

EBU

OPERATING EUROVISION AND EURORADIO

R 128 s2

LOUDNESS IN STREAMING



SUPPLEMENT 2 TO R 128

Geneva
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Loudness in Streaming

<i>EBU Committee</i>	<i>First Issued</i>	<i>Revised</i>	<i>Re-issued</i>
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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 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]).¹

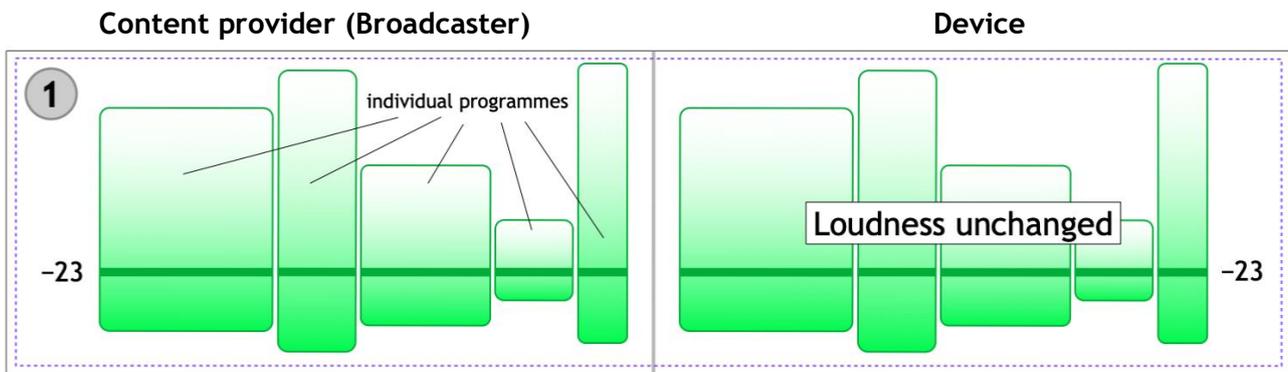
The EBU considering that:

- a) 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) there exist **two major use cases** for streaming 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 that:

- d) programmes shall be produced or prepared according to **EBU R 128** and **EBU Tech 3343** [4];
- e) programmes should be streamed **unchanged**, that is at **-23.0 LUFS** (see **Figure 1**);
- f) **Loudness Metadata** should be used, correctly indicating the actual Programme Loudness.

¹ See CTA-2075 [3] for a comprehensive description and device implementation advice.

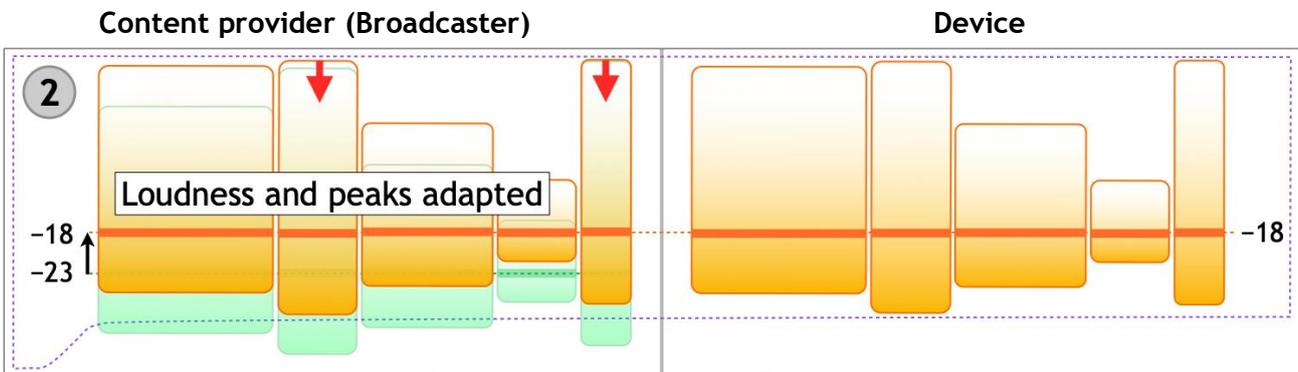


The device is used in a situation with sufficiently high playback gain and headroom as well as low background noise.

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

The EBU further recommends that:

- g) 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 [5]). In this case, the interim value for the *Distribution Loudness Level* should be in the range of -20.0 to -16.0 LUFS;
- h) 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) 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”).



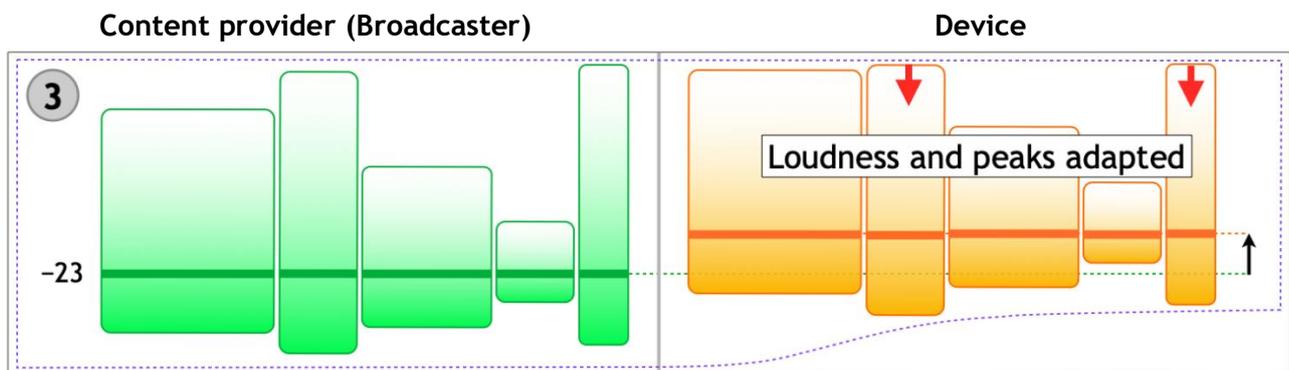
High quality dynamic treatment is performed by the broadcaster (see the two red arrows).

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

² It is anticipated that this will take place when CENELEC EN 50332-3 [6] and IEC 62368-1 [7] will effectively be enforced.

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

- j) 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 (see Figure 3);
- k) 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.



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 in the reproduction situation

Definitions, glossary:

- Programme:** An individual, self-contained audiovisual 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 *Maximum Possible Level* and the *Noise Floor* of a *system*;

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

Headroom:	The difference between the <i>Reference Level</i> and the <i>Maximum Permitted Level</i> of a system;
Peak-to-Loudness Ratio (PLR):	The difference between the <i>Programme Loudness Level</i> and the <i>Maximum True-Peak Level</i> of a signal. 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.

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] [CTA-2075](#) ‘Loudness Standard for Over-the-Top Television and Online Video Distribution for Mobile and Fixed Devices’
- [4] [EBU Tech 3343](#) ‘Guidelines for Production of Programmes in accordance with EBU R 128’
- [5] [AES TD1004](#) ‘Recommendation for Loudness of Audio Streaming and Network File Playback’⁴
- [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’

⁴ The AES Technical Committee for Broadcast and Online Delivery is currently revising TD1004. Publication is planned for Q3/2021. The reader is advised to check regularly for this revision as this supplement anticipates its updated content.