

A closer look at Multipath TCP traffic

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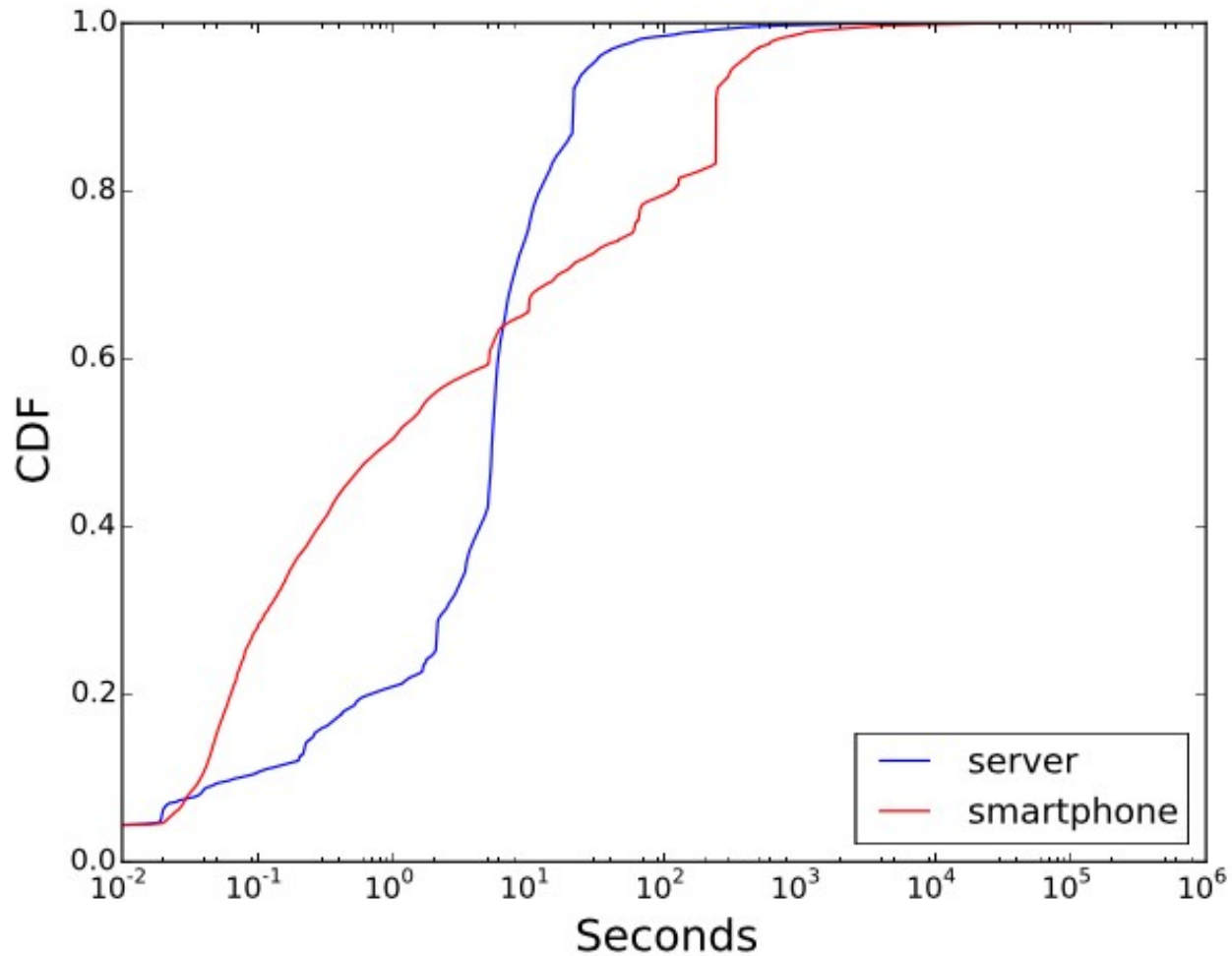
Olivier Bonaventure

