LINEAR ACOUSTIC®

THE TELOS ALLIANCE

(주)미디어큐브
www.mediacube.co.kr

MediaCube

Intelligent Dynamics™

Daniel Wang

Senior BD Manager, Asia

The Telos Alliance

LINEAR ACOUSTIC®

From level normalisation to loudness normalisation is the most important, fundamental change in broadcasting industry.

Linear Acoustic Inc.

- Founder: Mr. Tim Carroll, ex-Product Manager at Dolby Laboratory
- 2010, Tech Emmy Award for real time loudness processor
- Upmixing and loudness solution provi
- 2014, another Emmy Award for contribution to the work of ATSC A/85
- AES (sustaining member), ATSC (member), CEA (member), EBU (member of P-LOUD group), IEEE BTS (members/distinguished lecturers), SBE (member), SMPTE (we are a sustaining member)

- Loudness Measurement
- Loudness Processing
- Intelligent Dynamics™

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Loudness Measurement

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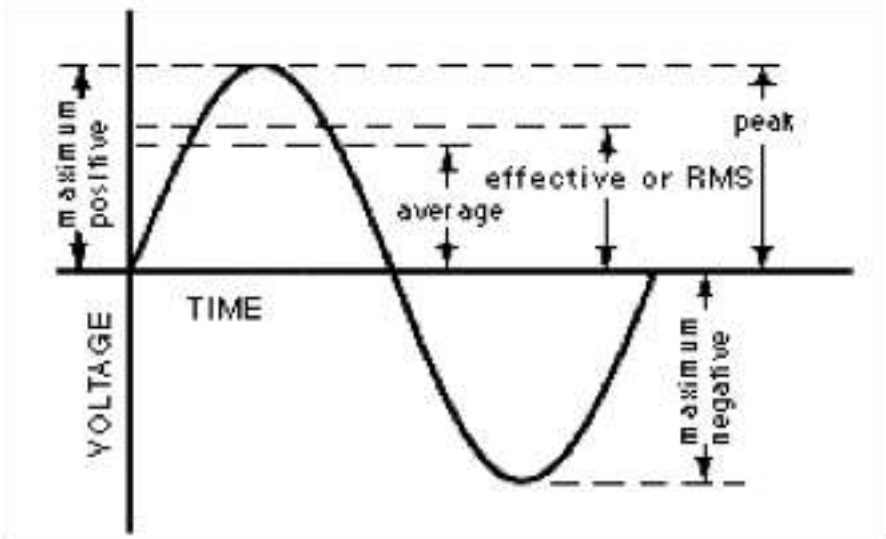
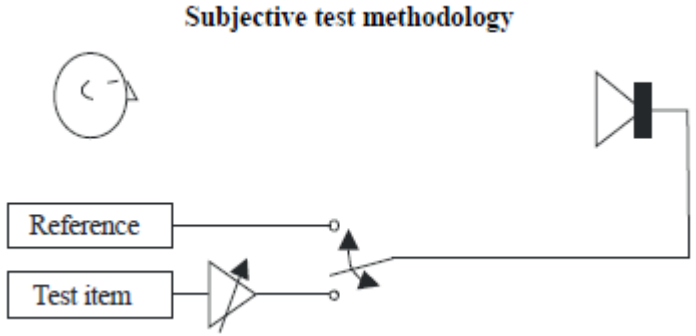
Audio Measurement

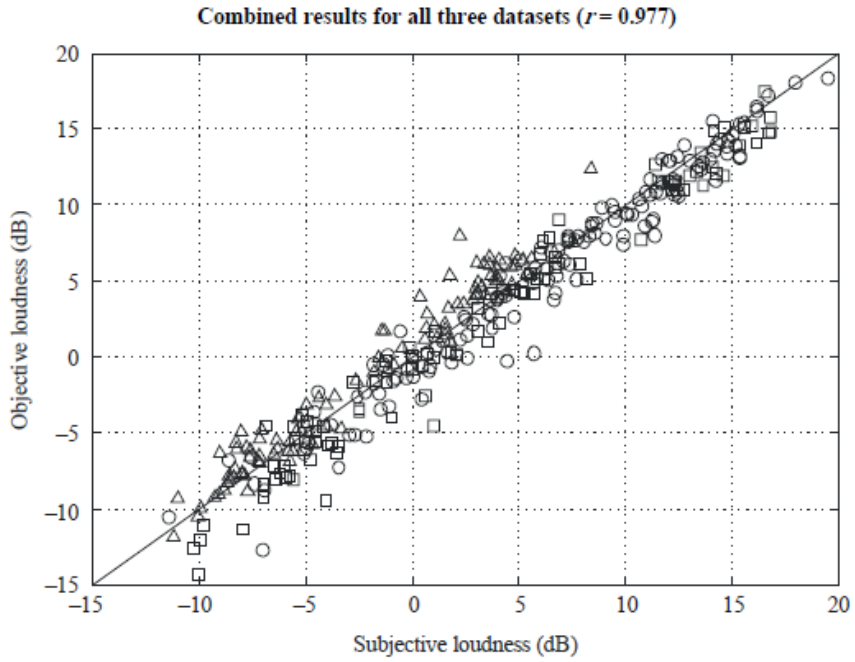
- Level (PPM and VU)
- Sound Pressure Level
- Volume
- Loudness



ITU-R BS.1770

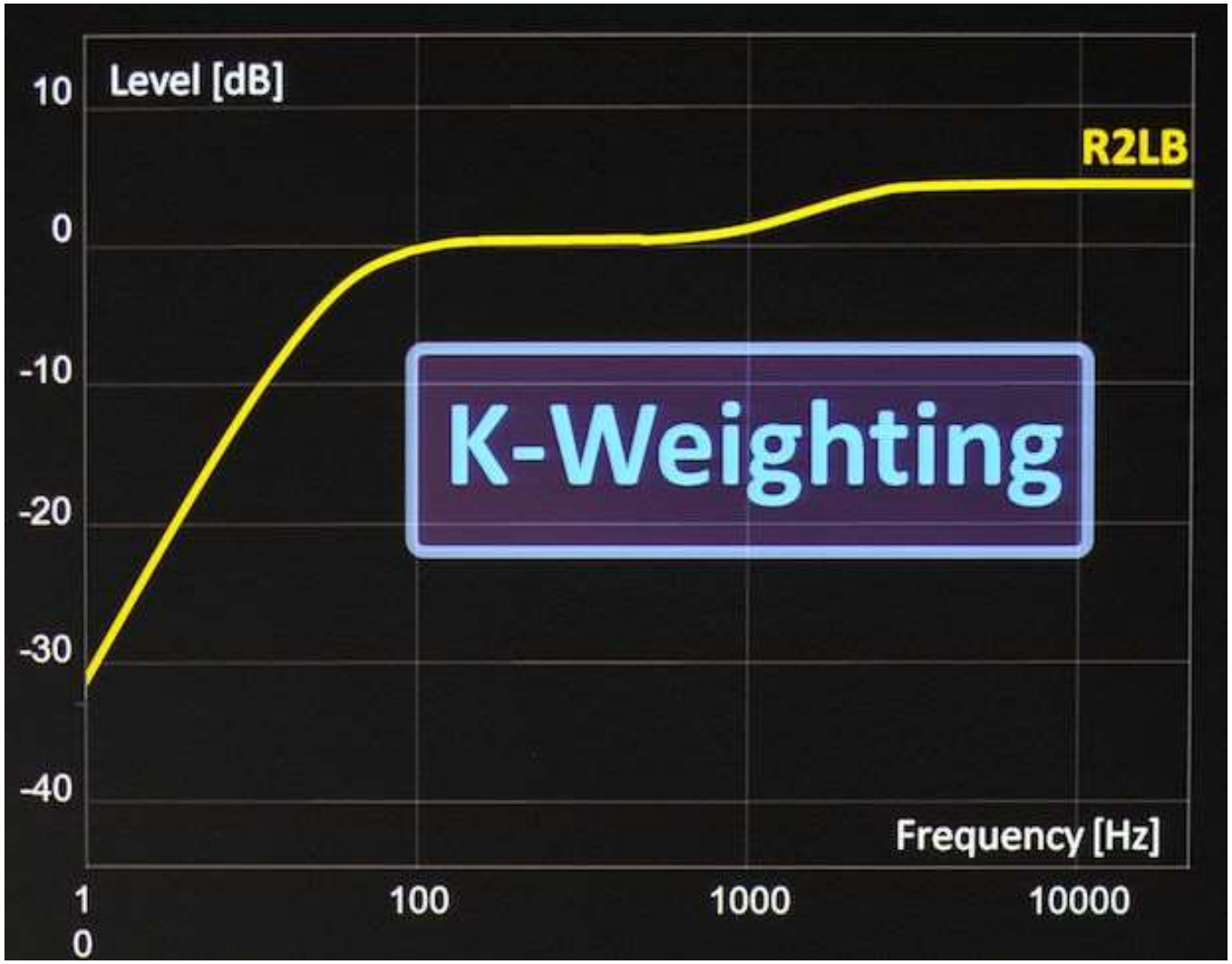
- ITU Radiocommunication section in 2001 initiated a study to identify an objective measure of the perceived loudness of typical broadcast program material.



