

# MPTCP RobE

## Robust session Establishment for MPTCP

draft-amend-mptcp-robe-00

IETF 105 Meeting, MPTCP, Montreal, July 2019

Markus Amend

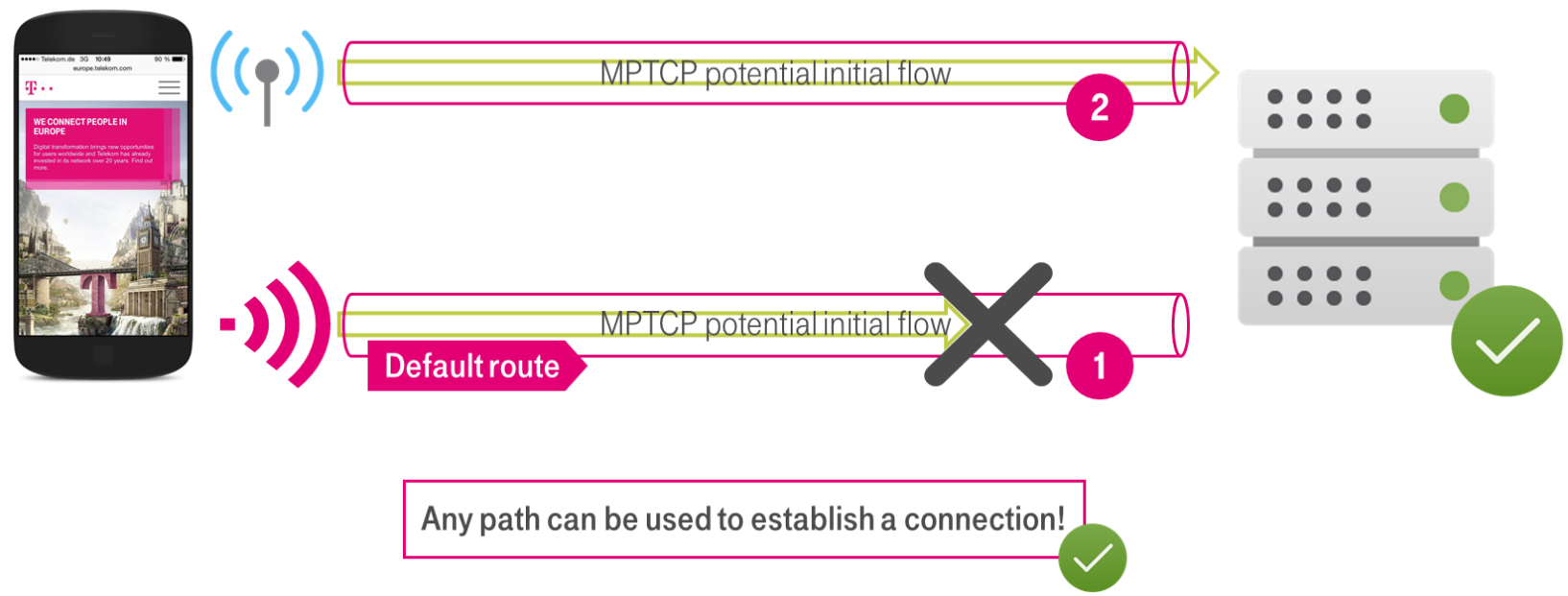


LIFE IS FOR SHARING.

# RobE MOTIVATION SUMMARIZED

First introduced as idea at IETF99 relaxing MPTCP's **initial flow concept** towards **POTENTIAL** initial flows, demanding:

**IF THERE IS AT LEAST ONE FUNCTIONAL PATH, A CONNECTION MUST BE POSSIBLE**



Detailed motivation can be found in IETF99 presentation: <https://datatracker.ietf.org/meeting/99/materials/slides-99-mptcp-a-proposal-for-mptcp-robust-session-establishment-mptcp-robe-01>

# WORK SINCE IETF99

Paper published <https://dl.acm.org/citation.cfm?id=3232762> elaborating the benefit of potential initial flows in terms of

- Robustness guaranteeing session establishment whenever one path is functional
- Handshake latency improvement compared to RFC6824 when initial flow has not the lowest latency
- Throughput gain by early availability of all subflows

Published draft document <https://tools.ietf.org/html/draft-amend-mptcp-robe-00> defining two concepts:

