

TCPM Working Group Meeting, IETF 105,
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0-RTT Converter PoC over Real 5G

KT and Tessares joint work based on draft-ietf-tcpm-converters

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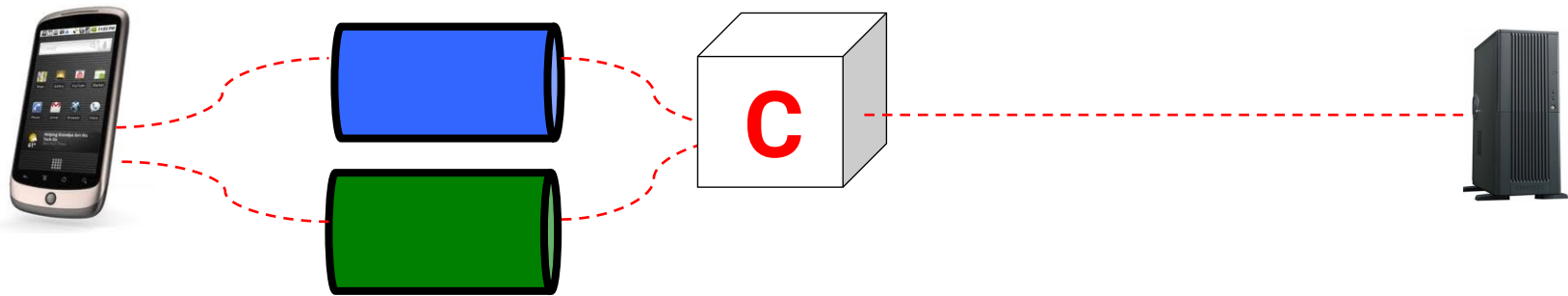


1 The 0-RTT TCP Convert Protocol

<https://tools.ietf.org/html/draft-ietf-tcpm-converters>

Initial Motivation

- More Multipath TCP enabled clients than Multipath TCP enabled servers
- Clients want to benefit from MPTCP at least on a fraction of the end-to-end path



IETF Discussion

- Not ready for a MPTCP approach, but a generic one could be acceptable

2 The Basic Design

<https://tools.ietf.org/html/draft-ietf-tcpm-converters>

0-RTT Convert Protocol is an **application-level protocol** listening on a specific TCP port