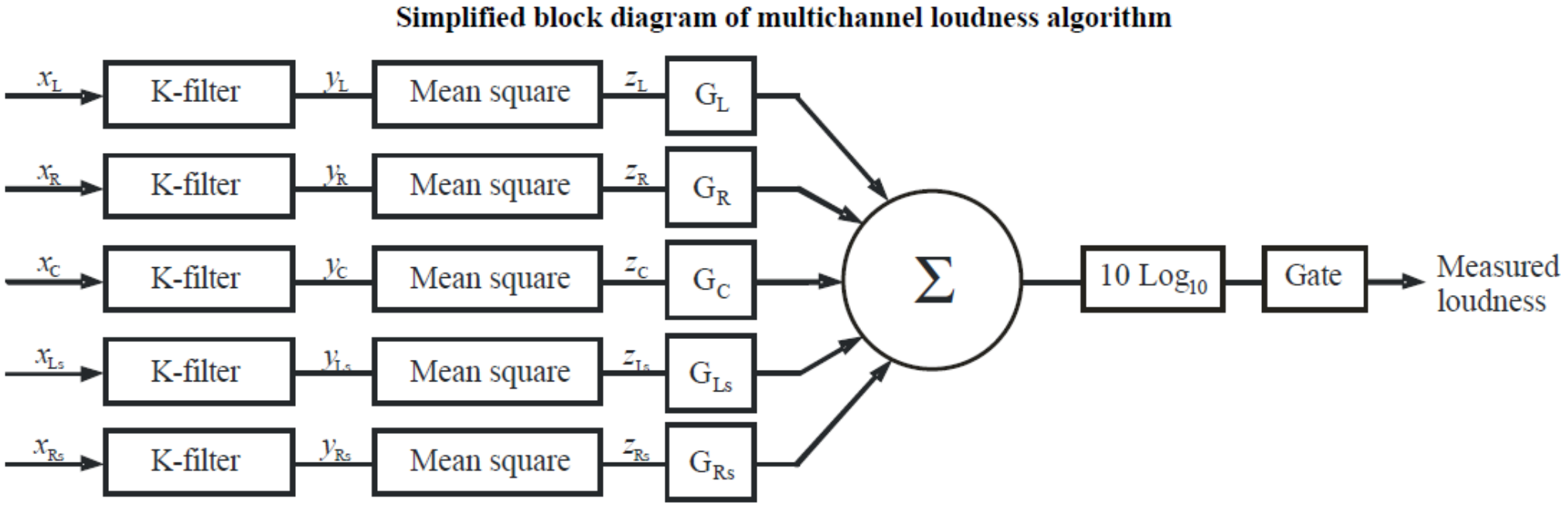


ITU-R BS.1770 K Weighting Filter Curve

- Combination of pre-filter to account for acoustic effects of the head and a simple 2nd Order High Pass Filter
- Designed to replicate the human auditory system
- Letter “K” has no relevance



ITU-R BS.1770-2 Algorithm



- LKFS – Loudness, K-weighted, referenced to Full Scale
  - A unit of LKFS is equal to a decibel

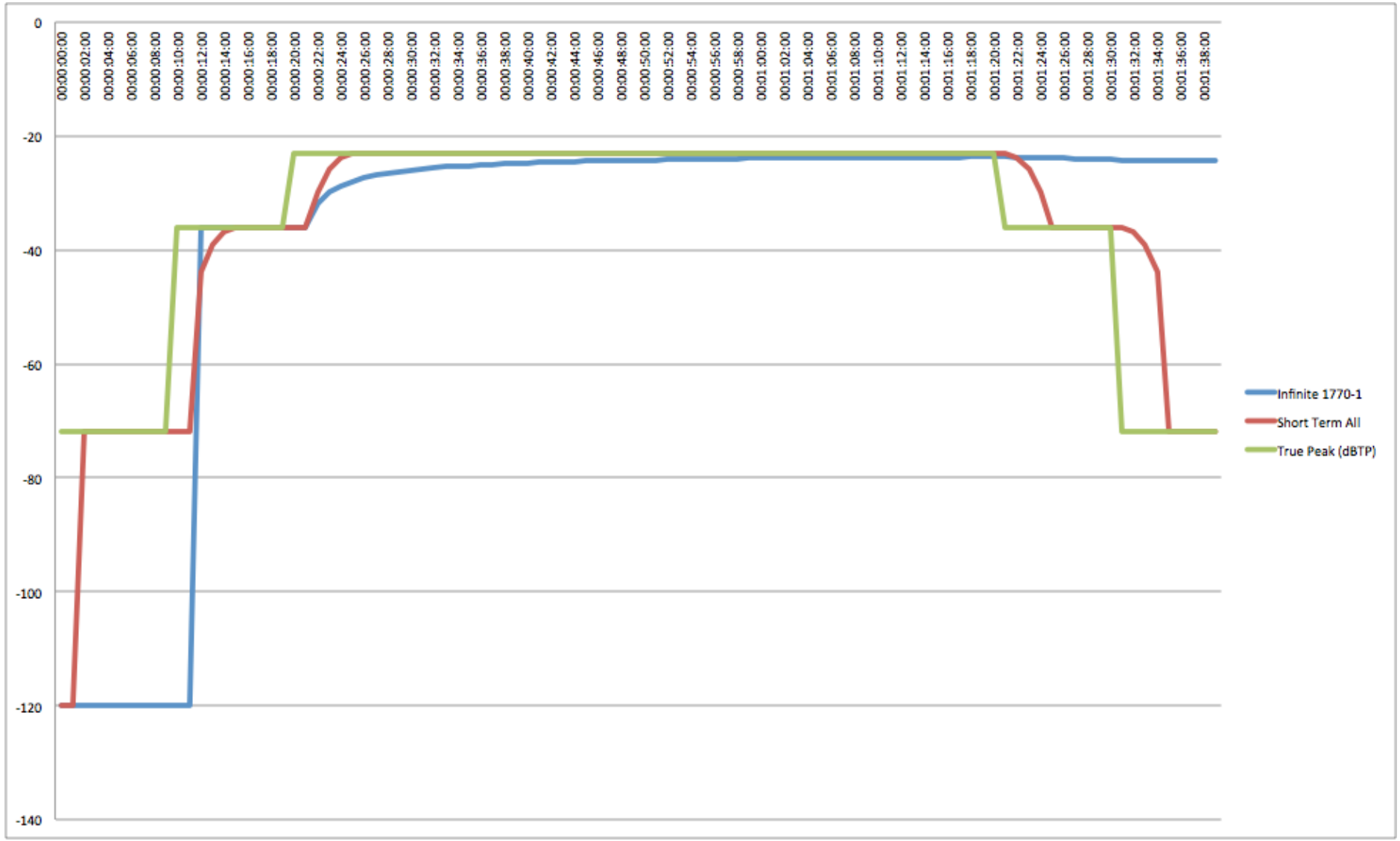
ITU-R BS.1770-2 Integration Time

- Momentary - 400ms
- Short term - 3s
- Integrated - from start to stop

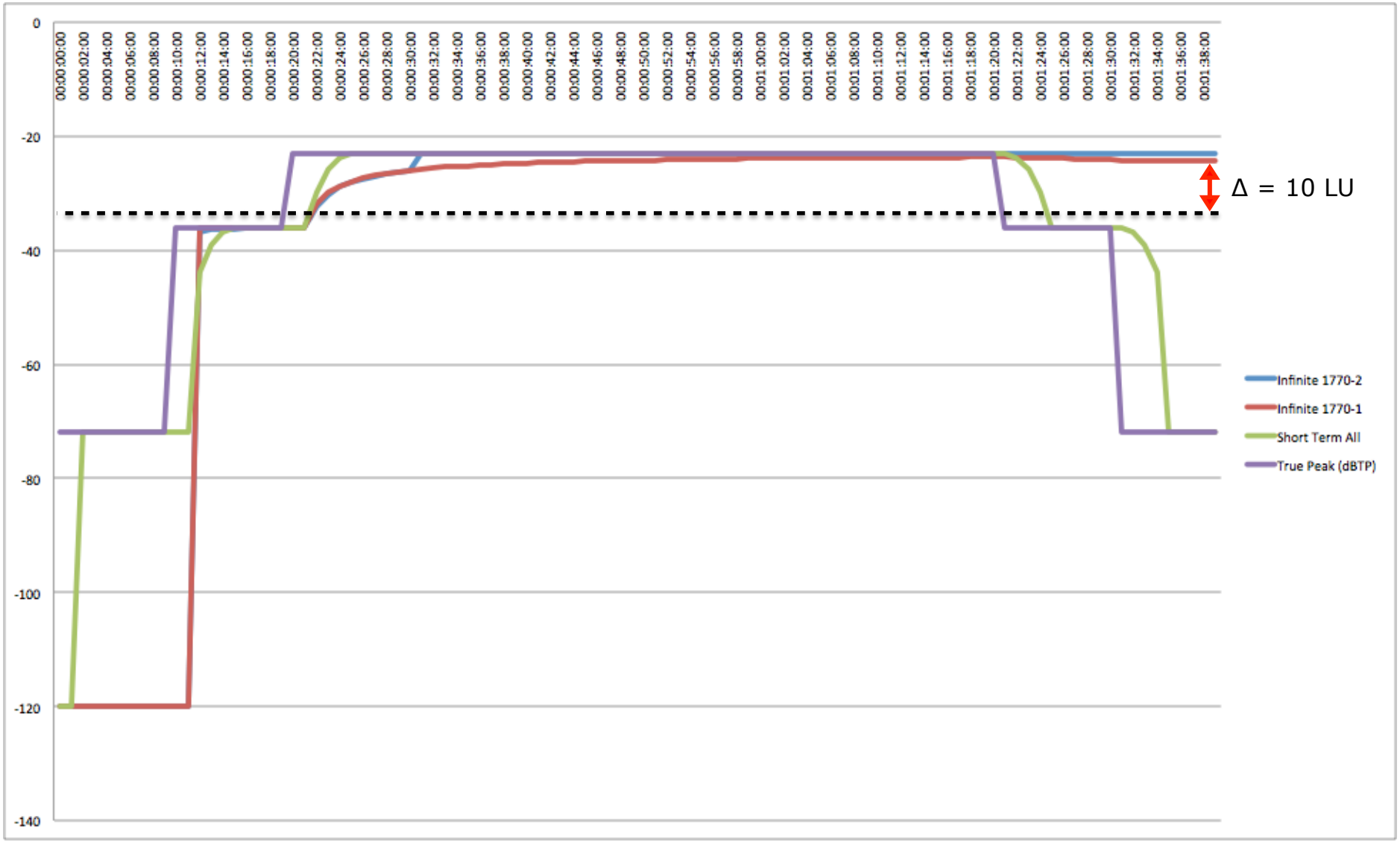
ITU-R BS.1770-2 Gating Method

- Absolute Gate: -70 LKFS
- Relative Gate: -10 LU

ITU-R BS.1770-1



ITU-R BS.1770-2



1770-1 or 1770-2?

