

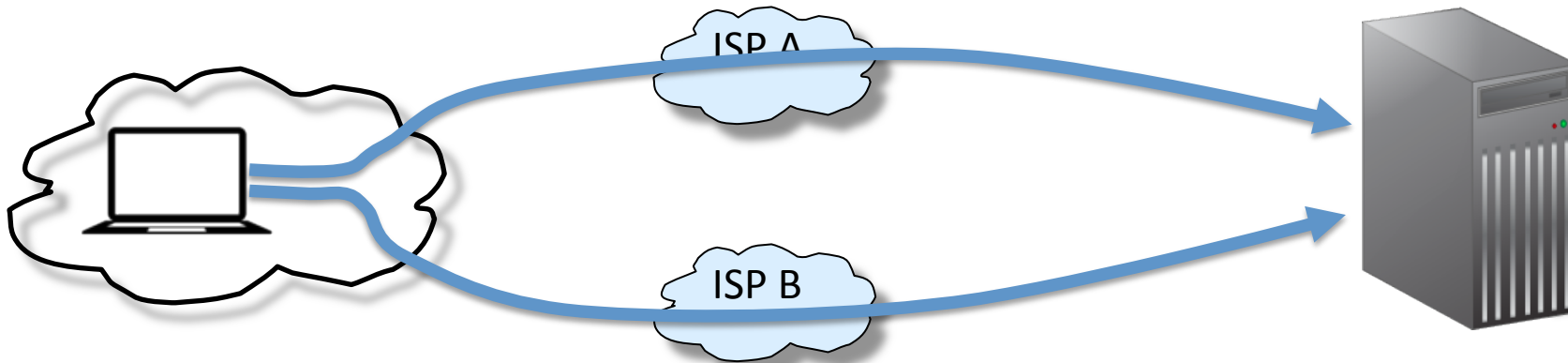
# Evolving the Internet with Connection Acrobatics

