,  | -15 | 1 |
| 16 | 5/4.1   | centre front,                         | C    | 0,    | 0   | 0 |
|    |         | left front,                           | L    | 30,   | 0   | 0 |
|    |         | right front,                          | R    | -30,  | 0   | 0 |
|    |         | left surround,                        | Ls   | 110,  | 0   | 0 |
|    |         | right surround,                       | Rs   | -110, | 0   | 0 |
|    |         | LFE,                                  | LFE  | 0,    | -15 | 1 |
|    |         | left front vertical height,           | Lv   | 30,   | 30  | 0 |
|    |         | right front vertical height,          | Rv   | -30,  | 30  | 0 |
|    |         | left vertical height surround,        | Lvs  | 110,  | 30  | 0 |
|    |         | right vertical height surround        | Rvs  | -110, | 30  | 0 |
|    |         |                                       |      |       |     |   |
| 17 | 6/5.1   | centre front,                         | C    | 0,    | 0   | 0 |
|    |         | left front,                           | L    | 30,   | 0   | 0 |
|    |         | right front,                          | R    | -30,  | 0   | 0 |
|    |         | left surround,                        | Ls   | 110,  | 0   | 0 |
|    |         | right surround,                       | Rs   | -110, | 0   | 0 |
|    |         | LFE,                                  | LFE  | 0,    | -15 | 1 |
|    |         | left front vertical height,           | Lv   | 30,   | 30  | 0 |
|    |         | right front vertical height,          | Rv   | -30,  | 30  | 0 |
|    |         | centre front vertical height,         | Cv   | 0,    | 30  | 0 |
|    |         | left vertical height surround,        | Lvs  | 110,  | 30  | 0 |
|    |         | right vertical height surround,       | Rvs  | -110, | 30  | 0 |
|    |         | top centre surround                   | Ts   | 0,    | 90  | 0 |
|    |         |                                       |      |       |     |   |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |                                     |       |                      |      |             |   |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------------|-------|----------------------|------|-------------|---|---|
| 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 6/7.1    | centre front,                       | C     | 0,                   | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | left front,                         | L     | 30,                  | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | right front,                        | R     | -30,                 | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | left surround,                      | Ls    | 110,                 | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | right surround,                     | Rs    | -110,                | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | left back surround,                 | Lbs   | 150,                 | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | right back surround                 | Rbs   | -150,                | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | LFE,                                | LFE   | 0,                   | -15  | 1           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | left front vertical height,         | Lv    | 30,                  | 30   | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | right front vertical height,        | Rv    | -30,                 | 30   | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | centre front vertical height,       | Cv    | 0,                   | 30   | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | left vertical height surround,      | Lvs   | 110,                 | 30   | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | right vertical height surround,     | Rvs   | -110,                | 30   | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | top centre surround                 | Ts    | 0,                   | 90   | 0           |   |   |
| 19                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 5/6.1    | centre front,                       | C     | 0,                   | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | left front,                         | L     | 30,                  | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | right front,                        | R     | -30,                 | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | left side surround,                 | Lss   | 90,                  | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | right side surround,                | Rss   | -90,                 | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | rear surround left,                 | Lsr   | 135,                 | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | rear surround right,                | Rsr   | -135,                | 0    | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | LFE,                                | LFE   | 0,                   | -15  | 1           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | left front vertical height,         | Lv    | 30,                  | 30   | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | right front vertical height,        | Rv    | -30,                 | 30   | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | left surround vertical height rear, | Lvr   | 135,                 | 30   | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | right surround vertical height rear | Rvr   | -135,                | 30   | 0           |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          | 20                                  | 7/6.1 | centre front,        | C    | 0,          | 0 | 0 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |                                     |       | left edge of screen, | Leos | "left eos", | 0 | 0 |
| right edge of screen,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Reos     |                                     |       | "right eos",         | 0    | 0           |   |   |
| left front,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | L        |                                     |       | 30,                  | 0    | 0           |   |   |
| right front,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | R        |                                     |       | -30,                 | 0    | 0           |   |   |
| left side surround,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Lss      |                                     |       | 90,                  | 0    | 0           |   |   |
| right side surround,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Rss      |                                     |       | -90,                 | 0    | 0           |   |   |
| rear surround left,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Lsr      |                                     |       | 135,                 | 0    | 0           |   |   |
| rear surround right,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Rsr      |                                     |       | -135,                | 0    | 0           |   |   |
| LFE,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | LFE      |                                     |       | 0,                   | -15  | 1           |   |   |
| left front vertical height,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Lv       |                                     |       | 45,                  | 30   | 0           |   |   |
| right front vertical height,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Rv       |                                     |       | -45,                 | 30   | 0           |   |   |
| left vertical height surround,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Lvs      |                                     |       | 110,                 | 30   | 0           |   |   |
| right vertical height surround                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Rvs      |                                     |       | -110,                | 30   | 0           |   |   |
| 21-63                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | reserved |                                     |       |                      |      |             |   |   |
| NOTE 1 – "Nominal" positions as found in typical layout definitions. Tolerances for the angular positions are omitted by intention as the values vary between various definitions that can be found in relevant industry standard documents. The azimuth angle is expressed in degrees; positive values rotate to the left when facing the front, i.e. counter clockwise when looking from above. The elevation angle is expressed in degrees where positive values indicate angles above the horizontal plane. |          |                                     |       |                      |      |             |   |   |

