

MultiPath TCP : Linux Kernel Implementation



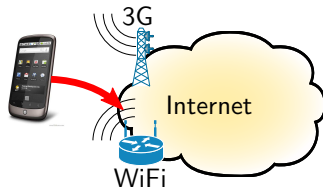
Presenter: Christoph Paasch
IP Networking Lab
Université catholique de Louvain

February 3, 2012

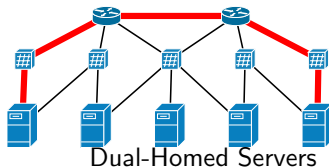
<http://mptcp.info.ucl.ac.be>

Current situation

- Mobile devices can connect to the Internet via different interfaces



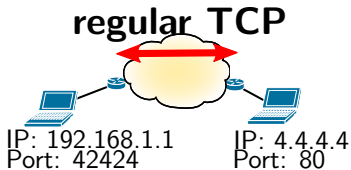
- Data-centers have a large redundant infrastructure



- TCP is used for 95% of the Internet communications

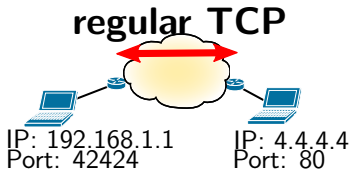
Current situation

- TCP is used for 95% of the Internet communications
- TCP identifies connections by the 5-tuple



Current situation

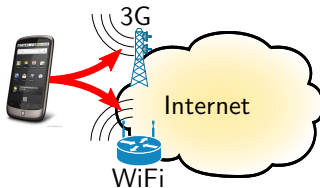
- TCP is used for 95% of the Internet communications
- TCP identifies connections by the 5-tuple



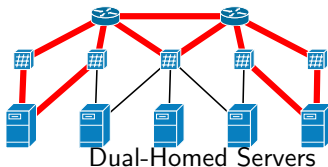
- A single TCP connection cannot be used across different interfaces.

Current situation

- Mobile devices should connect to the Internet by using **all** their interfaces

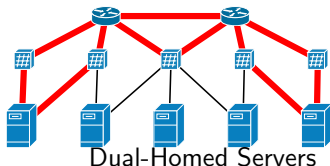
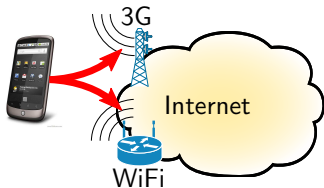


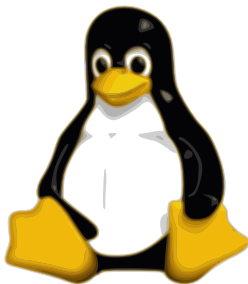
- Data-centers should use their redundant infrastructure in the most efficient way



MultiPath TCP (short MPTCP)

- MPTCP allows a single data-connection to use several interfaces simultaneously.
- Allows failover from one interface to another (e.g., mobile client).
- Increases the bandwidth due to resource pooling.
- Better load-balancing due to fair coupled congestion control.

