

# HLS Cheat Sheet — m3u8, Segments, Multivariant

Fifteen tags that matter, a worked multivariant playlist, the codec-string format, a 2026 bitrate ladder.

## Fifteen HLS tags grouped by job

| Tag                         | What it does                                                                                    |
|-----------------------------|-------------------------------------------------------------------------------------------------|
| #EXTM3U                     | HLS magic line; first line of every playlist.                                                   |
| #EXT-X-VERSION:N            | Minimum HLS protocol version the parser needs to read this file.                                |
| #EXT-X-INDEPENDENT-SEGMENTS | Every segment can be decoded without the previous one — matters for ABR switching and seek.     |
| #EXTINF:duration            | Precedes every segment URI; declares exact segment duration in seconds (decimal).               |
| #EXT-X-TARGETDURATION:N     | Upper bound on segment length, rounded to the nearest integer. Live: max playlist poll cadence. |
| #EXT-X-MEDIA-SEQUENCE:N     | Sequence number of the first segment listed. Live: advances every playlist refresh.             |
| #EXT-X-MAP:URI="init.mp4"   | Initialisation segment for fMP4 / CMAF. Downloaded once, re-used across all segments.           |
| #EXT-X-PROGRAM-DATE-TIME    | Ties a segment to wall-clock time. Lets the player sync across variants and external clocks.    |
| #EXT-X-KEY                  | Encryption descriptor (AES-128 or SAMPLE-AES-CTR). DRM via CENC + FairPlay/Widevine/PlayReady.  |
| #EXT-X-STREAM-INF           | One variant in a multivariant playlist. Carries BANDWIDTH, RESOLUTION, CODECS, FRAME-RATE.      |
| #EXT-X-MEDIA                | Alternate rendition (audio language, subtitle track). Grouped by GROUP-ID.                      |
| #EXT-X-I-FRAME-STREAM-INF   | I-frames-only variant for trick play (fast-forward, rewind, scrub).                             |
| #EXT-X-PLAYLIST-TYPE        | EVENT = grows forever. VOD = finite. Absent = sliding live window.                              |
| #EXT-X-ENDLIST              | Marks the playlist as complete; no further updates expected.                                    |
| #EXT-X-DATERANGE            | Carries arbitrary metadata, most commonly SCTE-35 ad markers translated from broadcast feeds.   |

### CODECS string format (RFC 6381)

avc1.PPCCLL — H.264. PP = profile (42 Baseline, 4D Main, 64 High); LL = level × 10 (e.g. 1f = 3.1, 28 = 4.0).  
hvc1.1.6.L120.90 — HEVC Main, level 4.0. mp4a.40.2 — AAC-LC. opus — Opus. ac-3 — Dolby AC-3. Every variant must declare CODECS or strict-conformance players will skip it.

## A 2026 HLS bitrate ladder (representative)

| # | Resolution  | Video bitrate | Codec          | When the player picks it          |
|---|-------------|---------------|----------------|-----------------------------------|
| 1 | 416 × 234   | 200 kbps      | H.264 Baseline | Sub-3G cellular, congested Wi-Fi  |
| 2 | 640 × 360   | 400 kbps      | H.264 Baseline | Slow 4G, weak Wi-Fi               |
| 3 | 768 × 432   | 800 kbps      | H.264 Main     | Average 4G                        |
| 4 | 960 × 540   | 1.6 Mbps      | H.264 Main     | Strong 4G, broadband baseline     |
| 5 | 1280 × 720  | 3.0 Mbps      | H.264 High     | Standard home broadband           |
| 6 | 1280 × 720  | 4.5 Mbps      | H.264 High     | Strong broadband (premium 720p)   |
| 7 | 1920 × 1080 | 6.0 Mbps      | H.264 High     | Fast broadband, large screen      |
| 8 | 1920 × 1080 | 8.0 Mbps      | H.265 Main     | Same audience, ~30% smaller files |
| 9 | 3840 × 2160 | 16 Mbps       | H.265 Main10   | 4K device, gigabit broadband      |

### Multivariant playlist

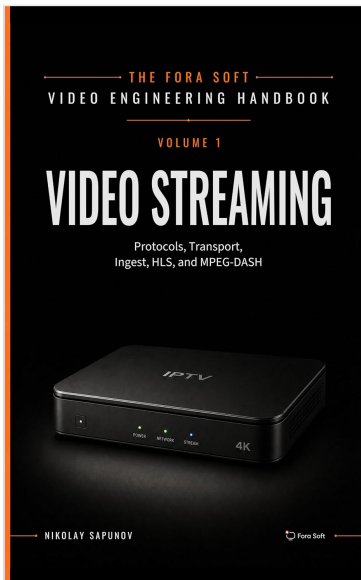
The menu. Lists every variant via #EXT-X-STREAM-INF rows. Contains zero media. Cached aggressively at the CDN edge.

### Media playlist

One per variant. Lists actual segments via #EXTINF + URI pairs. Sliding window for live; finite for VOD.

### Segment formats

MPEG-TS (legacy, 5–10% overhead). fMP4 since iOS 10 (1–3% overhead). CMAF (ISO/IEC 23000-19) is the dominant 2026 choice.



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This sheet keeps the fifteen HLS tags, the CODECS string format and a 2026 bitrate ladder on one page. Volume 2 explains the protocol behind them: multivariant and media playlists, segment formats from MPEG-TS to CMAF, LL-HLS, MPEG-DASH, and how packaging meets the network.

### WHAT YOU WILL FIND INSIDE

- Multivariant and media playlist structure
- LL-HLS parts and preload hints
- Transport under HTTP delivery
- MPEG-TS, fMP4 and CMAF segments
- HLS against MPEG-DASH

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