



Dodge: A Client-Side Framework for Application-Layer Video Fingerprinting Defenses

Ethan Witwer^{1,†} · David Hasselquist^{1,2} · Tobias Pulls³ · Niklas Carlsson¹

¹ Linköping University ² Sectra Communications ³ Karlstad University

† PGP E568 6096 9240 F8B0 1376 690B 775C E981 B1FF 41DB



<https://dodge.video>
scan to learn more or download

// THE THREAT

Encrypted video traffic leaks **what you're watching**.

A local, passive adversary — a coffee shop neighbor, a network admin, an ISP — can identify the exact title you're streaming from the **sizes of encrypted segments**. VPNs/Tor don't hide them.

fig 01 • three titles, distinct identities

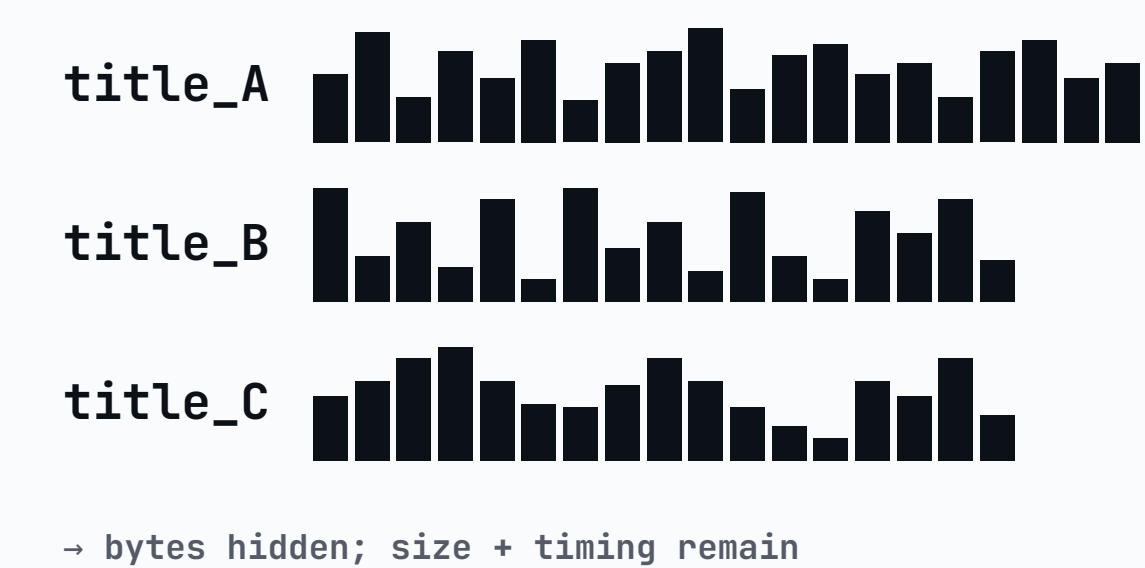


fig 02 • threat model, passive adversary



// OUR SOLUTION

A flexible defense framework, **not a hard-coded defense**.

Hard-coded defenses may be defeated by new attacks, requiring implementation effort to switch to a new one, and might not work for all use cases. We present a defense *framework*, where defenses are JSON files (**extended manifests**) that use the framework's building blocks.

- **Cycles** — a generalized model of DASH streaming: every request is a full, partial, or padding cycle.
- **Minimal interface** — just give the player an extended manifest URL instead of a vanilla video manifest.

fig 03 • segments → cycles shape ≠ identity



```
// sample extended manifest
{
  "base_uri": "https://ex.com/seg/",
  "streams": [{ "label": "video_1000k",
    "data": [
      { "index":0, "range":"-43999" },
      { "index":0, "range":"16000-", "buffer":true },
      { "index":1, "range":"-43999", "padding":true }
    ]
  }]
}
```

// DEPLOYMENT

Swap 2 JavaScript files. **No server changes**.

Dodge is an opt-in module for **dash.js**, the reference player for the DASH streaming standard, which is already deployed across the web. It will soon be merged into dash.js, and we're nearly done with the development of a dedicated browser extension to protect against video fingerprinting.

fig 04 • drop-in deployment

dash.js

→
replace one JS
file, add one

Dodge

// UPSTREAM MERGE

To be merged in dash.js **v5.3.0**, August 2026.