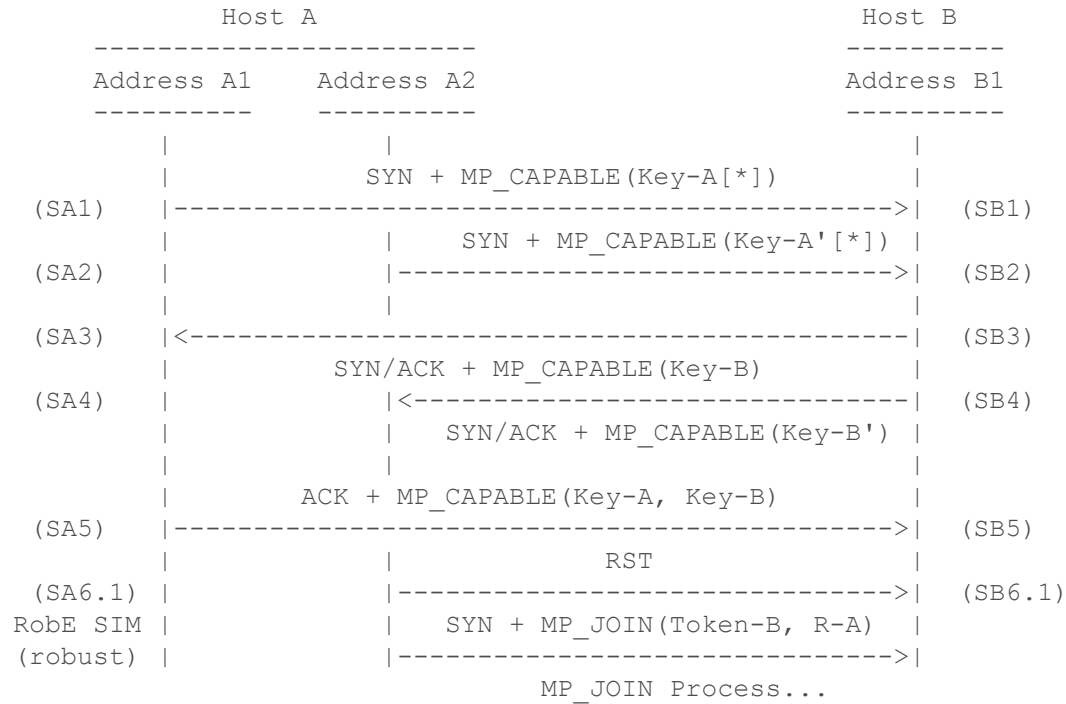
- Simple RobE (RobE\_SIM)
- Extended RobE (RobE\_EXT)

**Integrates and consider feedback from IETF 99**

1. Separate robustness and latency/throughput improvement
2. No Key-A in RFC6824bis initial SYN/MP\_CAPABLE for building relationship between several potential initial flows
3. Avoid computing overhead on sender and receiver side for increasing implementation probability (in Linux)
4. Ensure at least same authentication level of (sub)flows as MPTCP



# MAIN CONCEPTS IN DRAFT DOC - RobE\_SIM



[\*] Key-A in the first MP-capable is related to MPTCP v0 only and does not exist in MPTCP v1.

1. Initiating MP setup sending MP\_CAPABLE on all paths
2. Select initial flow based on fastest path return SYN/ACK
3. Reset other flow(s) and re-open using standard MP\_JOIN

## Pro

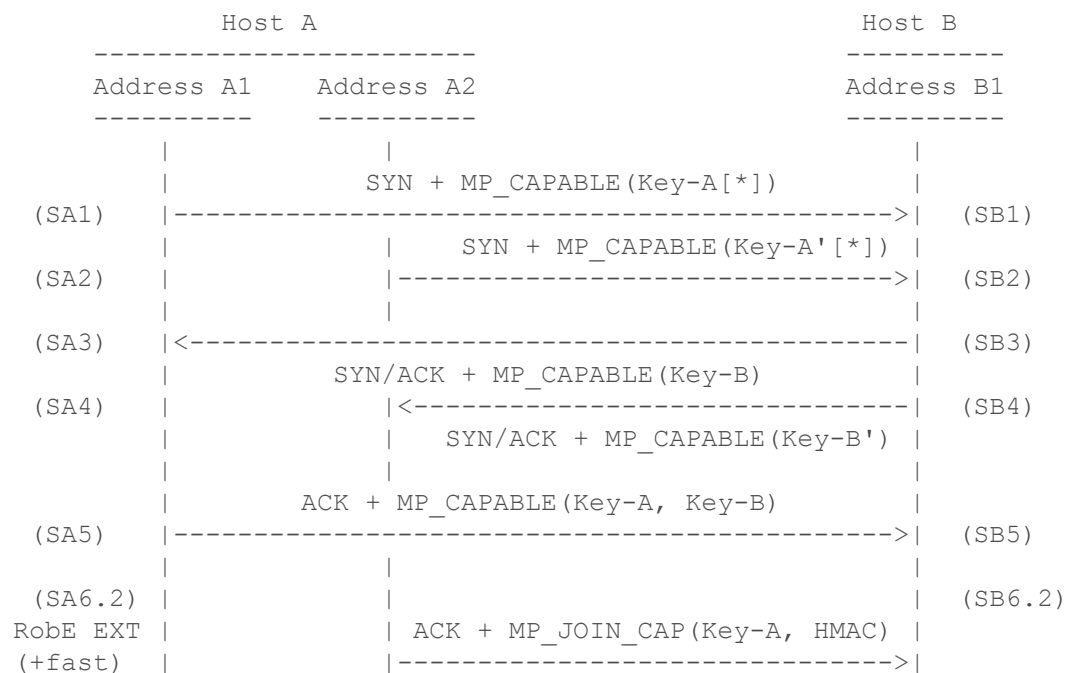
- Simple - Sender only implementation
- Full compliant to MPTCP v0/v1 standard
- Robust session setup for MPTCP v0
- Setup latency profits from fastest path

