Extended Socket APIs for MPTCP
- To Control Subflow Priority

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IETF 101
March 2018

Outline

➢ Motivation

➢ Proposed Solution

➢ Integration with Linux Kernel

- ▪ MPTCP Socket APIs
- ▪ Remembering Socket Priority

➢ Conclusion

Motivation

Scenario

- Several devices (e.g. Drones) require utmost reliability in data transmission and throughput.
  - Have multiple different streams to be communicated.
- Control messages are time critical
  - Helpful if different interface is used for these messages
- Sensor feed may congest the wireless link, which is fatal for UAV.

Problem

- ✓ The Control messages gets blocked by the User Data.
- ✓ Link Failures degrades QoE significantly.
- ✓ The throughput and delay for the user data must also be improved for better QoS.
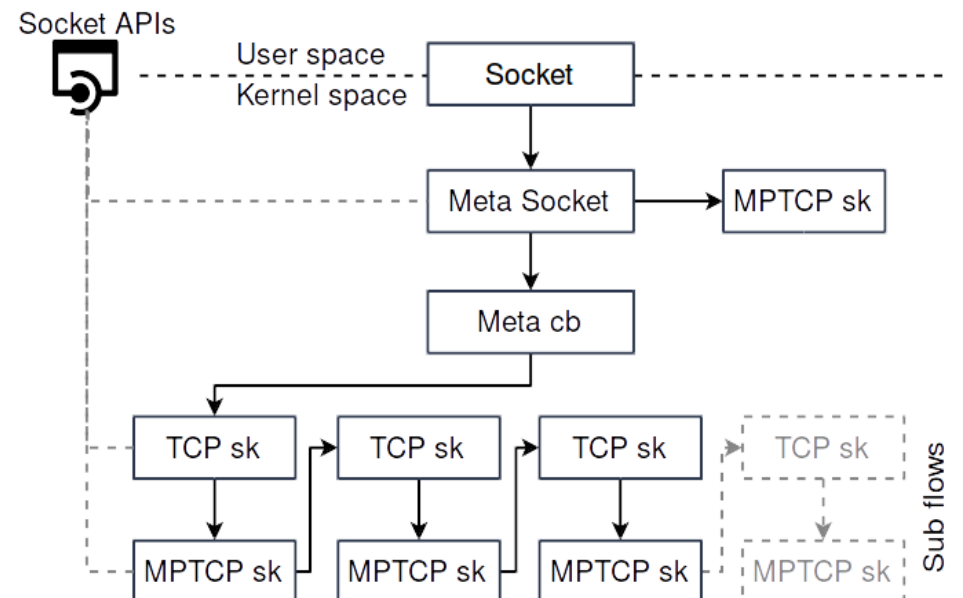
About Multipath TCP (MPTCP) and Socket API
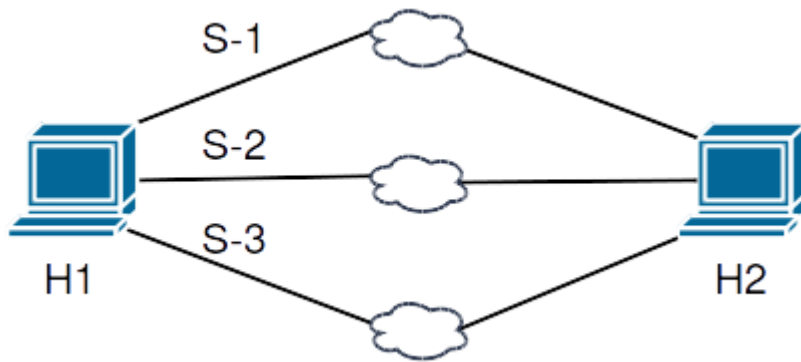
MultiPath TCP

- MultiPath TCP is drop-in replacement for standard TCP.
- Utilizes multiple interfaces available to a device
- Transparent to applications.
- It uses multiple standard TCP connections (sub-flows) internally to utilize multiple paths.

MPTCP Socket API

- Special type of system calls to create and manipulate sockets from user-space.
- MPTCP currently doesn't expose socket API to control/view internal structure.
- Socket APIs can be used to control the MPTCP behaviour from application layer (e.g. ROS).

Existing Multipath TCP Socket APIs

MPTCP_INFO

- Provides information about the subflows and main-flow

- Does not provide number of subflows, subflow id etc

draft-hesmans-mptcp-socket-00

- Provides multiple socket APIs to control MPTCP

- List subflows, Open/Close subflow, get subflow tuple.

