

Recommendation ITU-R BS.2102-0
(01/2017)

**Allocation and ordering of audio channels
to formats containing 12-, 16- and
32-tracks of audio**

BS Series
Broadcasting service (sound)



Foreword

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RA	Radio astronomy
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S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

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

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RECOMMENDATION ITU-R BS.2102-0

**Allocation and ordering of audio channels to formats containing
12-, 16- and 32-tracks of audio**

(2017)

Scope

This Recommendation specifies the allocation and ordering of multiple audio channels to media with 12, 16 and 32 tracks. These allocations are preferred for use on international contribution circuits, on interfaces, or in files. For streaming audio signals, Recommendation ITU-R BS.646 should be used.

Keywords

Channel ordering, multiple channel audio, channel allocation

The ITU Radiocommunication Assembly,

considering

- a) that the exchange of television programmes is very important and extensive;
- b) that there is a requirement to provide more than one sound signal including stereophony with a television picture;
- c) that within a television channel as used in present systems, several sound channels could be accommodated;
- d) that Recommendation ITU-R BS.1738 – Identification and ordering of 4 and 8 track audio channels carried on international contribution circuits, recommends allocations of up to 8 multiple audio signals on international contribution circuits;
- e) that Recommendation ITU-R BS.1726 – Signal level of digital audio accompanying television in international programme exchange, recommends reference level and permitted maximum level (PML) of digital audio signal for international programme exchange;
- f) that international identification of media content and of the format used for programme exchange offers both economical and operational advantages;
- g) that an alignment of operational practices used in connection with the identification of the content and format of sound programmes is highly desirable;
- h) that a technique is applied which ensures simultaneous availability of a line-up tone on the channels present in stereo and multi-channel modes so that the phase relationship between channels can be checked to mitigate phasing issues;
- i) that transmission systems with bit-rate reduced coding for multichannel sound transmission are in use in several countries;
- j) that production scenarios increasingly involve 12 or more audio channels;
- k) that coding of multi-track sound into an audio multiplex for audio production in many programme genres is increasing as a requirement for international programme exchange for sound and television broadcasting;

l) that specifications for international exchange of programmes with multiple channel audio are subject to contractual and commercial arrangements among the broadcasters and programme rights holders;

m) that many administrations are becoming increasingly involved in the exchange of television programme material,

recommends

1 that, if audio channel identification is required or in use, then the signaling should at least provide minimum information to ensure that downstream of the source any user can unambiguously determine the channel number and thus the content;

2 that the reference signal of each channel in a stereo signal should be a 1 000 Hz alignment tone at the reference level of either –18 dB FS or –20 dB FS in accordance with Recommendation ITU-R BS.1726, interrupted at least once every 30 s by a voice announcement indicating the channel number and optionally the source name;

3 that in stereo and multi-channel contribution circuits the reference tone should be applied simultaneously to all channels to aid in confirming correct phase relationship between channels at the destination end;

4 that the use of tracks to carry the various audio components of the programme should be mutually agreed in advance among the parties concerned;

5 that in the absence of such advance agreement, the use of tracks as indicated in Annex 1 should be preferred for the production scenarios described therein;

6 that Annex 1 should be extended, when required, to reflect other production scenarios,

and further considering

a) that there is anecdotal evidence of small synchronisation errors occurring between audio signals embedded in separate “groups” of video signals using the SMPTE ST 272 and SMPTE ST 299 standards;

b) that the mixing together of signals that are not properly synchronised can result in objectionable comb-filtering effects,

further recommends

that caution be exercised when using track allocations wherein a discrete multi-channel audio signal has the centre channel embedded in a video signal in a different group from the front left and front right signals.

Annex 1

Allocation and ordering of audio channels to formats containing 12-, 16- and 32-tracks of audio

This annex describes preferred identification of audio channels for production scenarios for a multichannel sound mix using 12-, 16- or 32-track media in the absence of an advanced mutual agreement among the parties concerned.

