



Netflix Audio Mix Specifications and Best Practices

version OC-1-0



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1.0 Nearfield Audio Prerequisites for Mix Facilities

Average loudness must be -27 LKFS +/- 2 LU dialog-gated. Peaks must not exceed -2db True Peak. Audio should be measured over full program according to ITU-R BS.1770-1 guidelines.

Standard or RF64 discreet LPCM .wav or .bwav files are required, with two exceptions:

1. Where multi-channel (interleaved) files are inherent to the source, such as with IMF, Quicktime or Atmos BWAV ADM delivery.
2. Localized Mix (Dub mix) .wavs delivered to Backlot may be .mov-wrapped

Content Hub deliveries may be discreet audio files alone, within folders or within Pro Tools session folders also containing sessions. Where non-Pro Tools sessions are delivered, AAFs/OMFs must also be included, or all channels must be rendered to continuous PCM audio.

Lossy or lossless audio compression is never allowed. Audio must be linear PCM.

Sample Rate and Bit Depth:

48k/24bit for Original Language Mix or M&E Mix. Applies to Stems & Mix Masters.

48k/16bit or 24bit for Secondary Language or Audio Description.

Audio must be recorded in sync to picture at native project frame rate. All audio must sync to final IMF/Prores picture delivery.

If conformed 5.1 audio was never created, stereo audio will be accepted (mono audio is acceptable if the program's original source is mono and no stereo and/or 5.1 mix exists. Mono audio must be duplicated on channels 1 & 2 and delivered as 2-channel).

1.1 Nearfield 5.1 Surround Mix - Original Version, Dub Mix, Audio Description

- Use 79db spl or 82db spl as your standard reference level for mixing
- Meet a -27 LKFS (+/- 2 LKFS) average dialog-gated level using ITU-R BS.1770-1 measured over entire program
- Maintain +18db (-2 dbfs) maximum level (true peak) over reference of -20 dbfs, achieved by peak limiting and not lowering the mix level
- Provide 5.1 Dialog, Music and Effects stems that equal the 5.1 mix when combined

1.2 Nearfield 2.0 Stereo Mix - Original Version, Dub Mix, Audio Description

- Use 79db spl or 82db spl as your standard reference level for mixing
- Provide a separate Lo/Ro or LT/RT mix with -27 LKFS (+/- 2 LKFS) dialog-gated using ITU-R BS.1770-1 measured over entire program
 - o Lo/Ro mix is preferred
- Lo/Ro or LT/RT mix to be mono compatible
- Maintain +18db (-2 dbfs) maximum level (true peak) over reference of -20 dbfs, achieved by peak limiting and not lowering the mix level
- When down-mixing from 5.1 to create Lo/Ro or LT/RT 2.0 mix:
 - o Lower Center channel content by -3db
 - o Center channel content should be included in both the LEFT and RIGHT CHANNELS
 - o Lower Surround channel content by a minimum of -3db

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- o Fold Left and Right Surround content into the corresponding LEFT and RIGHT CHANNELS
- o Optionally include the Low Frequency Effects (LFE) channel at -12db
 - Fold Low Frequency Effects (LFE) into both the LEFT and RIGHT CHANNELS
 - Low Pass Filter LFE at 200Hz or lower
- All adjustments must be made to the individual 5.1 channels prior to folding down

Note: The resulting 2.0 mix must be checked prior to delivery to ensure it is free of any audio artifacts and if necessary, as determined by Netflix, further adjustments shall be made to prevent them.

1.3 Nearfield 5.1 Surround M&E Mix

- 48kHz/24-bit
- Provide a separate fully filled 5.1 surround mix containing only Music & Effects (no dialog)
- Room tone and foley fill should be included to correctly match original mix. Any non-dialog sound present in the main mix must also be represented in M&E mix.
- All levels should mirror what was used for final Mastering and Archive so that any newly added dubbed dialog can be mixed in easily later
- For mixers creating the M&E, Netflix has a M&E Creation Guidelines document available on our Backlot Help site
 - o <https://backlothehelp.netflix.com/hc/en-us/articles/115006122187-M-E-Creation-Guidelines>

1.4 Nearfield 2.0 Stereo M&E Mix

- 48kHz/24-bit minimum
- Provide a separate fully filled 2.0 stereo mix containing only Music & Effects (no dialog)
- Room tone and foley fill should be included to correctly match original mix. Any non-dialog sound present in the main mix must also be represented in M&E mix.
- Center channel content must be reduced 3db as a default setting for LoRo or LT/RT
- All levels should mirror what was used for final Mastering and Archive so that any newly added dubbed dialog can be mixed in easily later
- For mixers creating the M&E, Netflix has a M&E Creation Guidelines document available on our Backlot Help site
 - o <https://backlothehelp.netflix.com/hc/en-us/articles/115006122187-M-E-Creation-Guidelines>

1.5 Nearfield Atmos Mix

The Dolby Atmos Home Mix must meet the following requirements.