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MPTCP WG meeting - IETF88

# Initial MPTCP use cases

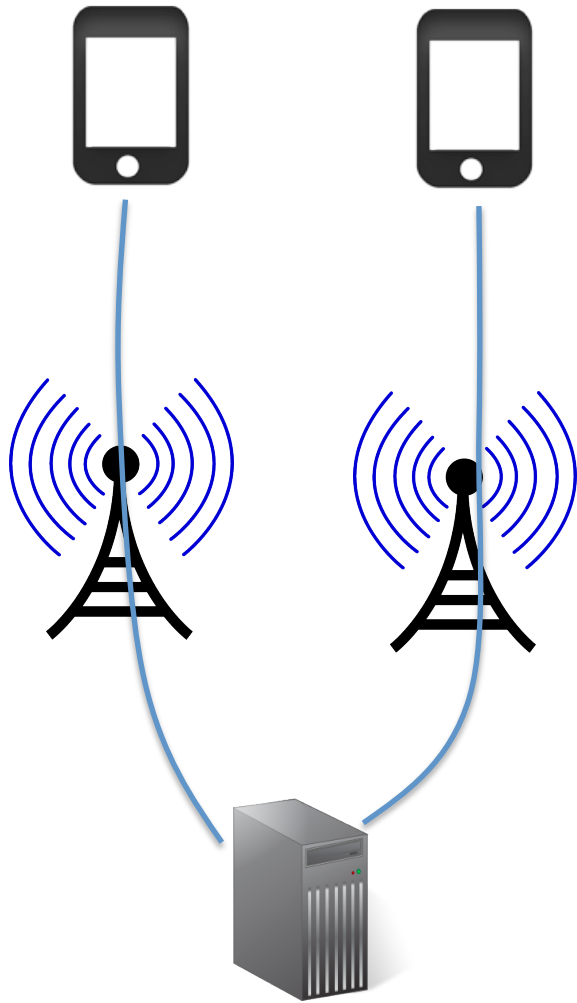


Multihomed device

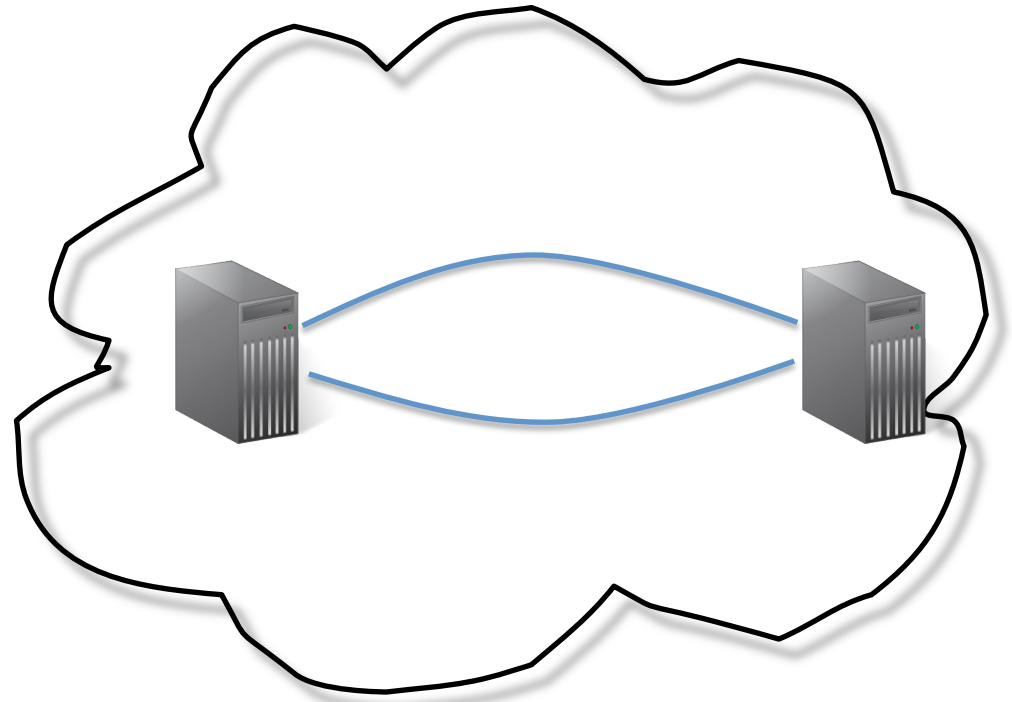


Device in multihomed network

# A couple more that came along...



Host Mobility

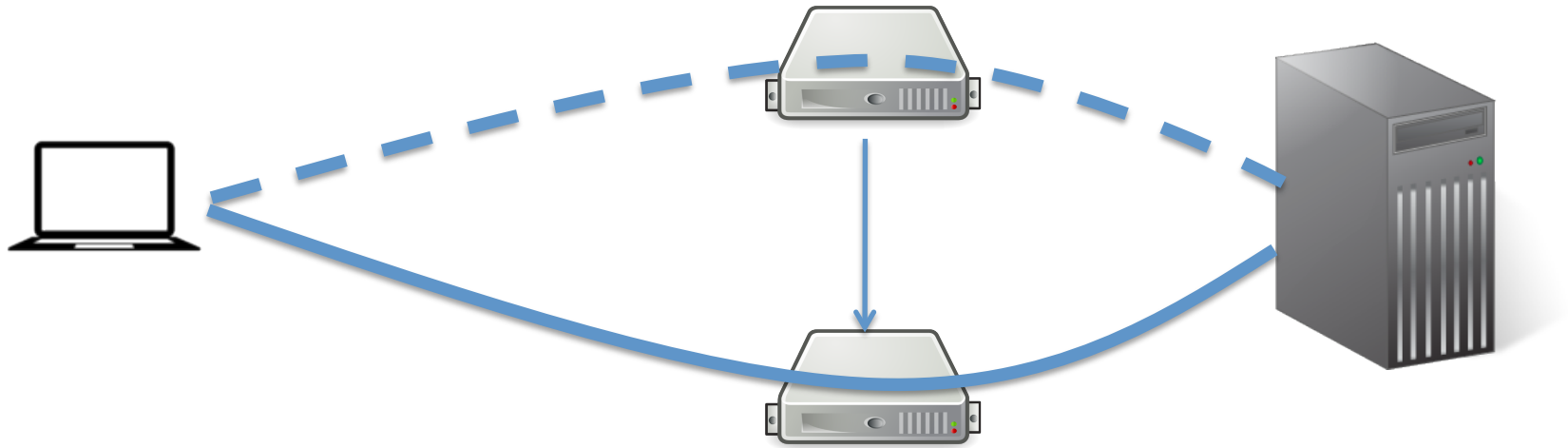


