

LOUDNESS CONTROL

THE DPP MADE A SIGNIFICANT ANNOUNCEMENT BY INTRODUCING EBU R128 LOUDNESS FOR TV BROADCAST IN THE UK DURING IBC 2013. NEIL HATTON EXPLAINS.

The most significant launch at IBC 2013 for those who work in the UK broadcast industry was the Digital Production Partnership's (DPP) announcement of 1st October 2014 as the date by which all the major broadcasters would be taking file delivery of programmes. This major pronouncement overshadowed the introduction of their latest Technical Delivery Standards which were unveiled at the same event. Their Version 4 spec now includes EBU R128 loudness as had been widely expected. With audio loudness regulation sweeping the world such as the CALM act in the USA and R128 now commonplace in Europe, the DPP broadcasters decided to pre-empt any intervention by OFCOM by self-regulating.

Jumps in loudness around commercial breaks and programme junctions have been a problem for years.

Advertising and promo producers have sought to create ear-catching, high-energy mixes by the over-use of compression much to the irritation of viewers who are constantly reaching for their TV remotes.

Loudness standards like R128 take into account the way our ears and brains perceive sound. It acknowledges that loudness is a function of frequency and also a function of time. The old paradigm of mixing to PPM6 is a hangover from analogue days when we were primarily concerned with avoiding peak distortion and therefore we normalised all programme material to its peak electrical level with generous headroom, rather than its perceived loudness. Whilst we still need to avoid digital clipping, the introduction of true peak meters means that there is less need to leave as much headroom as was needed when using the old quasi-peak PPMs.





The new specification allows us to accommodate short term dynamic peaks which contribute little to the perception of overall loudness and liberates mixers allowing more open balances with less compression and limiting. By normalising programmes across a broadcast channel's output according to their loudness levels, this encourages sound engineers to mix with their ears rather than being a slave to the meters.

The introduction of loudness mixing should not be feared by sound mixers. Years of research by the EBU's P/LOUD committee went into R128 and the target value of -23LUFS for integrated loudness has been carefully chosen so that well mixed programmes to the old PPM standard with a good dynamic range 'magically' come out within spec when measured on a loudness meter. This backwards compatibility has been aided by a 'relative gate' being incorporated into R128. The gate excludes silences and low level passages from the average or integrated loudness calculation and has the effect of focussing the measurement on the foreground sounds such as speech and featured music which are key to our perception of the overall loudness of the mix.