IETF93, July 2015, Prague

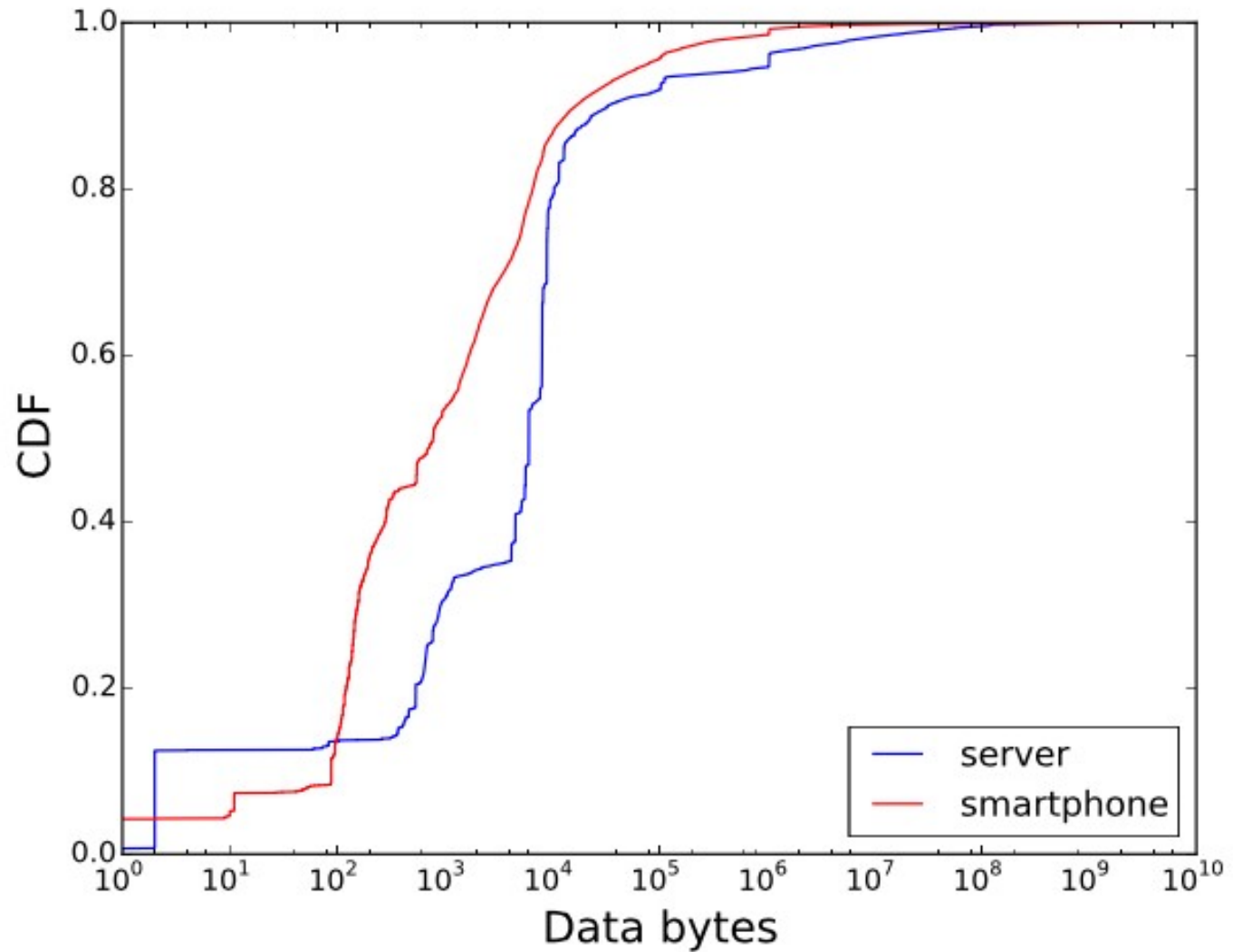
Datasets

- www.multipath-tcp.org
 - 5 months, 400 million packets
 - 7616 different IPv4 addresses in 4353 /24
 - 2496 different IPv6 addresses in 437 /48 subnets
- A dozen of smartphones through SOCKS proxy
 - Nexus5 with backported MPTCP 0.89.5
 - 6 weeks, 65 million packets

