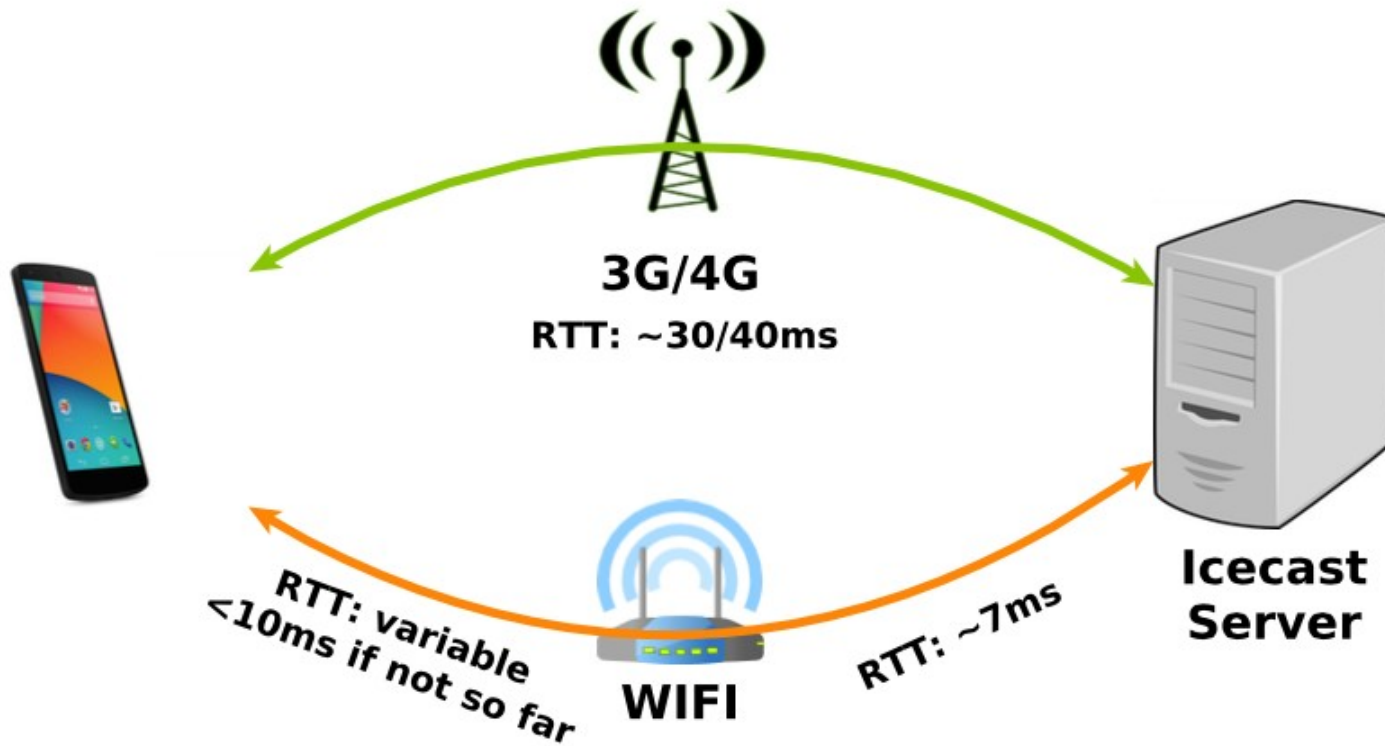# Improving Multipath TCP Backup Subflows

