BOLA Tuning & Pitfalls Sheet

Three knobs, four BOLA variants, five failure modes — the working reference for shipping buffer-based ABR.

1. The three knobs

Buffer target	How deep the buffer goes (seconds). Default 30 s VoD, 12 s live. Below 8 s, BOLA stops behaving — use L2A / LoL+.
V (Lyapunov)	Quality vs buffer-stability trade-off. Higher V = climb harder; lower V = guard buffer. dash.js derives from buffer target; rarely override.
Hysteresis	Distance past threshold required before switching rungs. Larger = fewer switches/min; smaller = tighter network tracking. BOLA-O ships small hysteresis by default.

2. Deployment defaults

Deployment	Buffer	V regime	Hysteresis	Companion rules
VoD, residential fibre	30 s	default	small	Throughput + Insufficient
Live, classic latency	12 s	default × 0.8	medium	Throughput + Abandon
Mobile-first OTT	20 s	default	medium	Thr + Ins + Abandon

3. Where BOLA wins

- Bursty networks (Wi-Fi, mobile, satellite) — buffer absorbs the swing; switch rate stays low.
- Long-form VoD — buffer fills in minute 1; slow climb is invisible.
- Deep-buffer use cases (≥ 10 s budget) — BOLA's threshold geometry has room to work.
- Well-shaped per-title or per-shot ladders — thresholds derive cleanly from segment sizes.

4. The four BOLA variants

BOLA-BASIC	The paper's baseline. Lyapunov utility-minus-penalty rule. Assumes infinite video and buffer. Theory only.
BOLA-FINITE	Real-world adaptation: dynamic buffer cap near the video's end, download abandonment when network drops mid-chunk.
BOLA-O	Adds hysteresis. Prevents flipping between adjacent rungs when the buffer hovers at a threshold.
BOLA-U	Adds upward bias on stable networks — occasionally picks one rung above the buffer-justified choice.

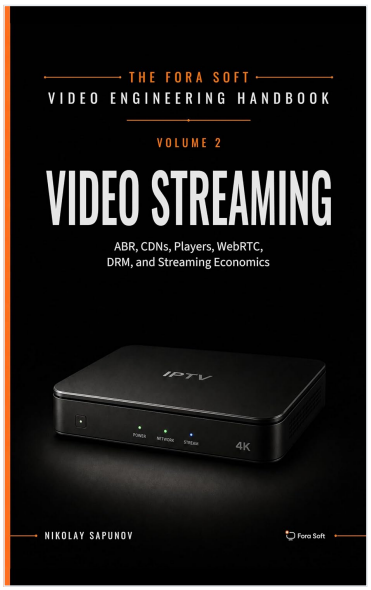
5. Five failure modes & fixes

Cold start	Climbs from buffer floor — 20+ s to reach top rung. Fix: dash.js hands first 4–6 segments to ThroughputRule + Insufficient, then switches to BolaRule.
Short video	Clip ends before climb completes. Fix: raise ladder floor, use BOLA-U, or switch to a hybrid algorithm for sub-30 s content.
Low-latency target	Buffer < 8 s leaves BOLA stuck at bottom of ladder. Fix: switch to L2A / LoL+ for LL-HLS, LL-DASH.
Bandwidth-capped line	BOLA picks a rung above the actual throughput; chunk drains buffer. Fix: enable ThroughputRule to veto BolaRule's pick.
Manifest change	Re-encoded ladder makes pre-computed thresholds stale. Fix: recompute thresholds when manifest reloads (dash.js does this automatically).

6. Pitfalls to avoid

- Turning off ThroughputRule and Insufficient — BOLA needs companion rules.
- Cranking V higher without testing — it widens thresholds, slows climb at the bottom.
- Confusing BOLA with BBA — BBA is a hand-tuned linear map; BOLA derives thresholds from utility.
- Removing the placeholder buffer in dash.js — it absorbs pause / track-switch drains.
- Benchmarking on short clips — BOLA was designed for content where buffer fills.

Companion to: 'Buffer-Based ABR: BOLA in Depth'
www.forasoft.com/learn/video-streaming/articles-streaming/buffer-based-abr-bola



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This sheet covers BOLA's three knobs, its variants and the failure modes you hit in production. Volume 3 puts BOLA in context: buffer-based, throughput-based and hybrid ABR algorithms, bitrate ladders, player stall recovery and QoE monitoring.

WHAT YOU WILL FIND INSIDE

- Buffer-based vs throughput-based ABR
- Player stall recovery
- Hybrid rung-selection algorithms
- QoE monitoring in production

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