Intra datacenter traffic engineering

# Some new use cases:

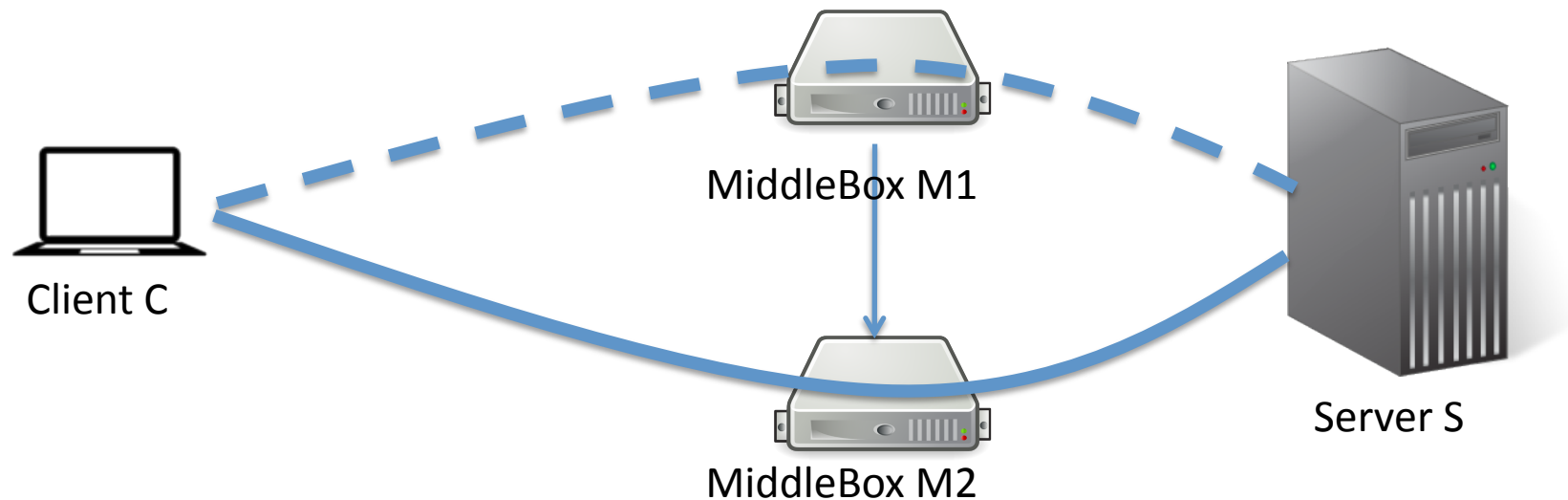
- Waypoint migration
- Endpoint migration
- Process migration

# Waypoint migration: what is it?



- Destination routing control
  - Move traffic based on policy (this flow needs to flow through this middlebox)
  - Traffic engineering/load balancing