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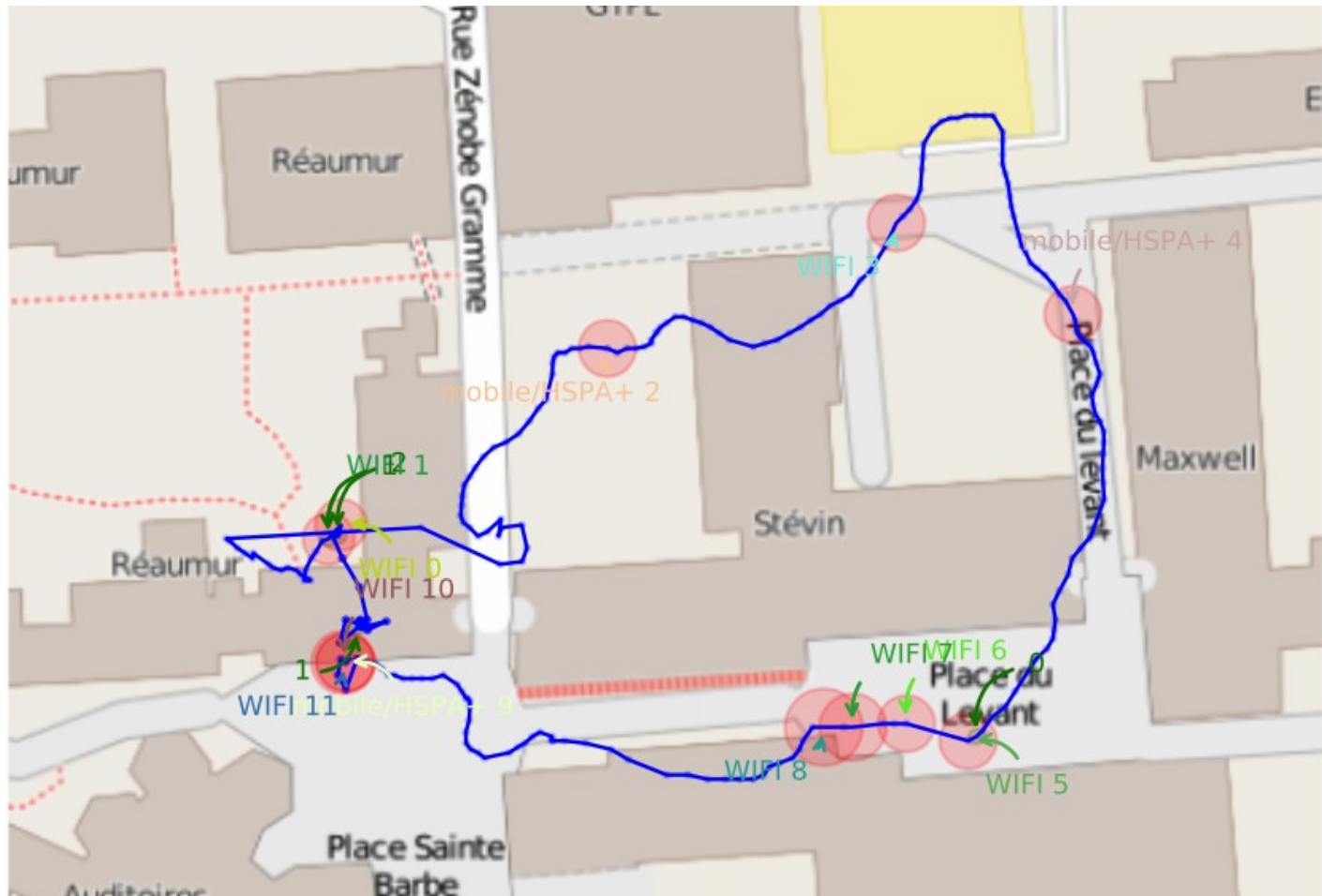
IETF93, July 2015, Prague