Name	No. of Tracks	Production Scenario	Notes	Origin (used by)	AUDIO TRACK NUMBER																	
					1	2	3	4	5	6	7	8	9	10	11	12						
12a	12	Stereo with discrete 5.1 + encoded 5.1 + Monos/Stereo	1, 2	(Australia)	Stereo L	Stereo R	5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs	Optional encoded 5.1 (for metadata)		(Note 7)							
12b	12		1, 3, 5	(SVT)	5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs	Stereo L	Stereo R										
12c	12	2x Stereo with 2x encoded 5.1 + extra Monos/Stereos	2, 4, 6		Stereo Mix L	Stereo Mix R	Stereo EFX L	Stereo EFX R	encoded 5.1 Mix		encoded 5.1 EFX											
12d	12		4, 6		Stereo Mix L	Stereo Mix R	Encoded 5.1 Mix		Stereo EFX L	Stereo EFX R	encoded 5.1 EFX											
12e	12	Discrete 5.1 + extra Monos/Stereo + encoded 5.1 + Stereo & encoded M&E	2, 3, 5	(SVT)	5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs	Stereo L or Mono	Stereo R or Mono	encoded 5.1 + Stereo incl. audio from ch 1 – 8 & Dolby Metadata		encoded 5.1 M&E sound & Dolby Metadata							
12f	12	Stereo with encoded 5.1 and IT and discrete 5.1		(ARD, ZDF, ORF)	Stereo Mix L	Stereo Mix R	encoded 5.1		Stereo IT L	Stereo IT R	5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs						
12g	12	Stereo with IT + discrete 5.1 + encoded 5.1		(ARD, ZDF, ORF)	Stereo Mix L	Stereo Mix R	Stereo IT L	Stereo IT R	5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs	encoded 5.1							
12h	12	Triple Language: 3x Stereos + 3x encoded 5.1		(France TV)	Stereo Mix L Lang 1	Stereo Mix R Lang 1	encoded 5.1 Language 1		Stereo Mix L Lang 2	Stereo Mix R Lang 2	encoded 5.1 Language 2		Stereo Mix L Lang 3	Stereo Mix R Lang 3	encoded 5.1 Language 3							
12i	12	Discrete 5.1 (main service) with matching Stereo and Stereo EFX	1, 8	(Japan)	5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs	Stereo L	Stereo R	Stereo EFX L	Stereo EFX R	(Note 7)							
12j	12	Stereo (main service) with matching discrete 5.1 and Stereo EFX	9	(Japan)	Stereo L	Stereo R	5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs	Stereo EFX L	Stereo EFX R	(Note 7)							
12k	12	Stereo and Stereo EFX, with discrete 5.1	10	(Australia)	Stereo L	Stereo R	Stereo EFX L	Stereo EFX R	5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs	(Note 7)							

Name	No. of Tracks	Production Scenario	Notes	Origin (used by)	AUDIO TRACK NUMBER															
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16a	16	2x Stereo with 2x discrete 5.1	2, 7, 12	(Japan)	Stereo Mix L	Stereo Mix R	5.1 Mix L	5.1 Mix R	5.1 Mix C	5.1 Mix LFE	5.1 Mix Ls	5.1 Mix Rs	Stereo EFX L	Stereo EFX R	5.1 EFX L	5.1 EFX R	5.1 EFX C	5.1 EFX LFE	5.1 EFX Ls	5.1 EFX Rs
16b	16		3, 7, 11	(Japan)	5.1 Mix L	5.1 Mix R	5.1 Mix C	5.1 Mix LFE	5.1 Mix Ls	5.1 Mix Rs	Stereo Mix L	Stereo Mix R	5.1 EFX L	5.1 EFX R	5.1 EFX C	5.1 EFX LFE	5.1 EFX Ls	5.1 EFX Rs	Stereo EFX L	Stereo EFX R
16c	16		2, 7, 13	(Australia, SKY)	Stereo Mix L	Stereo Mix R	Stereo EFX L	Stereo EFX R	5.1 Mix L	5.1 Mix R	5.1 Mix C	5.1 Mix LFE	5.1 Mix Ls	5.1 Mix Rs	5.1 EFX L	5.1 EFX R	5.1 EFX C	5.1 EFX LFE	5.1 EFX Ls	5.1 EFX Rs
16d	16	Dual Language: 2x discrete 5.1 + 2x Mono/Stereo or AD (dual language)		(France TV)							Additional Mono or Stereo, e.g. AD - Lang 1							Additional Mono or Stereo, e.g., AD - Lang 2		
					5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs		5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs			
					Language 1							Language 2								
16e	16			(France TV)							Additional Mono or Stereo, e.g., AD - Lang 1							Additional Mono or Stereo, e.g., AD - Lang 2		
					5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs		5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs			
					Language 1							Language 2								
16f	16	Triple Language: 3x Stereos + 3x encoded 5.1 +2x Mono/Stereo or AD		(France TV)	Stereo Mix L Lang 1	Stereo Mix R Lang 1	Encoded 5.1 Lang 1	Stereo Mix L Lang 2	Stereo Mix R Lang 2	Encoded 5.1 Lang 2	Stereo Mix L Lang 3	Stereo Mix R Lang 3	Encoded 5.1 Lang 3	Additional Mono or Stereo, e.g., AD	Additional Mono or Stereo, e.g., AD					

