Today, broadcasting and practically the entire global multimedia industry faces an historic opportunity - to effectively eliminate the notorious problem of inconsistent loudness being pushed to the absolute limits. **Mike Kahsnitz**, chief technology officer at RTW and a member of the EBU P/Loud project group, describes the current state of international standardisation efforts.

Loud and clear

For more than 40 years, Cologne-based RTW has been an industry leader in professional audio. Specialising in audio metering and visualisation, the company first became involved in loudness metering 20 years ago. While normal level metering using PPM instruments or VU meters plays an important role in analysing audio with regard to technical standards, RTW realised in the early 90s, however, that this approach was inadequate as the only means of level adjustment from an aesthetic point of view. This is because it does not allow for visualising individually perceived loudness when listening to audio very well. Therefore, RTW soon started developing its own loudness-metering system that was to supplement PPMs and other audio-visualisation tools.

RTW believes that all audio professionals can achieve consistent loudness only if we start replacing or supplementing PPM instruments and VU meters with loudness meters throughout our workflows, as well as normalising programs on the basis of loudness criteria instead of pure level based parameters. Therefore, in order to change the current situation, which is unsatisfying for all parties involved, RTW believes the industry needs loudness analysis that not only complies with international binding standards, but also allows for a global exchange of programs on the basis of unified evaluation criteria.

Industry experts are sure that the current results and efforts of the ITU and the EBU regarding the introduction of such standards offer a unique chance of achieving this goal within a short period of time. For example, users and vendors have clearly seen how cumbersome the

RTW's all new TouchMonitor TM9. The screen can show, for example, combined PPM/Loudness bargraphs, RTA, vectorscope, Surround Sound Analyzer and TC Electronic's loudness radar meter at the same time.

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different scaling, ballistics, reference-level and other technical standards of metering instruments, both regionally and institutionally, can be in practice.

To help fix that, the meters on instruments made by RTW today support a multitude of such different standards in order to meet all regional demands. Such a clatter of standards must be avoided when introducing new loudness instruments to make sure that loudness metering produces truly internationally comparable results. These could even be simple numerical figures used for indicating the loudness of specific program components and might be part of contracts and binding regulations. When measuring a specific audio element, such results should be the same throughout the signal path regardless of the metering point. This is just one reason why specifying the individual technical parameters has taken so long to achieve.

The task at hand is to establish a simple, preferably easily implemented and objective metering technique that describes a subjectively perceived entity: loudness. With its ITU-R BS.1770 and BS.1771 recommendations, the ITU has already made great strides towards the solution. Even though those recommendations use a relatively simple metering technique, which is

based on the K-weighting curve, and do not account for all the details, they produce robust and useful results.

Having dealt with loudness metering for such a long time, RTW is deeply involved in the current global discussion on binding loudness-metering and loudness-control standards. Because of our active participation in the EBU's P/Loud group, which has been working on defining European loudness-management standards for some time, RTW is able to offer appropriate tools to the pro-audio industry, allowing them to meet current and future demands. In addition, the company uses its expertise to actively participate in the composition of those standards.

Though P/Loud was initially established by the EBU, a growing number of renowned experts even from outside Europe are still joining the group, making it a truly international board, which, by the way, is highly active. Following intense debate, the group is currently working hard to ultimately sort out the few remaining issues. Its ultimate objective is to have traditional QPPM metering widely supplemented or even replaced by loudness-based metering and normalisation. The EBU's R128 recommendation ('Loudness normalisation and permitted maximum level of audio signals') will add three new descriptors to today's QPPM technique: programme loudness, loudness range and true peak level.

Programme loudness describes long-term loudness integration over the entire length of the programme or programme segment as a numerical value to one decimal point. Loudness range, on the other hand, is the statistical loudness distribution within the programme, thus providing a

measurement for loudness variations within an audio segment. While LKFS (Loudness, K-weighted, with reference to digital Full Scale) was originally planned by the ITU as the unit of absolute loudness, P/Loud finally proposes to the ITU the unit LUFS (Loudness Units with reference to digital Full Scale) to establish a more consistent term. LU (Loudness Units) is the unit used for relative metering. Finally, the true peak level, which is measured by means of oversampling, describes the maximum value of a signal waveform on the continuous time domain. It was found that this value might be slightly higher than the largest measured sample value.

The members of the EBU P/Loud group postulate to implement a so-called 'EBU mode' into EBU-compliant loudness metering devices as a must. Users choosing that mode can be sure that they measure loudness in compliance with the EBU recommendations. Measurements made this way are comparable between all instruments supporting the EBU mode. Thus, uncertainties prevailing due to parameters that have not yet been codified will hopefully be completed in the near future. As soon as the relevant EBU recommendations have been officially released, RTW will implement an EBU mode on those units that are supporting loudness metering.

Many RTW devices ranging from the entry-level, 2-channel instruments to large 8-channel surround systems with built-in monitoring control, audio router, Dolby decoder, and SDI interface have already supported the ITU

recommendations on loudness metering for some time by providing all currently discussed parameters in adjustable form. With its TouchMonitor range, which was introduced at this year's NAB Show, RTW breaks new ground in the ergonomically optimised implementation of current and future loudness-metering & display techniques.

Using the particularly practical user interface, based on a 7" or 9" touch screen, the user can visualise and analyse audio and metering in a more flexible, intuitive and faster manner. Instruments can be freely scaled and positioned on the graphical user interface; this allows for designing adequate screen layouts showing just the instruments relevant for the application at hand. Next, the device is capable of displaying multiple instruments of the same type with separate input signals at the same time. Those instances are separately configurable, and the on-screen help function allows for changing the setup quickly and efficiently. Regarding loudness metering, in particular, this operating concept offers an unprecedented level of flexibility when it comes to custom visualisation of measurements while still complying with the selected standard.

At the same time, the TouchMonitor units are based on a modular software design, allowing users to customise the functionality of their unit and to budget necessary functions only. New instruments and measuring functions can be added as software modules at any time as needed. Many display functions from existing RTW products

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are available to choose from including, among others, the Surround Sound Analyzer, the Real-Time Analyzer (RTA) and multichannel PPMs.

The modular software concept also allows for the use of third-party measurement tools specially developed for the TouchMonitor. For example, RTW will offer as a software add-on to the system, the Loudness Radar Meter from TC Electronic, a popular tool for loudness management in broadcasting, film, post-production and music-production applications. The Loudness Radar Meter visualises the current loudness state, the loudness history and the true peak levels in compliance with ITU-R BS.1770 as well as with the future EBU R128 and ATSC A/85 recommendations. Another part of this collaboration is special loudness measurement hardware offered by TC Electronic and based on the RTW TouchMonitor.

RTW also offers an OEM version of the TouchMonitor to allow for integrating its new technology into the user interfaces of large mixing-console systems. For instance, Lawo can furnish its mc? mixing consoles with a built-in TouchMonitor unit as an option.

RTW believes that collaborations like these, and the joint efforts of as many market players as possible, are critical for a successful and indispensable paradigm shift in audio metering and leveling. It is finally time to combat unpleasant volume discrepancies between programmes and broadcasting stations and to regain some dynamic range while listening to music. The efforts highlighted here are aimed at doing just that.