A generic control stream for Multipath TCP

Christoph Paasch
Olivier Bonaventure

draft-paasch-mptcp-control-stream-00

Extensibility of Multipath TCP

- More sophisticated security for MPTCP

- Other future extensions to MPTCP

- TCP-options space is scarce (40 bytes only)

  Proposal to extend TCP's option space

draft-kohler-tcpm-extopt (2004)

Use values 0 to 4 of the data-offset (currently not allowed)

Not deployable as stacks reject segments whose data-offset < 5.

draft-eddy-tcp-loo (2008)

Adding new options that indicate the "real" TCP-option space

Will not work across TCP segmentation offloading NICs.

(ab)use the urgent-pointer

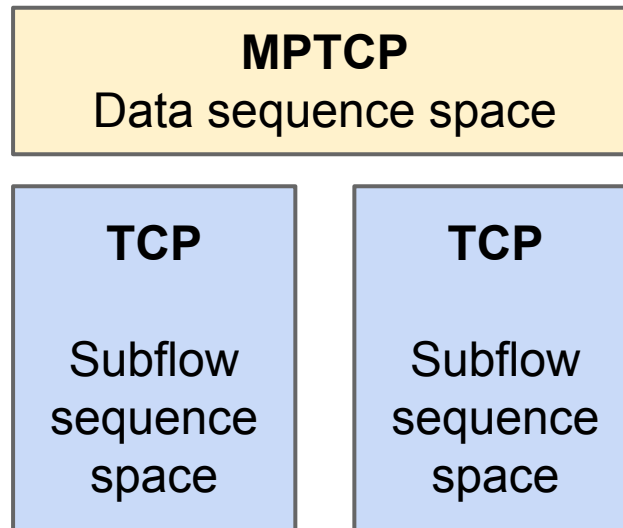The urgent-pointer could indicate the end of the control data

Middleboxes seem to mess around with the urgent pointer (RFC 6093).
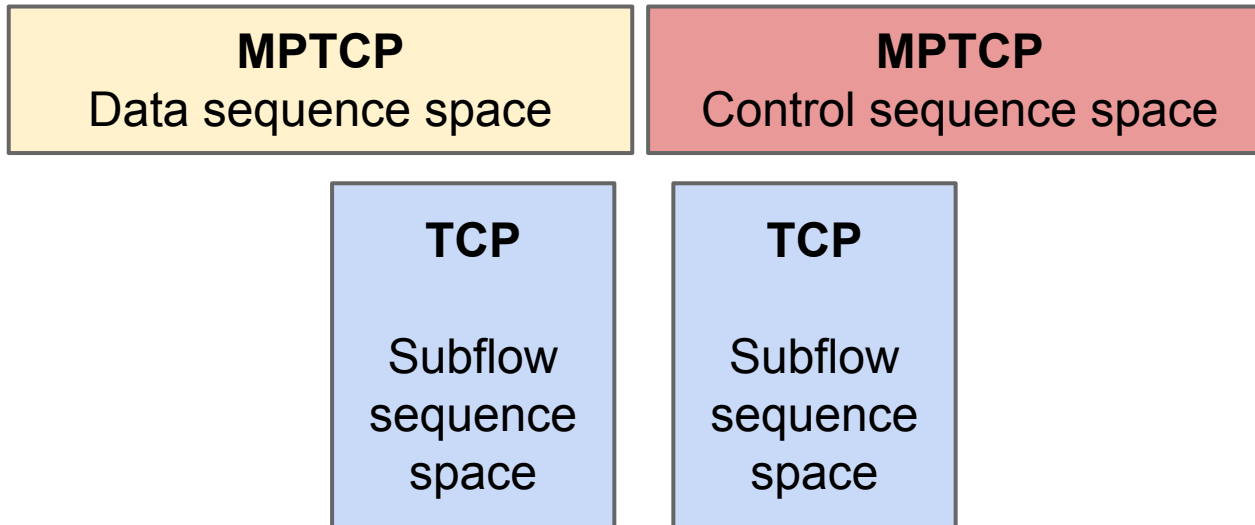
Multipath TCP Control Stream

