

Bitrate Ladder Design Worksheet

Audit ladder shape, top & bottom rungs, content profile, codec mix, and encoder-cost amortisation.

1. Ladder shape

- 6-9 rungs for 1080p VOD; 4-7 for live; 3-4 for short-form video.
- Adjacent rungs spaced ~1.5x apart in bitrate (not equally spaced).
- Two or three rungs share the top resolution; lower resolution at the floor.
- Geometric spacing audited per codec (H.264, HEVC, AV1).
- Manifest lists every codec/resolution pair the player can use.

2. Top rung

- Top rung sustained by > 5% of viewer sessions in production telemetry.
- Top rung below the codec's visible ceiling (H.264: 10 Mbps for 1080p).
- 4K rung shipped only when audience skews TV / fast networks.
- Decorative top rung retired in last 12 months.
- Resolution-bitrate pairing audited for HDR / non-HDR variants.

3. Bottom rung

- Bottom rung < 500 kbps for global mobile audiences.
- 240p-360p fallback for the worst realistic network.
- Bottom rung tested on a real congested 4G connection.
- Audio-only fallback considered for emergency egress.
- Player config logs the rung played first at start-up.

4. Content profile

- Content classified by encoder difficulty (easy / mixed / hard).
- Per-title encoding evaluated for titles with > 10K lifetime views.
- Per-shot encoding evaluated for tier-1 catalogue and live broadcast.
- Probe-based per-title (Mux Instant or equivalent) for long-tail catalogue.
- Trial-encode grid documented (resolutions, CRF/QP steps, metric).
- VMAF target documented per audience tier (95+ premium, 90+ standard).

5. Codec mix & cost

- Compatibility companion codec (H.264) always shipped.
- HEVC ladder shipped for Apple devices and Smart TVs.
- AV1 evaluated for tier-1 markets and modern devices.
- Encoder compute budget tracked per minute of source content.
- Storage cost reconciled with bandwidth savings monthly.

6. Standards anchor

- RFC 8216 §4.3.4.2 reviewed for HLS multi-variant playlist shape.
- Apple HLS Authoring Specification revision (current: 2025-09) §2.7 cross-checked.
- ISO/IEC 23009-1:2022 reviewed for DASH MPD; DASH-IF guidelines for implementation profile.
- Per-title and per-shot Netflix papers cited as the foundational sources for any internal docs.