

Multipath TCP Support for Single-homed End-systems

draft-wr-mptcp-single-homed-07

Rolf Winter

rolf.winter@neclab.eu

Origin of this work

- First draft in 2011
 - Specified DHCP options and gateway router behavior
- Then MIF came along
 - Came up with provisioning domains
 - Work halted to let provisioning domains mature
 - Now we have PD specs for DHCPv6 and ND
- Version 7 now uses PD
 - Router behavior unchanged

Problem statement

- Multi-homed end-devices increasingly a reality (in particular mobile devices)
- But for the foreseeable future, there will be a large number of single-homed devices like office PCs or devices in the home
- Even multi-interface devices might resort to only use a single interface (e.g. to conserve energy)
- While single-homing at end devices will remain with us for a long time, multi-homing for Internet access becomes increasingly popular (e.g. hybrid access)
- Big question: can we make multi-homing at the customer edge available to the single-homed end devices?

Scenario



Desirable properties

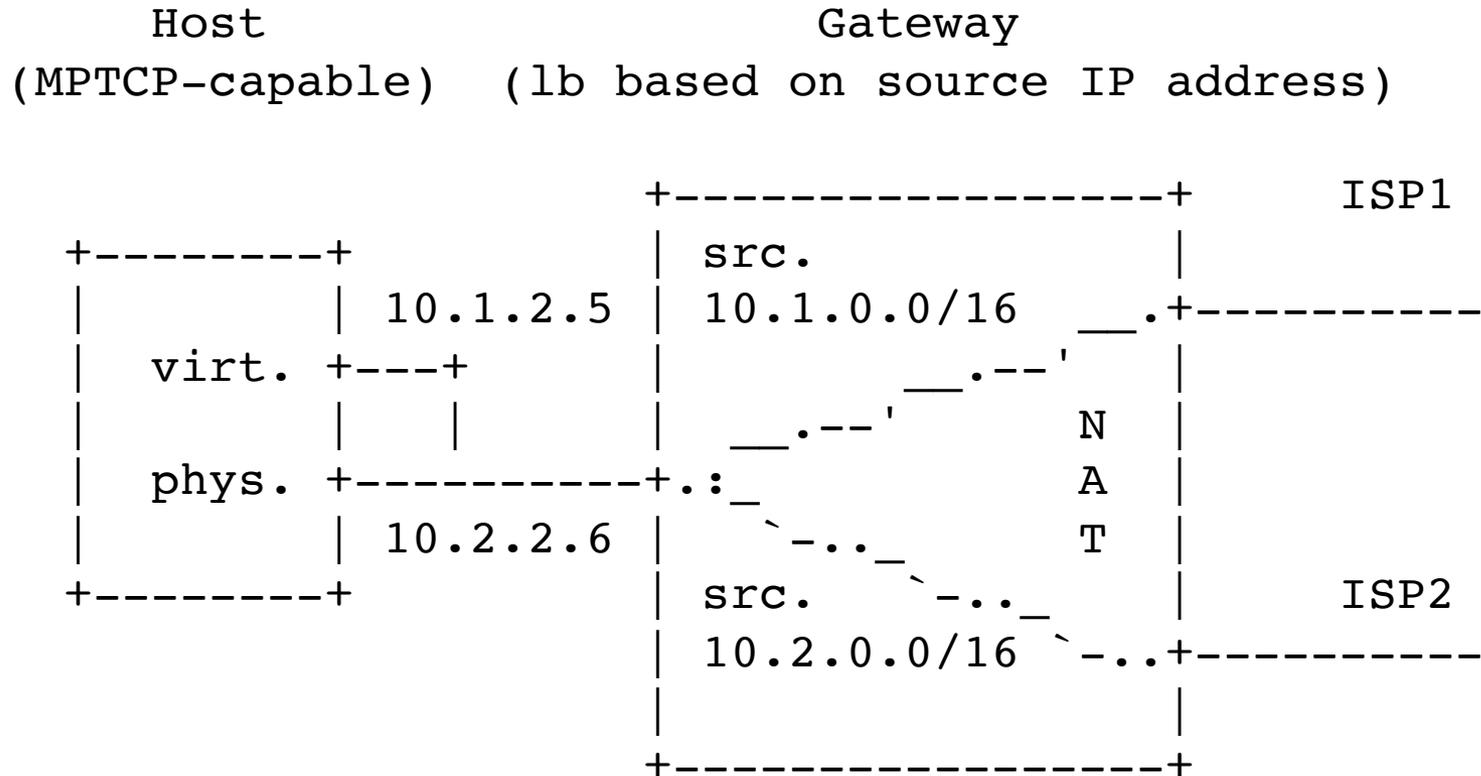
- No changes to MPTCP → *must work today*
- No complex proxy functionality
 - E.g. no MPTCP state machine or connection tracking on the gateway router → *no complex failure scenarios, no overhead (state and processing)*
 - No “understanding” of the MPTCP protocol necessary at the gateway router → *MPTCP can evolve separately without breaking this mechanism*
- No new signaling or provisioning protocol → *no external dependencies on something that not even exists today*