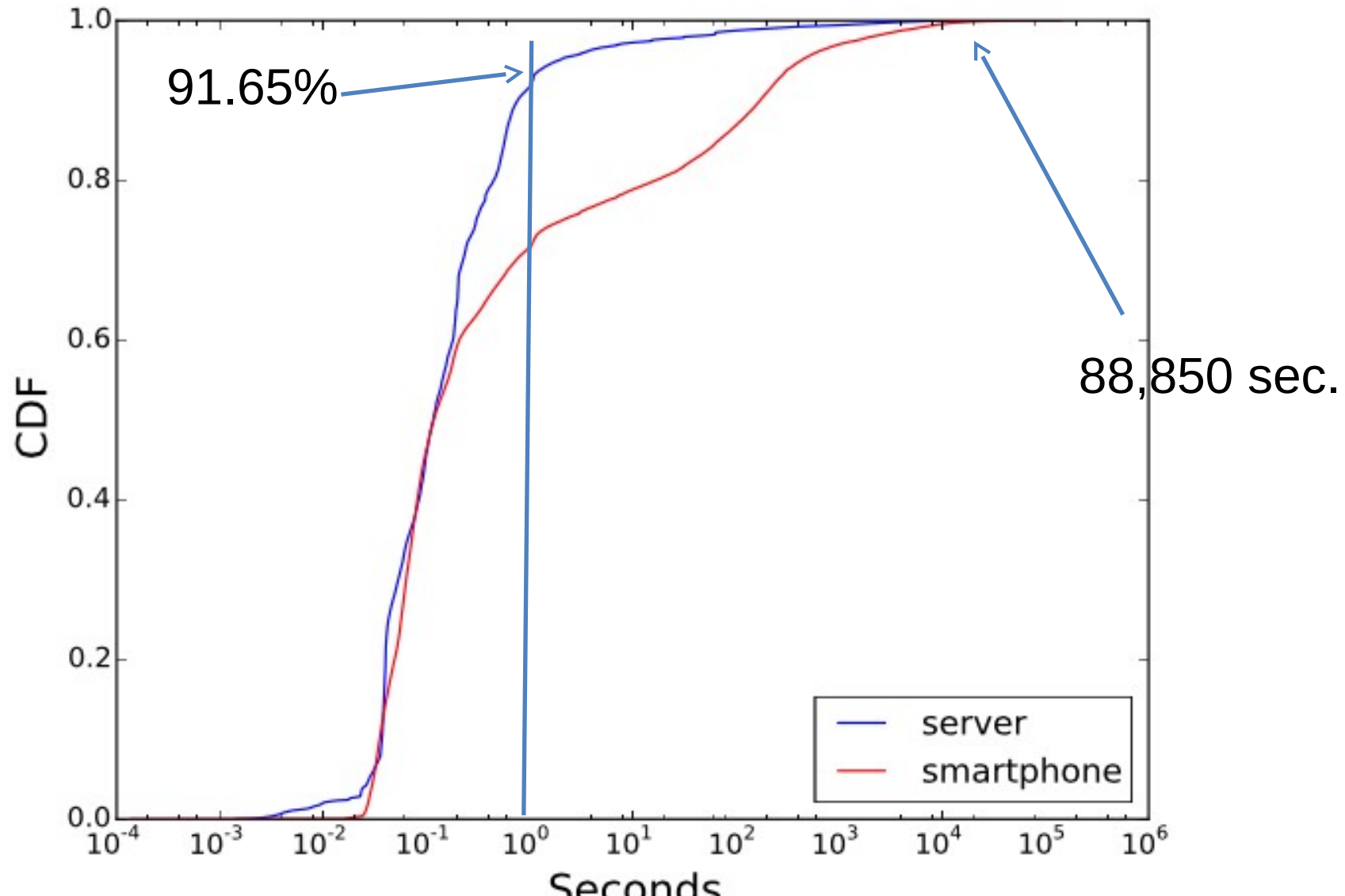
Connection duration



Connection volume