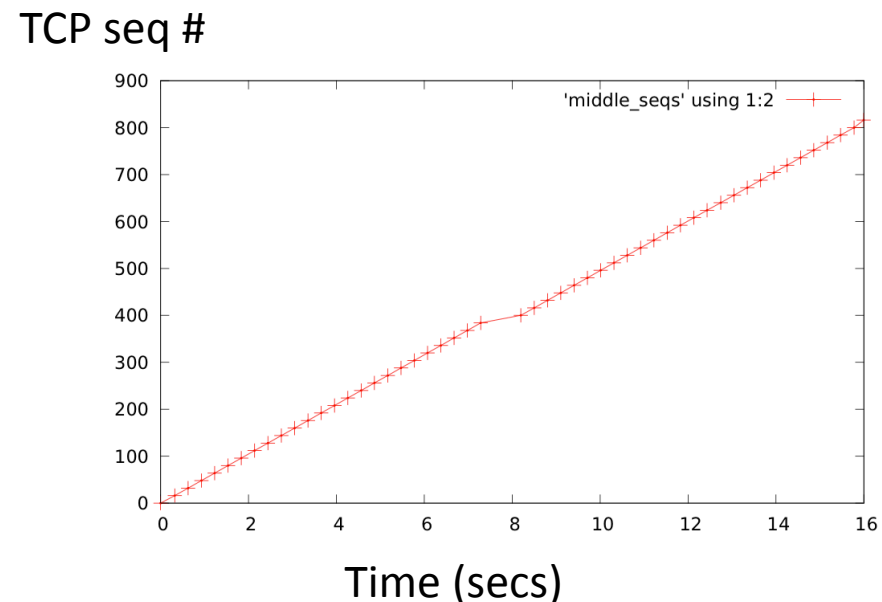
# Waypoint migration: How is it done?



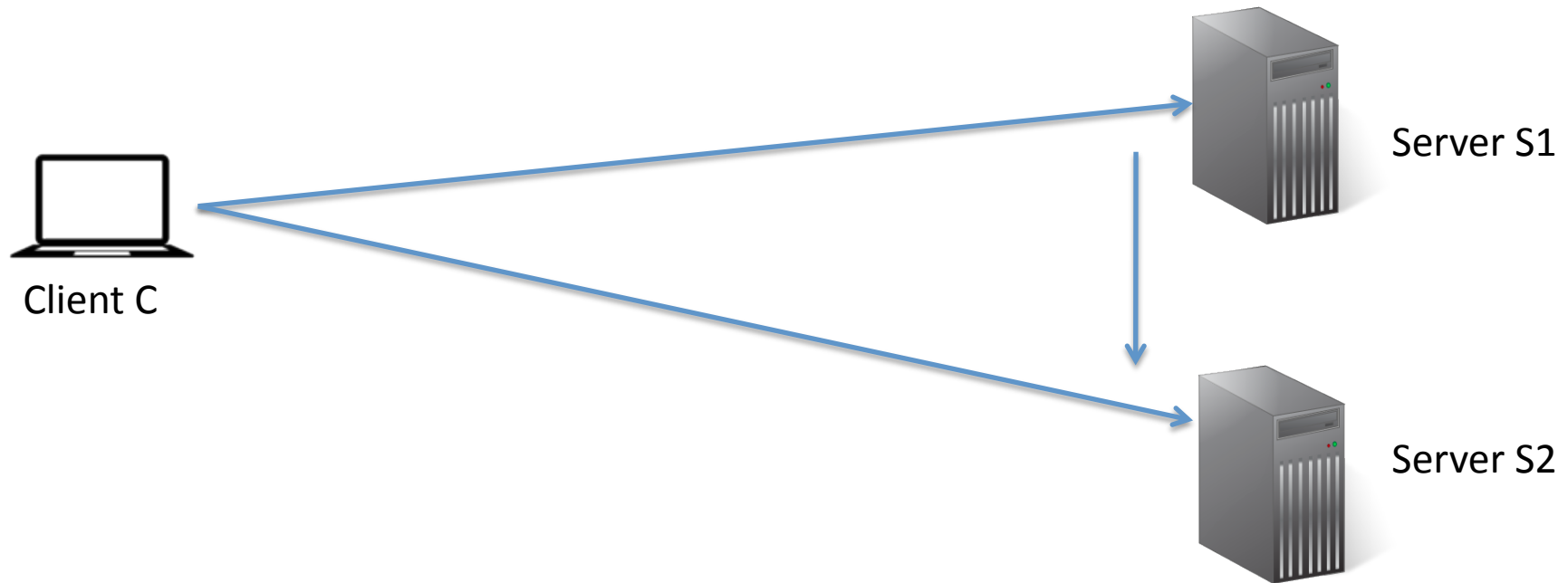
- C establishes MPTCP connection with S through M1
- M1 configures forwarding state in M2
- M2 issues an ADD\_ADDR msg with M2 address
- C sends an JOIN to M2 address
- M2 translates source and destination address and forwards to S
  - Same with rest of traffic between C and S
- M1 closes the MPTCP flow (RST)