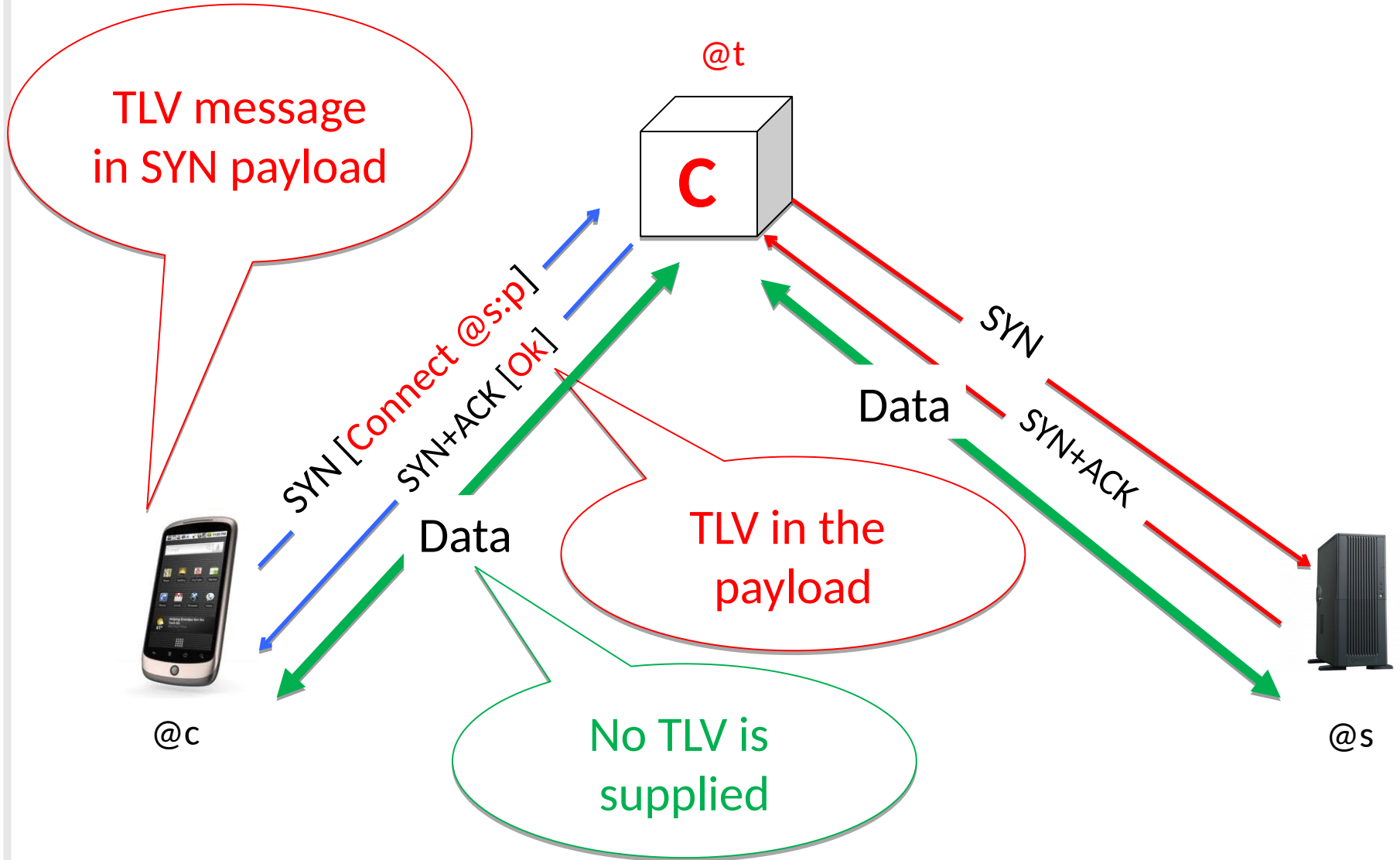
- Commands and responses are encoded as **TLVs**
 - ✓ Ensures extensibility
- Commands are sent inside SYN
 - ✓ Provides **0-RTT** to minimize connection establishment delays
- Responses are returned in SYN+ACK
- A **plain transport mode** is used between Clients and Converters (no encapsulation)

Clients can learn TCP options supported by Servers

- Allows Clients to **bypass** the Converter

3 Simple Example

How 0-RTT Convert protocol works?



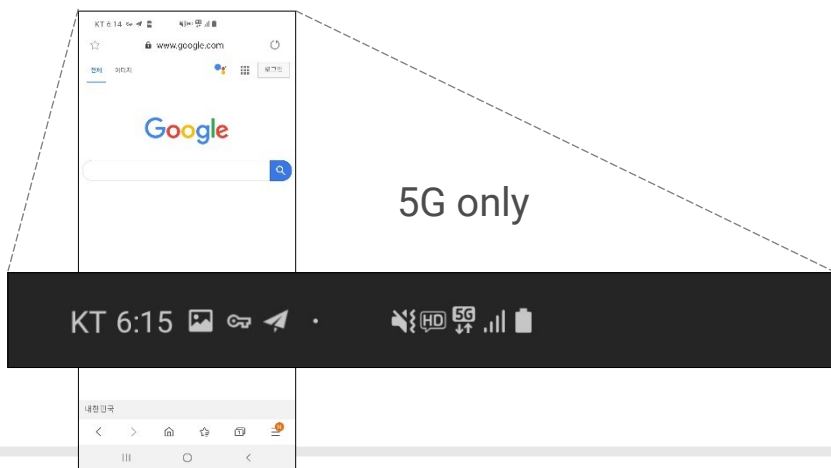
4 Proof of Concept

KT-Tessares joint collaboration for implementation and engineering based on the draft