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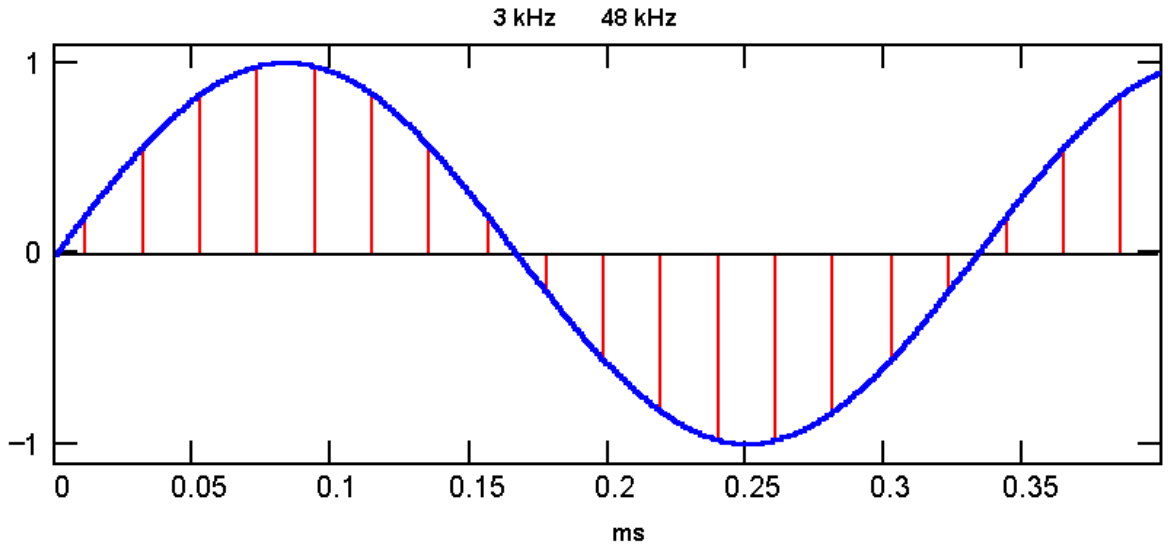
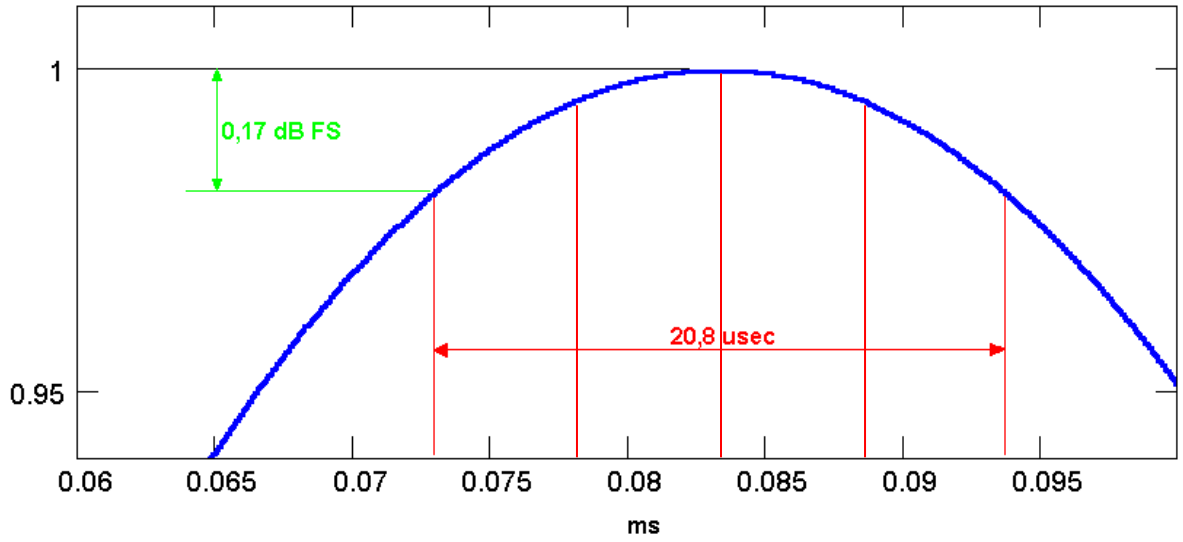
ITU-R BS.1770 True Peak

- True Peak
- dBTP





EBU R128

EBU "Recommendation–128" introduces three key elements

- Program Loudness
- Maximum True Peak Level
- Loudness Range

Also introduces the units LU (Loudness Units) and LUFS (Loudness Units referenced to digital Full Scale)

Target Loudness: -24 LKFS ± 2 LU

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Maximum True Peak: -1 dBTP

Loudness Range

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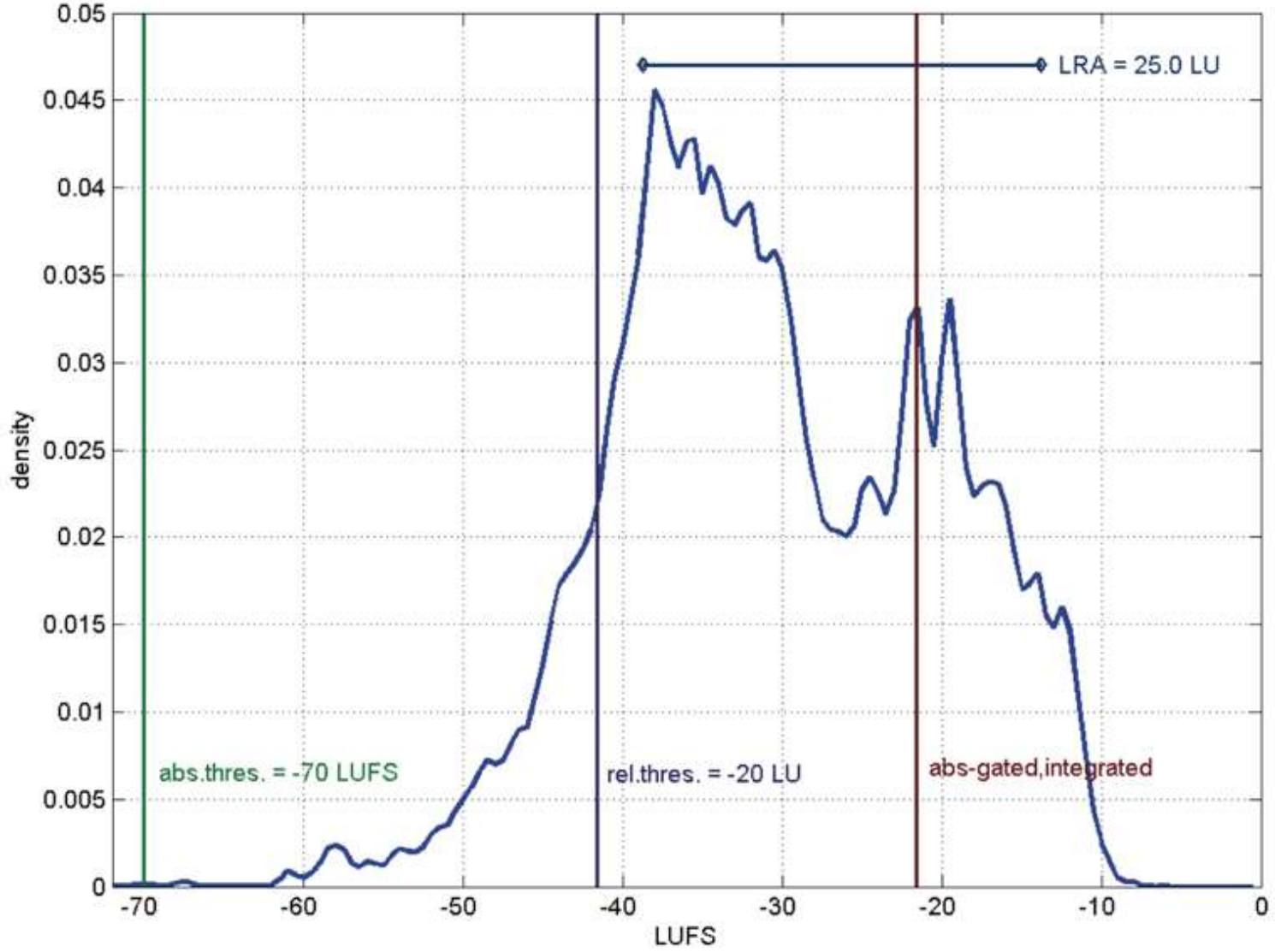
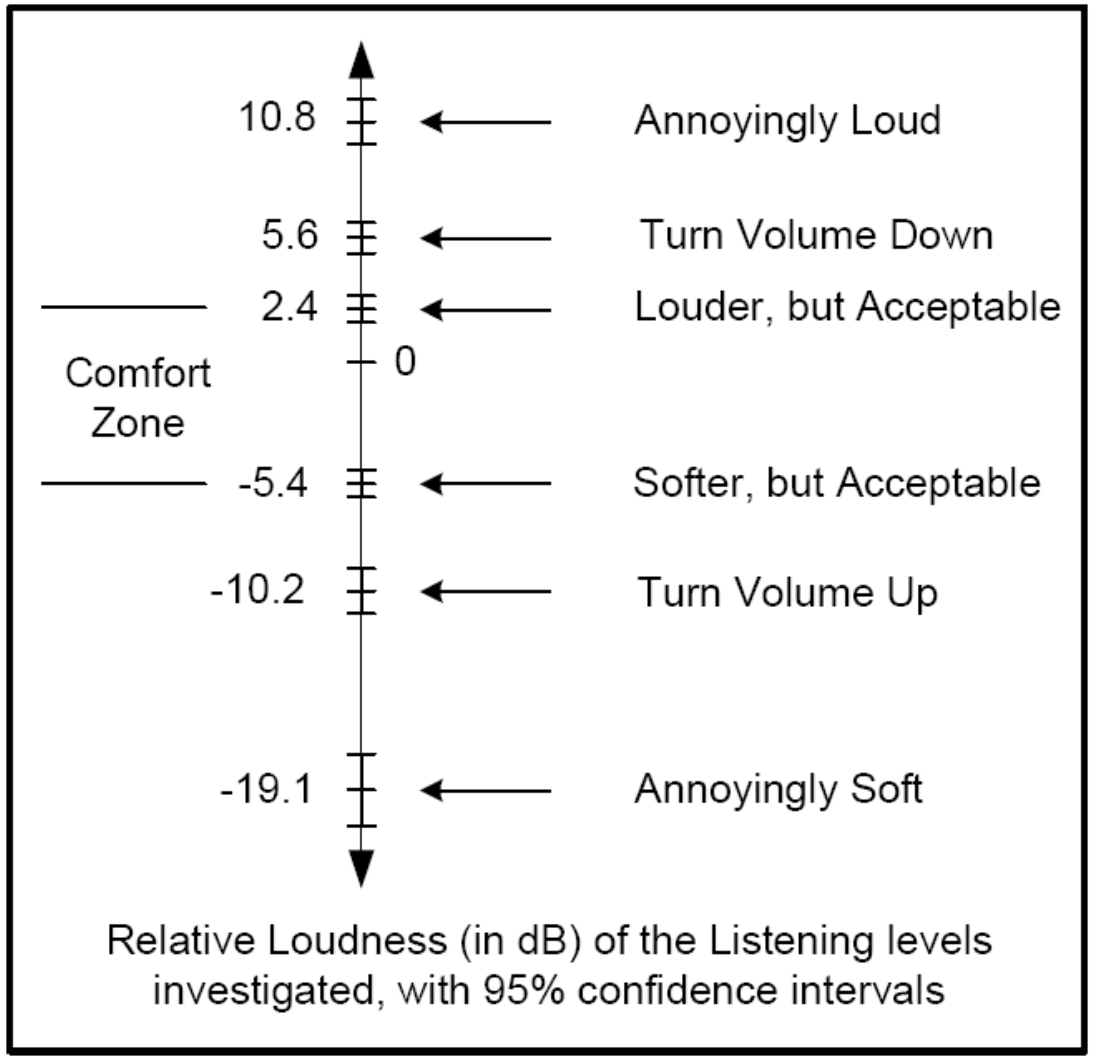
The calculation of Loudness Range