Dodge is in the process of being merged into the official dash.js player, which is used by major content providers.

- **Host manifests anywhere** — video server, a trusted server, or locally.
- **No special infrastructure** — no server-side modifications, no re-encoding, no new dependencies whatsoever.

// TESTING

Effective defenses with modest overhead and small QoE impact: **doable in practice**.

Our proof-of-concept defense **Dodge-mimic**, based on *k*-anonymity, builds anonymity sets and makes traffic patterns identical across videos. It searches the tree of possible anonymity sets and eventually finds the best ones.

- **Theoretical bounds** — near the theoretical maximum of 100/*k*% classification accuracy.
- **Overhead drops fast** — low-overhead sets are found in a minute or less.
- **Very small QoE impact** — we verify a number of player metrics.

fig 05 • overhead vs. time 16 threads

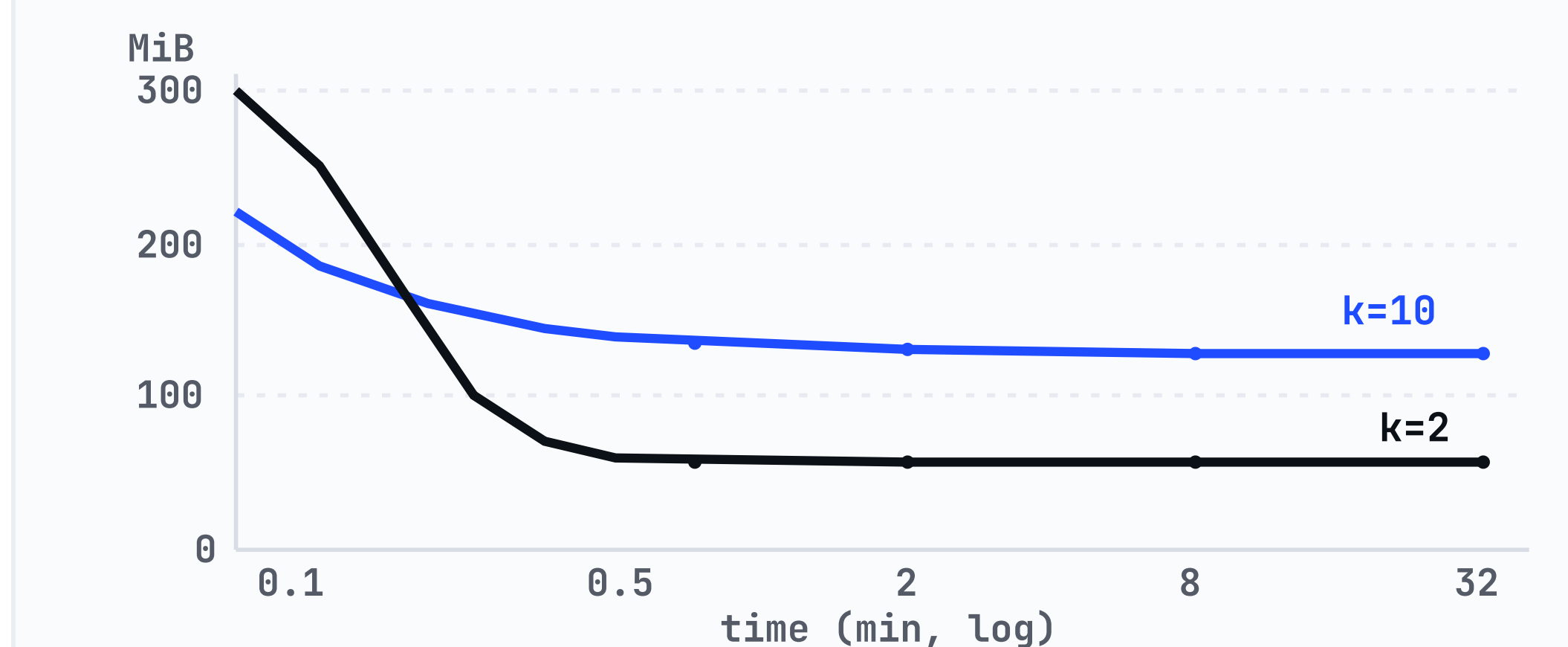


fig 06 • a defended stream (cycles) dodge-mimic