Where the geometric position of a loudspeaker is described by means of a semantic position relative to a video screen (e.g. "left edge of screen"), the reader is advised to consult appropriate screen size definitions to obtain additional information about typical angles as they will appear in real world loudspeaker arrangements.

## 8.4 Loudspeaker Positioning

### LoudspeakerGeometry

Type: Unsigned integer, enumeration

Range: 0 – 127

### LoudspeakerAzimuth

Type: Signed integer

Range: from -180 to 180

**LoudspeakerElevation**

Type: Signed integer

Range: from -90 to 90

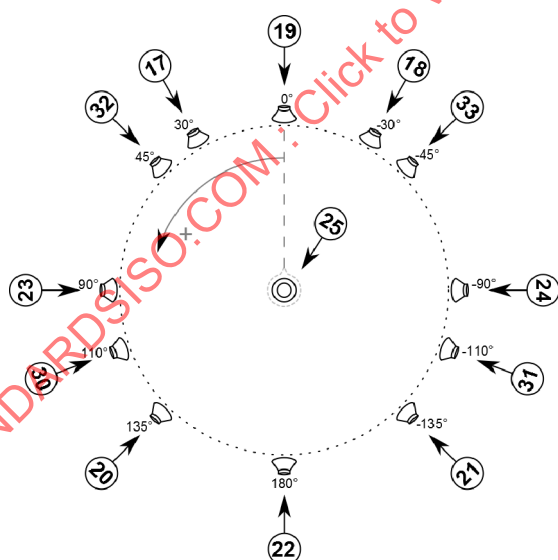
**LoudspeakerGeometry** specifies the nominal geometric position of a loudspeaker or audio channel according to Table 9, with azimuth and elevation angles in polar coordinates. The **LoudspeakerAzimuth** angle is expressed in degrees; positive values rotate to the left when facing the front, i.e. counter clockwise when looking from above. The **LoudspeakerElevation** angle is expressed in degrees; positive values go up from the horizontal plane. The horizontal plane is defined as the horizontal plane at ear level, i.e. elevation is 0.