MPTCP Socket API

Current Status

- Existing MPTCP API does not have any option to change sub-flow priority from the application layer.
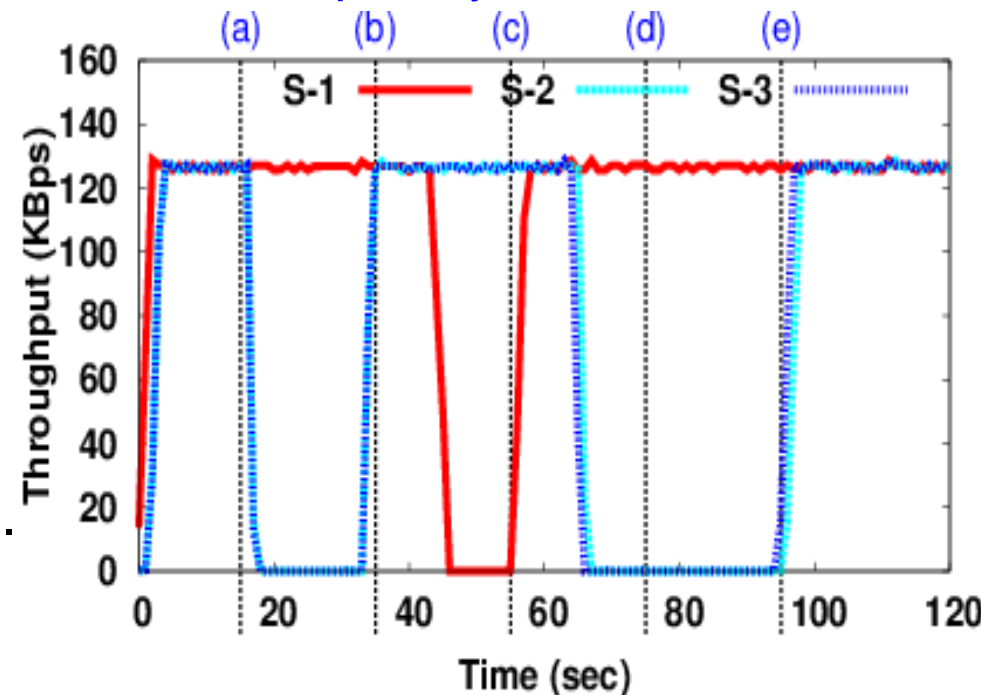
Draft Contribution

- This draft provides Socket APIs to control sub-flow priority.

Features

- Application can decide which path to be used to transmit data in usual case and which one to be used as backup.

Issues:

- Sub-flows priority resets every time corresponding interface is disconnected.

(a) Mark alternative paths as backup, (b) Primary path is disabled, (c) Primary path is enabled, (d) alternative paths are disabled, and (e) alternative paths (S-2, S-3) are enabled – **forgets their priorities**.

Requirement

- MPTCP should remember the particular sub-flow priority over the disconnection.

Our Contribution

- Propose active-path and backup-path lists in MPTCP module.

Features of these lists

- By default all the paths are active.
- Application can populate these as per requirements.
- These list will be remembered over the socket's life time.
- During the sub-flow creation, it will check the lists and set the priority.
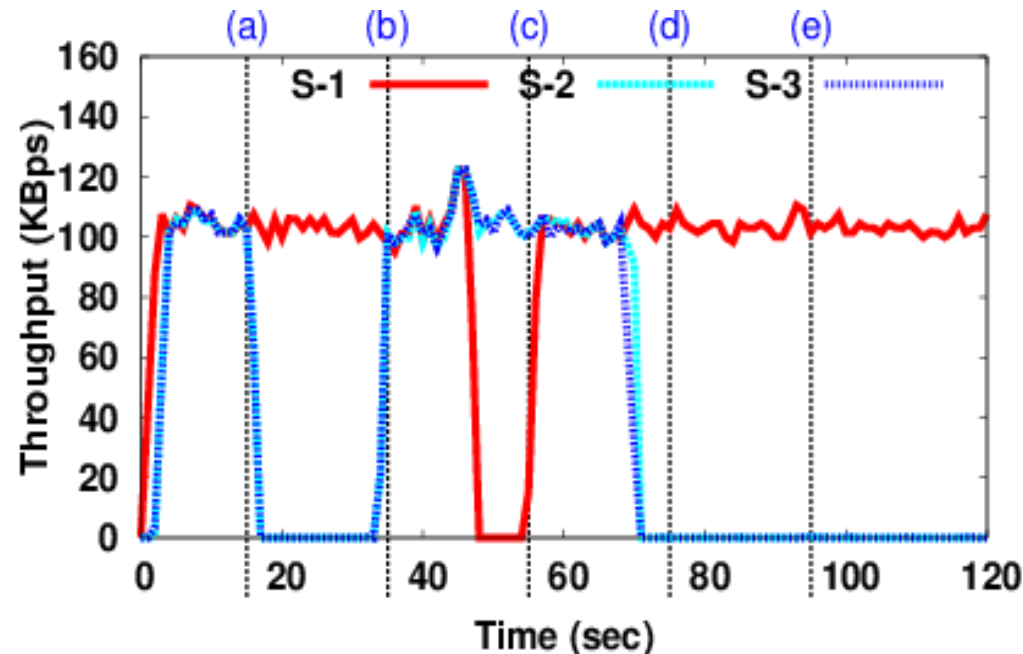
(a) Mark alternative paths as backup, (b) Primary path is disabled, (c) Primary path is enabled, (d) Alternative paths are disabled, and (e) Alternative paths are enabled – **Priorities of S-2 and S-3 are remembered so they don't become active !**

Conclusion

➢ Patch has been submitted at mptcp-dev.

  ▪ Looking for community feedback !

➢ Tested with ROS using Raspberry Pi.

  ▪ The effect of delay in switching to alternate paths is crucial and should be analyzed!

Thank you !!

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