Comfort Zone



Relative Loudness (in dB) of the Listening levels investigated, with 95% confidence intervals

30dB range from
turn that blasting noise down!
to ***I can't hear it!***

8dB Comfort Zone

16dB range from
turn it up
to
turn it down

Audio System Calibration

- Two channels, 1KHz@-20dBFS sine wave
- Loudness: -20 LKFS

LQ-1 Loudness Meter

- ITU-R BS.1770-1/2 meter with Dolby Dialogue Intelligence
- Analog, AES, HD/SD-SDI, ASI, TOSLINK optical input, LTC timecode input
- Dolby Digital (AC-3), DDP, Dolby E decoding, Metadata monitoring

LQ-1000 Loudness Quality Monitor

- Intuitive colour coding display for ITU-R BS.1770 and EBU R128 mode
- AES and HD/SD-SDI input
- Standard Dolby Digital (AC-3) decoding, Optional full Dolby decoding
- Loudness logging CSV file
- VGA output for external display

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Other Metering Products

Loudness Processing

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The Myth of Loudness Processing

- Wideband or Multiband?
- How to get audio into “Comfort Zone”?
- What’s the advantage of File-based processing?
- Multiple processing is good or bad?

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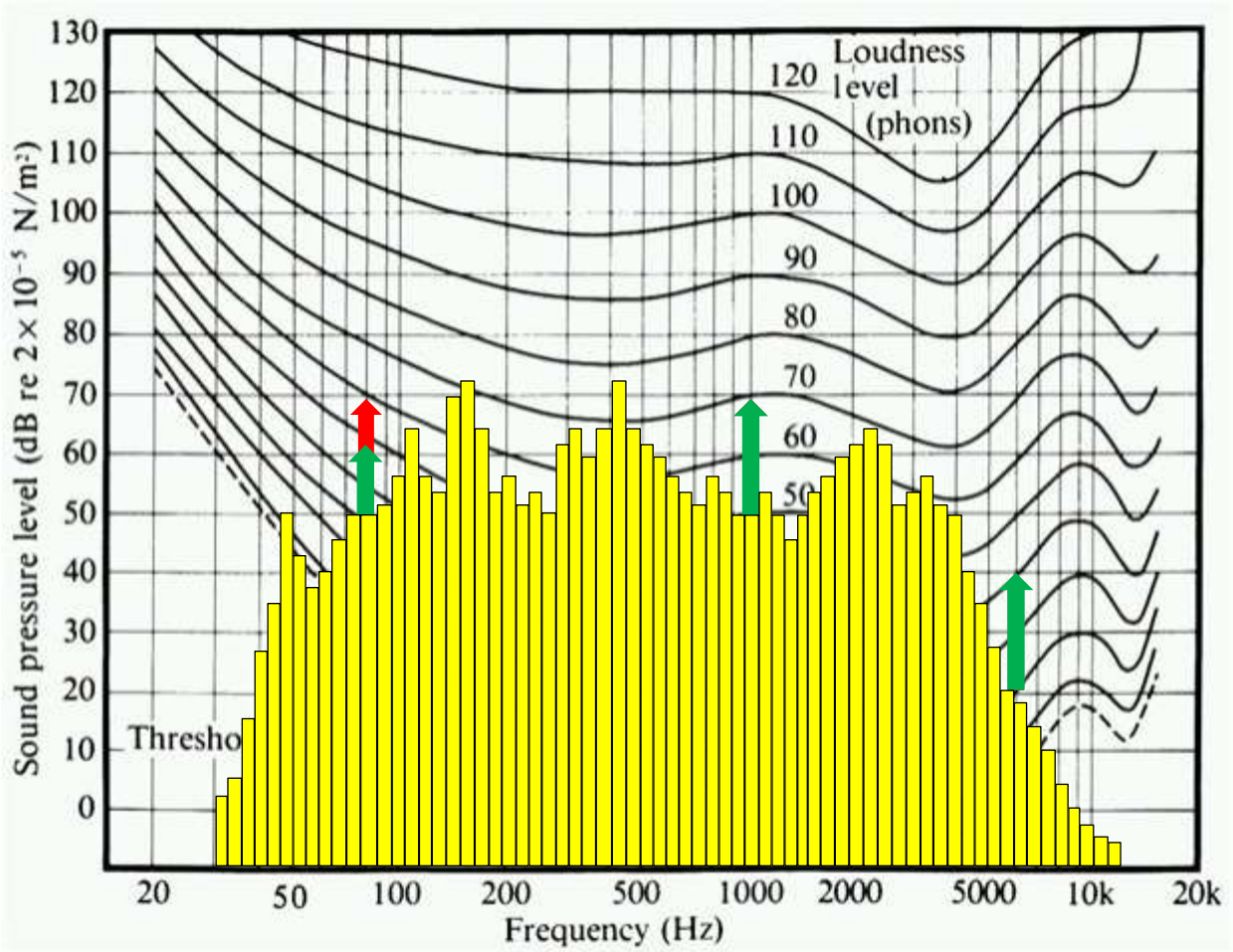
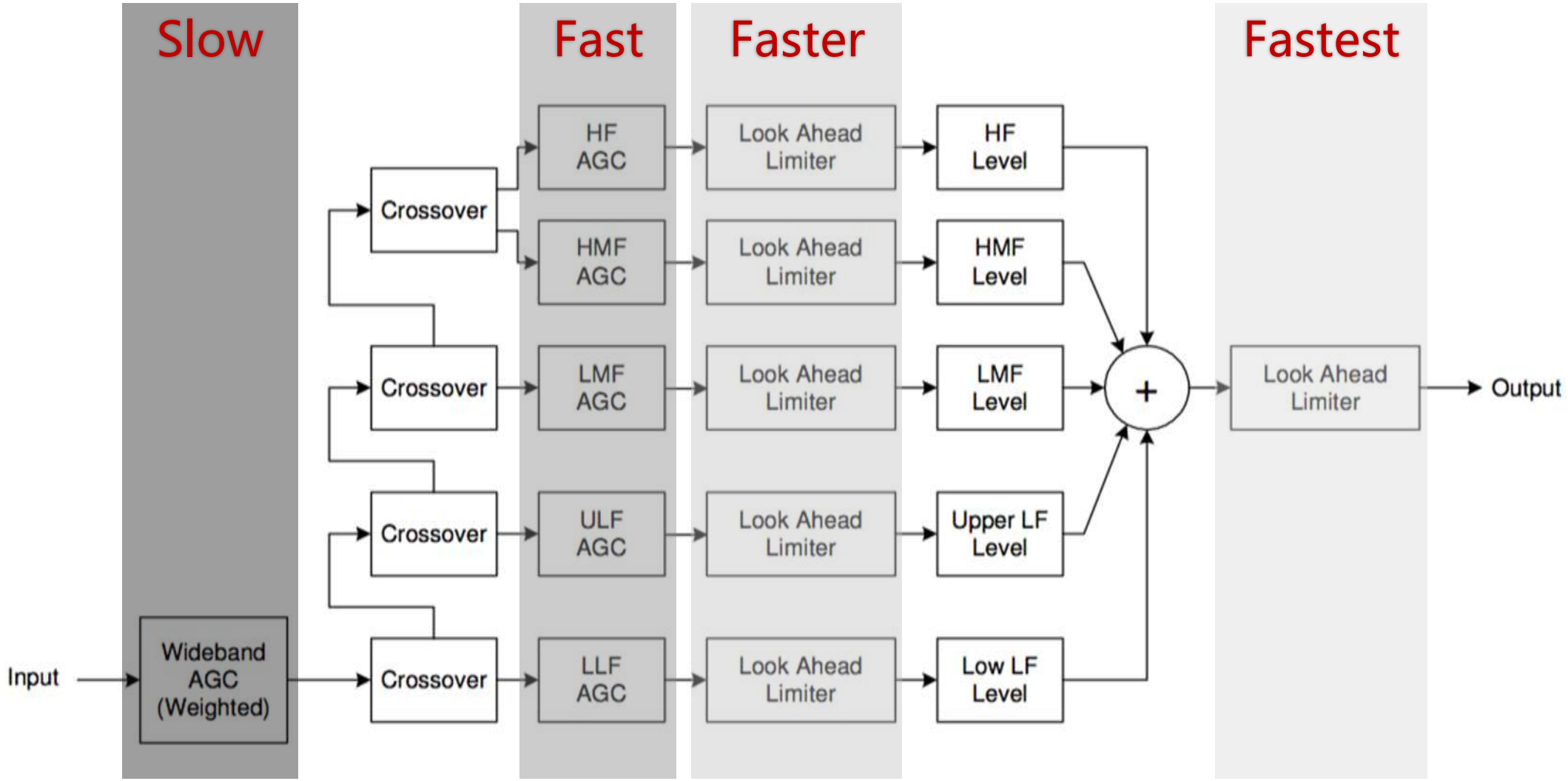
Wideband or Multiband ?



