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Analyzing the Effects of Network Conditions on Website Fingerprinting

Motivation

Website fingerprinting attacks allow an on-path attacker to identify which webpage a user is visiting based on the packets that the attacker observes during the page load. The most effective attacks are using machine learning.

Previous work [1] has shown that low-end network conditions can reduce the efficacy of such attacks. The goal of this thesis is to systematically evaluate the interplay of network conditions and website fingerprinting attacks.

Your Task

- Get familiar with website fingerprinting attacks and feature importance measures.
- Use and extend our existing website fingerprinting toolchain to measure different network conditions.
- Analyze the interaction between network conditions and attacks.

Requirements

- Linux plumbing skills: tcpdump, Wireshark, iproute2, bash scripting
- Good knowledge of computer networking concepts
- Data analysis, e.g., with python (sqlite, matplotlib, pandas) and basic understanding of machine learning

References

[1] Yifei Cheng, and others. 2025. HOLMES &amp; WATSON: A Robust and Lightweight HTTPS Website Fingerprinting through HTTP Version Parallelism. In Proceedings of the ACM on Web Conference 2025 (WWW '25). ACM, USA, 1078–1092.

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