# Waypoint migration: experiment

- Implemented the functionality.
- In the test, M1 scanned TCP payload for the word “secure” and redirects connection when match is found
- Negligible effect on performance
- Takes 2 RTT between M1 and M2 (200ms)



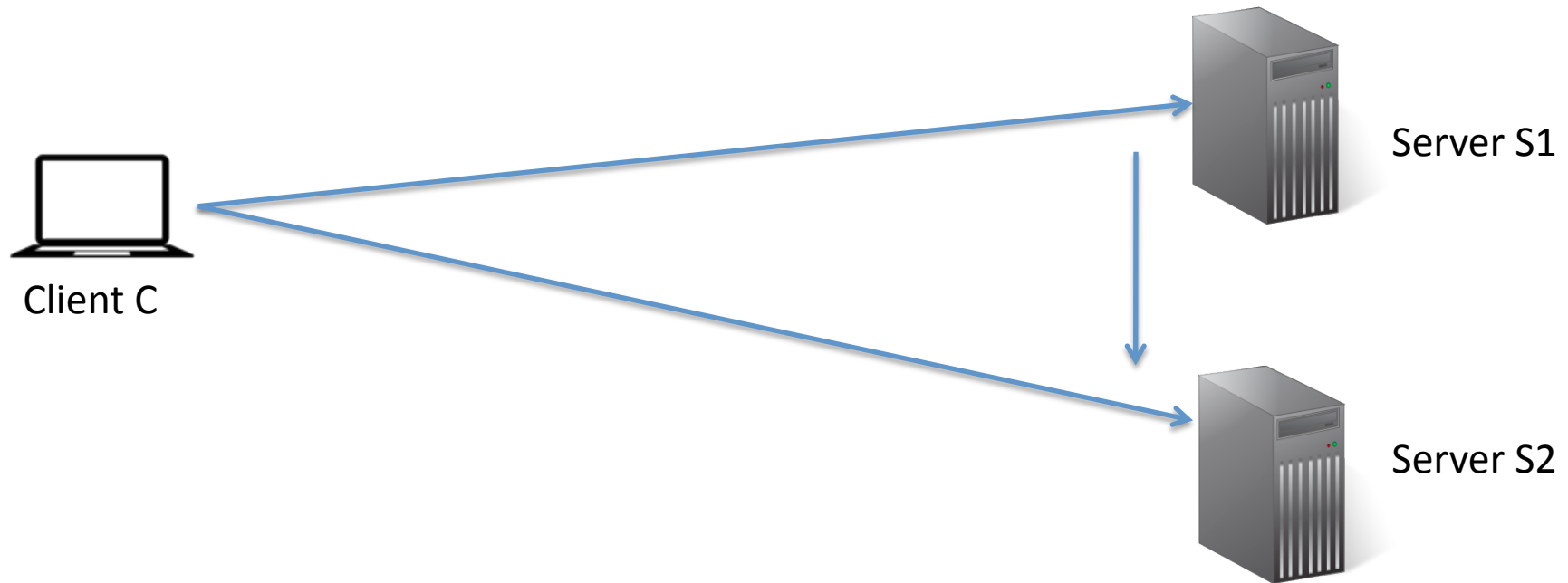
# Endpoint migration: What is it?