Table 9 — Definition of LoudspeakerGeometry

| Loudspeaker<br>Geometry | Ch. is<br>LFE | Nominal geometric position in polar coordinates<br>(radius omitted) |               |
|-------------------------|---------------|---------------------------------------------------------------------|---------------|
|                         |               | Azimuth [°]                                                         | Elevation [°] |
| 0                       | 0             | 30                                                                  | 0             |
| 1                       | 0             | -30                                                                 | 0             |
| 2                       | 0             | 0                                                                   | 0             |
| 3                       | 1             | 0                                                                   | -15           |
| NOTE1                   |               |                                                                     |               |
| 4                       | 0             | 110                                                                 | 0             |
| 5                       | 0             | -110                                                                | 0             |
| 6                       | 0             | 22                                                                  | 0             |
| 7                       | 0             | -22                                                                 | 0             |
| 8                       | 0             | 135                                                                 | 0             |
| 9                       | 0             | -135                                                                | 0             |
| 10                      | 0             | 180                                                                 | 0             |
| 11                      | reserv<br>ed  | reserved                                                            | reserved      |
| 12                      | reserv<br>ed  | reserved                                                            | reserved      |
| 13                      | 0             | 90                                                                  | 0             |
| 14                      | 0             | -90                                                                 | 0             |
| 15                      | 0             | 60                                                                  | 0             |
| 16                      | 0             | -60                                                                 | 0             |
| 17                      | 0             | 30                                                                  | 35            |
| 18                      | 0             | -30                                                                 | 35            |
| 19                      | 0             | 0                                                                   | 35            |
| 20                      | 0             | 135                                                                 | 35            |
| 21                      | 0             | -135                                                                | 35            |

|                                                                                                                                                        |          |                                                            |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------------------------------|-----|
| 22                                                                                                                                                     | 0        | 180                                                        | 35  |
| 23                                                                                                                                                     | 0        | 90                                                         | 35  |
| 24                                                                                                                                                     | 0        | -90                                                        | 35  |
| 25                                                                                                                                                     | 0        | 0                                                          | 90  |
| 26<br>NOTE1                                                                                                                                            | 1        | 45                                                         | -15 |
| 27                                                                                                                                                     | 0        | 45                                                         | -15 |
| 28                                                                                                                                                     | 0        | -45                                                        | -15 |
| 29                                                                                                                                                     | 0        | 0                                                          | -15 |
| 30                                                                                                                                                     | 0        | 110                                                        | 35  |
| 31                                                                                                                                                     | 0        | -110                                                       | 35  |
| 32                                                                                                                                                     | 0        | 45                                                         | 35  |
| 33                                                                                                                                                     | 0        | -45                                                        | 35  |
| 34                                                                                                                                                     | 0        | 45                                                         | 0   |
| 35                                                                                                                                                     | 0        | -45                                                        | 0   |
| 36<br>NOTE1                                                                                                                                            | 1        | -45                                                        | -15 |
| 37                                                                                                                                                     | 0        | left edge of screen                                        | 0   |
| 38                                                                                                                                                     | 0        | right edge of screen                                       | 0   |
| 39                                                                                                                                                     | 0        | half-way btw. centre of screen<br>and left edge of screen  | 0   |
| 40                                                                                                                                                     | 0        | half-way btw. centre of screen<br>and right edge of screen | 0   |
| 41                                                                                                                                                     | 0        | 150                                                        | 0   |
| 42                                                                                                                                                     | 0        | -150                                                       | 0   |
| 43-127                                                                                                                                                 | reserved |                                                            |     |
| NOTE 1: In addition to the geometrical position these entries also indicate an "LFE" channel, which typically has a strongly reduced frequency content |          |                                                            |     |

Figure 2 thru Figure 5 indicate the loudspeaker position in the 3D environment relative to the listener, each labelled with the LoudspeakerGeometry (circled with arrow) and the nominal azimuth angle in degrees).



**Figure 2 — Loudspeaker positions, upper layer.**  
Index 25 indicates the loudspeaker directly above the listener, sometime referred to as the "voice of god (VoG)" loudspeaker