Client side

- Open-source client library and wireshark dissectors released by Tessares
 - ✓ <https://www.tessares.net/technology/open-source-contributions/>
- Compare 0-RTT convert and SOCKSv5 protocol capable android smartphones
 - ✓ PoC Clients : Samsung Galaxy S10 5G (SM-G977N) in ENG firmware

0-RTT Convert	SOCKSv5
an open-source SOCKS integration	redsocks
5G only, 5G+WiFi with MPTCP	5G only, 5G+WiFi with MPTCP

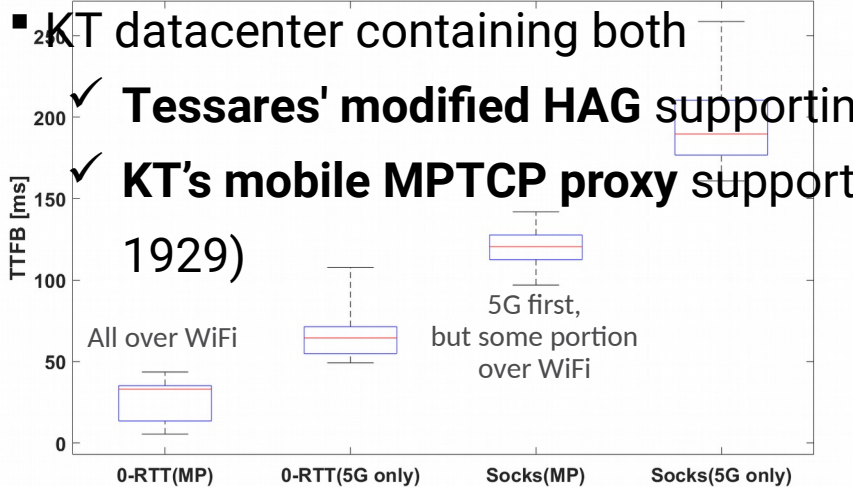


5 Measurement Results

Comparison with conventional proxy way

Test Scenario and Initial Results

- Commercial 5G network (NSA, 3.5GHz NR, CUPS 5GC, IPv6) + IEEE 802.11ax WiFi
- Compare latency for setup connection for 0-RTT Convert and SOCKSv5 protocol
 - ✓ TTFB : Time to First Byte; From time of SYN sent, to connection acceptance



msec	0-RTT Convert		SOCKSv5	
	MP* (WiFi+5G)	5G only	MP** (5G+WiFi)	5G only
MEAN	27.8	64.7	120.5	195.9
MIN	5.4	49.2	97.9	160.9
MAX	43.6	107.7	142.9	258.8