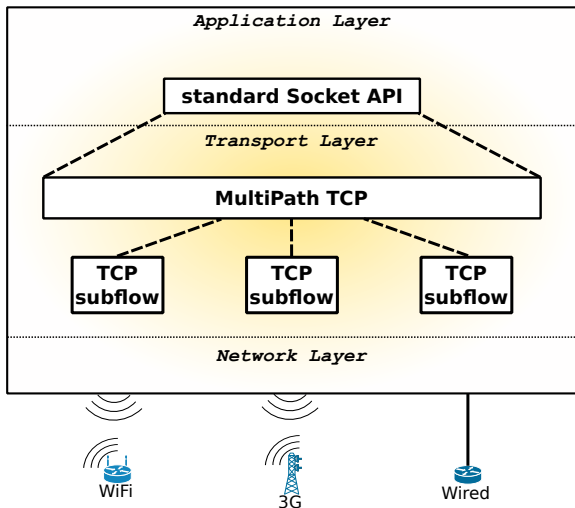




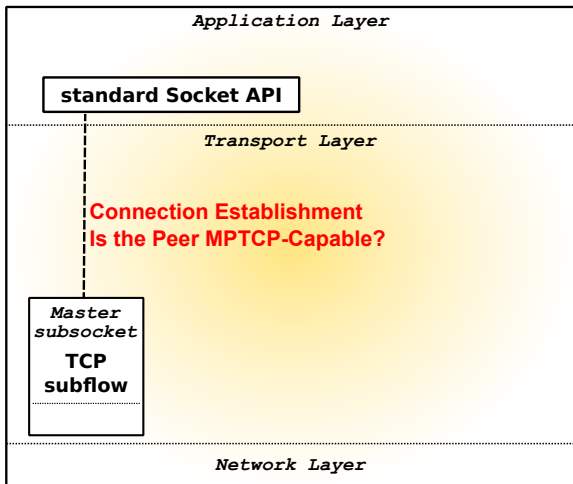
Linux Kernel MPTCP

- About 10000 lines of code in the Linux Kernel
- Lots of performance evaluation in different research-papers.
- **Live-Demo** of MPTCP at the end of this presentation.
- Implementation freely available at **<http://mptcp.info.ucl.ac.be>**