Wideband + Multiband !



Wideband + Multiband will get you the best audio quality.

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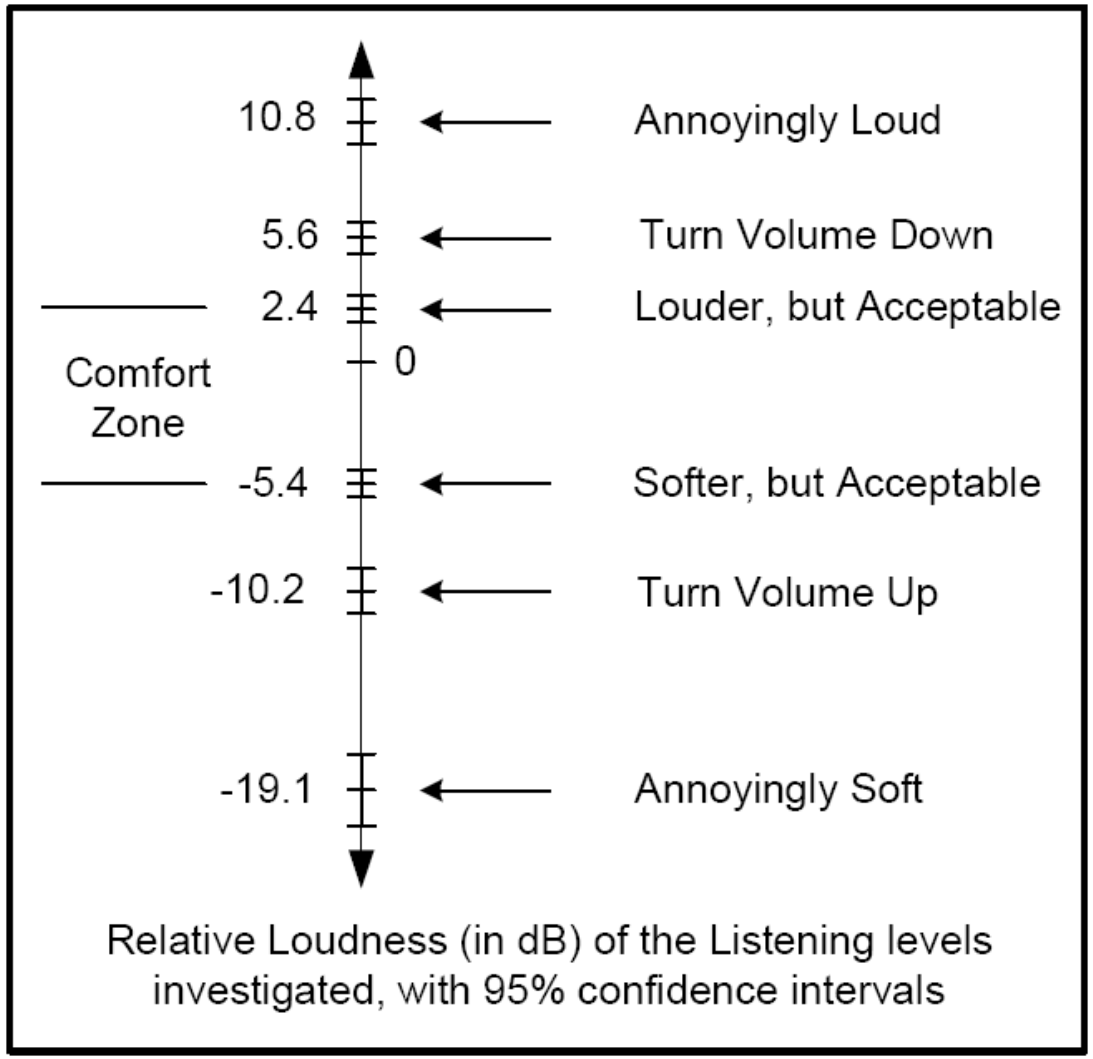
Comfort Zone



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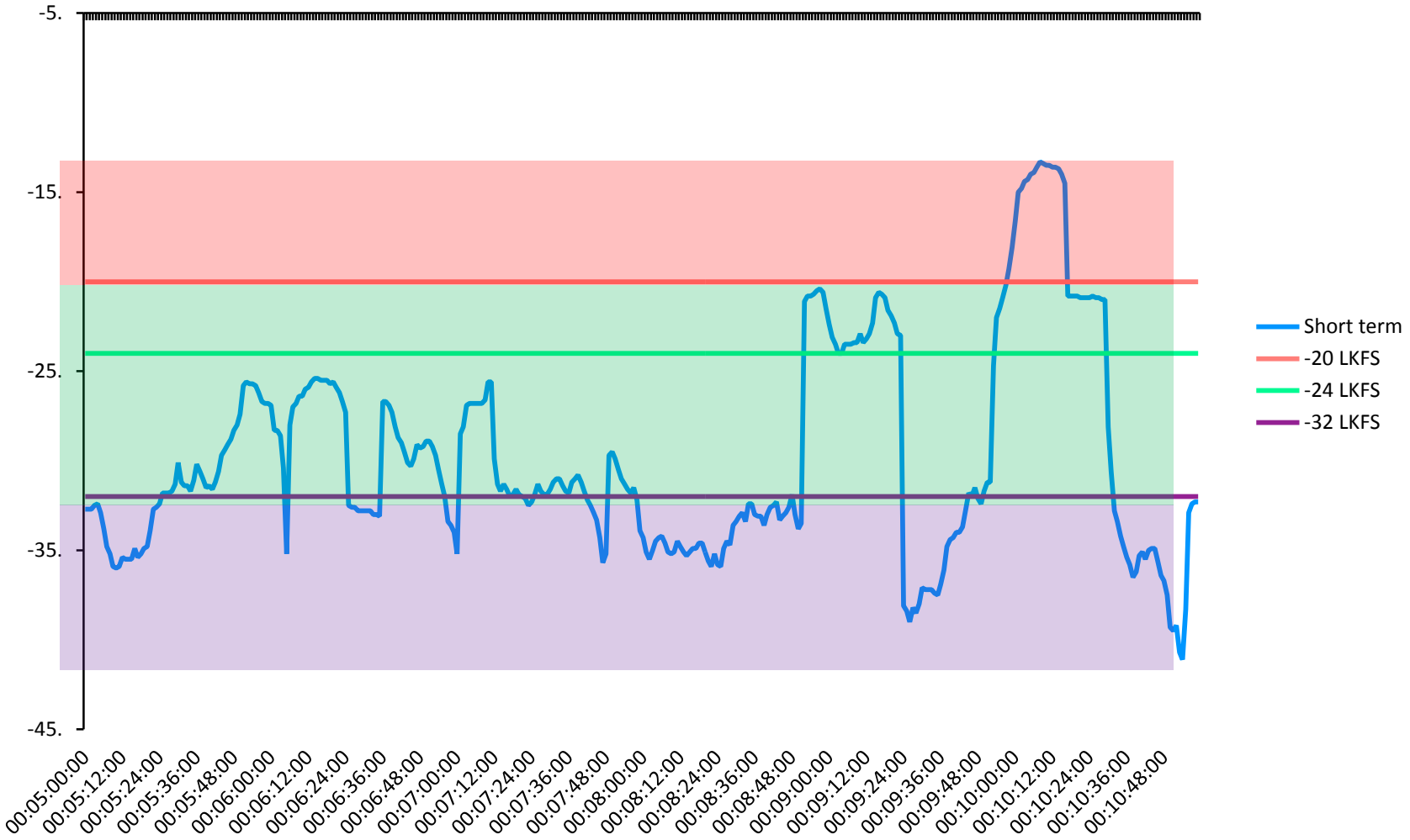
How to process audio into comfort zone?