Multipath TCP control stream

- Reliable, in-order delivery of control information

- Generic TLV-format for maximum extensibility

- Sent inside segment's payload for maximum space
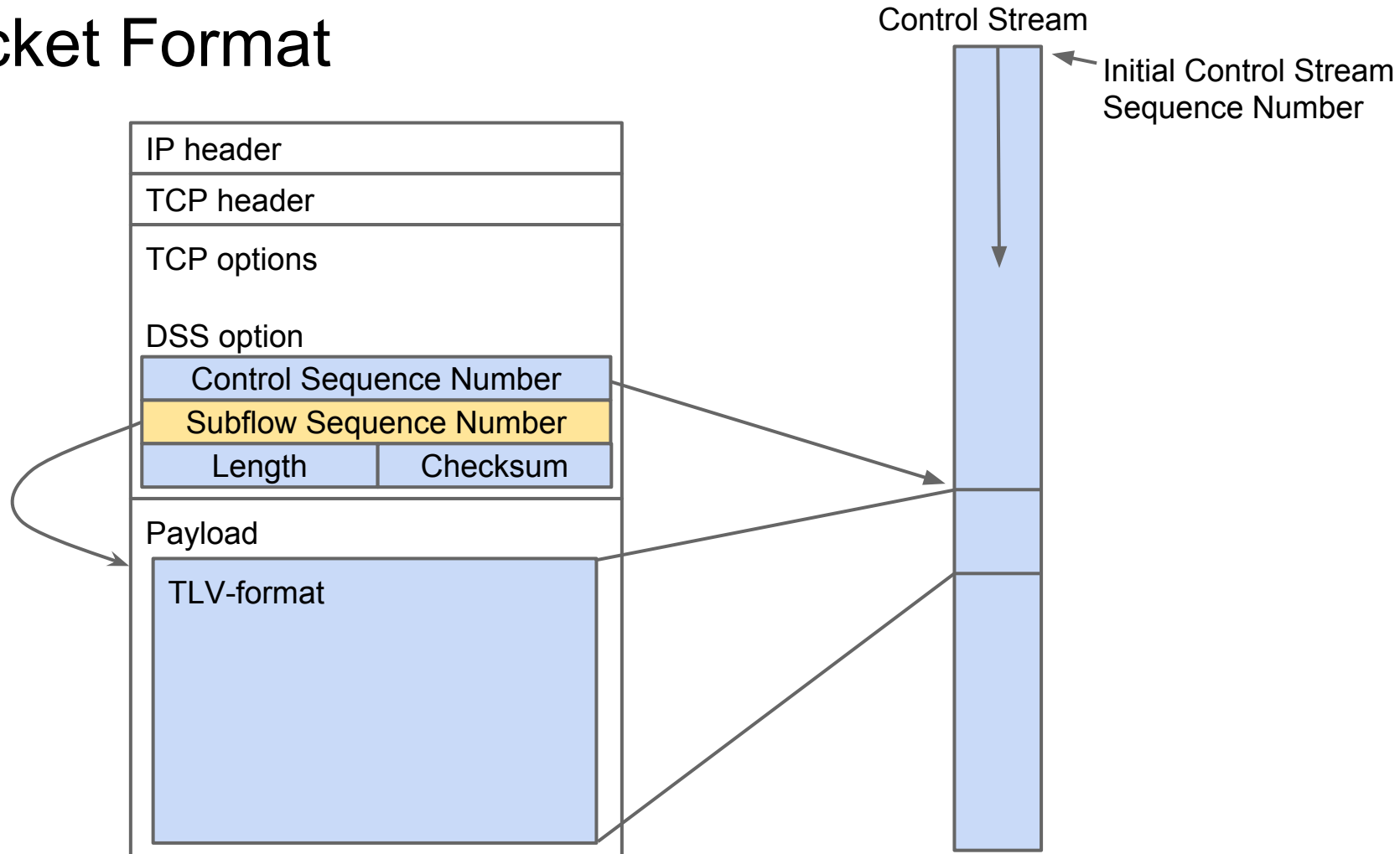
Multipath TCP control stream