→ **Simple**

Key idea

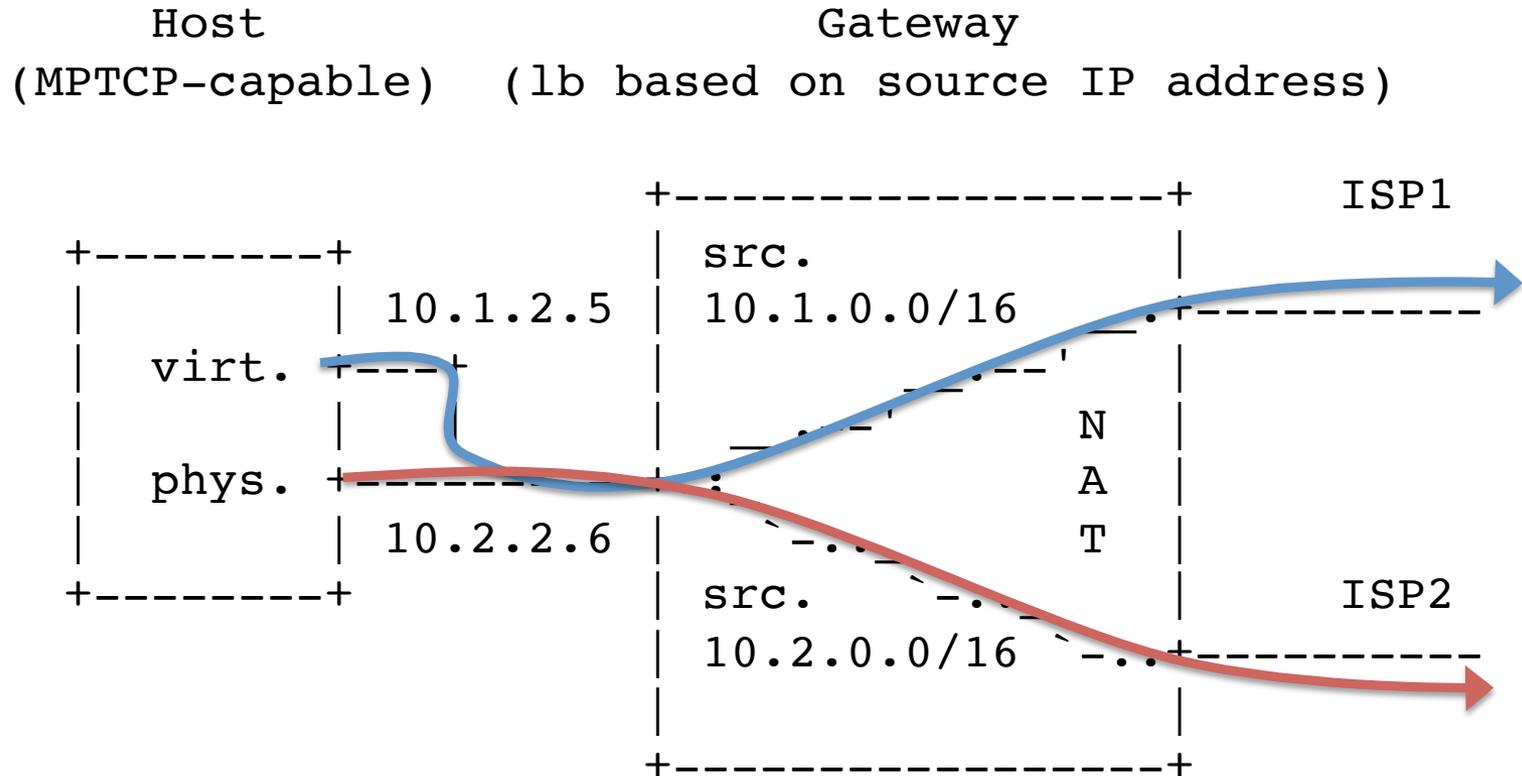
- Create virtual interface(s) (bound to the one physical interface on the host)
- Configure these virtual interfaces in a way that the gateway forwards them differently (through a different access network)
 - Configuration and gateway behavior is defined in this document
- Old version of the draft was implemented and tested on Linux
 - the only thing required was some configuration plus a simple script

Principal Approach



Other host must also be MPTCP-capable

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Proposed extension (to DHCP)

- A new DHCP option called EXT_ROUTE, which will be included in each provisioning domain sent by the server
 - In order to signal to the host, that each provisioning domain will result in a different path towards the Internet
- The option value (number) will determine which external interface is used to sent the traffic

Alternative

- Heuristic use of port combinations to leverage ECMP on the gateway
 - Need to know that ECMP is being deployed
 - Will likely result in either more subflows than external interfaces or less flows than external interfaces and an unbalanced number of subflows on these interfaces per MPTCP connection

Next steps

- Add ND
- Expand the text on host behavior
- Muse about potential other deployment scenarios
- Implement and test (the DHCP part)