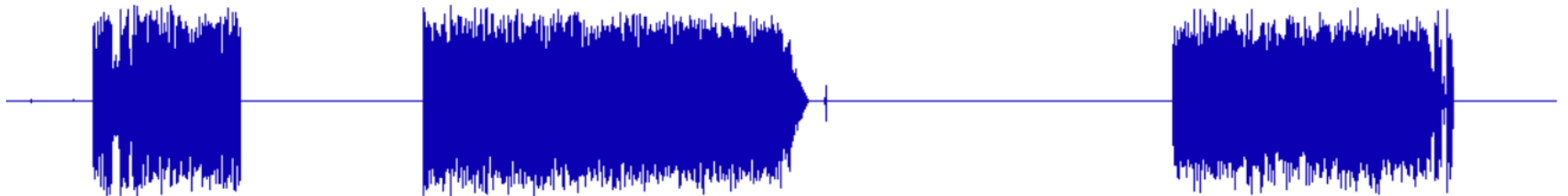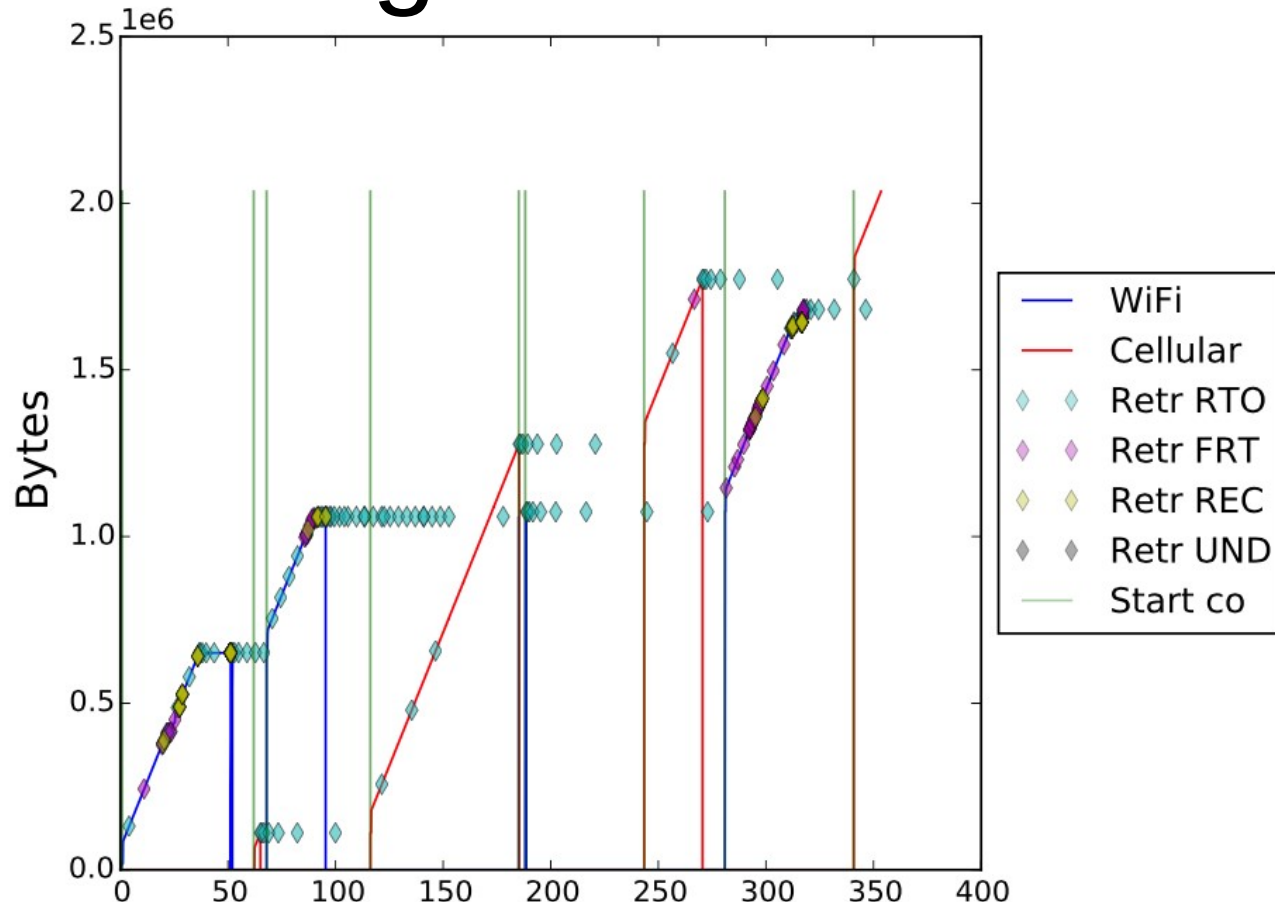
Motivation
TuneIn Radio with TCP/Multipath TCP

