

# Haystack: In Situ Mobile Traffic Analysis in User Space



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## How Do Mobile Apps Operate Behind The Scenes?

- Which information do apps extract from their phones and who do they share it with?
- How is the network performance for each app?

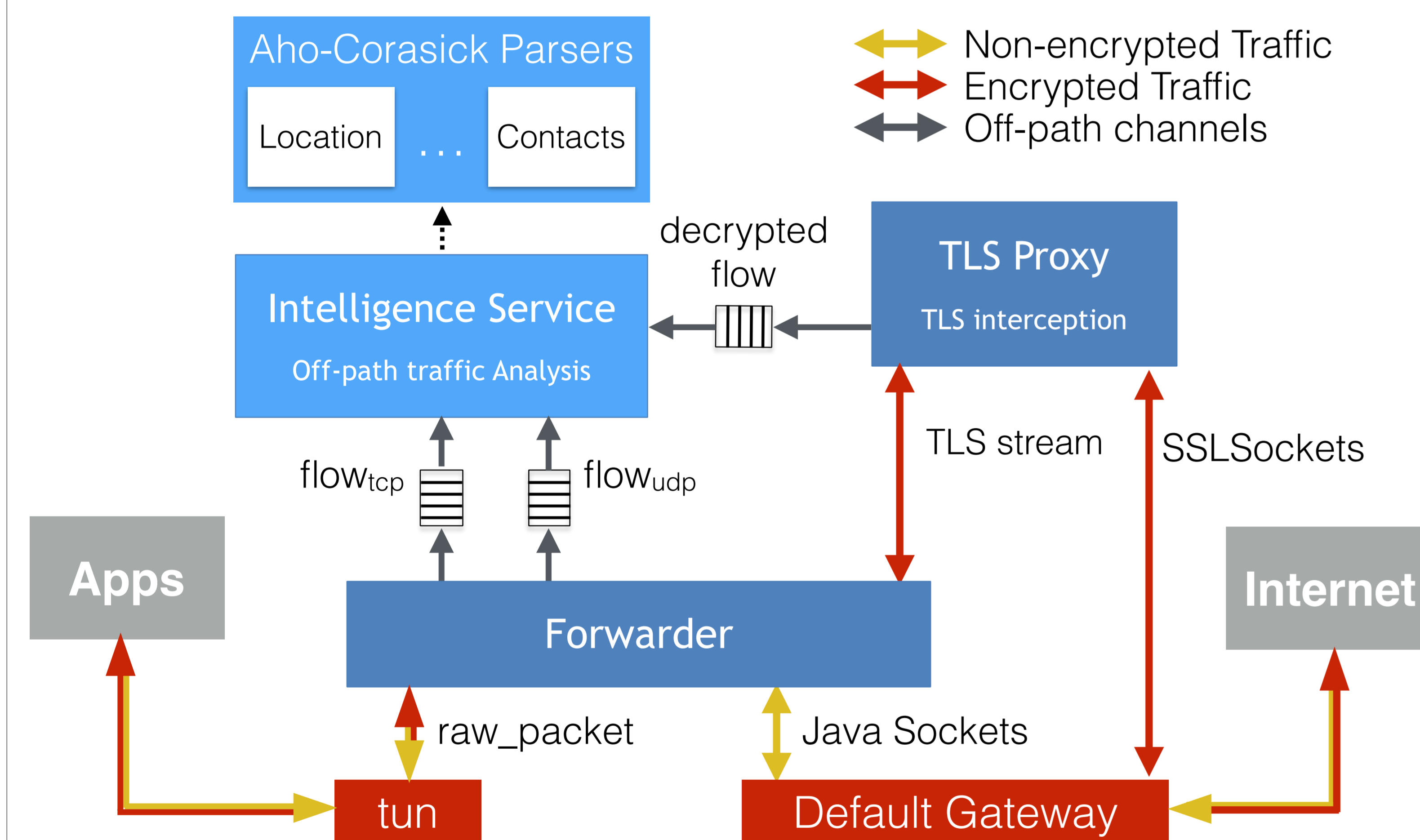
There are no tools to understand the mobile ecosystem **at scale** and on **real world traffic**

## Haystack

A **handset-**, **traffic-**, and **user-centric** platform that provides high-fidelity insight about security, privacy, and performance aspects of mobile apps **in the wild**

Haystack captures and analyzes all app's traffic in userspace

- No root access required
- User-friendly
- Available on **Google Play**
- Runs **locally** on the phone



Haystack allows us to obtain:

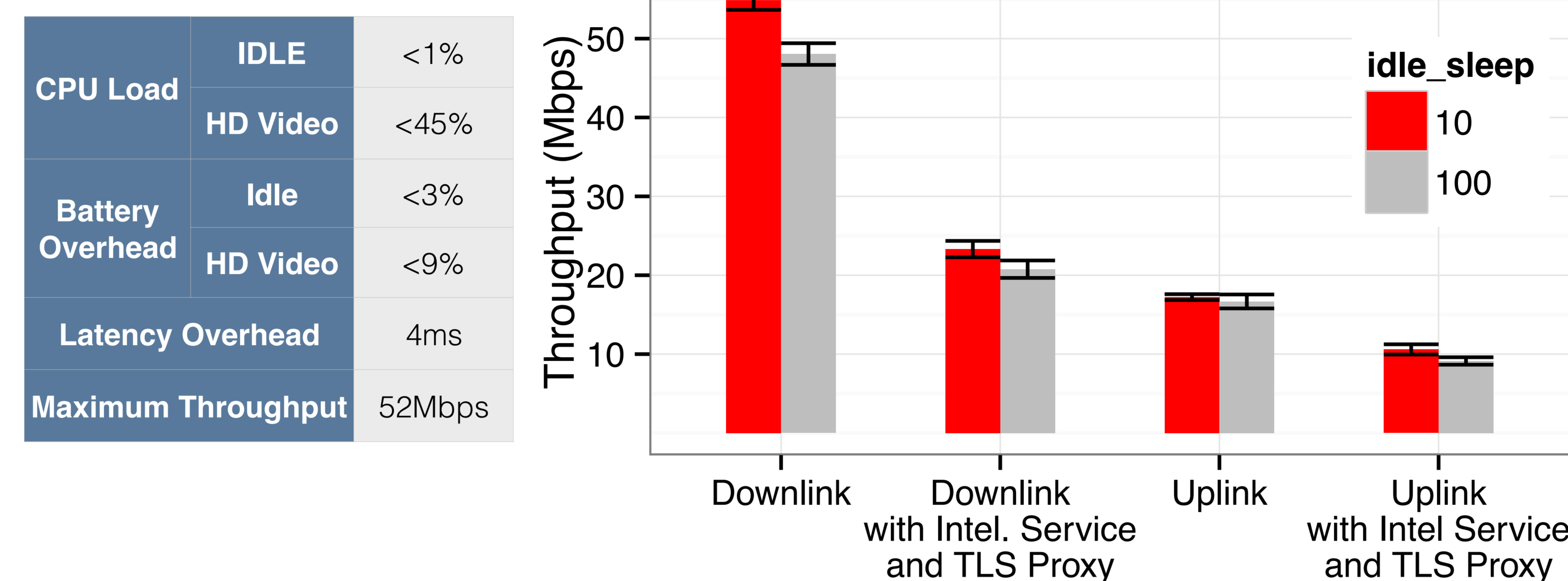
- App and OS context
- Device and network status
- Device-specific information (e.g. IMEI, build ID)
- User-related information

Performs **TLS interception** (optional):

