TCP over Constrained-Node Networks

draft-gomez-lwig-tcp-constrained-node-networks-02

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IETF 98 – Chicago, March 2017
Status

• draft-gomez-core-tcp-constrained-node-networks-00
  – Presented in IETF 96 (LWIG and TCPM WGs)
• draft-gomez-lwig-tcp-constrained-node-networks-01
  – Presented in IETF 97 (LWIG)
  – Several updates
• draft-gomez-lwig-tcp-constrained-node-networks-02
  – Several updates
  • Comments by Michael Scharf
Motivation

• Several application layer protocols being used for the Internet of Things (IoT)
  – Constrained Application Protocol (CoAP)
    • Originally over UDP
    • CoAP over TCP in progress
      – To overcome middlebox problems
  – HTTP/2 and HTTP/1.1
  – XMPP
  – MQTT

• TCP is being / will be used in many IoT scenarios
  – Offer simple measures for suitable TCP implementation/operation over CNNs
Updates in -02 (I/VI)

- Intended status
  - Informational

- 2. Characteristics of CNNs relevant for TCP
  - Explicit definition of CNNs
  - RFC 7228

- 4.2. Maximum Segment Size (MSS)
  - Added information on links with MTU greater than 1280 bytes
    - MS/TP (1500 bytes)
    - IEEE 802.11ah (7991 bytes)
    - NB-IoT (1600 bytes)
  - TCP MSS may be set to a value > 1220 bytes
    - As long as IPv6 datagram size is not exceeded
Updates in -02 (II/VI)

• 4.3. Window size
  – Single-MSS window now not recommended
  – “A TCP stack can reduce implementation complexity by advertising a TCP window size of one MSS, and also transmit at most one MSS of unacknowledged data, at the cost of decreased performance”
Updates in -02 (III/VI)

• 4.4. RTO estimation
  – If small window size used, Fast Retransmit / Fast Recovery or SACK may not be used
    • Then the RTO algorithm has larger impact on performance
    • RTO algorithm tuning may be considered
      – With care!
  • Fundamental trade-off
    – Aggressive RTO behavior reduces wait time before retries
    – ... but also increases probability of spurious timeouts
Updates in -02 (IV/VI)

• 4.4. RTO estimation
  – CoCoA RTO algorithm still mentioned...
  – ... now as a “related note”

• 4.8. Delayed acknowledgments
  – Not recommended for scenarios with mostly transactional traffic (< 1 MSS)
  – Allow to reduce number of ACKs in bulk transfers
    • No particular assumption whether these are common or not
Updates in -02 (V/VI)

• 5. Security considerations
  – TCP options that improve security
    • TCP MD5 signature option
      – RFC 2385
    • TCP Authentication Option (TCP-AO)
      – RFC 5925
  – Add overhead and complexity
    • MD5 adds 18 bytes to each segment
    • TCP-AO typically has a size of 16-20 bytes
Updates in -02 (VI/VI)

- Annex

<table>
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<tr>
<th></th>
<th>uIP</th>
<th>lwIP orig</th>
<th>lwIP 2.0</th>
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<th>OpenWSN</th>
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<tr>
<td>Memory</td>
<td></td>
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More details welcome!
WG adoption ?