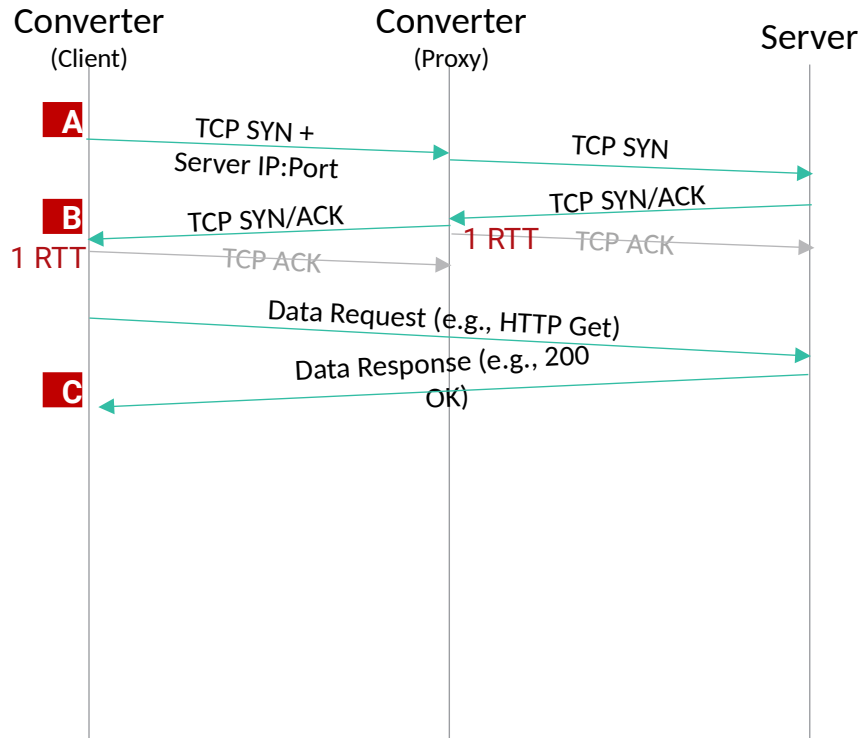
* Primary route is WiFi

** Primary route is 5G

A End-to-End Signalings

0-RTT Convert vs. SOCKSv5 w/ authentication

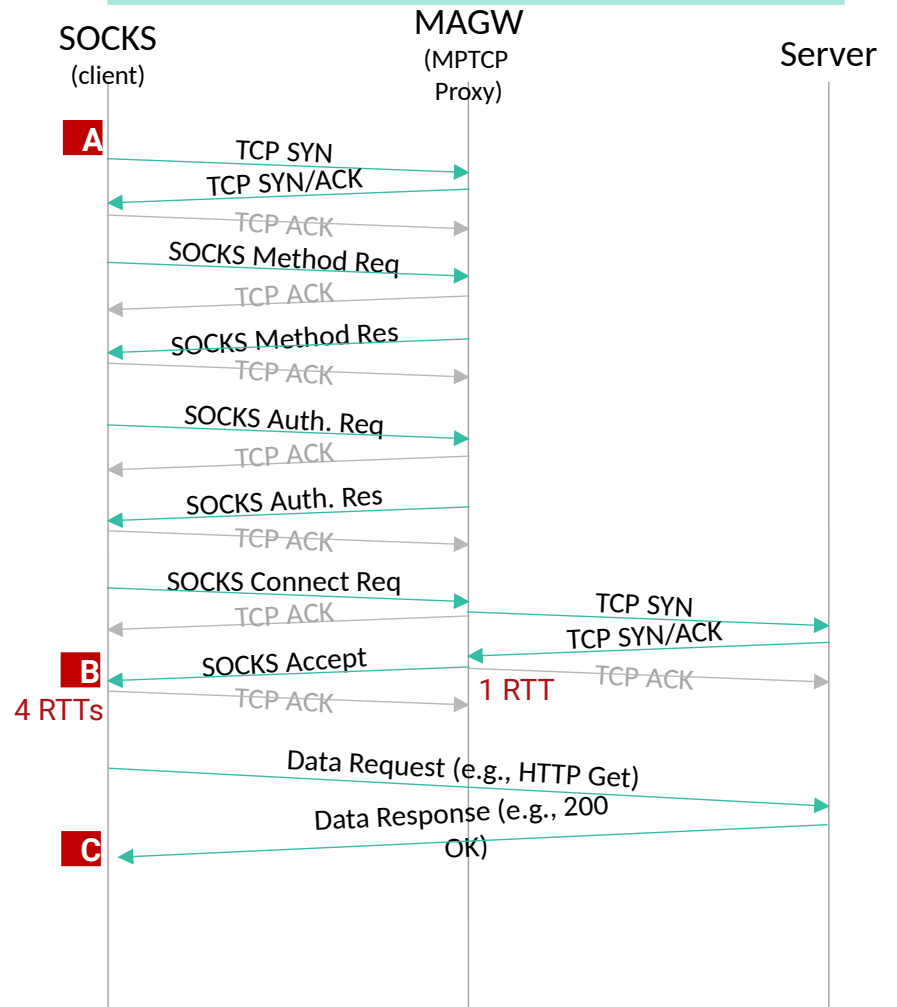
0-RTT Convert (1RTT+1RTT)



▪ $TTFB = B - A$ // Time To First Byte

▪ $TTGTFB = C - A$ // Time To Get the First Byte

SOCKS (4RTTs+1RTT)



Q & A