- Identifies privacy leaks even in encrypted traffic

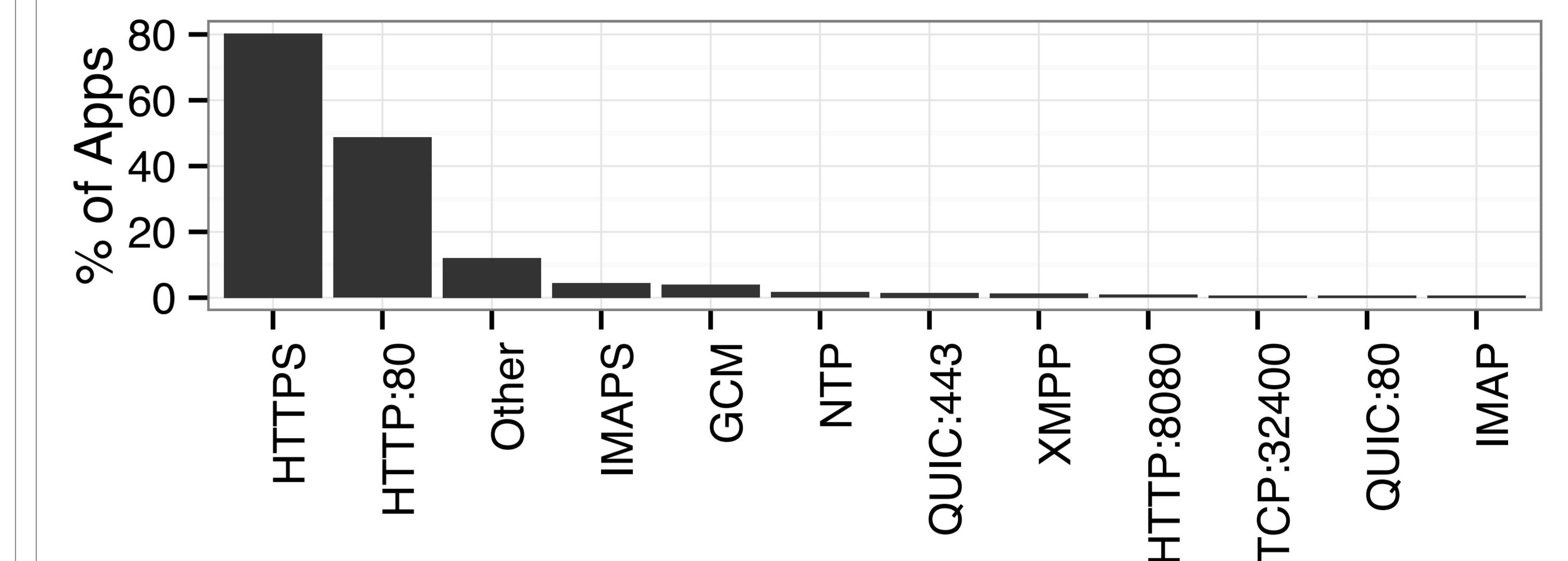
## Haystack Performance Overhead

Haystack adapts its behavior to traffic