Multipath TCP with NAT64 Networks

Playing with ietf-nat64 Wireless Network

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A NAT64 Environment

IPv6

NAT64

Network 1
IPv4

Network 2
IPv6

IPv6

IPv4
Initiating Connection on v6

DNS req for v6.server.com

IPv6

DNS res: IPv6

Network 1

IPv4

IPv6

Network 2

IPv6

NAT64
Initiating Connection on v6

IPv6

NAT64

Network 1

IPv4

Network 2

IPv6

SYN to IPv6

SYN/ACK from IPv6
Then Adding IPv4 Subflow

IPv6

NAT64

Network 1
IPv4

Network 2
IPv6

ADD_ADDR(IPv4)
Then Adding IPv4 Subflow

Currently, no way for the client to infer the embedding!
What is the Problem?

• Client receives IPv4 address, but is IPv6 only
  – Address conversion performed by NAT64
  – Through DNS resolution

• Performing conversion at NAT64 seems bad
  – This is probably not its business
  – Could face problems with TCP option space
    • IPv6 takes 12 more bytes than IPv4 in ADD_ADDR
    • What if there is not enough space in the packet?
How to Solve This?

- Opportunistic client test
  - Client performs embedding of v4 into IPv6 address
  - Quite easy to implement…
  - … but only with Well-Known-Prefix (64:ff9b::/96)

- NAT64 can have Network-Specific Prefixes
  - Currently no way to infer it (easily)
    - Especially if client is behind multiple NAT64
  - But could be communicated thorough DHCP option
    - draft-li-intarea-nat64-prefix-dhcp-option-01