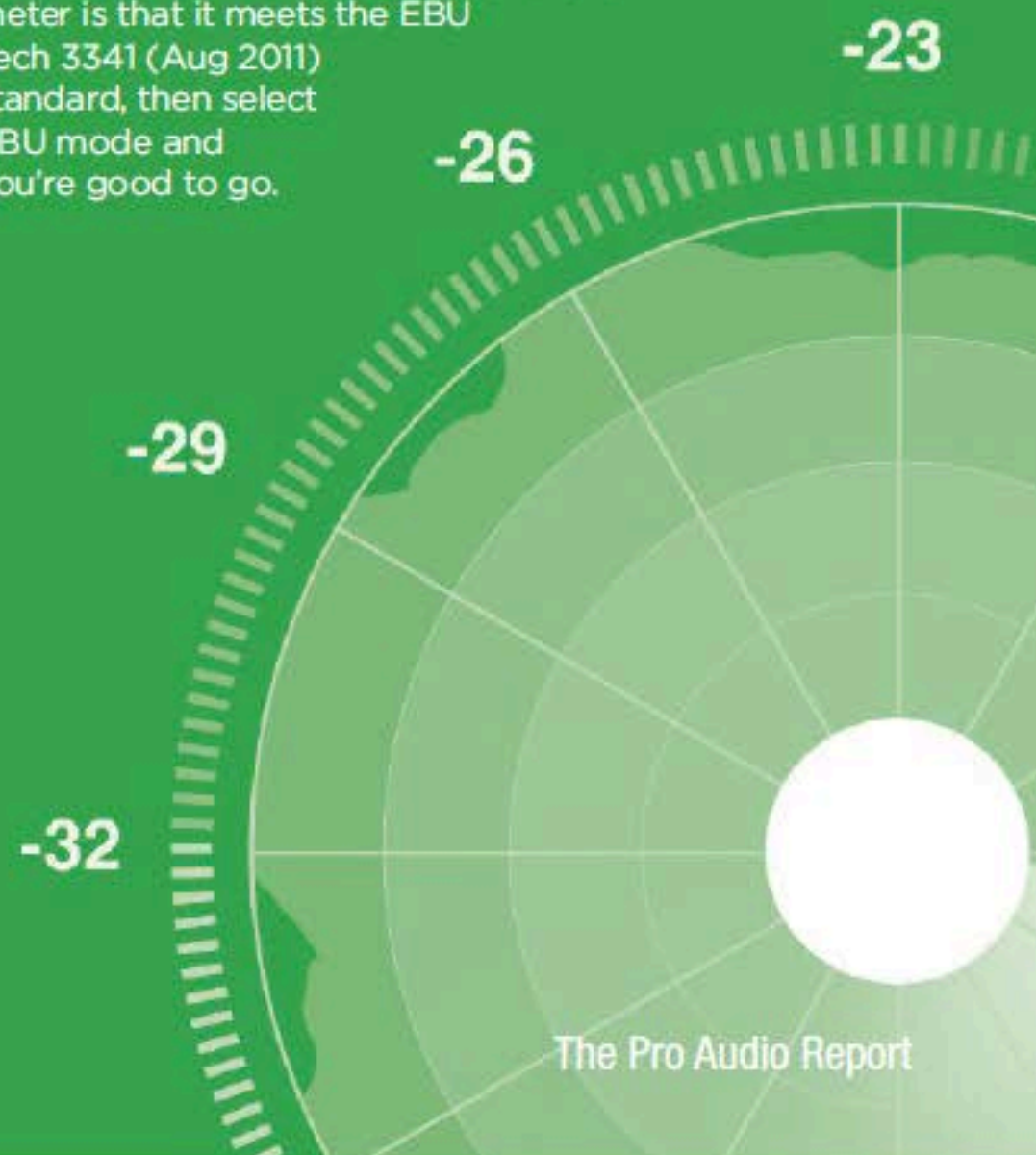
The new DPP Technical Delivery Standard comes into effect right away and as well as covering the transition to file masters, also covers live programmes and the diminishing number of programmes mastering to HDCAM SR tape. Regardless of how you deliver, the DPP broadcasters will require R128 loudness compliance from now on. The only exceptions to this will be legacy content and programmes that are already in production under the old PPM6 standard which they can continue to use, but may deliver to R128 if they wish.

Commercials are outside the scope of the DPP as they are regulated by the ASA, but it is almost inevitable that their BCAP specification will be revised to incorporate R128 at some point. However promos, sponsorship bumpers and other interstitial material are very much covered by the DPP spec. For short pieces of content like these, the Integrated measurement is less reliable as an indication of the perceived loudness. To counter this, R128 defines a Short Term measurement of a three second floating window and a Momentary measurement of a 400ms window but it stops short of assigning maximum loudness values to them. Different European territories have interpreted this aspect of R128 in varying ways. In France, they specify a maximum Short Term loudness of -20LUFS whilst in the Netherlands they mandate a maximum momentary loudness of -15LUFS.

This confusion undoubtedly creates more work (and revenue) for those involved in the international distribution of commercials. There is a lot of debate about what is the best approach for short duration material and for now the DPP has declined to set maximum values for the Short Term and Momentary loudness measurements, preferring to wait and see how things progress in the UK and Europe.

It may have been a long time in coming but R128 is now definitely upon us in the UK and there will be very little overlap with the old standard, so what is required to mix to R128? Obviously a good set of ears and a proper acoustic environment are both pre-requisites for loudness mixing. Now more than ever, it's going to be difficult to mix compliant audio on a set of headphones in the corner of a busy production office!

For those mixing in a live environment such as TV studios and OBs, a straight replacement of PPMs with hardware loudness meters is a viable route. There's plenty of choice from all the main manufacturers with clear displays for the loudness figures, bar graph true peak meters and some also show loudness history either as a graph or as a radar display. There are also several cost effective loudness meter plug-ins available with similar functionality to their hardware counterparts. The key requirement for a meter is that it meets the EBU Tech 3341 (Aug 2011) standard, then select EBU mode and you're good to go.



As you are aiming to mix to an average of -23LUFS across the whole programme, in a live environment you will need the ability to start and stop the measurement period manually. The same might also be true in a post environment if you make use of a lot of real-time processing in outboard effects equipment. But for those choosing to mix purely in the box, faster than real-time analysis becomes a possibility. This avoids the need for a time consuming pass through of the entire programme merely to gauge the effect on the overall average loudness from remixing a short section.

