TCP Usage Guidance in the Internet of Things

draft-ietf-lwig-tcp-constrained-node-networks-05

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Status

• IETF 103
  – Presented draft-ietf-lwig-tcp-constrained-...-04
    • LWIG and TCPM
    • Asked whether it was a good moment for WGLC

• Last revision is draft-ietf-lwig-tcp-constrained-...-05
  – Addresses feedback received on -04:
    • Reviews by Yoshifumi Nishida and Ilpo Järvinen
    • Comments by David Black and Emmanuel Baccelli
    • Code size measurements by Rahul Jadhav

• Post-cutoff feedback by Stuart Cheshire
  – On -04
  – No significant issues
Updates (I/V)

• Section 4.1.1. Maximum Segment Size (MSS)
  – Modified the ordering to start with the main recommendation
  – A longer MSS (to a reasonable extent) reduces the number of packets for transferring larger payloads

• Section 4.1.2. Explicit Congestion Notification (ECN)
  – Congestion can be signalled without packet drops
  – RTO may incur a wake-up action, in contrast with ACK-clock triggered sending
Updates (II/V)

• 4.2. TCP guidance for single-MSS windows & buffers
  – Previously, “small”

• 4.2.3. Delayed ACKs for single-MSS stacks
  – Usefulness of Delayed ACKs depends heavily on the usage scenario
  – Senders using Nagle may suffer similar delay issues as those produced by receivers using Delayed ACKs
    • Disabling Nagle has no impact for stop-and-wait senders

• 4.2.4. RTO estimation for single-MSS stacks
  – Added reference to draft-ietf-tcpm-rto-consider
Updates (III/V)

• 5.2. Number of concurrent connections
  – Overhead of the 3-way handshake of each additional connection

• 5.3. TCP connection lifetime
  – TFO deviates from standard TCP semantics
    • The data in a SYN could be replayed to an application in some circumstances
    • Applications should not use TFO unless the issue can be tolerated
      – Timely detection of a dead peer may allow memory savings
      – Sending TCP keep-alives frequently drains power on energy-constrained devices
Updates (IV/V)

- **6. Security considerations**
  - Removed TCP MD5 signature option

- **Annex**
  - uIP
    - Multiple connections need to share the same global buffer
    - TCP implementation in Contiki-NG (code size) is 3.2 kB on CC2538DK
  - RIOT
    - 32-bit platforms, also supported
    - Optional support for POSIX compliant socket
    - References to the main sources
  - TinyOS
    - A send buffer is provided by the application
Updates (V/V)

- Annex

<table>
<thead>
<tr>
<th>Feature</th>
<th>uIP</th>
<th>lwIP orig</th>
<th>lwIP 2.1</th>
<th>RIOT</th>
<th>TinyOS</th>
<th>FreeRTOS</th>
<th>uC/OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory Code size(kB)</td>
<td>&lt;5</td>
<td>~9 to ~14</td>
<td>38</td>
<td>&lt;7</td>
<td>N/A</td>
<td>&lt;9.2</td>
<td>N/A</td>
</tr>
<tr>
<td>(a) (T1)</td>
<td>(T4)</td>
<td>(T3)</td>
<td>(T2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Single-Segm. Yes | No | No | Yes | No | No | No | No |
- Slow start No | Yes | Yes | No | Yes | No | Yes |
- Fast rec/retx No | Yes | Yes | No | Yes | No | Yes |
- Keep-alive No | No | Yes | No | No | No | Yes | Yes |
- Win. Scale No | No | Yes | No | No | Yes | No |
- TCP time No | No | Yes | No | No | Yes | No |
- SACK No | No | Yes | No | No | Yes | No |
- Del. ACKs No | Yes | Yes | No | No | Yes | Yes |
- Socket No | No | Yes | Yes | Yes | Yes | Yes |
- Concur. Conn. Yes | Yes | Yes | Yes | Yes | Yes | Yes |
- TLS supported No | No | Yes | Yes | Yes | Yes | Yes |
Post-cutoff feedback

• Stuart Cheshire’s comments on -04
  – Suggested additional text in the document (not in a reference) about options 0, 1 and 2
  – “MSS ≤ 1220 bytes”
    • Explicitly state assumption that remote peer sends no TCP options, aside from the MSS option in the SYN packet
    • Some platforms will include TCP timestamps (12 bytes). Advertise MSS ≤ 1200 bytes to accommodate possible unrequested TCP options
  – Request/Response traffic
    • Disabling Delayed ACKs not recommended
Ready for WGLC ?