demands to reduce overhead

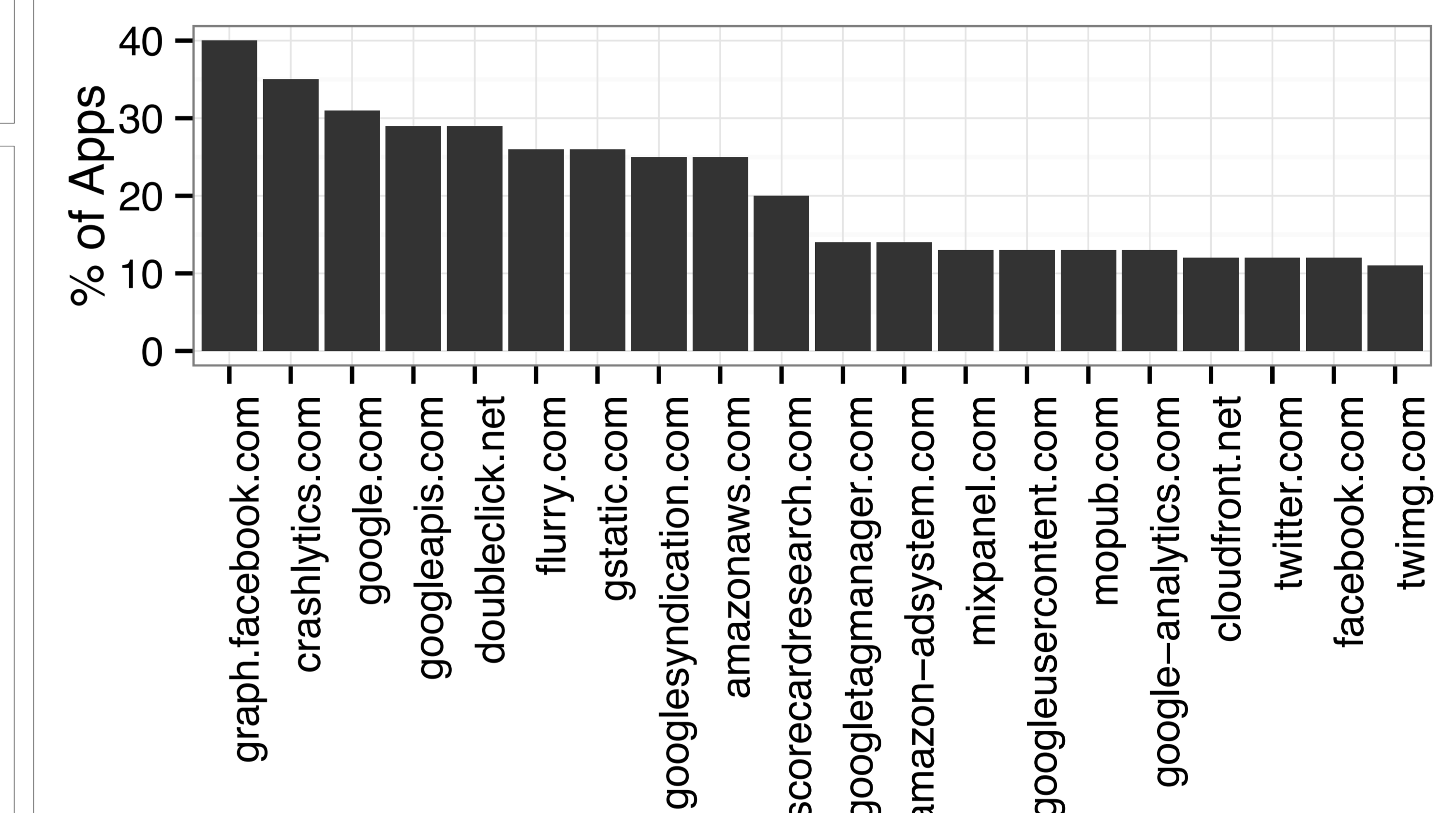


## Preliminary Results

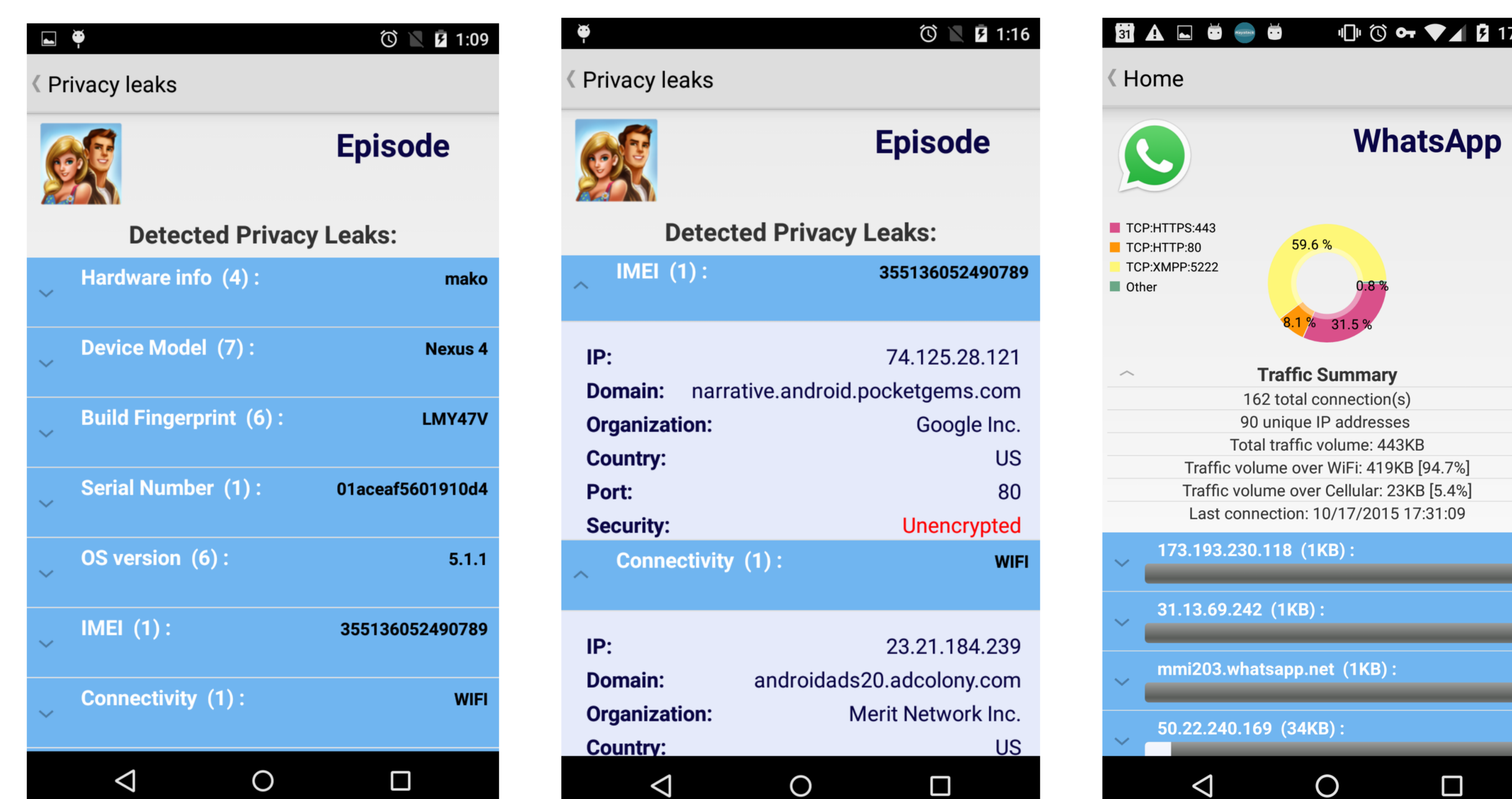
Protocol usage breakdown:



Tracker popularity:



## Haystack App: A Tool for the User

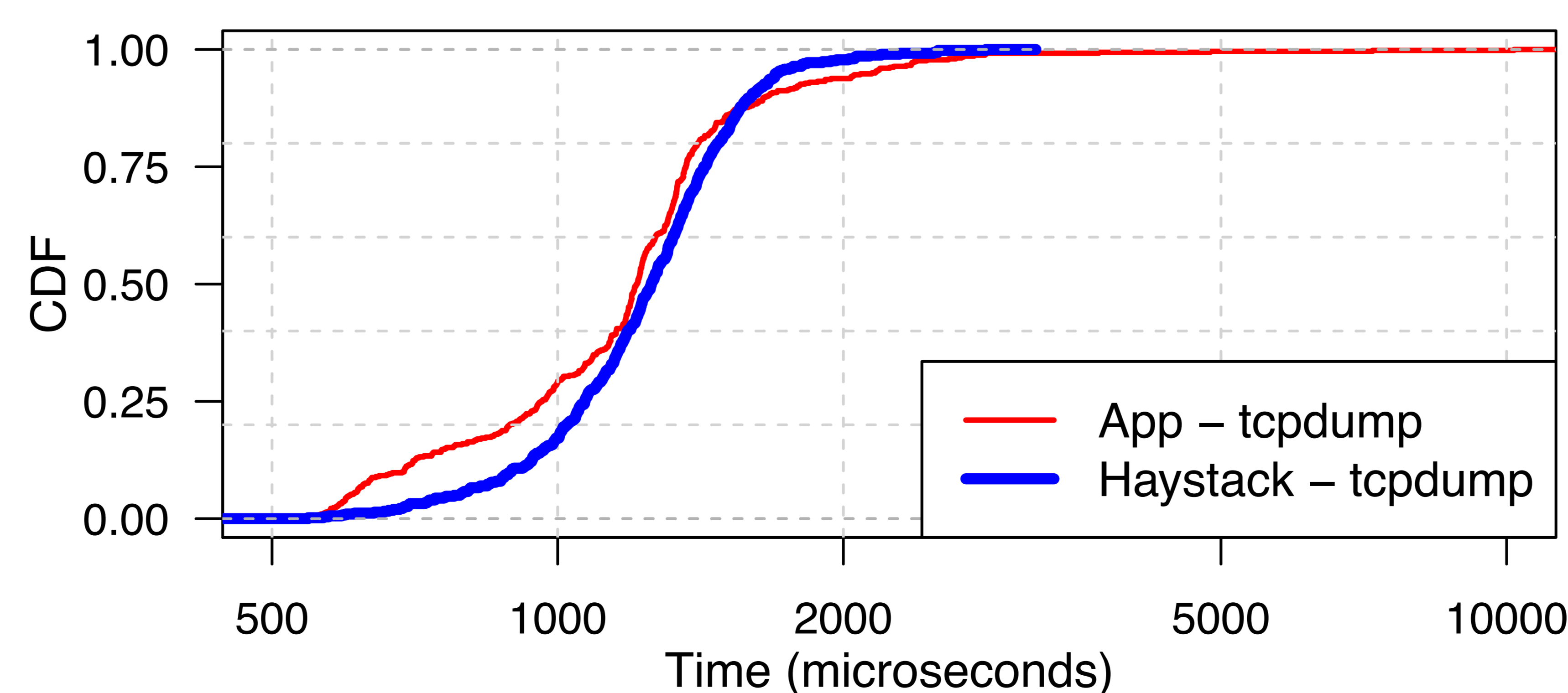


\* Data collection process approved by ICSI/UC Berkeley's IRB

## Performance Measurements Enabled by Haystack

Haystack can be used to measure different aspects of traffic at scale.

- Passive traffic performance measurements
- CDN server assignment evaluations
- Reactive measurements [Allman+Paxson, PAM 2008]
- High fidelity DNS lookup time measurements:



## Future Work

Haystack enables a number of other applications

- User empowerment and awareness
- **Censorship circumvention**
- **Privacy and security firewall**
- **Traffic performance enhancement, measurements, and troubleshooting**

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<https://www.haystack.mobi>

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