A First Analysis of Multipath TCP on Smartphones

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Main findings

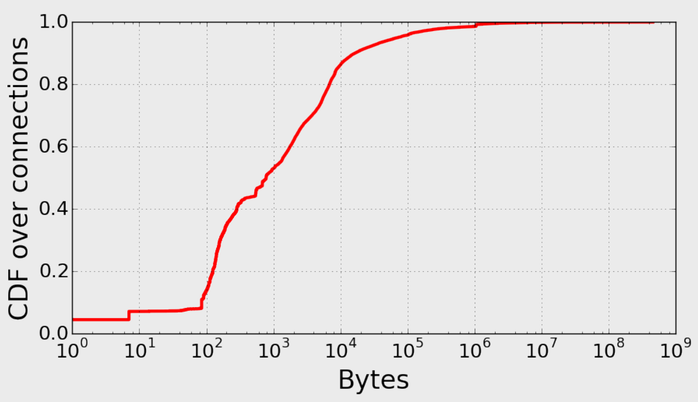
During this 7-weeks measurement campaign on smartphones, we found that

- Smartphone traffic can **not** be characterized by **bulk transfers**
- **Aggregation** of both wireless interfaces **not required** by smartphone apps
- **Data handover** is probably the **main selling point** of Multipath TCP on smartphone

Global trace information

Name	Description	Connections	To proxy	From proxy
$\mathcal{T}_0$	Full trace	~400,000	650 MB	25,000 MB
$\mathcal{T}_1$	$\geq$ 2 established subflows	126,000	240 MB	13,500 MB
$\mathcal{T}_2$	$\geq$ 2 used subflows	32,900	150 MB	11,850 MB
$\mathcal{T}_3$	With data handover	8,450	37 MB	4,625 MB

$\mathcal{T}_0$: Connections' profile

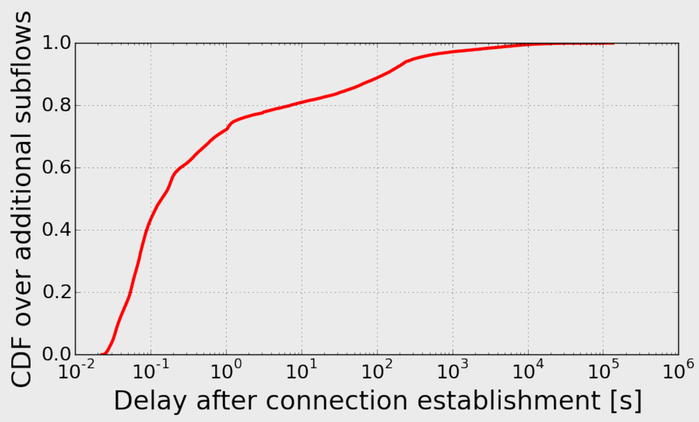


95% of bytes on HTTP/HTTPS

Similar trends with duration

$\mathcal{T}_0$: Subflow establishment

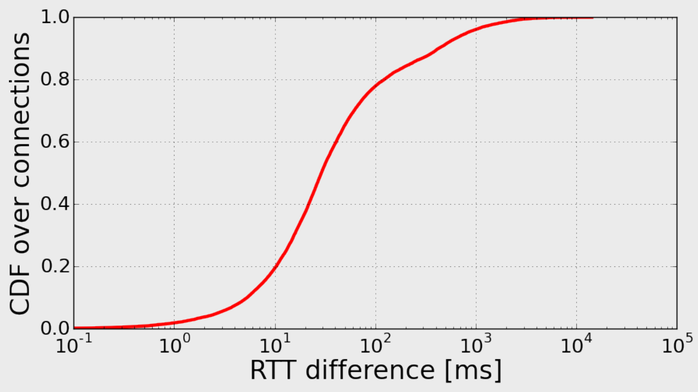
Number of subflows	1	2	≥ 3
Percentage of connections	**68 %**	30 %	~ 2 %



