

EBU

OPERATING EUROVISION AND EURORADIO

R 128 s2

LOUDNESS IN STREAMING



SUPPLEMENT 2 TO R 128

Geneva
November 2023

Document History

EBU Committee	TC	
Drafting Group	PLOUD	
First published	August 2020	
Revised	June 2021	V2; minor editorial updates
	November 2023	V3; Figures changed to vector files; 2 footnotes added

Publication Keywords: Audio levels, loudness, streaming, normalisation, EBU R 128.

Acknowledgement

EBU technical publications are the work of experts from EBU Members, Associate Members and third parties consisting of international standards bodies, industry partners, academic institutions and independent consultants.

Their contribution to EBU technical publications is a very generous act by the individuals concerned and by their employers. The EBU appreciates their efforts and thanks them most sincerely.

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Loudness in Streaming

Streaming of broadcast content (live programmes as well as file content) has become an increasingly important distribution method for EBU members. On streaming platforms broadcasters are competing with a vast array of major content providers such as Facebook, Apple, Amazon, Netflix, Google and Disney as well as music services such as Spotify, Apple Music and Tidal or audio-only services such as podcasts. Typically, these services use a higher Target Loudness Level than specified in Broadcast Loudness standards.

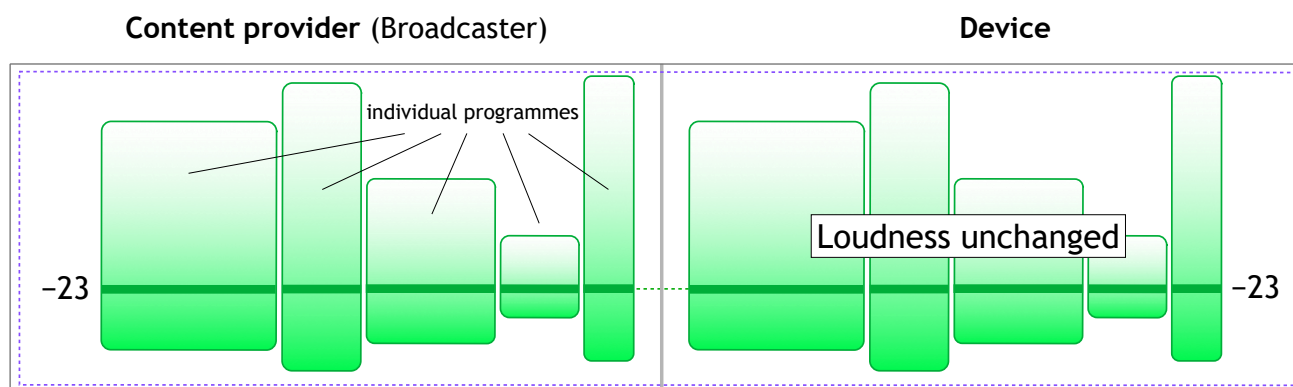
After the introduction and successful adoption of recommendation EBU R 128 [1], the EBU has studied its practical consequences. There is a need to give guidance for an audio levelling solution in streaming based on loudness (see also [2] and [3]).

The EBU considering:

- a) that the majority of European broadcasters produces its programmes according to EBU R 128 with a Target Level of **-23.0 LUFS** (for production and QC tolerances, also refer to [1]);
- b) that there exist **two major use cases** for streaming¹ with conflicting requirements:
 - situations with sufficiently high playback gain and headroom as well as low background noise to faithfully reproduce dynamic programmes (for example, devices such as TV receivers, Smart Speakers and Home Theatre Equipment);
 - situations with limited playback gain and headroom and/or higher background noise (for example, devices such as smartphones or Personal Music Players);
- c) and that streaming platforms increasingly use **metadata** to perform loudness normalisation (either by default or on demand);

recommends:

- d) that programmes shall be produced or prepared according to EBU R 128 and EBU Tech 3343 [5];
- e) that programmes should be streamed **unchanged**, that is at **-23.0 LUFS** (see Figure 1);
- f) that **Loudness Metadata** should be used, correctly indicating the actual Programme Loudness.