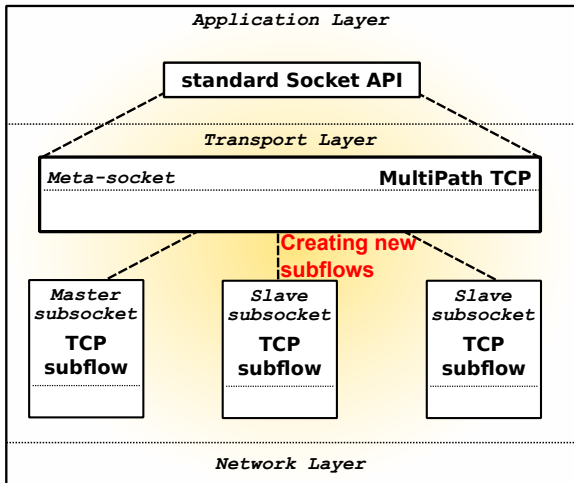
MultiPath TCP - The Protocol



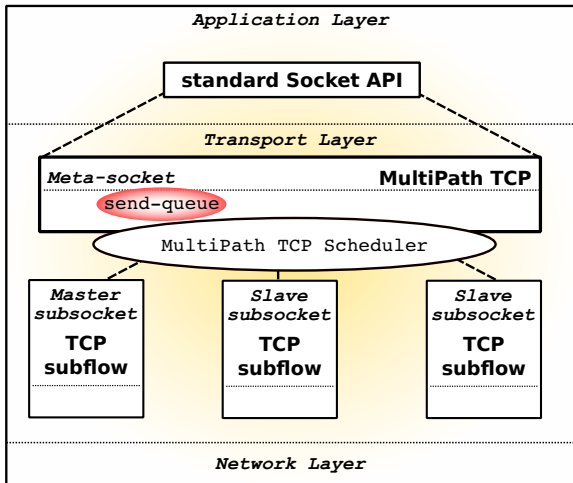
Establishing a connection



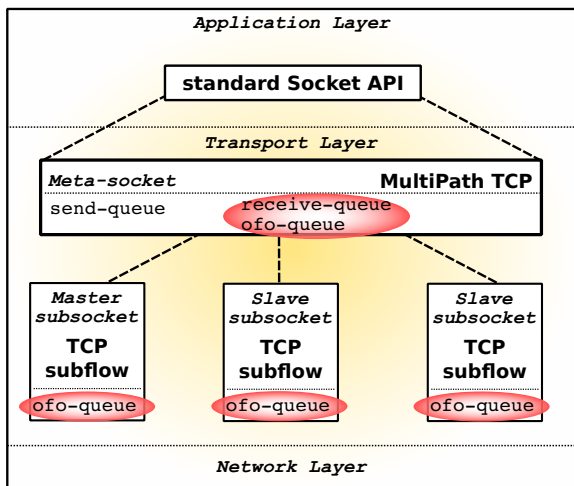
Establishing a connection



Sending packets over MultiPath TCP

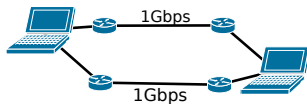


Receiving packets over MultiPath TCP



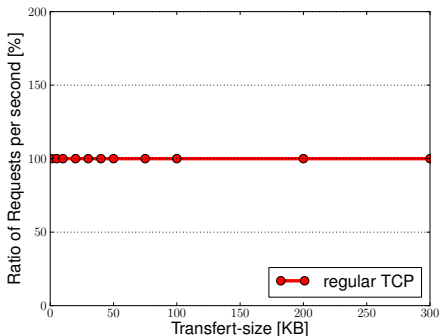
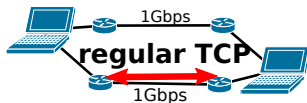
MultiPath TCP - Performance Results

- Interconnected testbed with two separate paths at 1Gbps



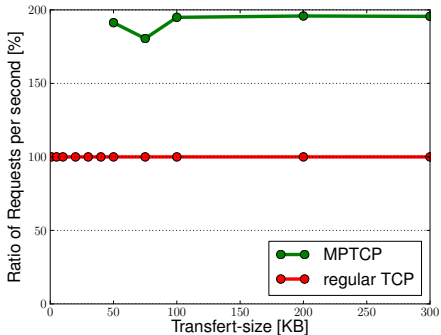
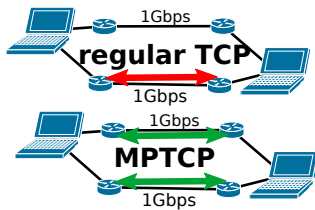
MultiPath TCP - Performance Results

- Interconnected testbed with two separate paths at 1Gbps
- regular TCP can only use one single paths



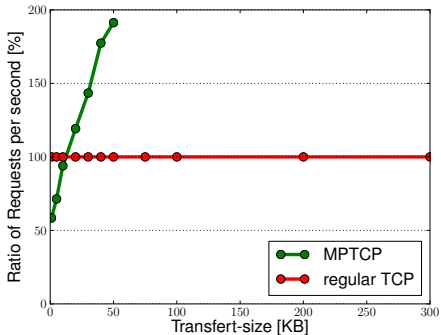
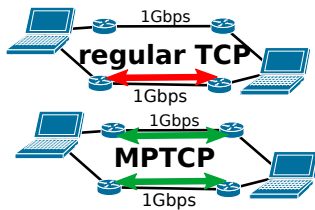
MultiPath TCP - Performance Results

- Interconnected testbed with two separate paths at 1Gbps
- regular TCP can only use one single paths
- MultiPath TCP uses both paths simultaneously



MultiPath TCP - Performance Results

- Interconnected testbed with two separate paths at 1Gbps
- regular TCP can only use one single paths
- MultiPath TCP uses both paths simultaneously



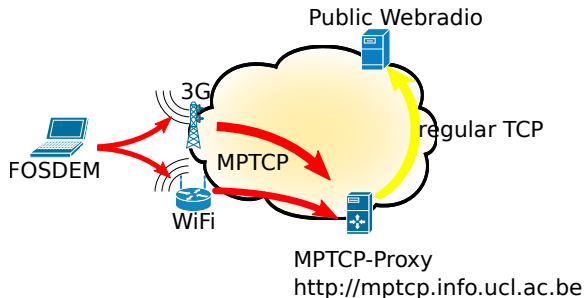
Use it!!!

- Compile the source yourself
- or Install from our apt-repository
- or Set it up on a virtualbox-image
- or Use it with `user-mode-linux`

Contribute

- Integrate some missing features
- Optimize the code
- Refactoring the code
- Testing

Live-Demo!!!



<http://mptcp.info.ucl.ac.be>

Download MPTCP, try it out, ask questions on the mptcp-dev list and contribute.

Thanks!!!