Multipath TCP for FreeBSD: WG Update

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Background

- Started implementation around May/June 2012

    - Based on FreeBSD-HEAD

- Project goals

    - Create flexible platform for research

    - Use for congestion control experiments

- Developers: Nigel Williams and Lawrence Stewart

- Project page: http://caia.swin.edu.au/newtcp/mptcp/

Current Status

- Version 0.1 released in March this year

- Currently at Version 0.3

    - Completed most of the big architectural changes

    - http://caia.swin.edu.au/newtcp/mptcp/tools.html

    - Technical Report: High-level design overview

    - http://caia.swin.edu.au/reports/130424A/CAIA-TR-130424A.pdf

- Version 0.4 to be released later this week.

    - Greatly improved stability (though still 'alpha')

    - Can now focus more on becoming feature complete

Working

- Compatible with standard TCP implementations

- FreeBSD <-> FreeBSD multi-subflow MPTCP connections

- MP_CAPABLE, ADD_ADDR, MP_JOIN, DSS options

- Socket isolated from individual subflows

  - Basic schedular; Send buffer to subflow mapping

  - Multi-packet, per-packet DS-Maps

Working

- Modified reassembly logic and data structures

  - Rx queues merged with receive buffer

- Fast Recovery, SACK, RTOs, window probes (with multiple subflows), timeouts.

- Static path manager (via sysctl)

  - Specify 'slave' subflows

- Clean connection teardown (sans DFIN)

Upcoming

- Sender side

  - Hooks for congestion control, module to use them

  - Improved algorithm for send socket-to-subflow mapping

- Receiver side

  - Tweaks to receive window advertisements

- DFIN, Data-level RTO

- Coupled CC

- Profiling/performance testing (stack changes have been extensive...)

- ISO image

Known Issues

- IPv4 only

- Basic packet schedular

    - Just tries to distribute bytes between subflows

    - Subflows can starve if application does not fill send buffer

- No fallback

- Still Alpha, not performance optimised

- Need testers, feedback

Projects

- MPTCP for persistent Vehicle to Infrastructure (V2I) connections

  - Delay-tolerant 'Infotainment' applications

  - Embedded On Board Unit uses a combination of 3/4G and 802.11p

  - MAC layer feedback to aid scheduling decisions