The device is used in a situation with sufficiently high playback gain and headroom as well as low background noise

Figure 1: Normalisation Scheme for a stream at -23 LUFS with unchanged Loudness Level

¹ See CTA-2075 [4] for a comprehensive description and device implementation advice

The EBU further recommends:

- g) that, unless metadata is employed to manage device gain and the dynamic properties of content, the *Distribution Loudness Level* may be higher than -23.0 LUFS prior to streaming if the broadcaster wants to be in control of the quality of the potential dynamic treatment (see **Figure 2** and [3]). In this case, the interim value for the *Distribution Loudness Level* should be in the range of -20.0 to -16.0 LUFS;
- h) that once especially mobile devices provide sufficient headroom and gain to enable satisfactory playback levels even in noisy environments², broadcasters streaming at a higher Loudness Level should switch to using -23.0 LUFS;
- i) that especially when individual tracks are streamed as separate elements (for example, music services) additional metadata may be used to ensure faithful reproduction of the artistically intended relationship between programmes. These can indicate, for example, the loudest track of a music album, the loudest movement of a classical symphony or the loudness of speech (“album normalisation”, “anchor-based normalisation”).

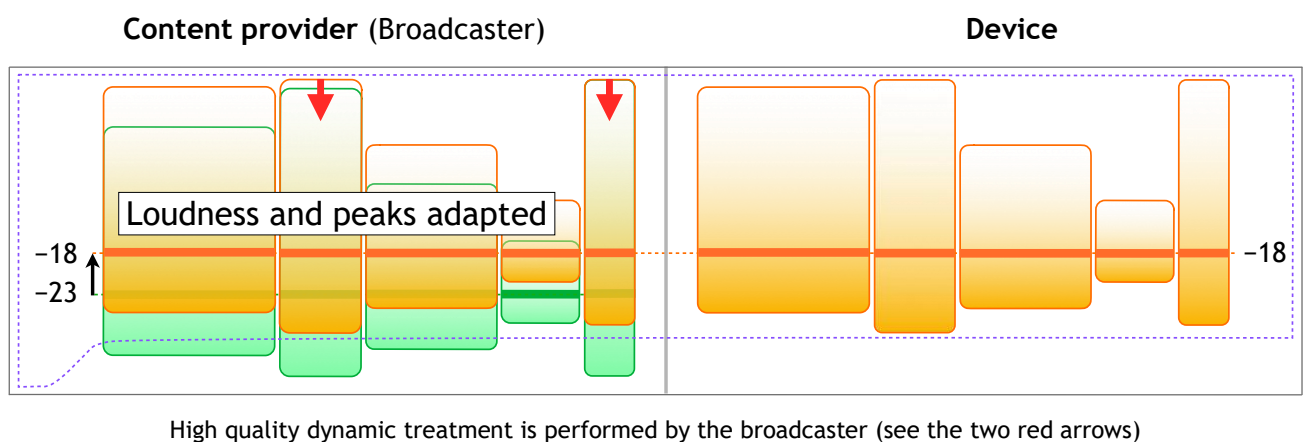
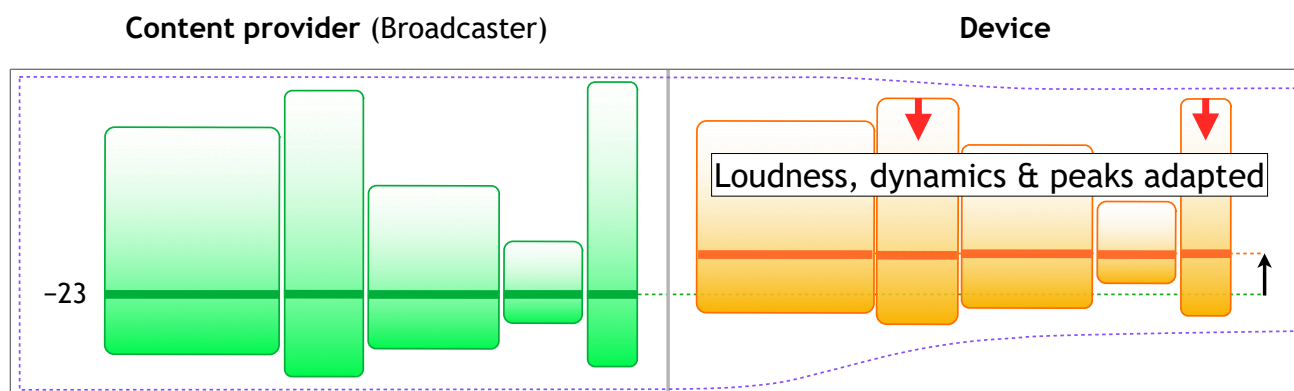