- Connection is transferred from S1 to S2 right after the 3WHS is finished and **before** the app kicks in
- Use cases:
  - Server load balancing
  - DoS protection
  - TLS offloading
  - Off-by default (connection is redirected after authentication)



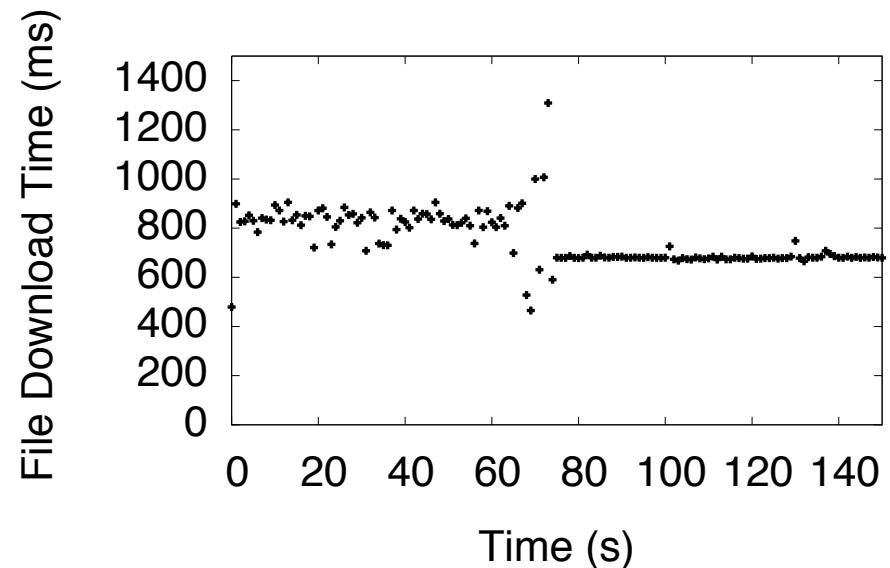
# Endpoint migration: How is it done?



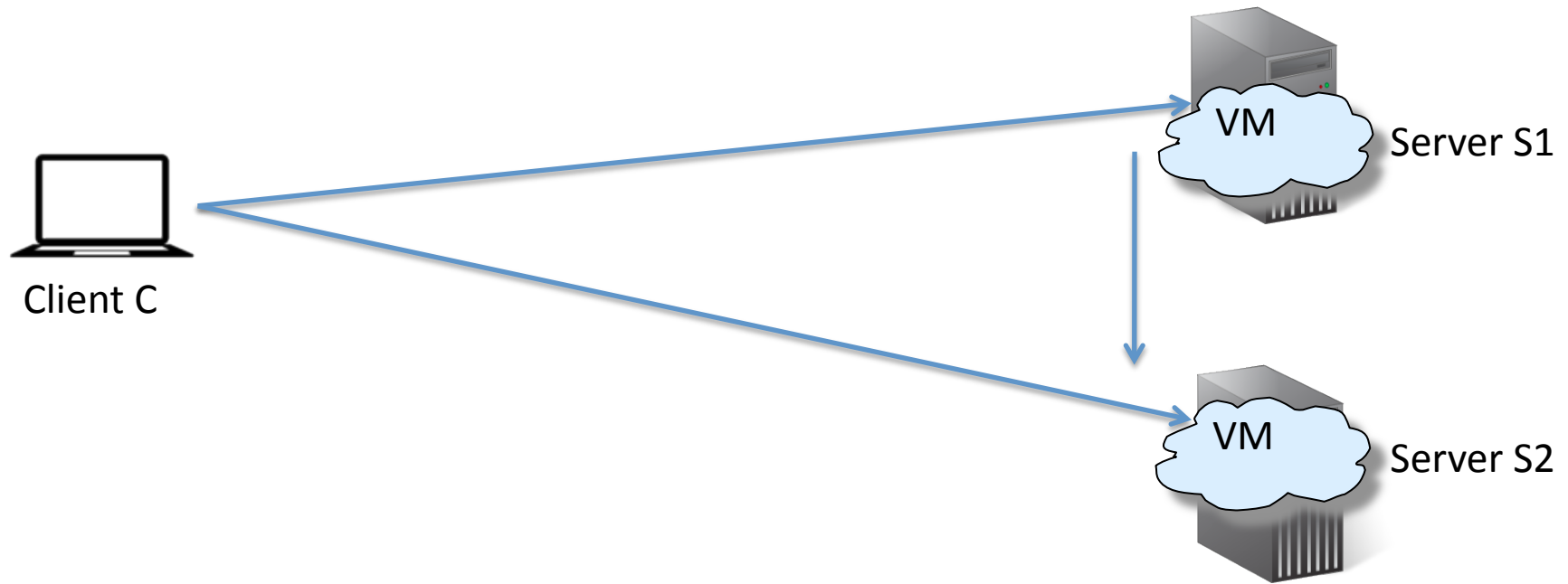
- C establishes MPTCP connection with S1
- Right after the 3WHS is finished, S1 forwards the crypto material (2 session keys) to S2
- S1 sends ADD\_ADDR to C with S2 address

