A Modification to Make PAWS Robust to Segment Reordering

<draft-demizu-tcpm-paws-reordering-00.txt>

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Problem

- PAWS may discard reordered legitimate segments when retransmission happens.

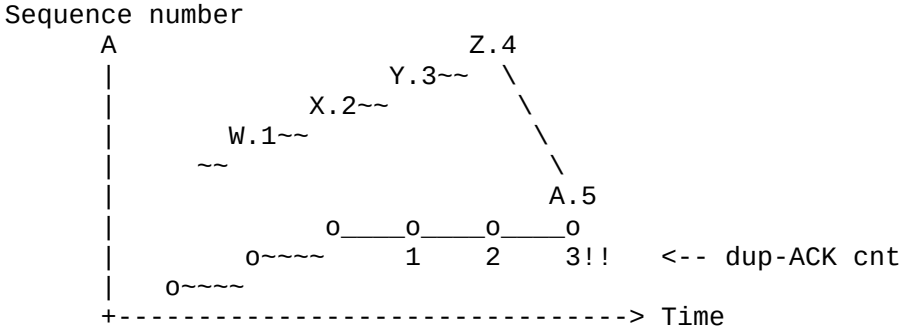
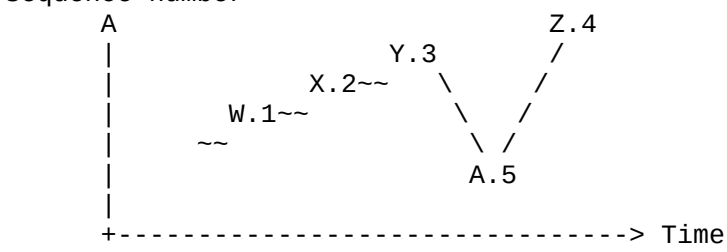


Figure 1: Time vs. sequence number at a sender



Segment	(prev)	W.1	X.2	Y.3	A.5	Z.4
PAWS	-	Pass	Pass	Pass	Pass	Fail
TS.Recent	0	0	0	0	5	5
RCV.NXT	A	A	A	A	>A	>A

Figure 2: Time vs. sequence number at the receiver

Possible Solutions

1. Receiver-side Modification
   - Proposal: SEG.TSval < TS.Recent - RTT
2. Sender-side Modification

    - Use a specific value between the TS.SndMin value and the TS.SndMax value for the TSval on the segment.
3. A Replacement of PAWS
    - Current proposal in the I-D (See Next page).

Any other good ideas?

Current Proposal: A Replacement of PAWS

- Record the following tuple for every 2^30 bytes of data.
    - (receiving time, sequence number, TSval)
- Any incoming segment should be checked as follows:
    - If the second latest tuple is not older than 24 days ago, and the SEG.TSval value on the received segment is older than the TSval value in the second latest tuple, the incoming segment is an old duplicate segment.

Issues and Future Work

- Issue 1: Fails to protect ACK segments against old duplicate ACK segments.
  --> Planning to solve it by applying the proposed algorithm also to acknowledgement number.
- Issue 2: Does not describe procedure after 24 days idle.
  --> Planning to add it.