MPTCP Data sequence space	
TCP Subflow sequence space	**TCP** Subflow sequence space

Multipath TCP control stream

MPTCP Data sequence space	MPTCP Control sequence space

TCP Subflow sequence space	TCP Subflow sequence space

Multipath TCP control stream

Packet Format

IP header	
TCP header	
TCP options	
DSS option	
Control Sequence Number	
Subflow Sequence Number	
Length	Checksum
Payload	
TLV-format	

Control Stream
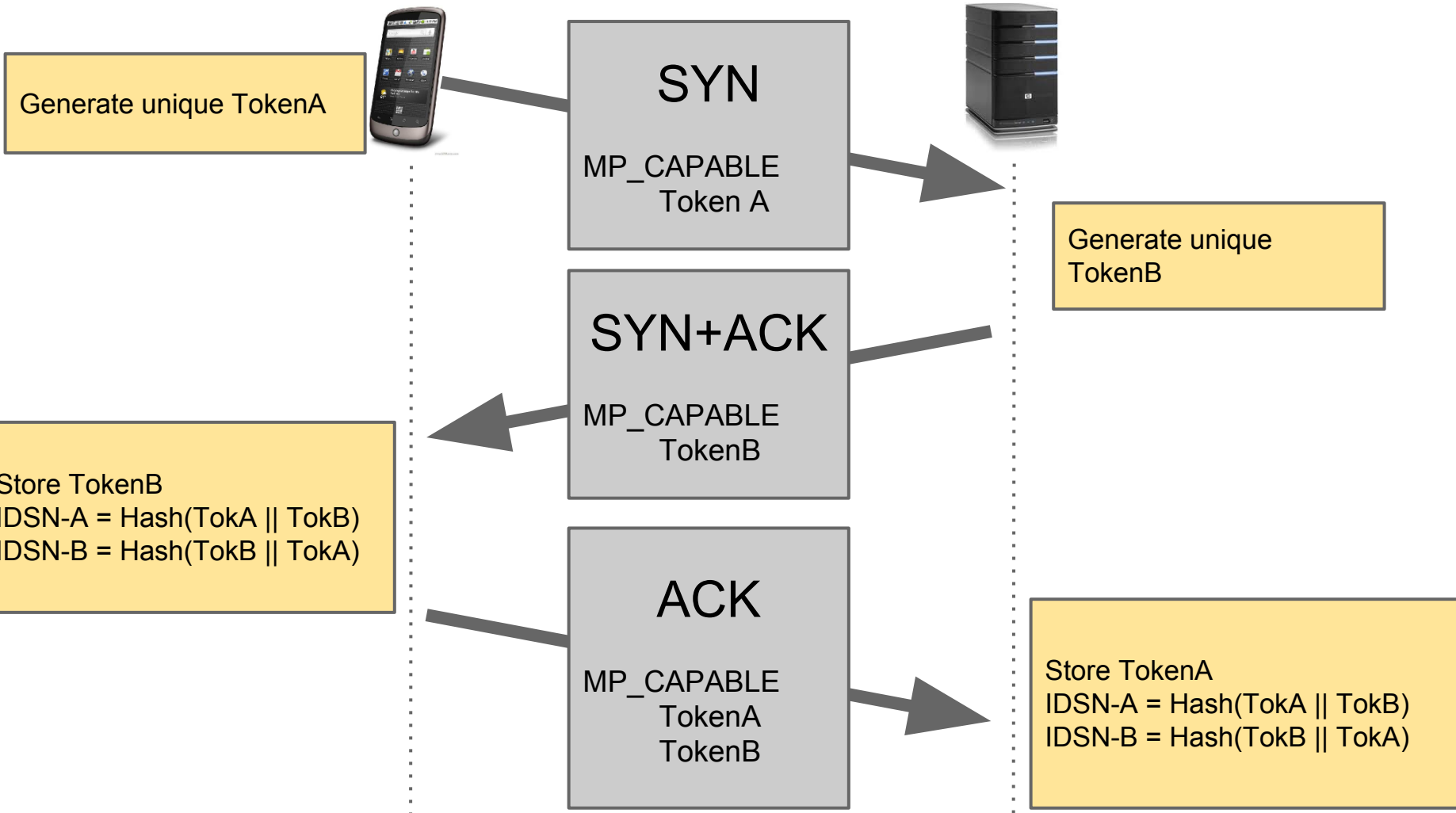
Initial Control Stream Sequence Number
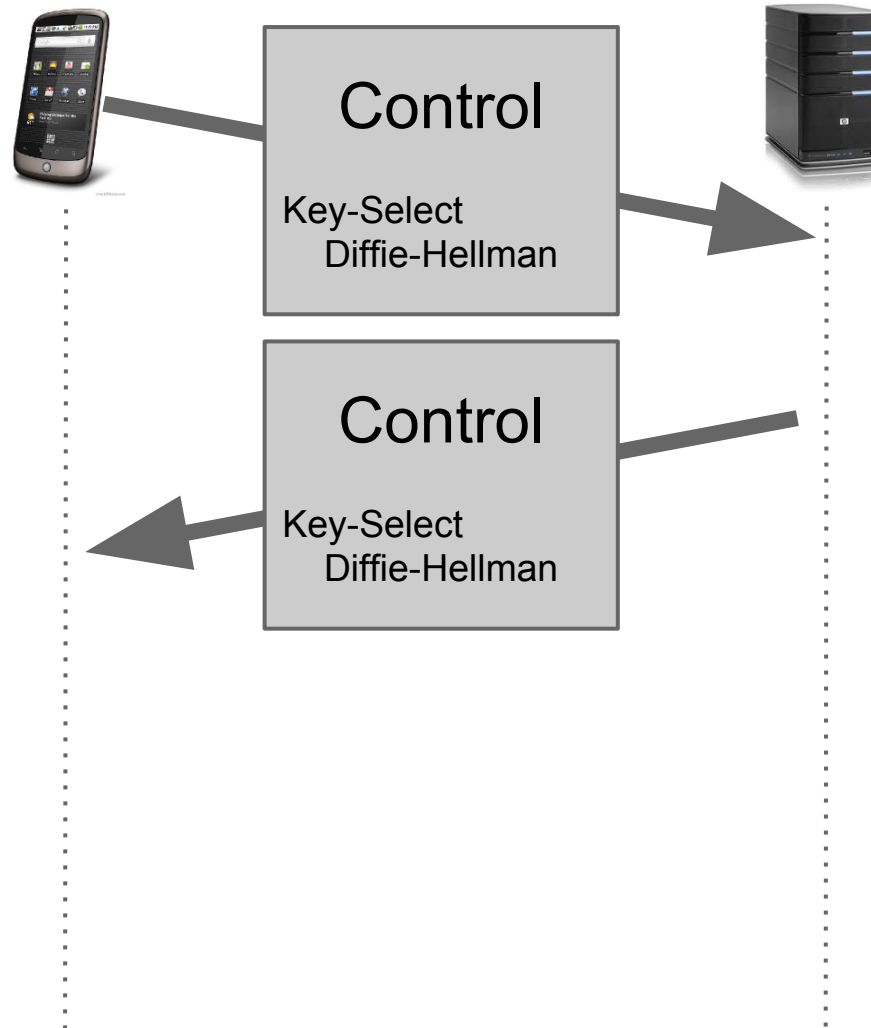
Use-Cases