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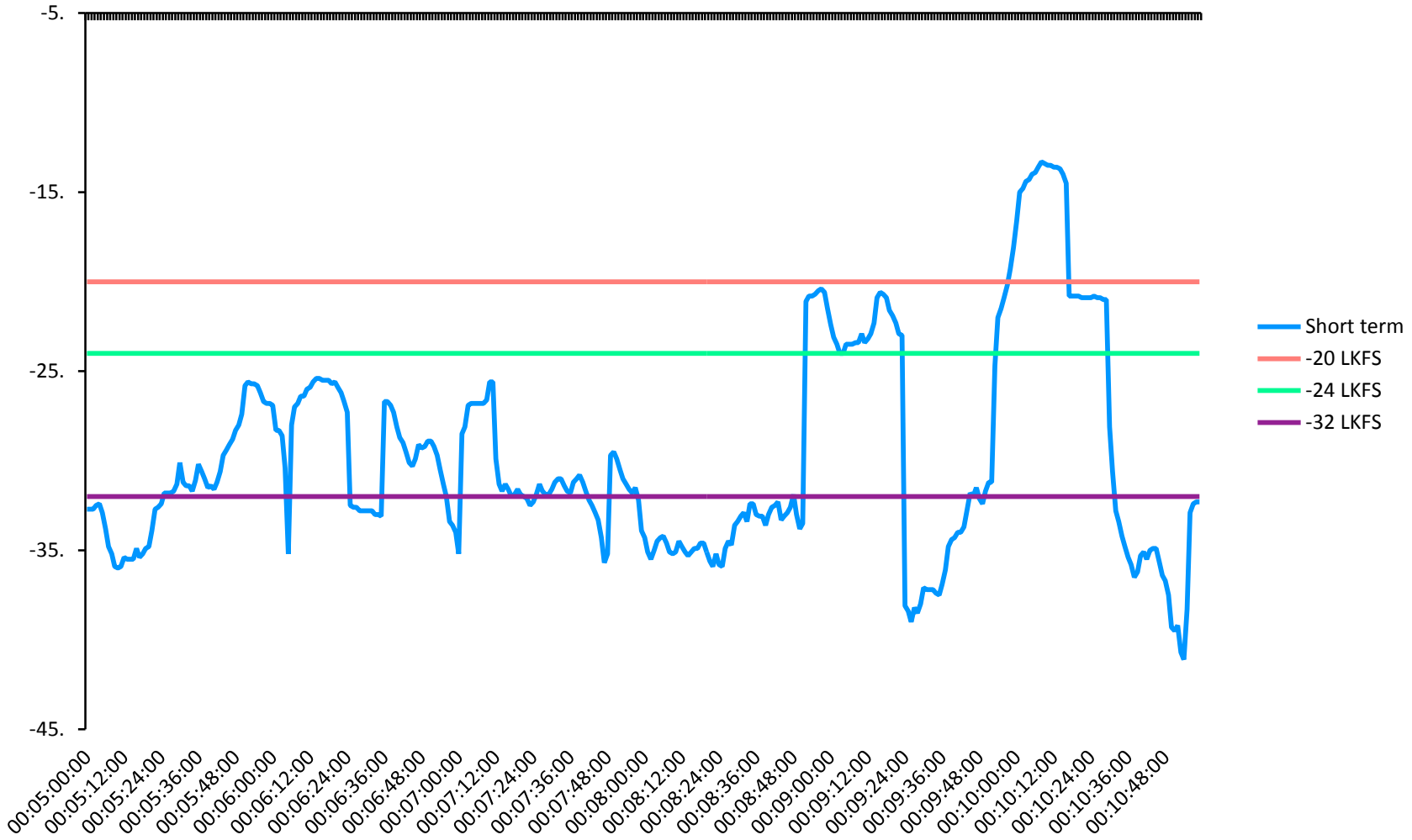
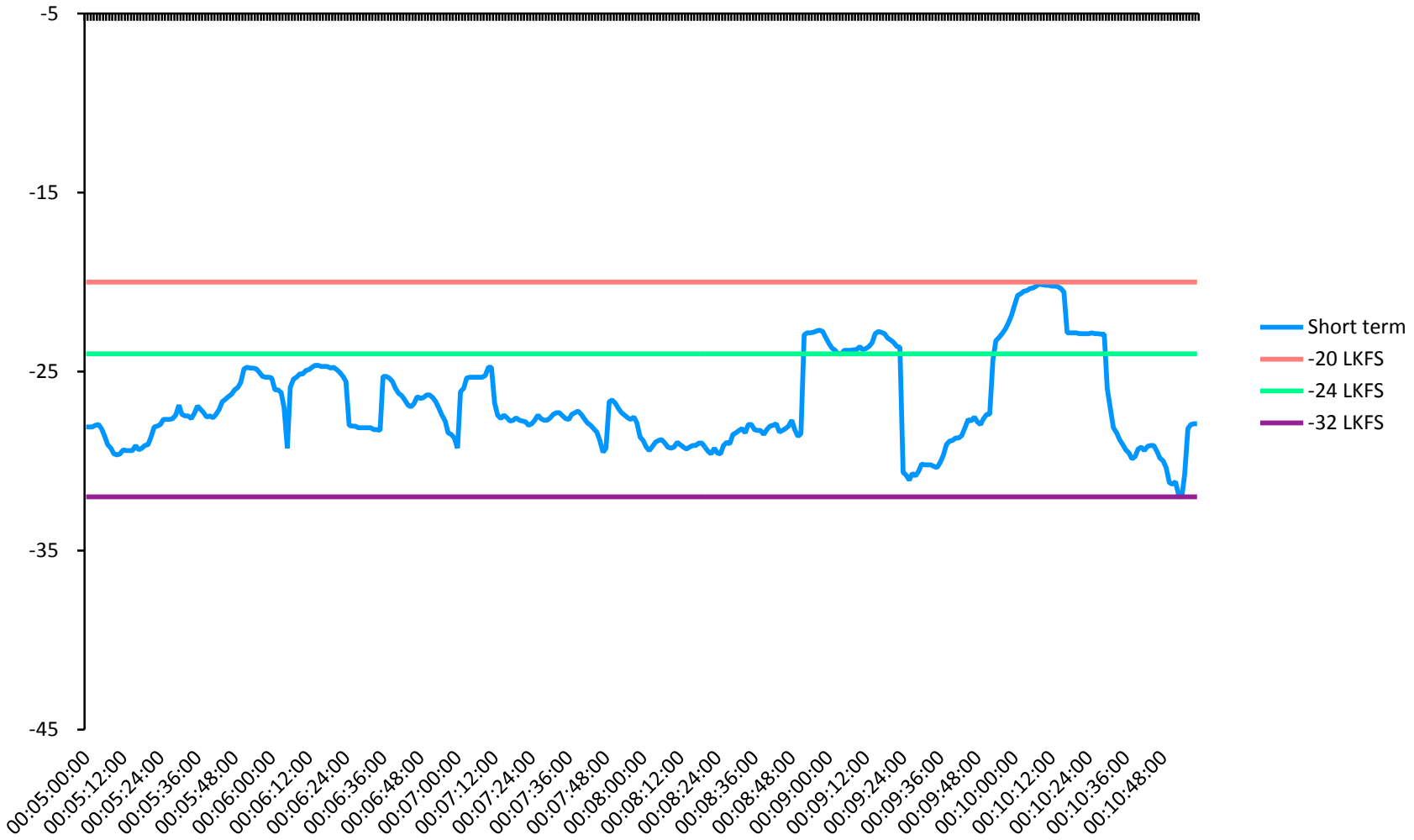
How to process audio into comfort zone?



How to process audio into comfort zone?



Real time processing control audio to target in proportion.

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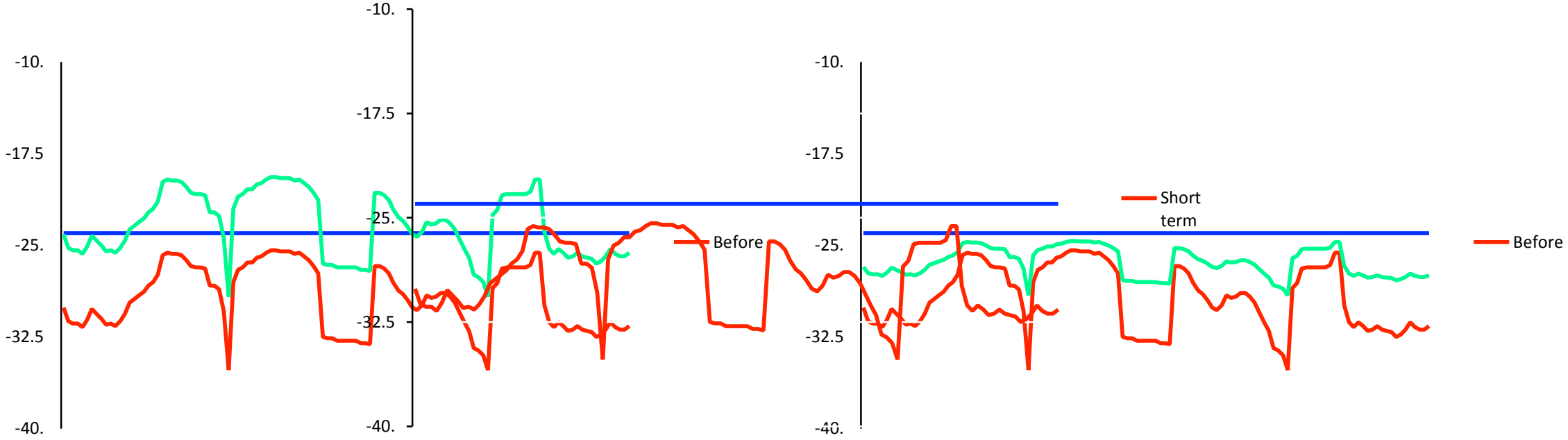
File base Processing



Advantage of file base processing:
Can shift audio to target loudness, no loss of dynamics.

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File Based Products

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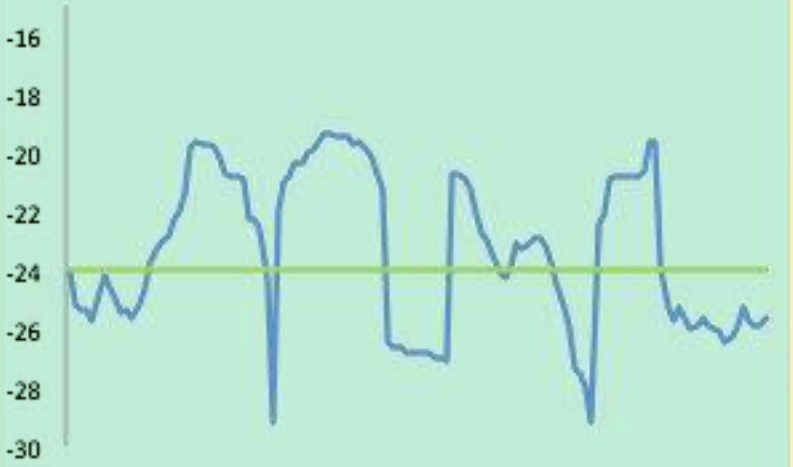
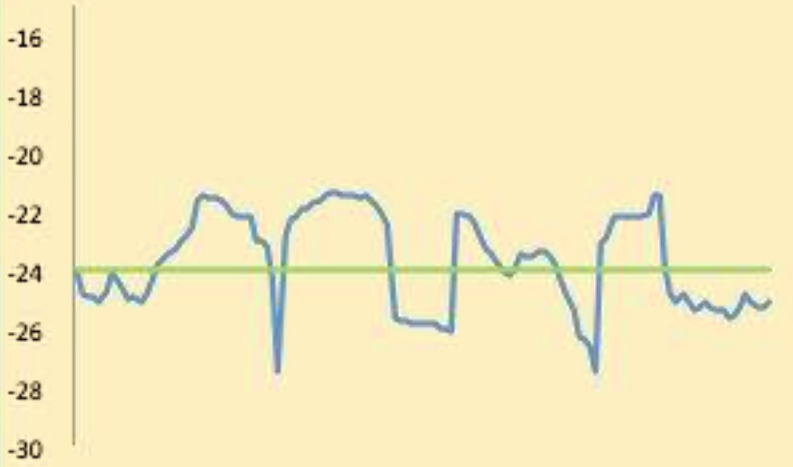
Multiple processing

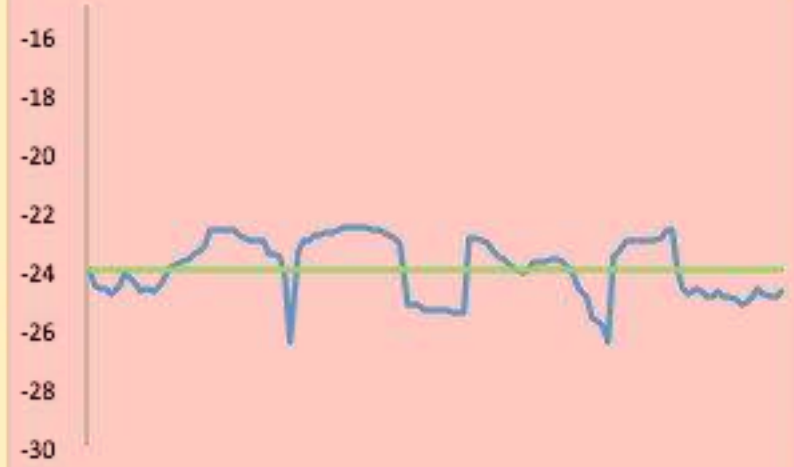
Live or File base



Real time @ Playout



Real time @ Headend



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Multiple processing will loss dynamics.