# Endpoint migration: experiment

- Implemented the functionality
- The servers were running Apache on a 1 Gbps link serving a 25MB file to 2 clients that repeatedly downloaded the file
- Better performance:
  - Lower delay
  - Lower variance



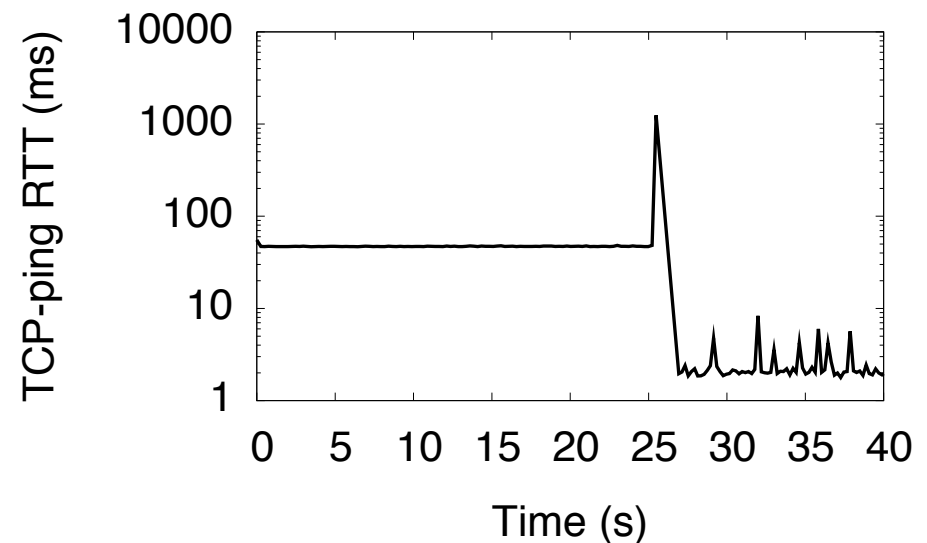
# Process migration: what is it?



- VM migration in the wide area (using different IP addresses)

# Process migration: experiment

- Implemented the functionality
- Client in Romania sends periodic requests to a Server in Germany. Server's VM is migrated to machine in Romania
- Perturbation lasts for few secs



# MPTCP use cases

- Multihomed device
- Multihomed site
- Mobility
- Data center TE
- Waypoint migration
- Endpoint migration
- Process migration
- Others...?