Most of the connections are single path

$\mathcal{T}_1$: Subflow characteristics

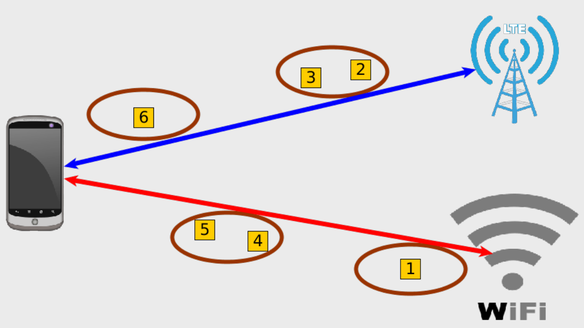
Default scheduler is RTT dependent

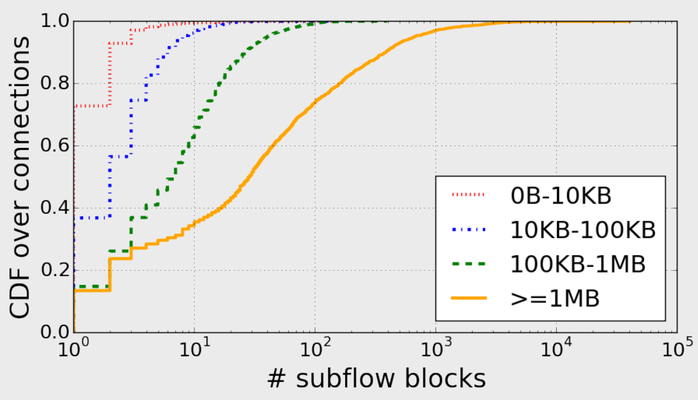


Subflows can exhibit very different RTTs

$\mathcal{T}_1$: Subflow utilization

Subflow frequency change metric: **subflow block**





Most of the connections only use one subflow

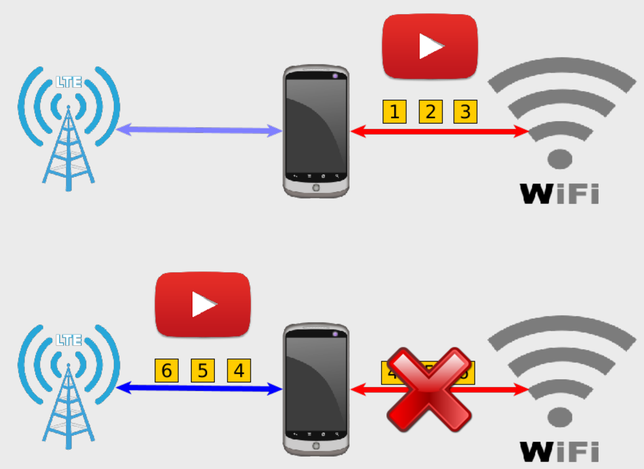
Connections are too short

Low performing subflows

Backup subflows

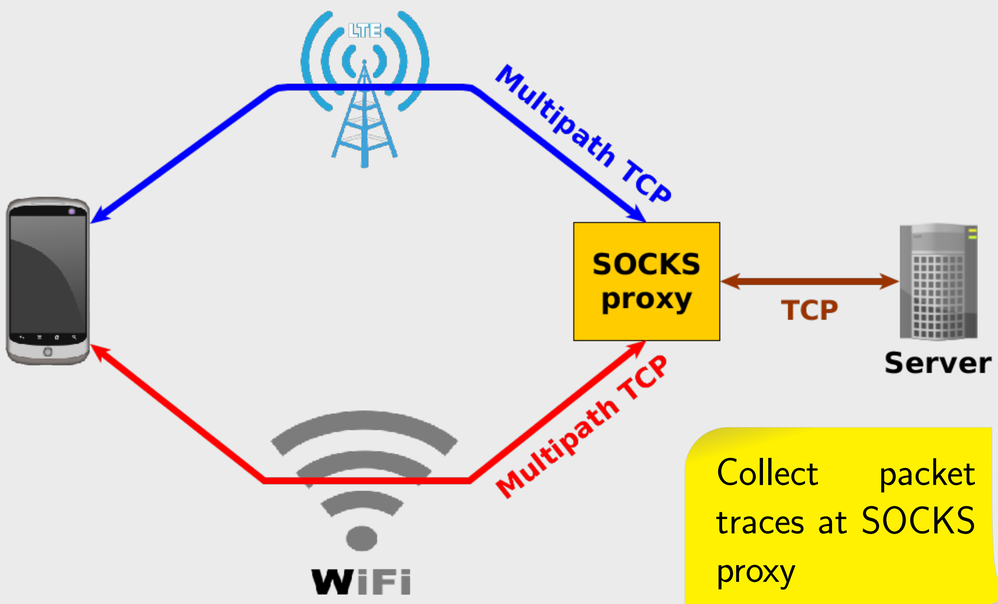
$\mathcal{T}_2$: Data handover

Recovery of a **failed used** subflow by another one



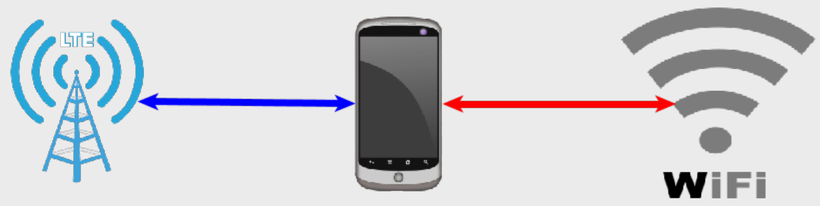
26% of connections experience data handover

Deployment architecture



Collect packet traces at SOCKS proxy

Motivation & Background



Path Manager

Where should I create additional subflows?

Fullmesh: client creates subflows on **all** available network interfaces

Scheduler

Where should I send my next packet?

Default: **lowest round-trip-time** available subflow

Same algorithms on both smartphones and proxy