3G/4G

RTT: ~30/40ms

RTT: variable
<10ms if not so far

WIFI

RTT: ~7ms

Icecast Server

The scenario

With Regular TCP : disaster

With Multipath TCP
WiFi default route and 3G

Figure 6.8: Quantity of bytes transferred during a walk when using Multipath TCP with LIA, WiFi interface as default route and 3G.

With Multipath TCP
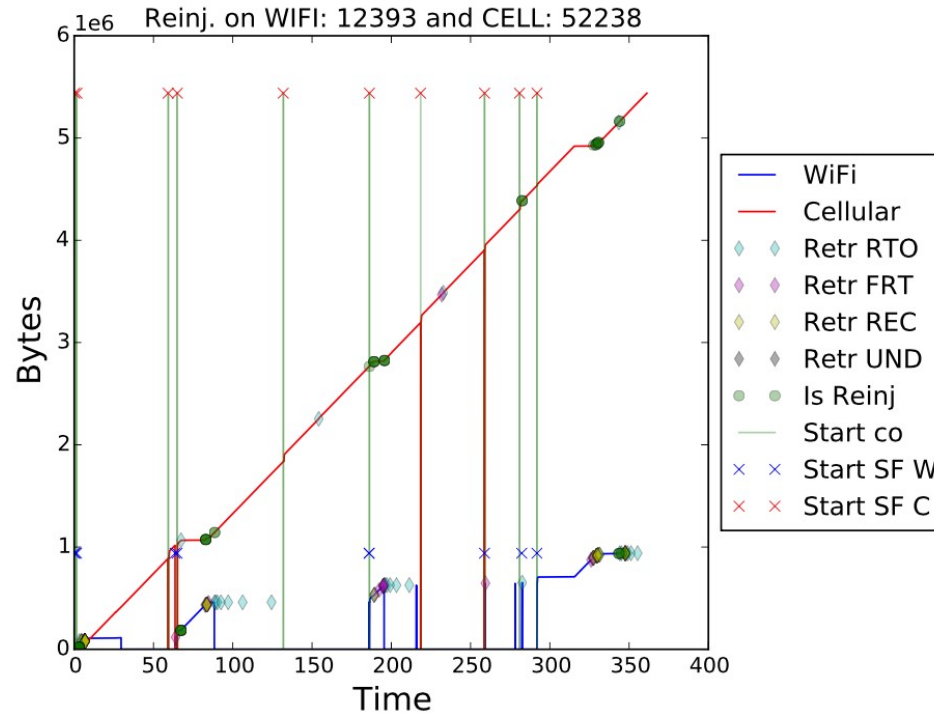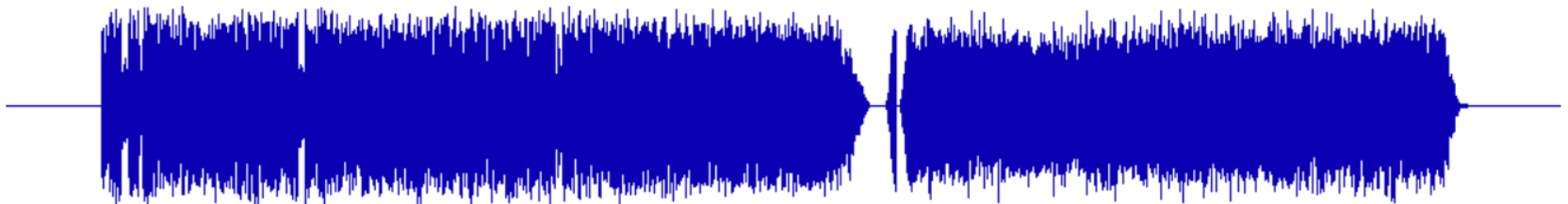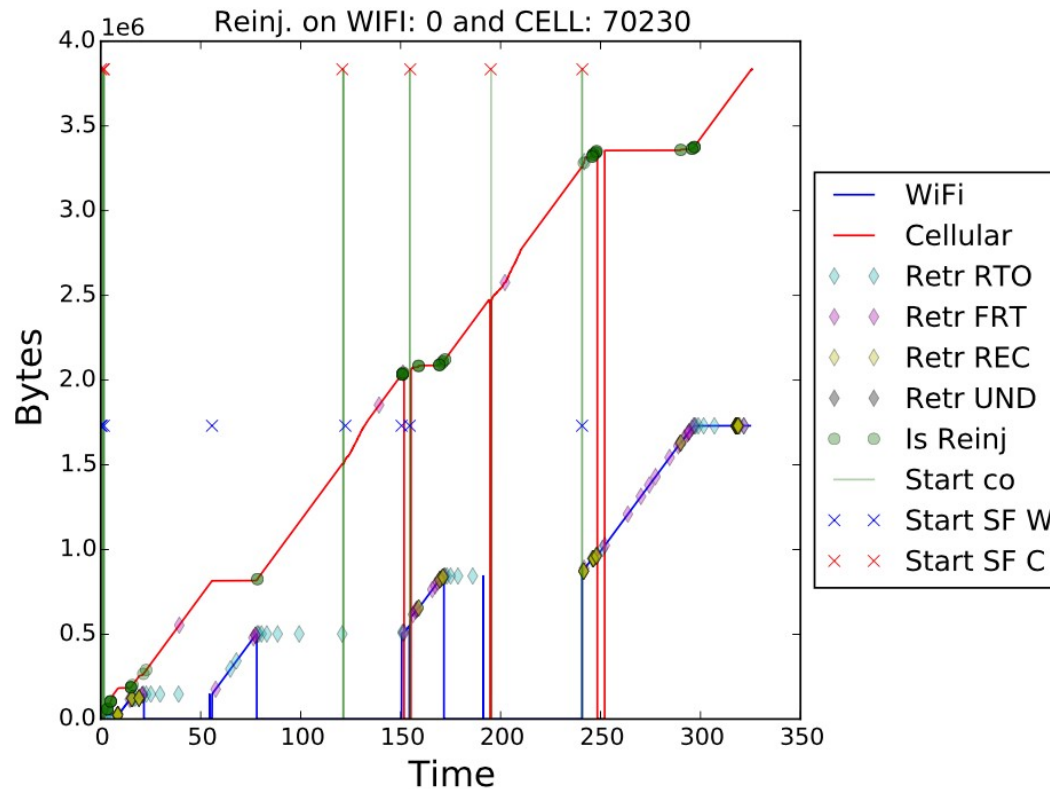# WiFi default route and 2G

Figure 6.10: Quantity of bytes transferred during a walk when using Multipath TCP with LIA, WiFi interface as default route and 2G.

