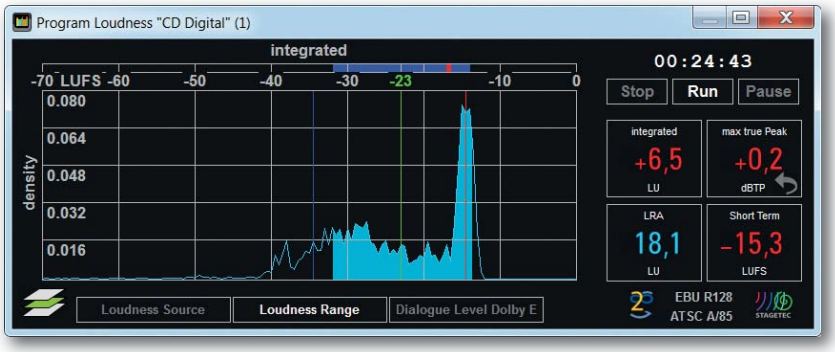
Loudness Metering & Spectral Analysis in NEXUS Networks

Loudness Metering



The XCPU09, the latest-generation CPU board for NEXUS, incorporates loudness metering in the master-monitoring path. The NEXUS loudness-metering function complies with the ITU-R BS.1770-3, ITU-R BS.1770-2, ITU-R BS.1771, EBU R128, and ATSC A/85 standards.

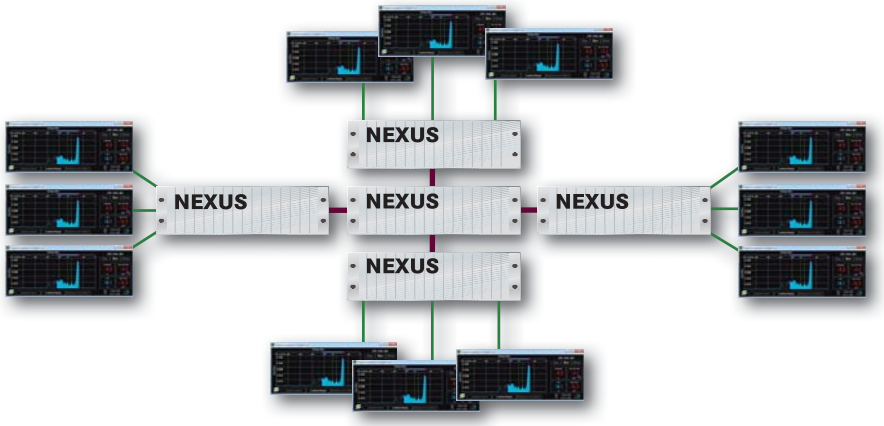
Users have three standard types of loudness metering available simultaneously:

- **Momentary (M)** loudness with an integration time of 400ms.
- **Short-term (S)** loudness with an integration time of 3s.
- **Integrated (I)** loudness (programme loudness) when triggered manually long-term metering with a gating function.

The results of the selected metering pass can be used directly as metadata in a Dolby E®-encoder stream. Various configuration dialogues provide numerous settings. Loudness is measured using a new unit, LUFS, which stands for Loudness Units Full-Scale. The EBU R128 loudness reference is –23 LUFS absolute or 0 LU relative. Start, Stop and Pausing of the long-term measurements can also be controlled by NEXUS Logic Control functions.

Loudness Range

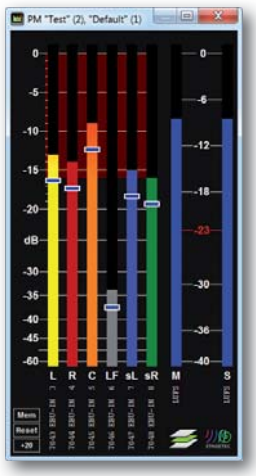
Loudness-range (LRA) measurement is supported in addition to loudness with true peak metering. The calculated value provides information on the loudness-level distribution within a programme. Distribution and intensity of the loudness of a programme are displayed graphically. LRA is measured using a long-term integration with LU (loudness units) as the unit of measurement.

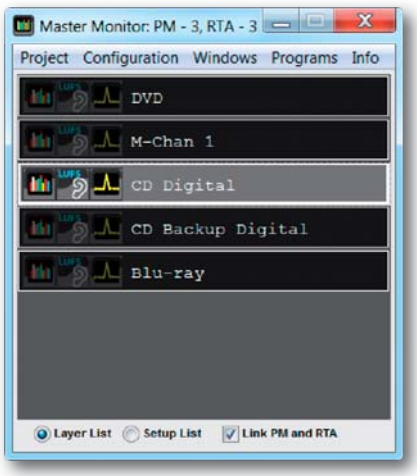


Each XCPU09 card on the NEXUS network can compute up to three loudness-meter instances with up to eight channels simultaneously and independently. A total of 256 configurations can be created for each loudness-meter instance which can be managed using NEXUS Logic Control functions.

True Peak Metering

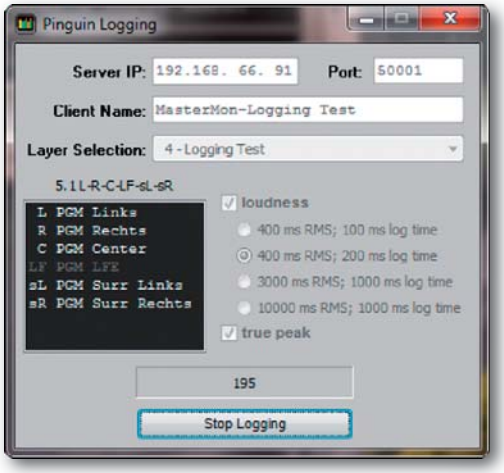
The level metering stage is implemented as an ITU-R BS.1770-2-compliant true-peak meter. Using oversampling, peak levels are detected between samples, thus ensuring precise metering.

