Towards Extending the TCP Option Space

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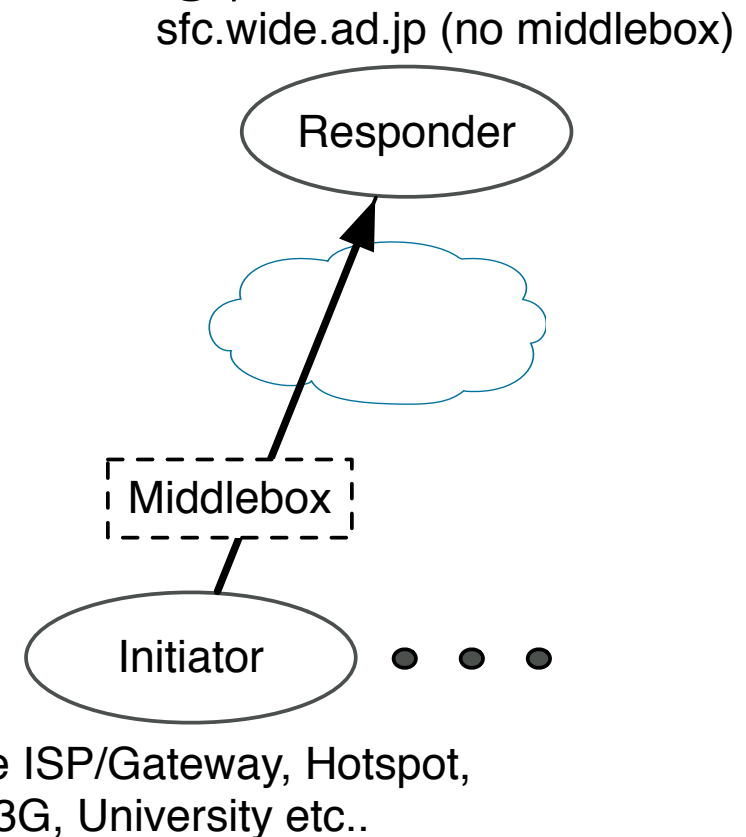
TSVWG in 82nd IETF meeting

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Motivation

- TCP option space is scarce! – 40 Byte limitation
  - e.g. How to use Multipath TCP and TcpCrypt simultaneously?
    - Some options are mostly reserved for regular options (e.g., TIMESTAMP and SACK blocks)
- Option 1:
  - Use of a part of payload
    - Specify the actual data offset in the regular TCP option space
- Option 2:
  - Reuse existing options (e.g., TIMESTAMP)
    - Embed control data in the TIMESTAMP value

Payload vs. Timestamp

- We measured middlebox behaviors in 142 paths and some NICs in early 2011

  - Control both ends of the measuring paths

    - You and we run the initiator tool (acts as TCP client) in many access networks

sfc.wide.ad.jp (no middlebox)

Responder

Middlebox

Initiator ● ● ●

Home ISP/Gateway, Hotspot,
3G, University etc..

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Option 1 (Use of Payload) is Bad Idea

- Retransmission with different payload (i.e., different options in the extended option space) is risky
  - TCP connection can be reset
  - Segments can be cached (symptomatic of Snoop)
- Middleboxes that understand deployed options don't understand options in the extended option space
  - Forget modifying SACKs in the extended option space
- We cannot use TCP Segmentation Offload (TSO)
  - They copies the option to all the split segments
  - Copying the option that specifies actual data offset to regular segments!

Option 2 (reuse TIMESTAMP) might be Good

- We observed three types of middlebox behavior
  - Pass TS
  - Removes TS
  - Doesn't reply to TS, but uses TS at the server side independently
- draft-scheffenegger-tcpm-timestamp-negotiation-03
  - How strange is it from the middlebox view?
    - TSecr in the SYN
    - Incredibly distant TS values
    - Different TSecr from the TSval

Please Contribute to the Next Tests!

- **Is the extended option space in TIMESTAMP safe?**

- We will announce the second call for contributions on middlebox measurements at the end of this IETF meeting

  - I'm now implementing tests for extended option space in TIMESTAMP!

  - We also added some tests (e.g., SYN with payload)

- Please run a self-contained tool for 15 min experiments!

- http://web.sfc.wide.ad.jp/~micchie/middlebox/cfc.html

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