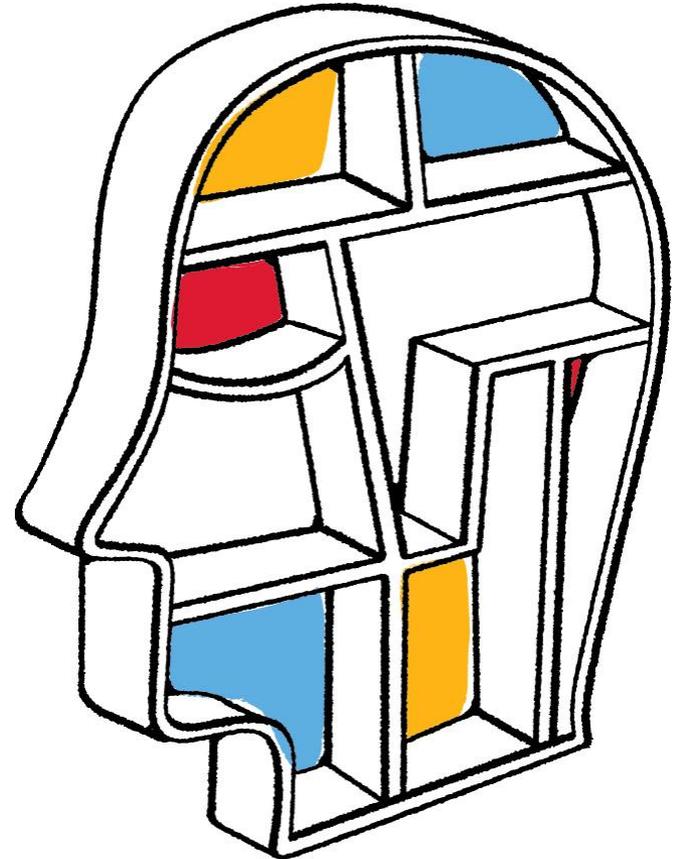# RFC1323bis – TCP Extensions for High Performance

Richard Scheffenegger (Editor)

David Borman

Bob Braden

Van Jacobson

`http://tools.ietf.org/html/draft-ietf-tcpm-1323bis-06`

RFC1323bis – since IETF85

- ## Feedback from three reviewers

- ## No change in technical content
  - last change in -02
- ## Editorial Changes (reviewer feedback)
  - shortened introduction
  - "changes" section is last appendix
  - Introduction updated to align with later sections
  - Word smiting

RFC1323bis – delta to RFC1323 (content)

- Window Scale option:
  - Clear guidance to implementers for corner cases (Window Reduction – Section 3.4)
- Timestamp option:
  - Updated wording to allow "late" Timestamp enabling (non SYN)
  - Clear guidance which TS values can update RTT
  - Edge cases in receiver TS processing
  - Explicitly address <ACK> with SACK option
  - Recommend TS in <RST>, but exclude from PAWS test

RFC1323bis – delta to RFC1323 (editorial)

- Formatting updated (using xml2rfc instead of noff)
  - Errata of 1323 addressed
  - Indentation of RFC1323 fixed
- Use of RFC2119 wording in normative sections
- New pseudo code appendix D
- Addressing lots of Nits mentioned over the years
  - oversights, word smiting
  - Proper variable names in appendices
  - Fixed internal references and added/updated external references
- TS Offset explicitly mentioned
  - To address potential information leak

Introduction (upcoming)

- Original conception of the text concerned WS, TS and SACK simultaneously. Updated to properly apply to the two options remaining in this document.

Old:

```
                          ... Therefore, for each of the
extensions defined below, TCP options will be sent on non-SYN
segments only when an exchange of options on the SYN segments has
indicated that both sides understand the extension.
```

New:

```
The window scale option negotiates fundamental parameters of the TCP
session.  Therefore, it is only sent during the initial handshake.
Furthermore, the window scale option will be sent in a <SYN,ACK>
segment only if the corresponding option was received in the initial
<SYN> segment.

The timestamps option may appear in any data or ACK segment, adding
12 bytes to the 20-byte TCP header.  It is recommended that this TCP
option will be sent on non-SYN segments only after an exchange of
options on the SYN segments has indicated that both sides understand
the extension. ...
```
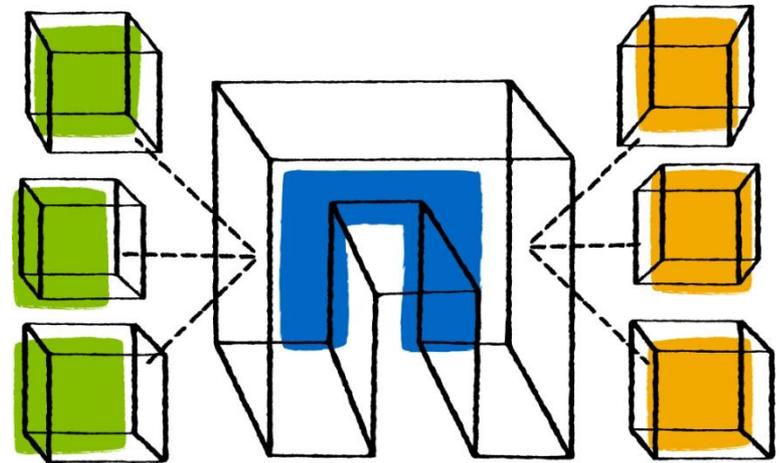
Next steps

- Technical changes are uncontested since -02
- Editorial changes only
  - important to clarify to implementers
- Current open editorial point
  - Change "Changes" section from chronological to partitioned technical/editorial, sorted by section

- Ready for WLC
  - Final discussions on specific wording during WLC

Thank you

Backup

Window Scale Retraction

- Expanded text to dedicated section 3.4
- Explicitly quoted section 4.2.2.16 of RFC1122 to describe the expected behavior.

Timestamp negotiation

- Allow late negotiation:

Old:

A TCP may send the Timestamps option (TSopt) in an initial
<SYN> segment (i.e., a segment containing a SYN bit and no ACK
bit), and may send a TSopt in other segments only if it re-
ceived a TSopt in the initial <SYN> segment for the connection.

New:

A TCP MAY send the Timestamps option (TSopt) in an initial <SYN>
segment (i.e., a segment containing a SYN bit and no ACK bit). Once
a TSopt has been sent or received in a non <SYN> segment, it MUST be
sent in all segments. Once a TSopt has been received in a non <SYN>
segment, then any successive segment that is received without the RST
bit and without a TSopt MAY be dropped without further processing,
and an ACK of the current SND.UNA generated.

Timestamp RTTM processing

- Only reflect timestamp from last in-sequence data packet.

- Only process timestamp when new data is acknowledged.

- However, ACK loss may lead to increased RTT (first ACK in a series of duplicates lost)

- Presence of SACK option indicates that reordering/loss was present at the receiver, sender SHOULD ignore that RTT update.

Technical Changes between -01 and -02

- Window Scale (WS):
  - sec 2.4 window retraction – M. Mathis
- Timestamp (TS):
  - sec 3.2 removed text to allow potential in-session negotiation of TS – M. Mathis
  - sec. 3.3 explicitly excluding ACKs with selective acknowledgements (SACK) for round trip-time measurement (RTTM) processing – R. Scheffenegger