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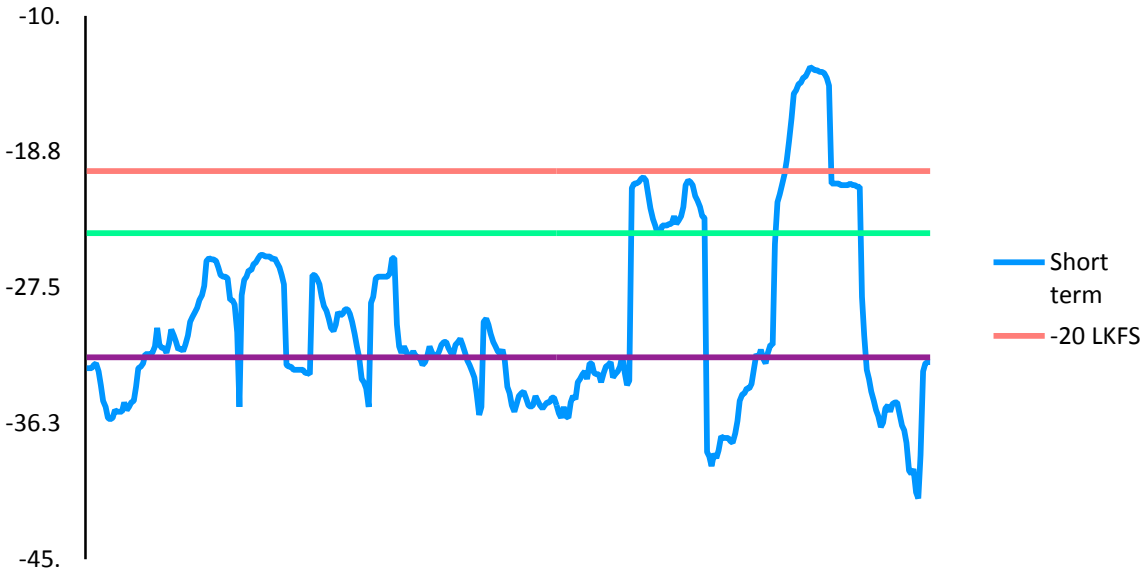
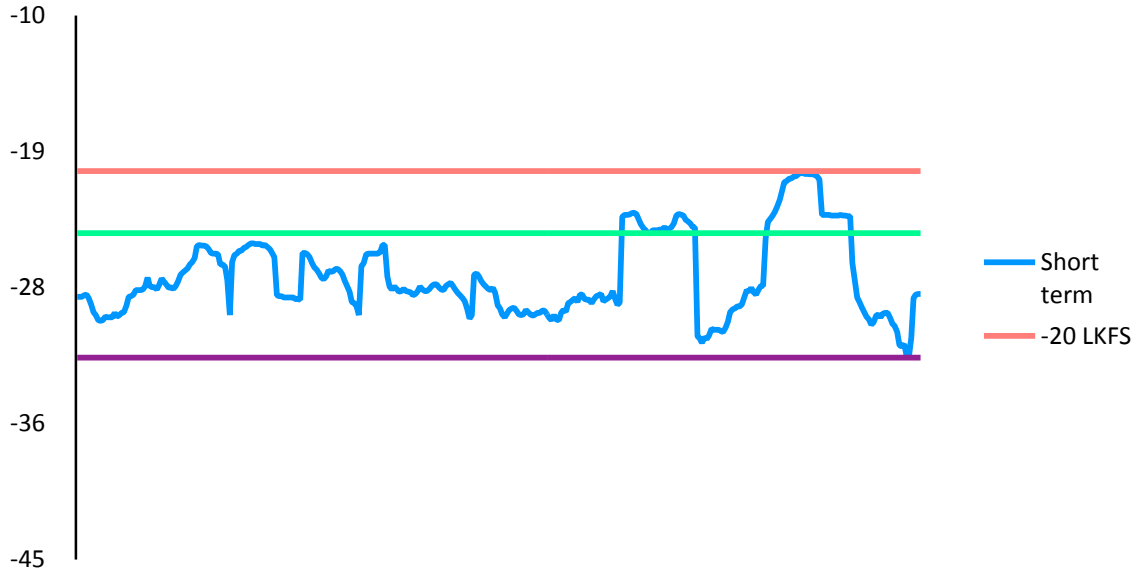
智慧動態——Intelligent Dynamics™

- Three puzzles we have today
  - Dynamics or Loudness consistency – Conflict between producer and transmission
  - Program with good loudness loss dynamics after multiple processing
  - Different viewers get the same audio experience, but their requirement is different!

Loudness Consistency or Dynamics





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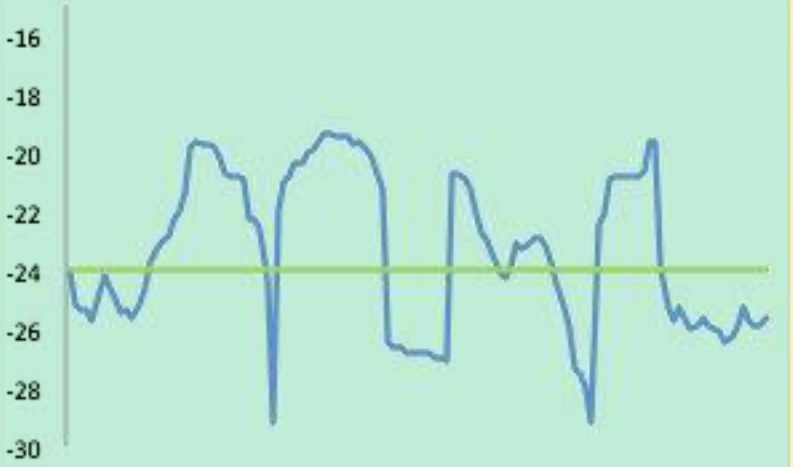
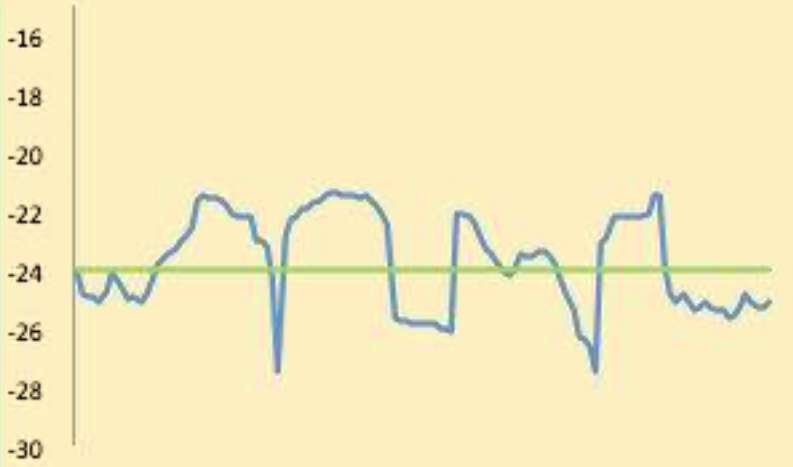
Multiple processing

Live or File base



Real time @ Playout



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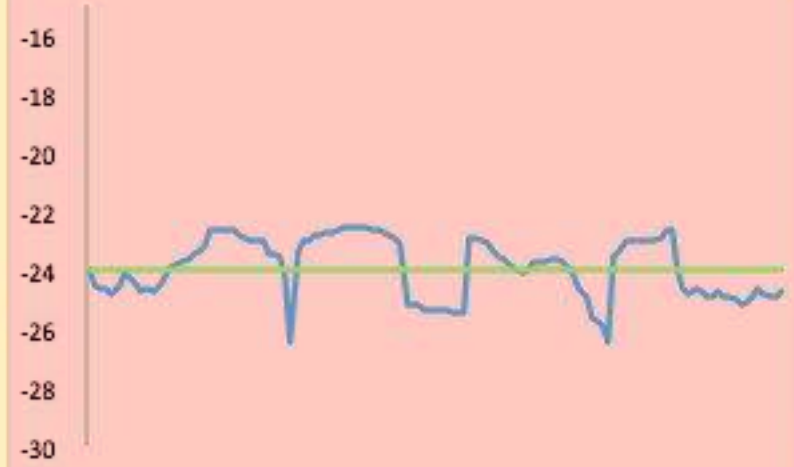

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Different Viewers, Different requirements

TV + STB

Loudness Consistency

TV + STB + 5.1 Home Theater

Wide Dynamics

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Introducing Intelligent Dynamics™

- Combines technologies from Dolby Laboratories and Linear Acoustic
- Connects the creative community back to consumers
- Valid content avoids being “corrected” again
- Enables instantaneous, accurate verification of loudness