Figure 2: Normalisation Scheme for a stream at -23 LUFS with adaptation of the Loudness Level to, for example, -18 LUFS by the broadcaster prior to streaming

For broadcasters providing their own interface (app on a mobile device, web-browser) including loudness metadata, the EBU recommends (see Figure 3):

- j) that for situations with limited playback gain and headroom and/or higher background noise, content may be streamed unchanged (that is, at -23.0 LUFS) with subsequent adaptation of the Target Level in the device;
- k) that appropriate **True-peak Limiting** according to **EBU Tech 3344** [8] should be performed in the device, if a Target Level higher than -23.0 LUFS results in insufficient headroom to faithfully reproduce the programme;
- l) and that additional adaptation of the **dynamic properties** of the content to the playback situation may also be performed in the device.

² With the publication of the revisions of CENELEC EN 50332-3 [6] and IEC 62368-1 [7] this situation is effectively in place and streaming need not be treated differently than broadcast.



The device is used in a situation with limited playback gain and headroom and/or higher background noise; High quality True-peak limiting is performed where needed (see the two red arrows)

Figure 3: Normalisation Scheme for a stream at -23 LUFS with adapted Loudness Level and dynamics processing (where applicable) in the reproduction situation

Definitions, glossary:

Programme:	An individual, self-contained audio-visual or audio-only item to be presented in Radio, Television or other electronic media. An advertisement (commercial), trailer, promotional item ('promo'), interstitial or similar item shall be considered to be a programme in this context.
Stream:	A continuous transmission to listeners over a network (typically the Internet) that consists of one or more programmes presented sequentially
Personal Music Player:	A portable device for personal use, designed to allow the user to listen to recorded or broadcast sound or video, primarily uses headphones or earphones, and allows the user to move around while in use
Dynamic Range³:	The difference between the <i>Maximum Possible Level</i> and the <i>Noise Floor</i> of a <i>system</i>
Headroom:	The difference between the <i>Reference Level</i> and the <i>Maximum Permitted Level</i> of a <i>system</i>
Peak-to-Loudness Ratio (PLR):	The difference between the <i>Programme Loudness Level</i> and the <i>Maximum True-Peak Level</i> of a <i>signal</i> . PLR describes the level variation of a programme on a microscopic scale.
Loudness Range (LRA)³:	The difference between the loud and soft parts of a programme (see EBU Tech 3342 [9]). It describes the loudness variation of a programme on a macroscopic scale.

³ This measure is not referred to in the main text. It is included here for clarification and deeper understanding.

References

- [1] EBU R 128 *‘Loudness normalisation and permitted maximum level of audio signals’*
- [2] AES 71 *‘Loudness Guidelines for Over the Top Television and Online Video Distribution’*; AES Recommended Practice
- [3] AES 77 *‘AES Recommended Practice Loudness Guidelines for Internet Audio Streaming and On-Demand Distribution’*
- [4] CTA-2075 *‘Loudness Standard for Over the Top Television and Online Video Distribution for Mobile and Fixed Devices’*
- [5] EBU Tech 3343 *‘Guidelines for Production of Programmes in accordance with EBU R 128’*
- [6] CENELEC EN 50332-3 *‘Sound system equipment: headphones and earphones associated with personal music players - maximum sound pressure level measurement methodology - Part 3: measurement method for sound dose management’*
- [7] IEC 62368-1 *‘Audio/video, information and communication technology equipment - Part 1: Safety requirements’*
- [8] EBU Tech 3344 *‘Guidelines for Distribution and Reproduction in accordance with EBU R 128’*
- [9] EBU Tech 3342 *‘Loudness Range: A measure to supplement Loudness normalisation in accordance with EBU R 128’*