Another useful addition to your toolkit will be loudness normalisation software. Whilst the purists will argue that you should go back and remix the problem section that is taking you out of spec, if you're just a few LU out of the allowed tolerance, pressure on time and budget will usually necessitate a quick fix. Normalisation software will apply just the right amount of gain or attenuation across the whole programme to hit -23LUFS without affecting the balance of the mix.

The audio section of the new version 4 DPP spec has grown to several pages longer than it was in the previous document. It now contains copious advice for the positioning of dialogue in a surround sound mix and how a 5.1 mix should be folded down to stereo. This is the only area where the DPP broadcasters have not achieved total consensus and each broadcaster will preface the generic DPP specification with their own individual requirements. These vary because of creative preferences and constraints from contracts already in place.

Most of the DPP broadcasters are asking for dialogue which is diverged across the front three speakers in a 5.1 mix. They argue that this is to aid the intelligibility of the dialogue particularly when folded down to stereo. Some broadcasters have agreed that a traditional centre-only dialogue positioning is acceptable if that is what is required by co-production partners and there is insufficient budget for two mixes.

Intelligibility is definitely high on the broadcasters' agendas. BBC DG Tony Hall was recently quoted complaining about "mumbling actors". The DPP specification demands that "Dialogue must be acquired and mixed so that it is clear and easy to understand". Note the acknowledgment here that the damage is not just done by unsympathetic high levels of background music laid on in the dub, but also that poor recording on location is a problem.

At a recent DPP forum, the participants noted that the availability of cheaper tapeless HD cameras had actually increased picture quality, but at the same time audio quality had decreased because of multi-skilling. Poor technique in the choice and positioning of microphones is leading to unacceptable levels of embedded background noise competing with the dialogue captured on location. This will also undoubtedly make achieving your loudness targets more difficult. The need for training is obvious.



The DPP's new loudness criteria is a hot topic because we have a large freelance base and we need to ensure that everyone is working from the same hymn sheet. We have a wider template that caters for most, but our specifications will be written to factor in the DPP requirement. This announcement has given us the opportunity to address it and set a deadline for compliance.

Richard Chipperfield - IMG Media Head of Post Production and Encoding



The level of agreement that the DPP broadcasters have achieved over technical standards is remarkable in such a short space of time and all this has been done in consultation with other interested parties such as UK Screen. Like all delivery documents, the success of the new DPP spec will now rely on a consistent and fair

interpretation by the broadcasters' QS assessors, particularly where it deals with subjective areas such as intelligibility. For anyone involved in audio for TV broadcast, the dual challenges loudness and the phasing in of file delivery of programmes will make for interesting times in 2013/14.



DPP Loudness Requirements: quick guide

Meters set to EBU R128 mode.

Integrated loudness over the entire programme should be -23LUFS.

Tolerance is 31LU for post-produced content and 32LU for live or as-live content.

DPP has not specified maximums for Short term and Momentary loudness measurements.

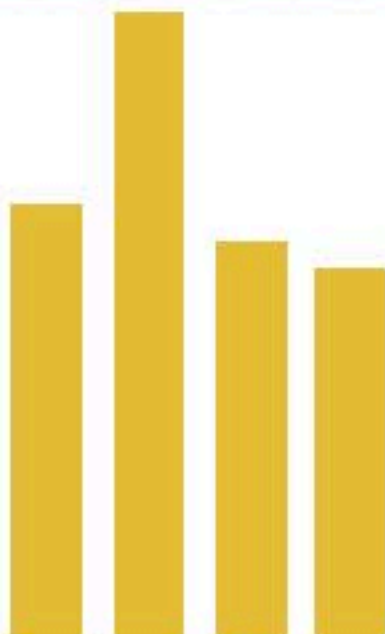
Maximum true peak audio level recommended as -3dBTP. Programmes will be rejected if it exceeds -1dBTP. Recommended loudness range (LRA) is 18LU.

Dialogue must be acquired and mixed so that it is clear and easy to understand.

WHAT IS THE DPP?

The Digital Production Partnership (DPP) is an initiative formed in 2011 by the UK's public service broadcasters to help producers and broadcasters maximise the potential of digital production. The partnership is funded by ITV, BBC and Channel 4 with representation from Channel Five, Sky, S4/C, UKTV, BT Sport and the independent sector including UK Screen on its working groups. The DPP leads the standardisation of technical and metadata requirements within the UK broadcast industry.

www.digitalproductionpartnership.co.uk



Neil Hatton

is a freelance post production consultant. He is chair of the UK Screen Technology Working Group and has led the trade association's liaison with the DPP.



