

QoE KPI Definition Pack

Six core QoE metrics for any video-streaming dashboard: CTA-2066 definitions, 2026 targets, CMCD v2 field map, traps.

1. VSF

Video Start Failure (fatal pre-frame).

Definition: % of plays terminated with a fatal player error before first frame.

CTA-2066: Stream Initialisation Failure.

Target: $\leq 0.5\%$ web/Android, $\leq 0.3\%$ iOS, $\leq 1.0\%$ CTV.

Common cause: 404 on manifest, DRM licence timeout, codec unsupported.

Alert: rate per device family + region; segmented threshold.

2. EBVS

Exit Before Video Start (non-fatal).

Definition: % of plays ended before first frame without fatal error.

Mux 2024 rule: < 1 s exits get no QoE score.

Split: EBVS-Wait (QoE) vs EBVS-Bounce (UX).

Target: $\leq 1.5\%$ web, $\leq 2.5\%$ CTV, $\leq 3.0\%$ live.

Trap: bounces count as failures and paint the dashboard red.

3. VST

Video Startup Time (click → first frame).

Definition: seconds from play intent to first frame rendered (content, not ad).

Krishnan-Sitaraman 2012: $+1$ s = -5.8% retention.

Target p50/p95: 2.0/4.0 web, 1.5/3.0 iOS, 2.5/5.0 CTV.

Always show p50, p90, p95 — never mean alone.

Budget split: DNS + TLS + manifest + key + segment + decode.

4. Rebuffer

Rebuffering ratio (stall over play).

Definition: stall seconds / total play seconds, viewer-weighted.

Target VOD $\leq 0.4\%$; live $\leq 0.8\%$.

$+1$ pp rebuffer ratio ≈ -5 pp completion rate.

Track frequency separately — many short stalls hurt most.

Exclude ad spans from content-rebuffer ratio.

5. VPF

Video Playback Failure (fatal post-frame).

Definition: % of sessions that died with a fatal error after first frame.

Target: $\leq 0.5\%$ web, $\leq 0.3\%$ mobile, $\leq 1.0\%$ CTV.

Common cause: DRM renewal, Wi-Fi→LTE handoff, corrupt segment.

Always segment by DRM system: Widevine, PlayReady, FairPlay.

Alert: per-DRM spike points at a licence-server outage.

6. Picture Quality

Perceptual quality score.

Definition: VMAF p50 against source; SSIM/PSNR as diagnostic.

Target ≥ 90 (excellent); 85–95 good; below 70 noticeably degraded.

Live proxy: % session-minutes at top rung; share at $\geq 720p$ / $\geq 2160p$.

Source: Netflix 2016 VMAF release + LIVE / UT-Austin papers.

Use VMAF to redesign the ABR ladder — not bitrate alone.

CMCD v2 (CTA-5004-A) — fields a dashboard needs

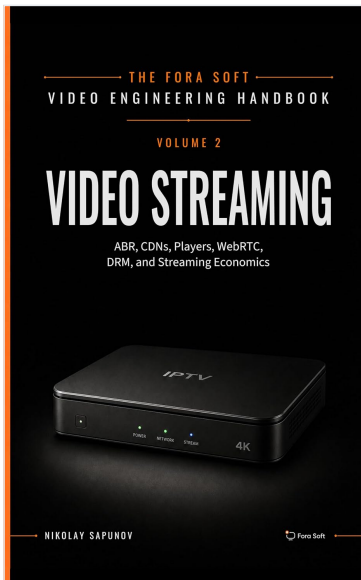
Key	Meaning	Feeds
br	Encoded bitrate (kbps)	Picture Quality, ABR
bl	Buffer length (ms)	VST, Rebuffer
mtp	Measured throughput (kbps)	ABR, debug
rtp	Requested top bitrate	ABR strategy
ps	Playback state (start/buffer/seek/pause/end)	VST, Rebuffer, VPF
ec	Error code (standardised, v2)	VSF, VPF
sid	Session ID	All — session join
cid	Content ID	All — per-title

2026 reference targets (p95 latencies, viewer-weighted ratios)

Metric	Web	iOS	Android	CTV	Live
VSF	≤ 0.5%	≤ 0.3%	≤ 0.5%	≤ 1.0%	≤ 0.8%
EBVS-Wait	≤ 1.5%	≤ 1.0%	≤ 1.5%	≤ 2.5%	≤ 3.0%
VST p50	≤ 2.0 s	≤ 1.5 s	≤ 2.0 s	≤ 2.5 s	+0.5–1 s
VST p95	≤ 4.0 s	≤ 3.0 s	≤ 4.0 s	≤ 5.0 s	+1.0 s
Rebuffer	≤ 0.4%	≤ 0.3%	≤ 0.4%	≤ 0.6%	≤ 0.8%
VPF	≤ 0.5%	≤ 0.3%	≤ 0.5%	≤ 1.0%	≤ 0.8%
VMAF p50	≥ 90	≥ 92	≥ 90	≥ 88	≥ 80
Composite	≥ 85	≥ 88	≥ 85	≥ 80	≥ 75

Seven aggregation traps — the dashboard looks green while the product is bleeding

Trap	Mitigation
Mean instead of percentile	VST mean hides p95; tail abandonment lives in p90/p95. Show three percentiles together.
Equal-weight sessions	5-second and 5-hour sessions count the same. Weight by play time for viewer-impact metrics.
Non-stationary aggregation	New app version ≠ yesterday's population. Cut by app version; hold one-week reference line.
EBVS as engagement	Bounce inflates failure rate after every carousel redesign. Split EBVS-Wait vs EBVS-Bounce; drop <1 s exits.
Ad rebuffer as content	SSAI ads inserted into the timeline inflate content-rebuffer. Honour CTA-2066 ad/content state split.
Global thresholds	Indonesia 4G ≠ US fibre. Alerts must be segmented by device + region + network type.
Composite-only alerts	SPI hides which metric moved. Alert on six underlying metrics; show composite on executive screen.



GO DEEPER · VOLUME 3 OF 7

Video Streaming: A Complete Guide to Video Delivery

From ABR and CDNs to Players, WebRTC, DRM, and the Economics of Streaming

By Nikolay Sapunov, CEO at Fora Soft · 1,182 pages · Kindle & paperback on Amazon

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This pack defines six QoE KPIs, maps CMCD v2 fields to them and lists 2026 targets and aggregation traps. Volume 3 covers the delivery side that moves these numbers: ABR ladders and rung selection, CDN caching, player stall recovery, and QoE monitoring of a live service.

WHAT YOU WILL FIND INSIDE

- QoE monitoring and player telemetry
- ABR ladders and rung-selection algorithms
- CDN caching and its effect on startup
- Player stall recovery and error handling

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