Name	No. of Tracks	Production Scenario	Notes	Origin (used by)	AUDIO TRACK NUMBER															
					1/17	2/18	3/19	4/20	5/21	6/22	7/23	8/24	9/25	10/26	11/27	12/28	13/29	14/30	15/31	16/32
32a	1-16	22.2 + 5.1 + Stereo		(Japan)	22.2 FL	22.2 FR	22.2 FC	22.2 LFE1	22.2 BL	22.2 BR	22.2 FLc	22.2 FRc	22.2 BC	22.2 LFE2	22.2 SiL	22.2 SiR	22.2 TpFL	22.2 TpFR	22.2 TpFC	22.2 TpC
	17-32				22.2 TpBL	22.2 TpBR	22.2 TpSiL	22.2 TpSiR	22.2 TpBC	22.2 BtFC	22.2 BtFL	22.2 BtFR	5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs	Stereo L	Stereo R
32b	1-16	Stereo + 5.1 + 22.2		(Japan)	Stereo L	Stereo R	5.1 L	5.1 R	5.1 C	5.1 LFE	5.1 Ls	5.1 Rs	22.2 FL	22.2 FR	22.2 FC	22.2 LFE1	22.2 BL	22.2 BR	22.2 FLc	22.2 FRc
	17-32				22.2 BC	22.2 LFE2	22.2 SiL	22.2 SiR	22.2 TpFL	22.2 TpFR	22.2 TpFC	22.2 TpC	22.2 TpBL	22.2 TpBR	22.2 TpSiL	22.2 TpSiR	22.2 TpBC	22.2 BtFC	22.2 BtFL	22.2 BtFR

Key to table abbreviations:

Mono= 1/0 specified in Recommendation ITU-R BS.775.

Stereo= 2/0 multichannel sound specified in Recommendation ITU-R BS.775.

5.1 = 3/2 multichannel sound specified in Recommendation BS.775 and System B (0+5+0) specified in Recommendation ITU-R BS.2051.

22.2 = System H (9+10+3) specified in Recommendation ITU-R BS.2051.

Each channel label is specified in Recommendation ITU-R BS.2051.

EFX = Effects, IT = International sound, AD = Audio description, FL = Foreign language, M&E = Music and effects (no dialogue).

Note 1 – The stereo should be related to the multichannel mix and can be either a downmix from the multichannel sound or a separate stereo balance.

Note 2 – This format supports compatibility with legacy stereo environments by placing the stereo version(s) first.

Note 3 – The main use of this format is to support compatibility with encoded transport streams (such as 20 bit Dolby E) audio track allocation for multi-track recordings, to that recommended for sound-only programmes, EBU Technical Recommendation R91-1998 where the first 6 channels are the multi channel mix and 7 and 8 are the stereo mix.

Note 4 – Some forms of compression have different options for the audio coding (e.g. 16 versus 20 bit coding). It is essential that this choice be noted on the labels and recording report.

Note 5 – In some circumstances neither a specific stereo mix nor an automated downmix will exist during the early stages of the production process. Under these circumstances, tracks 7 and 8 would be unused.

Note 6 – This track allocation provides a main mix and a clean effects version, and is based on common operating practice, particularly in sport.

Note 7 – Tracks 11 and 12 could be used for alternative commentary(s), different language tracks or audio description, in mono or stereo.

Note 8 – Used when the host broadcaster can provide a 5.1 surround sound complete mix, a stereo complete mix and an additional stereo M&E. The main service of the host broadcaster is 5.1 surround sound. Devices based on the 8-channel system (for instance, HD-SDI) are mainly used at the host facility.

Note 9 – Used when the host broadcaster can provide a stereo complete mix, a 5.1 surround sound complete mix and an additional stereo M&E. The main service of the host broadcaster is stereo. Devices based on the 8-channel system (for instance, HD-SDI) are mainly used at the host facility.

Note 10 – Used when the host broadcaster can provide a stereo mix, stereo M&E plus a multichannel mix (typically 5.1) and this is required by the destination broadcaster.

Note 11 – Used when the host broadcaster can provide a 5.1 surround sound complete mix, a stereo complete mix and additional M&E audio signals of both 5.1 surround sound and stereo. The main service of the host broadcaster is 5.1 surround sound. Devices based on the 8-channel system (for instance, HD-SDI) are mainly used at the host facility.

Note 12 – Used when the host broadcaster can provide a stereo complete mix, a 5.1 surround sound complete mix and additional M&E audio signals of both stereo and 5.1 surround sound. The main service of the host broadcaster is stereo. Devices based on the 8-channel system (for instance, HD-SDI) are mainly used at the host facility.

Note 13 – Used when the host broadcaster can provide a stereo mix, stereo M&E, a multichannel mix (typically 5.1) plus a 5.1 M&E mix, and this is required by the destination broadcaster.
