

# Simulcast vs SVC — decision sheet

Side-by-side comparison, scalabilityMode by codec, and the 2026 production decision tree for WebRTC SFUs.

## A. Simulcast vs SVC at a glance

| Aspect                   | Simulcast                                                                | SVC                                                                        |
|--------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------|
| <b>Encoder output</b>    | N independent streams (typically 3) at different resolutions / bitrates. | One stream with nested temporal and/or spatial layers; any prefix decodes. |
| <b>Codec coverage</b>    | VP8, H.264, VP9, AV1 — every codec.                                      | Temporal-only on VP8/H.264. Spatial+temporal only on VP9 / AV1.            |
| <b>Publisher CPU</b>     | 1.5 to 2.5× a single-stream encode.                                      | 1.1 to 1.4× a single-stream encode.                                        |
| <b>Publisher uplink</b>  | Sum of all layers. ~43% over single for 150/500/1500 kbps.               | 10 to 25% less than the equivalent simulcast set.                          |
| <b>SFU forwarding</b>    | Pick one of the encoded streams per subscriber.                          | Forward a prefix of the layers; drop higher packets.                       |
| <b>Layer switching</b>   | Needs a keyframe; PLI may force keyframes across all layers.             | Downgrade free; L3T3_KEY softens upgrade recovery.                         |
| <b>Robustness</b>        | Independent encodes; one layer dying does not affect others.             | Layer dependencies; failure can stall enhancement frames.                  |
| <b>Safari publishers</b> | Yes — VP8, H.264.                                                        | No for VP9 / AV1 (encode). Safari decode-only on hardware AV1.             |
| <b>Best fit</b>          | Cross-browser rooms, Safari publishers, VP8/H.264 stacks.                | Chromium rooms, AI agents, bandwidth-constrained publishers.               |

## B. scalabilityMode by codec

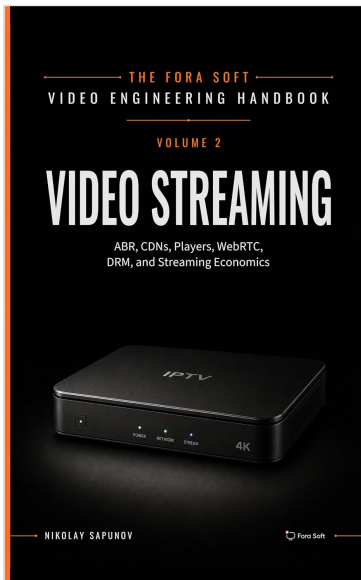
| Mode            | VP8 | H.264 | VP9 | AV1 | Meaning                                                                                        |
|-----------------|-----|-------|-----|-----|------------------------------------------------------------------------------------------------|
| <b>L1T1</b>     | yes | yes   | yes | yes | Plain single-stream encode. No scalability.                                                    |
| <b>L1T2</b>     | yes | yes   | yes | yes | Temporal only — half-rate base + full-rate enhancement.                                        |
| <b>L1T3</b>     | yes | yes   | yes | yes | Temporal only — quarter / half / full rate. Most common 2026.                                  |
| <b>L2T3</b>     | no  | no    | yes | yes | Two spatial layers + three temporal. VP9 / AV1 only.                                           |
| <b>L3T3</b>     | no  | no    | yes | yes | Three spatial layers + three temporal. Full SVC.                                               |
| <b>L3T3_KEY</b> | no  | no    | yes | yes | L3T3 variant; lower spatial layers do not depend on higher ones at keyframes. LiveKit default. |

## C. Decision tree (in order)

- **Q1.** Any publishers on Safari, or devices without AV1 encode? → **Simulcast in VP8 / H.264**. Three rungs at 180p / 360p / 720p. Works everywhere.
- **Q2.** Chromium-only publishers, bandwidth at peak load is a cost line? → **AV1 SVC (L3T3\_KEY) + multi-codec backup**. LiveKit-style multi-codec runs VP8 simulcast for Safari subscribers in parallel.
- **Q3.** Mostly mobile publishers on constrained uplinks? → **Temporal-only SVC (L1T3)** on your existing codec — subscribers downgrade by frame rate first. Otherwise → **Spatial + temporal SVC (L3T3\_KEY) in VP9 or AV1**.

## D. Five pitfalls every team hits

- **Forgetting the subscriber UI hint.** A 90-pixel thumbnail does not need 720p. Wire pin/thumbnail/off-screen state into the SFU's preferred-layer call.
- **Assuming Safari can publish VP9 or AV1 SVC.** Safari decode-only on hardware AV1; no AV1 encode. Cover with multi-codec fallback.
- **Skipping L3T3\_KEY.** The \_KEY variant decouples lower spatial layers at keyframes; switching is cleaner. Use \_KEY by default.
- **Ignoring PLI cascades.** A PLI to a simulcast publisher forces keyframes in every layer. Budget the spike or move to SVC.



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This sheet compares simulcast and SVC, maps scalabilityMode by codec and gives a production decision tree for SFUs. Volume 3 covers WebRTC and real-time delivery in depth, including bitrate ladders and ABR, QoE monitoring and the cost of serving each layer.

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