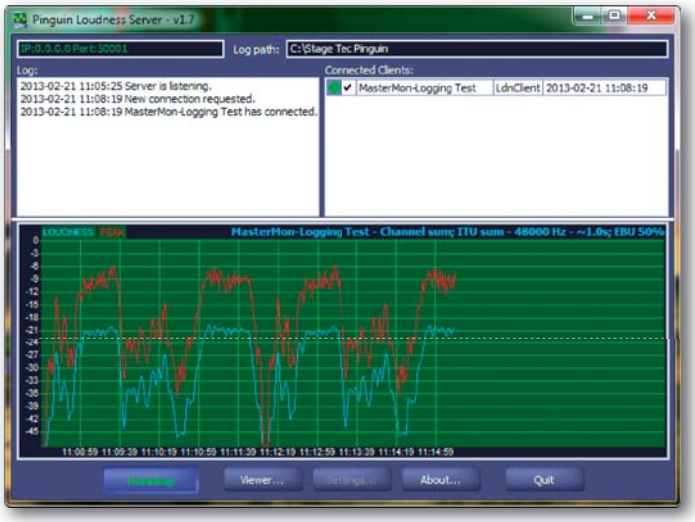




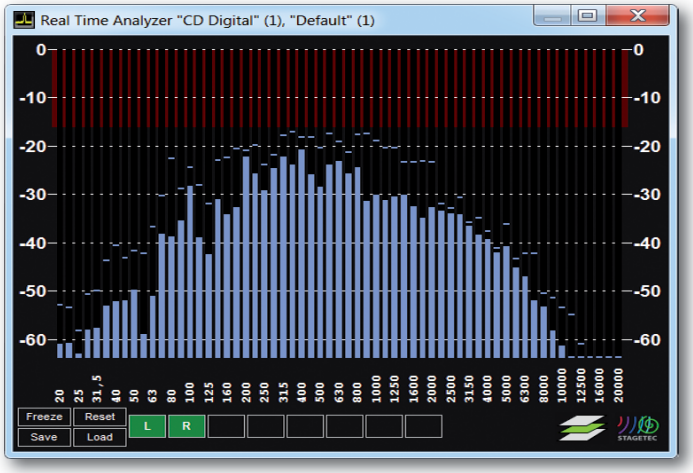
Long-term Loudness Logging

An interesting new feature was developed in close cooperation with the Ralph Kessler's renowned Pinguin Ingenieurbüro: The loudness values measured by the NEXUS are routed to a PINGUIN LdnServer logging server for long-term recording. In this way, programme-loudness metering results can be made available for subsequent evaluation. The recorded values may span any length, for example, days, weeks, or even months.





Ralph Kessler, founder of Pinguin Ing. Büro, researches, develops and consults in the fields of multi-channel recording and multi-channel monitoring systems, loudness metering and multi-channel acoustic measurements as a basis for high-quality room simulations. He is a member of the EBU Loudness working group.



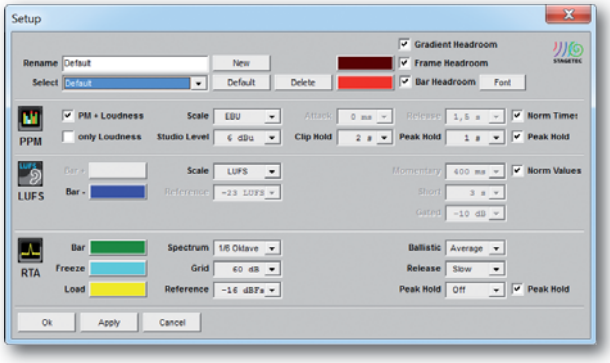
Spectral Analysis

The spectral-analysis feature displays the frequency distribution of audio channels that can be selected from any individual channels or buses on the NEXUS. The user can switch between 31 or 61 frequency bands for display. Various settings including the reference level, the metering range, ballistics, etc. can be adjusted in the configuration screens. Curves can be »frozen« and then saved and reloaded.

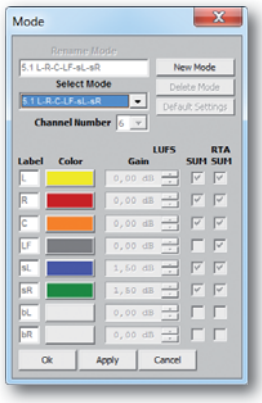
The master monitoring software featuring Loudness Metering, Loudness Range, True-Peak meter, and spectral analysis is an option that can be purchased separately for the XCPU09 board.

The XCPU09 can be installed in a NEXUS network which includes Base Devices that still employ the predecessor XCPU08 board. In addition, Base Devices incorporating the new board integrate seamlessly into existing NEXUS STAR networks.

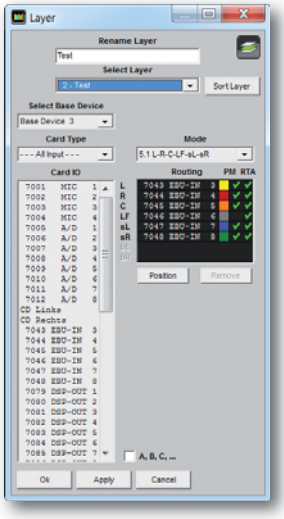
The configuration dialogues provide many settings for customising setup parameters.



Setup



Channel-Mode Configuration



Layer Configuration

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