## Con

- Wasting resources when resetting flow(s)
- Robustness for MPTCP v1 depends on initial flow final ACK



# MAIN CONCEPTS IN DRAFT DOC - RobE\_EXT



[\*] Key-A in the first MP-capable is related to MPTCP v0 only and does not exist in MPTCP v1.

1. Initiating MP setup sending MP\_CAPABLE on all paths
2. Select initial flow based on fastest path return SYN/ACK
3. Send new MP\_JOIN\_CAP option on other flows to immediately merge with initial flow

## Pro

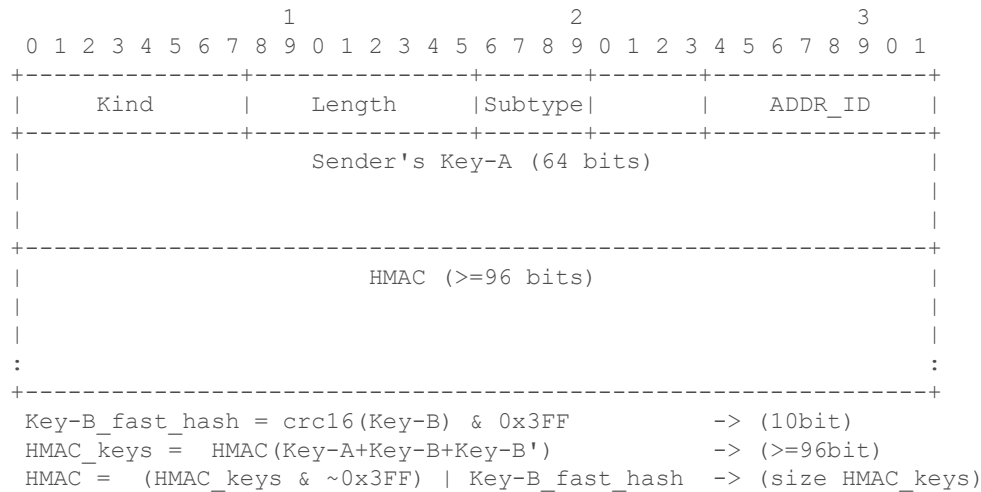
- Robust session setup for MPTCP v0 and v1
- Setup latency profits from fastest path
- Early availability of all subflows for highest throughput

## Con

- Requires new MPTCP option MP\_JOIN\_CAP



# RobE\_EXT - MP\_JOIN\_CAP option



Computational effort on receiver side is most often expected to be the same as with MP\_JOIN.

Key-A ensures identification of related flows

Key-B\_fast\_hash enables MP session even when selected initial flow is not fully established yet (slight computational overhead)

HMAC authenticates relationship of initial and potential initial flows

Detailed explanation can be found on the [mailinglist](#) or in the [draft document](#)



# NEXT STEPS

Existing Linux prototype is outdated and does not comprise the changes since IETF99. Implementation from scratch is recommended. If someone e.g. from academia is interested, this could be a good thesis for a student.

RobE\_EXT signalling is not yet fully specified:

- Might require 4-WHS like MP\_JOIN
- Negotiation of RobE\_EXT support and fallback mechanism needs to be discussed

Improve draft-00 content and integrate feedback from the mailinglist discussion and IETF105 meeting

Goal WG adoption; What is required therefore?

# Thank you very much for your attention

If there are any questions, please feel free to ask.

Markus Amend  
markus.amend@telekom.de

## Further documents

Paper with detailed results: <https://dl.acm.org/citation.cfm?id=3232762>

IETF 99 introduction: <https://datatracker.ietf.org/meeting/99/materials/slides-99-mptcp-a-proposal-for-mptcp-robust-session-establishment-mptcp-robe-01>

Mailinglist: <https://mailarchive.ietf.org/arch/browse/multipathtcp/?q=robe>

Draft @Github: <https://github.com/markusa/ietf-mptcp-robe>



**LIFE IS FOR SHARING.**