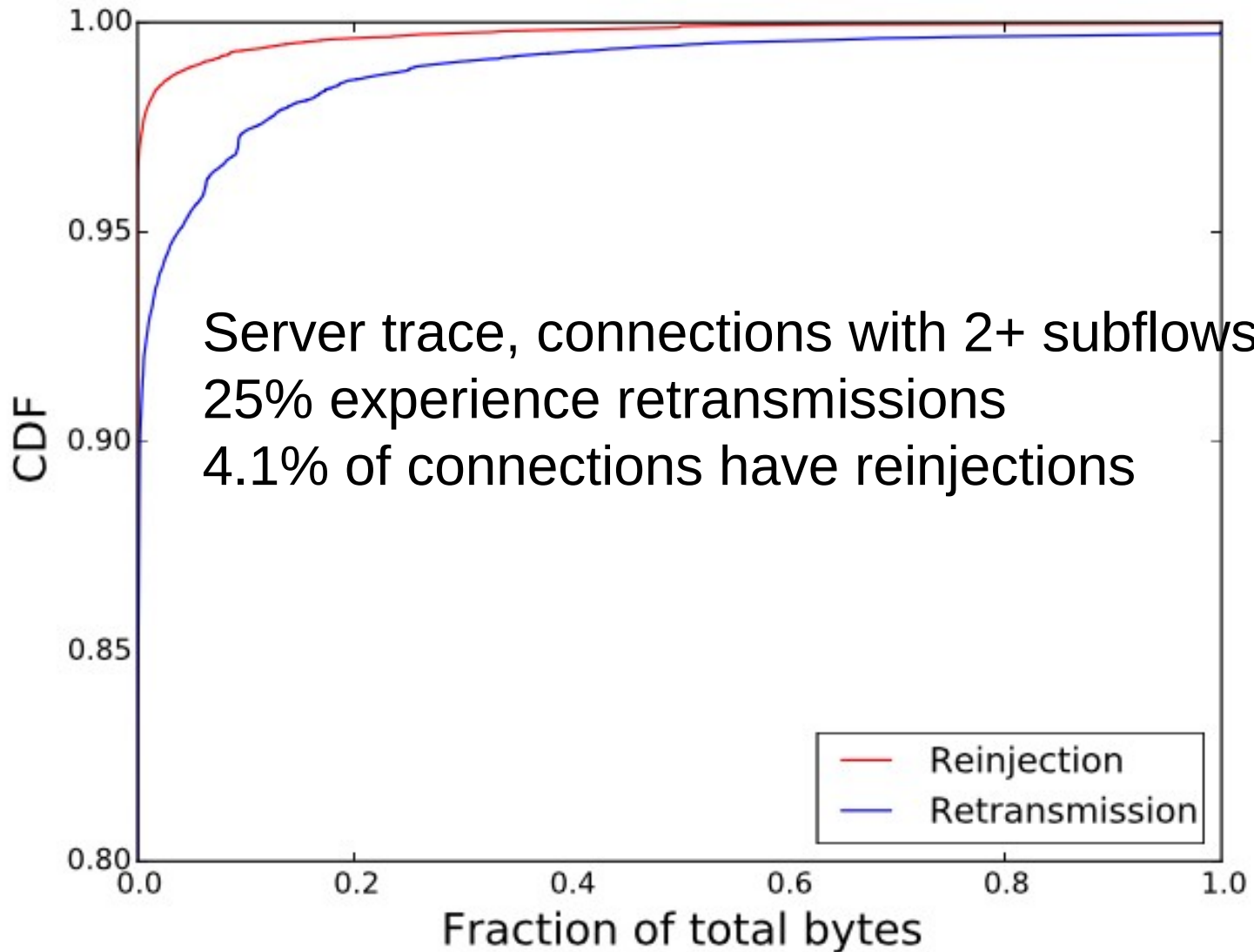
How quickly are subflows created ?