- At a minimum, must be mixed in a 7.1.4 room
- This is a nearfield mix. The most common monitoring levels for nearfield are 79db or 82db.
- Must conform to Netflix loudness spec (-27db LKFS +/- 2 LU 1770-1 dialog-gated).
- Peaks must not exceed -2dbfs True Peak. To achieve this, we recommend setting True Peak limiters on all beds and objects at -2.3 or lower. Loudness and peaks may be measured via a 5.1 re-render.
- For native Atmos mixes, make sure the 5.1 and 2.0 re-renders are approved as well.
- All beds and objects are encoded and will always be audible. A printmaster may utilize a composite of all bed material OR multiple beds, but not both.
- If a 85 db reference theatrical mix is created, two complete sets of deliverables are required. One for theatrical, one for nearfield.
- All deliverables shall be conformed and synced to final IMF picture as long-play and not separate reels. Leader and sync pop shall be removed. File must start at FFOA.

1.5.1 For Distribution

- Final Home Theater Print Master
 - Dolby Atmos BWAV ADM File
 - Single or multiple LCR, 5.0, 5.1, 7.1 or 7.1.2 bed(s)
 - Tracks 11-128 may be used for Objects or beds
 - 48 kHz, 24 bit
- Mix Minus Narration (when applicable)
 - Dolby Atmos BWAV ADM File
 - Single or multiple LCR, 5.0, 5.1, 7.1 or 7.1.2 bed(s)
 - Tracks 11-128 may be used for Objects or beds
 - 48 kHz, 24 bit

1.5.2 For Localization

- Music & Effects mix
 - Dolby Atmos BWAV ADM
 - Single or multiple LCR, 5.0, 5.1, 7.1 or 7.1.2 bed(s)
 - Tracks 11-128 may be used for Objects or beds
 - M&E Options stems as separate WAV file(s)
 - Channel mapping must match the bed(s) of the M&E mix
 - 48 kHz, 24 bit
- Dialogue, Music, Effects, Narration stems (not necessary if PM uses DME beds rather than composite)
 - Dolby Atmos BWAV ADM File
 - Must include minimum three beds
 - Tracks 11-128 may be used for Objects or beds
 - 48 kHz, 24 bit

1.5.3 For Archive

- All deliverables should be conformed and synced to the final picture as long-play
- Final Home Theater Printmaster DAMF (Dolby Atmos Master File)
 - Components of DAMF are:
 - .atmos file
 - .audio file
 - .metadata file
 - Tracks should be grouped / associated to Dialogue, Music and Effects stems
 - Single or multiple LCR, 5.0, 5.1, 7.1 or 7.1.2 bed(s)
- M&E DAMF (Dolby Atmos Master File) (when applicable)
 - Components of DAMF are:
 - .atmos file
 - .audio file
 - .metadata file
 - Tracks should be grouped / associated to Dialogue, Music and Effects stems

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- Single or multiple LCR, 5.0, 5.1, 7.1 or 7.1.2 bed(s)
- Mix Minus Narration DAMF (Dolby Atmos Master File) (when applicable)
 - Components of DAMF are:
 - .atmos file
 - .audio file
 - .metadata file
 - Tracks should be grouped / associated to Dialogue, Music and Effects stems
 - Single or multiple LCR, 5.0, 5.1, 7.1 or 7.1.2 bed(s)
- Pro Tools Atmos full mix session (if requested)
- Theatrical Dolby Atmos MXF used for DCP

2.0 Theatrical Mix - Mastering and Archive

- Theatrical Mixes should follow the Nearfield specification, listed above, with the following exceptions:
 - Use 85db spl as your standard reference level for mixing
 - Theatrical mixes have no LKFS loudness requirement and may peak at 0db True Peak
 - Provide Dialog, Music and Effects Stems at Theatrical spec

3 Best Practices

NOTE: The below are not Technical Specifications. The below is guidance to help achieve an optimal customer experience. Following the guidelines below is not required by Netflix, but is preferred.

3.1 Dialog-Gated Loudness and Loudness Range

Netflix is committed to protecting creative intent - we do not compress, limit or modify audio mixes. However, content which is not excessively dynamic provides a better experience for our customers.

For best results, measure with a dialog-gated meter and aim for average dialog levels between -25 LKFS to -29 LKFS with -27 LKFS as a target. We suggest Dolby Media Meter or NuGEN Vis-LM, which should be set to 1770-1 dialog-gated.

The following loudness range (LRA) values will play best on the service:

- 5.1 program LRA between 4 and 20 LU
- 2.0 program LRA between 4 and 18 LU
- Dialog LRA of 7 LU or less
- Difference between FX content and Dialog of 4 LU

When mixes measure at less than 15% dialog, program-gated measurement will be used instead (-24db LKFS +/- 2 LU - ITU BS 1770-3)

3.2 Peaks

We recommend setting a True Peak limiter at -2.3 for all audio deliverables. For 5.1 / 2.0, this helps to prevent false positives from minor differences in metering. For Atmos beds and objects, this setting will reduce excessive peaks due to summing factors within the Atmos renderer.

3.3 Room Setup

We recommend Nearfield mixing in rooms that approximate the size of a living room. Larger or smaller rooms can also work, when they are well-built and aligned. Use multiple microphones which average to align rooms. Atmos rooms should be 7.1.4 at a minimum. Dolby engineers are available to assist with alignment for facilities that would like assistance.

4.0 Change Log History

Change Log OC-1-0 (2018-07-26)

- First version