

HLS / DASH Lip-Sync Debugging Checklist

Four failure modes, one formula, and why the fix is almost always at the packager.

The four failure modes

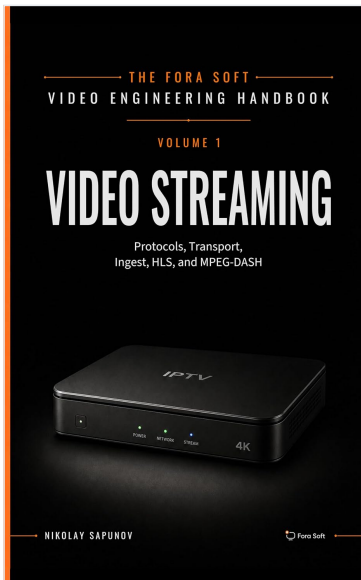
1 Audio priming	AAC adds silent samples (2112 Apple / 2048 FDK / 1024 FFmpeg). fMP4 edit list trims it; MPEG-TS cannot.
2 Rendition edits	If some bitrate levels carry an edit/CTS others don't, video shifts vs audio on a quality switch.
3 Ad insertion	HLS EXT-X-DISCONTINUITY or new DASH Period resets the clock. New content = new priming = new offset.
4 Segment drift	Sample duration shorter than advertised leaves a hole per segment; audio drifts behind over long playback.

The DASH offset + the tolerance

DASH offset	$\text{MSE.timestampOffset} = \text{Period@start} - \text{Period@presentationTimeOffset}$
The rule	$\text{presentationTimeOffset} = \text{earliest presentation time of the period's first segment, in the track timescale.}$
Tolerance	Keep audio within +90 ms lead / -185 ms lag of video (ITU-R BT.1359-1).

Symptom to cause: five checks

- ☐ Small constant lag from second one, worse on MSE players than Safari = audio priming in TS or stripped edit list.
- ☐ Fine in main content, breaks at the first ad and worsens each break = discontinuity or period-offset error.
- ☐ Imperceptible at start, obvious 20 min in = segment-duration rounding accumulating into drift.
- ☐ Fine on fast Wi-Fi, breaks only when the network forces a quality switch = inconsistent edits across renditions.
- ☐ Encode once with CMAF (ISO/IEC 23000-19): one timeline, edit lists survive, no HLS-vs-DASH divergence.



GO DEEPER · VOLUME 2 OF 7

Video Streaming: A Complete Guide to Video Delivery

From Network Protocols and Transport to Ingest, HLS, and MPEG-DASH

By Nikolay Sapunov, CEO at Fora Soft · 1,124 pages · Kindle & paperback on Amazon

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This checklist traces lip-sync drift in HLS and DASH back to priming, edit lists, discontinuities or segment rounding. Volume 2 covers the packaging layer where these bugs start: HLS and MPEG-DASH internals, CMAF fragments and timelines, segment durations, and ingest over SRT and RTMP.

WHAT YOU WILL FIND INSIDE

- HLS playlists and discontinuities
- CMAF fragments and edit lists
- Contribution and ingest timing
- MPEG-DASH periods and timelines
- Segment duration and packaging choices

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Audio drifting out of sync after ads or on long HLS and DASH streams?

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