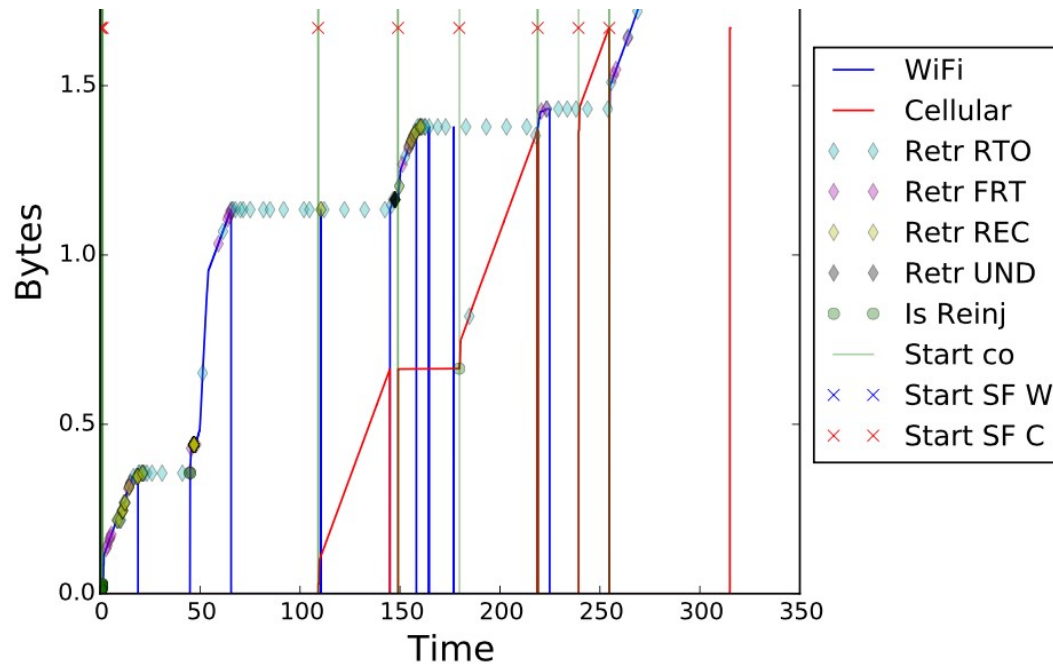# With Multipath TCP
WiFi default route and 3G Backup

Figure 6.11: Quantity of bytes transferred during a walk when using Multipath TCP with LIA, WiFi interface as default route, cellular as MPTCP backup link and 3G.
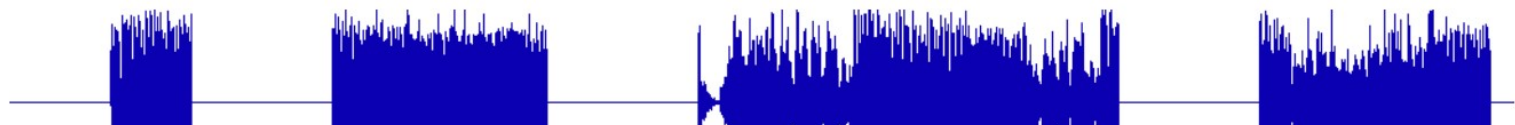
Issues with MPTCP's backup definition

- Multipath TCP only agrees to use a backup subflow once all regular subflows have failed

- What does failure means ?
  - IP address of subflow unconfigured
  - Reception/transmission of a RST
  - Excessive expirations of the retransmission time
    - Default delay : too long for fast reaction

Proposal

- Underperforming state for MPTCP subflow
  - In this state, subflow retransmits already sent data but not new data
  - Subflow remains in this state for some time
- Allow client to dynamically suggest a bound on the maximum RTO with

```
                    1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+----------------+----------------+------+----------------------+
|      Kind      |     Length     |Subtype| Flags |  Experiment  |
+----------------+----------------+------+------+----------------+
| Id. (16 bits)  |       Maximum  RTO  (milliseconds)           |
+---------------------------------------------------------------+
```