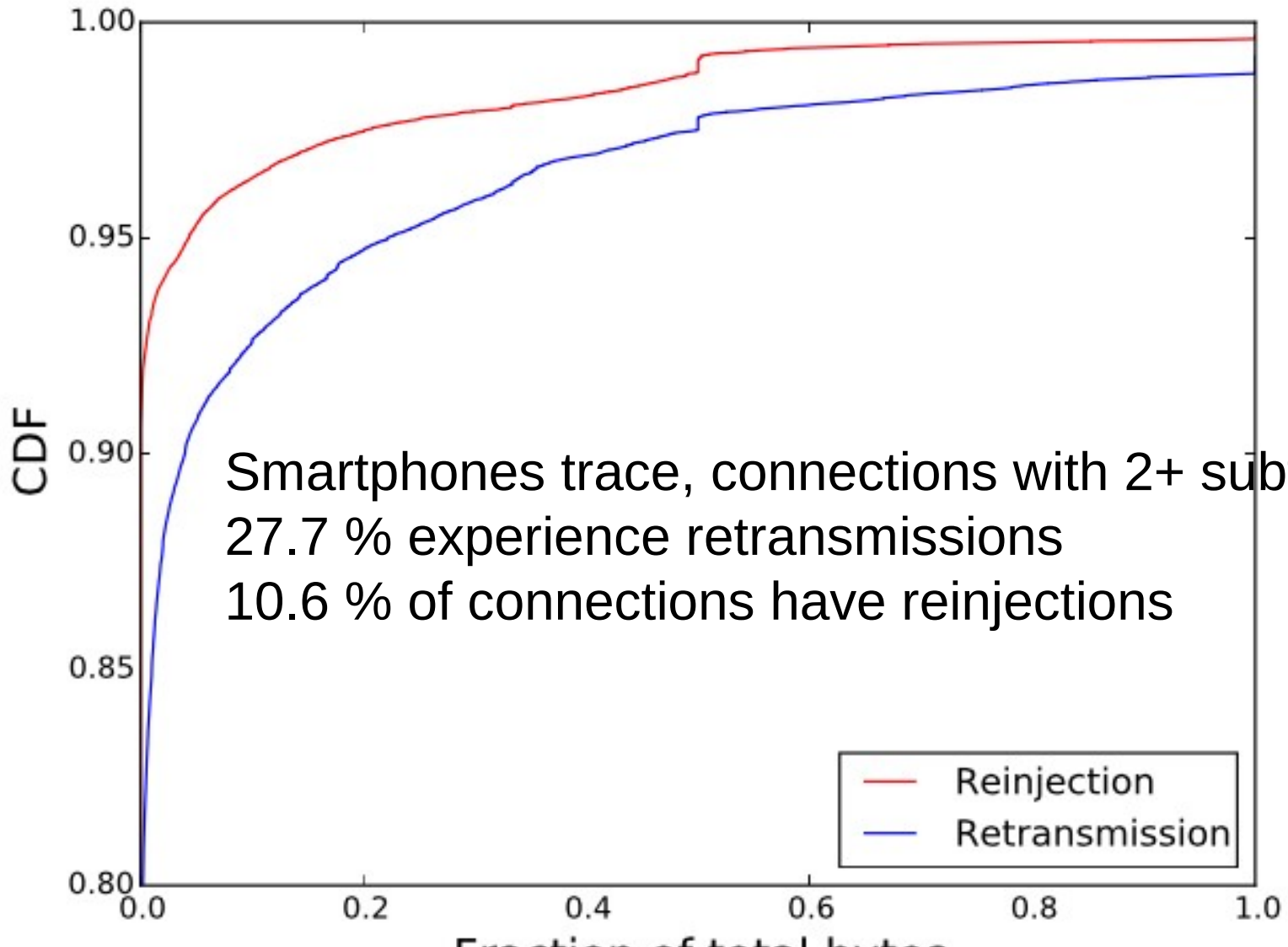
Subflow usage

- On smartphones, 39.45% of bytes carried in first subflow
 - Default interface plays a major role in the performance on smartphones
- Many subflows do not transport any data
 - 102,287 out of 249,622 subflows
 - Most connections are short
 - 53.6% carry less than 1 KBytes
 - Scheduler prefers subflow with lowest rtt
 - 43.15 % of add. Subflows have better rtt than initial one