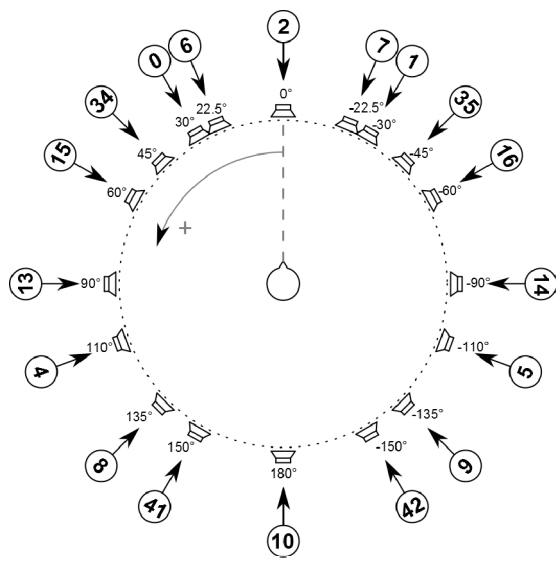


Figure 3 — Loudspeaker positions, mid layer

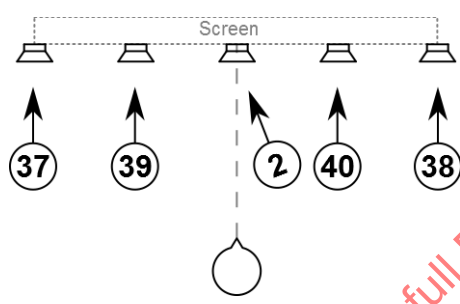


Figure 4 — Loudspeaker positions, screen relative

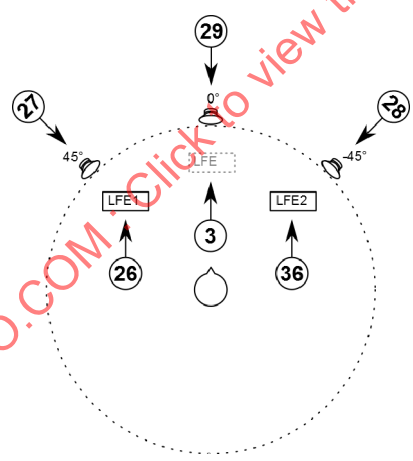


Figure 5 — Loudspeaker positions, bottom layer

Renumber subclause 8.3 to 8.5

Renumber subclause 8.4 to 8.6

Add the following sections after 8.6:

## 8.7 Range of Loudness

Type: fixed-point or integer value

Range: 0 to 90 dB, with a precision to at least 1 dB

**LoudnessRange** indicates the loudness range of the corresponding audio program. It is the loudness difference between the loudest and softest part of that audio program. The loudness of the loudest part is described by LoudnessRangeTop. LoudnessRange is measured in dB according to [21],[18].

## 8.8 Top of Loudness Range

Type: fixed-point or integer value

Range: -41 to 6 dB, with a precision to at least 1 dB

**LoudnessRangeTop** indicates the loudness value of the top of the loudness range described by LoudnessRange of the corresponding audio program. LoudnessRangeTop is measured in LKFS according to [21],[18].

## 8.9 Maximum of Momentary Loudness level

Type: fixed-point or integer value

Range: -41 to 6 dB, with a precision to at least 1 dB

**MomentaryLoudnessMax** indicates the maximum value of the loudness values obtained from measurements of the corresponding audio program using a 400 ms window. MomentaryLoudnessMax is measured in LKFS as specified in [21],[17] or [20].

## 8.10 Maximum of Short-Term Loudness level

Type: fixed-point or integer value

Range: -41 to 6 dB, with a precision to at least 1 dB

**ShortTermLoudnessMax** indicates the maximum value of the loudness values in LKFS obtained from measurements of the corresponding audio program using a 3 s window. Measurements are specified in [21],[17] and [20].

## 8.11 Short-Term Loudness level

Type: fixed-point or integer value

Range: -70 to 6 dB, with a precision to at least 1 dB

**ShortTermLoudness** indicates the value of the loudness values in LKFS obtained from measurements of the corresponding audio program using a 3s window. Measurements are specified in [21],[17] and [20]. The 3s window shall include the current frame.

## 8.12 Peak level

Type: fixed-point or integer value

Range: -41 to 40 dB, with a precision to at least 1 dB

**SamplePeakLevel** indicates the level of the largest magnitude of the corresponding audio program samples. SamplePeakLevel is measured in dB relative to full scale.

**TruePeakLevel** indicates the level of the largest magnitude of the corresponding audio program samples after oversampling. TruePeakLevel is measured in dBTP as specified in Rec. ITU-R BS.1770.