Loudness Technology

TC Electronic TM7 and TM 9 TouchMonitor

The TM7 and TM9 standalone audio and loudness meters are compatible with all major broadcast standards and feature touchscreens with flexible layout options and an array of software choices from Surround Sound to Real-Time analysers, and numerous display options. A recent software update now offers the LM6 algorithm, allowing users to load two independent Radar meters simultaneously.



RTW TouchMonitor TM3

The TM3 TouchMonitor offers comprehensive loudness metering in compliance with all globally relevant standards, in addition to PPM and true-peak instruments. Featuring a 4.3-inch touchscreen that allows for horizontal and vertical placement, it is controlled using a touch-sensitive display. New firmware for the TM3 now includes an emulation of moving coil meters and functions for Loudness Test Time Control.



DK-Technologies DK1, 2, 5 and T7 and Loudness Meters

DK-Technologies loudness meters are a cost effective, compact and USB powered loudness solution, providing high resolution metering for broadcast, film and post production, live transmission and recording. DK meters are compact in size and supplied with all known loudness measurement recommendations. The range offers a variety of I/O options with up to 16 display channels. The new DK 5 now offers a Picture Preview video monitoring feature.



TC Electronic LM6

The LM6 plug-in displays Loudness History, Momentary Loudness, True-peak Level, Programme Loudness and Loudness Range (LRA) in a radar-like view with true-peak warnings and true peak bar graphs. It conforms to all of the major broadcast standards and is available in Audio Units, VST, AAX, AudioSuite and RTAS plug-in formats with features for mono, stereo or 5.1 metering.



Nugen Complete Loudness Bundle

Nugen's Complete Loudness Solution is an all-in-one bundle of plug-ins for audio and loudness metering, monitoring and correction. It includes the VisLM-H True Loudness Metering plug-in, the LM-Correct Loudness quick-fix tool in either Avid AudioSuite or Standalone variants, the ISL Inter-Sample true peak Limiter and the LMB Loudness Management Batch Processor.



Dolby Media Meter 2

Media Meter 2 is a software tool that measures loudness in programming for broadcast, packaged media, cinema trailers, VOD, and games. Featuring Dialogue Intelligence technology adapted from the DP600 Program Optimizer, it can automatically detect speech in the audio track and only then measures loudness. The ITU-R BS.1770-1 or BS-1770-2 algorithms are used as its core measurement option.



TC Electronic LM2

LM2 is fully-featured stereo loudness and true-peak level meter optimised for a variety of broadcast and post production applications, and is compliant with new ITU-R BS.1770, ATSC A/85, EBU R128, NABJ, OP-59, BCAP guidelines and more. A variety of 24-bit resolution audio I/O are offered, including AES/EBU, TOS, SPDIF / AES3 id, ADAT and Analogue. A real-time Radar screen is provided when connected to a PC or Mac.



Dolby DP600-C Program Optimizer

The Dolby DP600-C Program Optimizer is an intelligent file-based audio loudness analysis and correction system. It delivers faster-than-real-time file-based encoding, decoding, conversion, and transcoding between Dolby Digital, Dolby Digital Plus, Dolby Pulse, and Dolby E bitstreams; in addition to PCM, MPEG-1 LII, AAC, HE AAC, and HE AAC v2. A unique, high-quality, single-step Dolby Digital to Dolby Digital Plus transcoder preserves the metadata and minimises tandem coding losses.



Dolby DP580 Professional Reference Decoder

The Dolby DP580 Professional Reference Decoder is a first-of-its-kind TrueHD decoder that enables validation of associated Dolby TrueHD signals encoded in the MAT format. It also features a newly added HDMI port. It monitors the enhanced features of Dolby Digital Plus, and provides a real-time reference tool for Dolby TrueHD, Dolby Digital Plus, and Dolby Digital signal generation. Features are also provided for display and logging of all audio-related metadata, plus Programme loudness measurement.



TC Electronic DB6

DB6 is a transparent one-step loudness management solution for TV and Mobile TV transmission, handling everything from loudness metering at the input and output stages, up or down conversion, loudness processing, on-line lip-sync delay, as well as logging of all relevant loudness statistics in one simplified process.



Junger T*AP

T*AP is an 8-channel Television Audio Processor that incorporates the established Level Magic adaptive loudness algorithm and the Spectral Signature dynamic EQ to provide greater consistency of audio across multiple programme sources for loudness management.