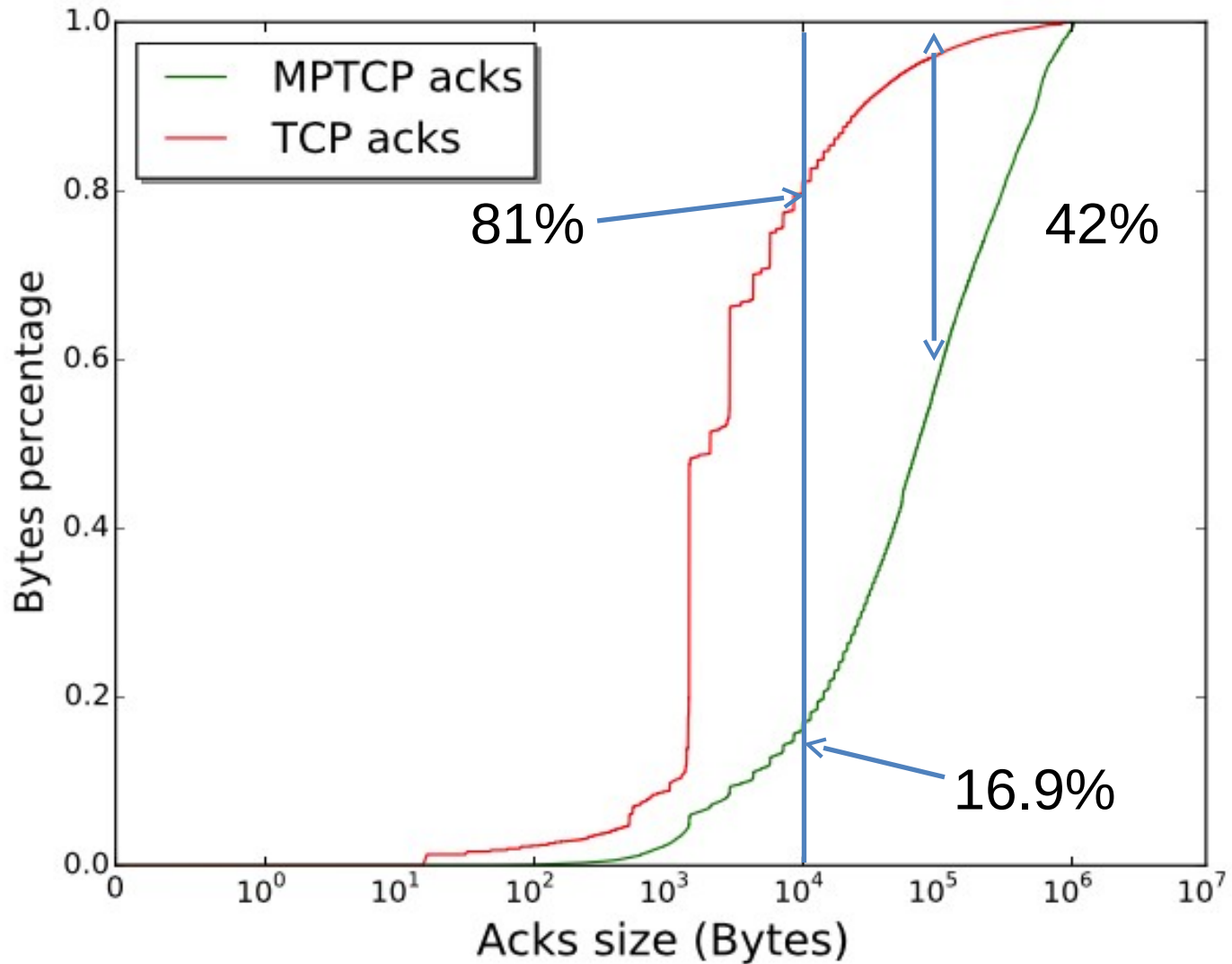
Retransmissions/Reinjections



Retransmissions/Reinjections



Data covered by the ACKs smartphones trace



Conclusion

- Packet trace analysis reveals interesting information about Multipath TCP in the wild
 - Few middlebox interference on server
 - Most connections are short
 - Multipath TCP is sometimes too fast to create subflows
 - Path manager should be improved
 - On long-lived connections, Multipath TCP maintains connection for a long time
 - Reinjections are used to recover from losses
 - Data acks sizes needs to be more studied