- Negotiate crypto-info for authentication
  - tcpcrypt
  - SSL
  - …

- General MPTCP control info
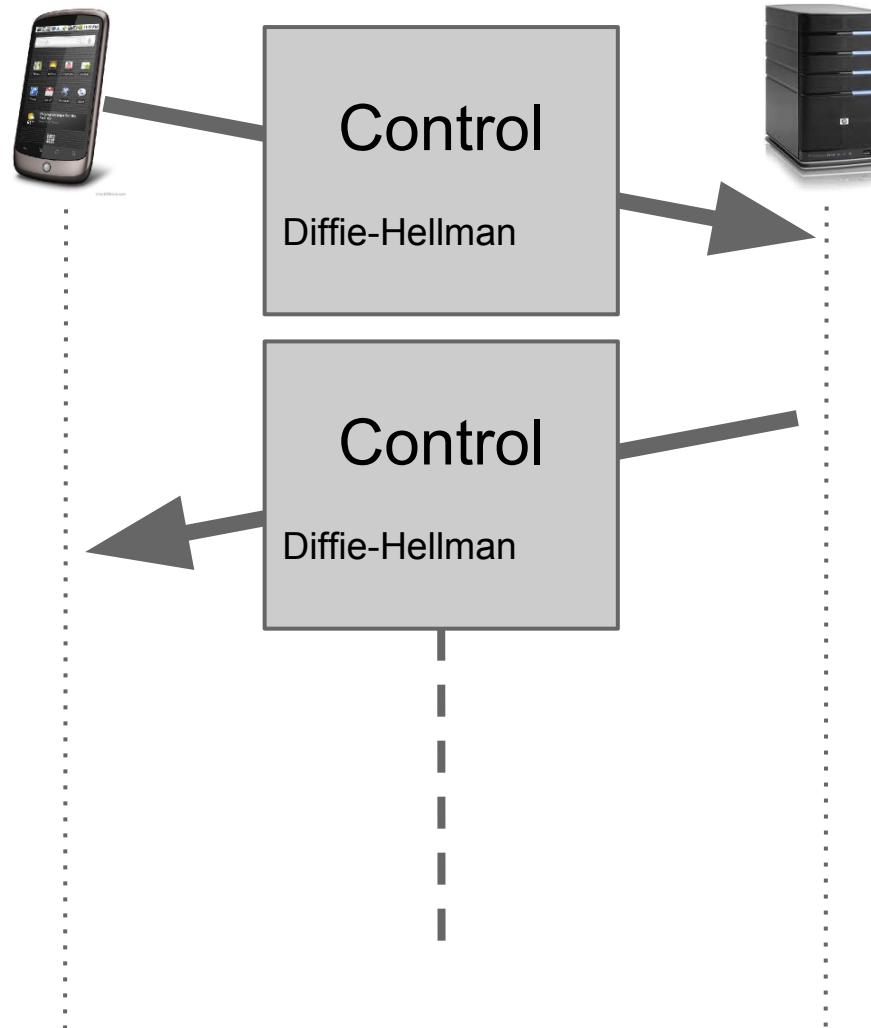 - Address agility
  - Subflow priorities
  - ...

Modified initial handshake

Generate unique TokenA

SYN

MP_CAPABLE
Token A

Generate unique
TokenB

SYN+ACK

MP_CAPABLE
TokenB

Store TokenB
IDSN-A = Hash(TokA || TokB)
IDSN-B = Hash(TokB || TokA)

ACK

MP_CAPABLE
TokenA
TokenB

Store TokenA
IDSN-A = Hash(TokA || TokB)
IDSN-B = Hash(TokB || TokA)

Choose Crypto-selection

Choose Crypto-selection

To conclude

Control stream …

- … enables reliable, in-order delivery of control info

- … overcomes the limited TCP option space

- … allows for maximum extensibility in the future of MPTCP