TCP FWA: Fast Window Advance for TCP

draft-thejeswara-tcpm-tcp-fwa-01

Thejeswara Reddy

Harsh Kothari

Srinivas Chinthalapudi
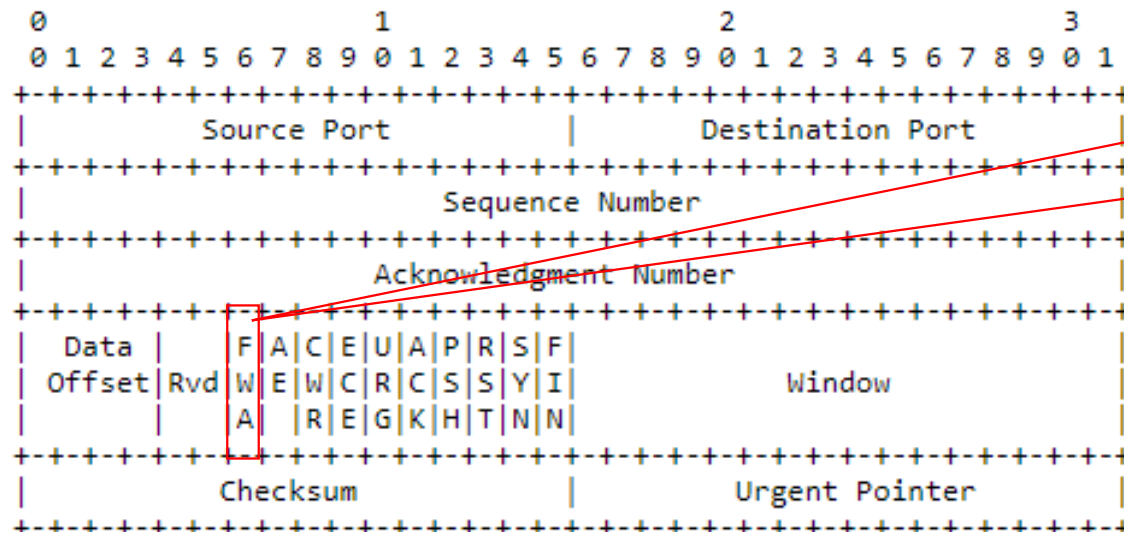
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Intro: motivation

- TCP RTO (retransmission timeout)
  - TCP RTO ensures data reliability by retransmission as per RFC 9293.
  - TCP RTO does not consider Sessions Timeout in application context.

- Head of Line Blocking (HOL)
  - A protocol state TCP can not process the received data, until the missing segment is received.

- Congestion Control Window (cwnd)
  - Changing congestion window (cwnd) of the sender based on congestion control algorithm doesn't help to align TCP transmission as per Application Session status.

- TCP User Timeout Option (UTO)
  - Terminates the TCP connection after timeout for unacknowledged data and impacts the session continuity of application.

Intro: addition of FW flag in TCP Header

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|          Source Port          |       Destination Port        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                        Sequence Number                        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                     Acknowledgment Number                     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Data  |     |F|A|C|E|U|A|P|R|S|F|                               |
| Offset|Rvd  |W|E|W|C|R|C|S|S|Y|I|            Window             |
|       |     |A| |R|E|G|K|H|T|N|N|                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|           Checksum            |         Urgent Pointer        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

- Extend TCP flags by utilizing one bit among the reserved bits.
- This new flag is termed as Fast Window Advance (FWA)

- **FWA (Fast Window Update) : 1 bit**
  - When application has closed its session as failure and application wants TCP layer of both sender and receiver to flush any previous data even if application data is not acknowledged by the receiver. Application can configure setting FWA flag through socket option interface.

Status

- Internet Draft
  - draft-thejeswara-tcpm-tcp-fwa-01

- September 2023
- Version - 01

Draft Content (I/IV)

- Section 5 : "TCP Header Modification"
    - Modified header depicting introduction of TCP FWA bit.

    - Brief introduction on operation of FWA bit at both sender and receiver side.

Draft Content (II/IV)

- Section 6 : "FWA flag Operation"
  - Introduction of new TCP variable SND.FWS to TCP Control block.

  - Configuring TCP FWA trough socket options.

  - Updating TCP Sequence number based on derived SND.FWS

  - TCP FWA bit processing on receiver side.

Draft Content (III/IV)

- Section 6.1 : "FWA impact"
  - Addressing TCP FWA flag impact on middle boxes and TLS case.

  - Normative language to suggest improvement in good put .

Draft Content (IV/IV)

- Section 7 : "Example usage"
  - Example to describe socket option usage for enabling TCP FWA bit.

  - Normative language to describe case when TCP FWA bit is set to 1.

Next steps

- No (further) outstanding issues we are aware of
  - Areas of improvement?
  - Other suggestions?
  - Reviews?

Thanks!
Questions? Comments?

Thejeswara Reddy

Harsh Kothari

Srinivas Chinthalapudi

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