

ABSTRAK

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ANALISIS PENGARUH UKURAN FILE TERHADAP WAKTU UNDUH PADA JARINGAN TOR DAN JARINGAN PUBLIK

(xv + 52 halaman; 17 gambar; 20 tabel; 9 lampiran)

Jaringan *Tor* merupakan jaringan yang memberikan *anonimitas* bagi penggunanya, namun sering kali dikritik karena performanya yang lebih rendah, terutama dalam hal *latensi* dan kecepatan unduh dibandingkan jaringan non-Tor. Dalam penelitian ini, *file* dengan tiga ukuran berbeda (50KiB, 1MiB, dan 5MiB) diunduh melalui kedua jaringan, dan waktu unduh tersebut dicatat. Data tersebut dianalisis menggunakan parameter statistik kuartil pertama (Q1), *median* (MD), dan kuartil ketiga (Q3) untuk mengidentifikasi perbedaan performa di antara kedua jenis jaringan. Penelitian menggunakan *data Tor Metrics* periode 11 April 2017 hingga 30 Januari 2025 dan mengungkapkan bahwa jaringan *Tor* memiliki *tolerance factor* 2-3,6 kali lebih lambat dibandingkan jaringan publik. *Overhead* tertinggi mencapai 310% pada *file* 5MiB-Q1, dengan standar deviasi *latensi Tor* mencapai 34ms dibanding 22ms pada jaringan publik. Analisis menunjukkan *fixed overhead* berupa *setup relay*, enkripsi berlapis, dan *routing* tiga hop berdampak signifikan pada *file* kecil namun relatif kurang dominan pada *file* besar. Variabilitas performa *Tor* yang tinggi disebabkan oleh inkonsistensi kondisi jaringan dan karakteristik inheren arsitektur *multi-hop*. Hal ini menunjukkan bahwa *latensi* dan arsitektur *multi-hop Tor* berdampak langsung terhadap efisiensi proses unduh, sehingga perlu dipertimbangkan dalam penggunaan aplikasi yang sensitif terhadap waktu.

Kata Kunci: *Tor*, jaringan publik, waktu unduh, *latensi*, ukuran *file*.

Referensi: 24

ABSTRACT

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ANALYZING THE IMPACT OF FILE SIZE ON DOWNLOAD TIME IN TOR NETWORK AND PUBLIC NETWORK

(xv + 52 pages; 17 figures; 20 tables; 9 appendixes)

Tor is widely recognized for its user anonymity features but is often criticized for lower performance, especially in terms of latency and download speed. In this research, files of three different sizes (50KiB, 1MiB, and 5MiB) were downloaded through both networks, and the download times were recorded at various intervals. The data was analyzed using the first quartile (Q1), median (MD), and third quartile (Q3) statistical parameters to identify performance differences. This study utilizes Tor Metrics data from April 11, 2017, to January 30, 2025, and reveals that the Tor network has a tolerance factor of 2-3.6 times slower compared to public networks. The highest overhead reaches 310% for 5MiB-Q1 files, with Tor latency standard deviation reaching 34ms compared to 22ms on public networks. Analysis shows that fixed overhead consisting of relay setup, layered encryption, and three-hop routing significantly impacts small files but is relatively less dominant for large files. High Tor performance variability is caused by network condition inconsistencies and inherent characteristics of multi-hop architecture. This demonstrates that latency and multi-hop architecture of Tor directly impact download process efficiency, requiring consideration in applications sensitive to time.

Keywords: *Tor, public network, download time, latency, file size.*

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