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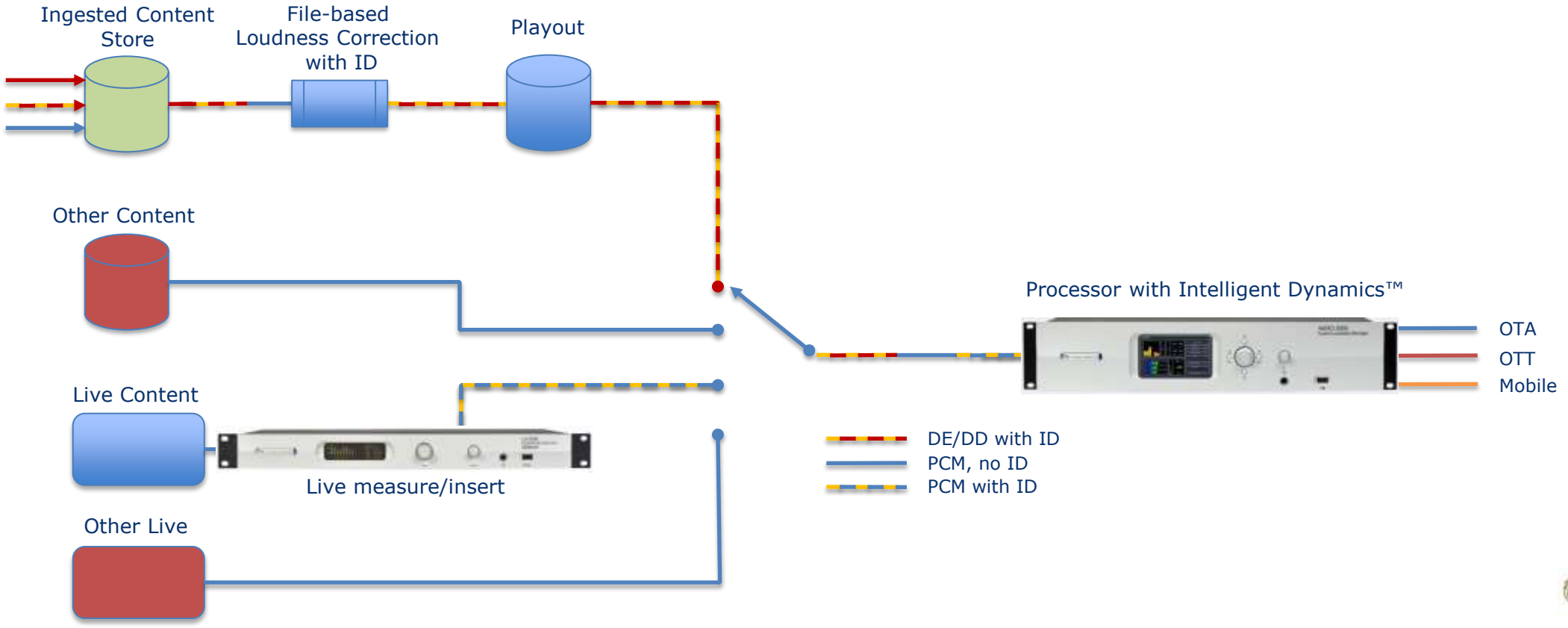
Intelligent Dynamics™

Content drives processing decisions, no more guessing



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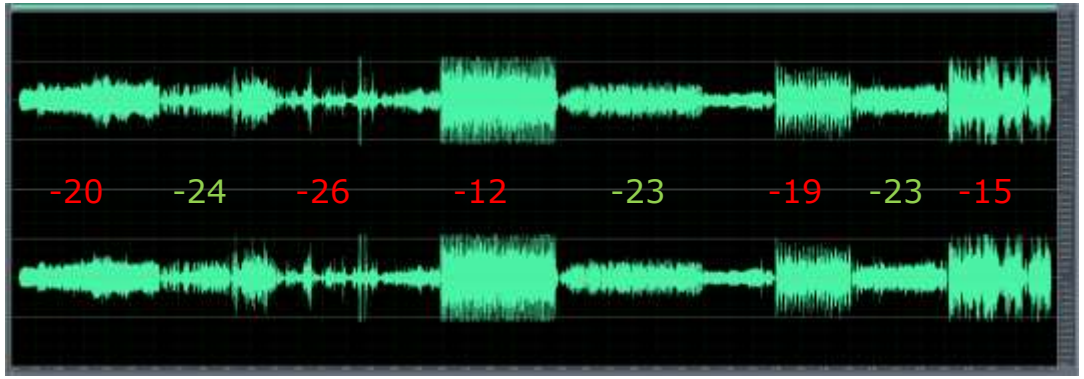
Program Loudness →



MD %

100 0 100 100 100 100 0 100 0

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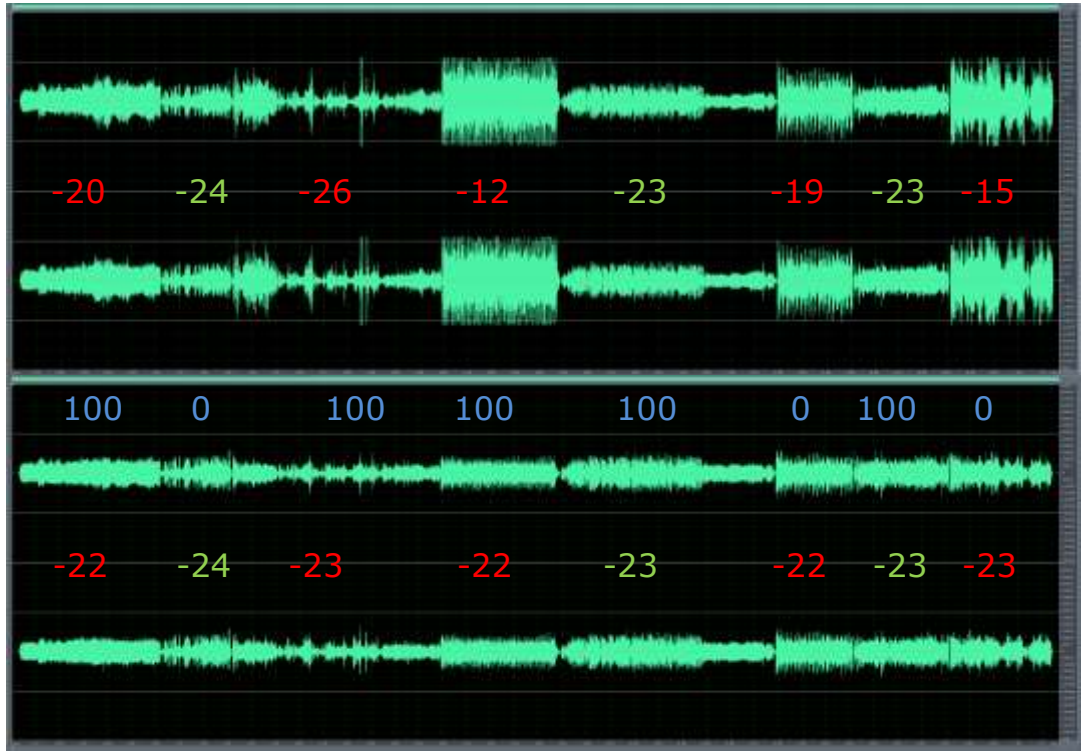
Program Loudness →

MD % →

DRC On →



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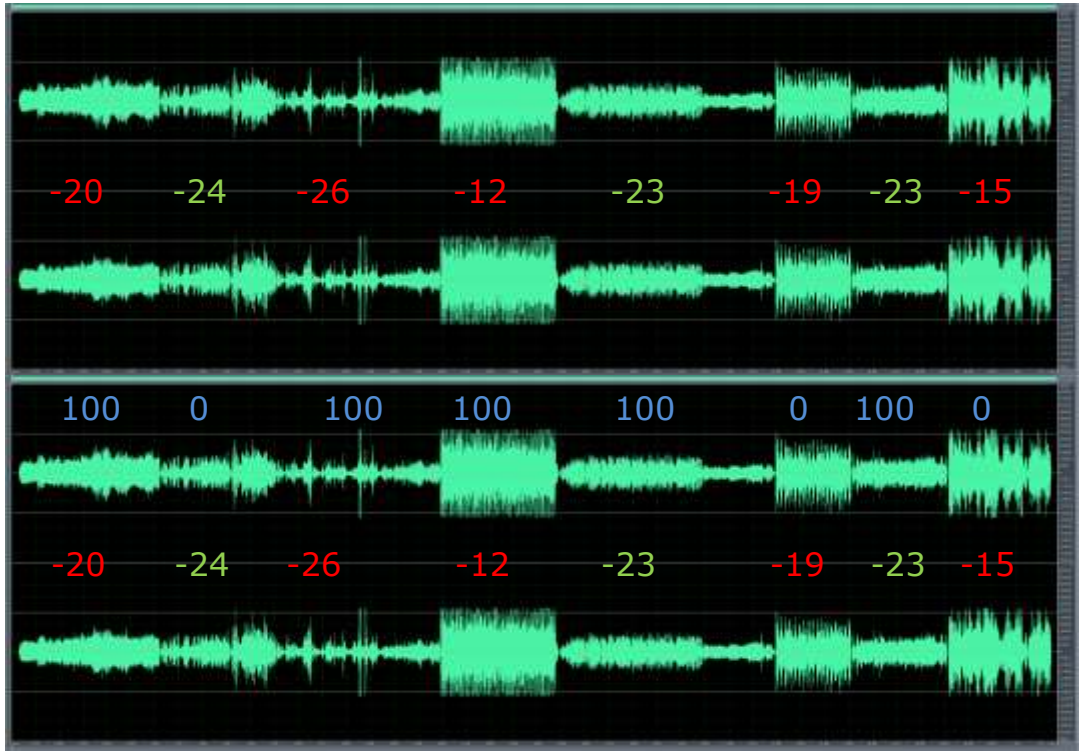
Program Loudness →

MD % →

DRC Off →



AERO.2000, AERO.100 Audio/Loudness Manager

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Solution for High Density System

AERO.soft + SDI xNode

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Intelligent Dynamics™

- Keep both loudness consistency and dynamics at viewer fingertips
- Only ONE time processing, maintain the best audio quality
- Providing differentiate services to various viewer groups

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End to end loudness normalisation solution

Production

Correctly using
Loudness meter

Ingest

File-based System

Distribution

Real time processor
meter and logger

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