TCP Usage Guidance in the Internet of Things

draft-ietf-lwig-tcp-constrained-node-networks-01

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Status

- WG document after IETF 99 (Prague)

- draft-ietf-lwig-tcp-constrained-…-01
  - Last revision
  - Feedback from IETF 99
  - Comprehensive review by Hannes Tschofenig
  - Further on-list comments
    - Rahul Jadhav, Joe Touch, Abhijan Bhattacharyya…

Updates (I/VIII)

- Title
  - Old: TCP over Constrained-Node Networks
  - New: TCP Usage Guidance in the Internet of Things

- Abstract
  - Old
    - Profile
  - New
    - Guidance: techniques that simplify a TCP implementation
    - Related trade-offs
    - Help embedded developers with decisions

Updates (II/VIII)

- 1. Introduction
  - Optional TCP extensions increase codesize and RAM requirements
    - Many are not required for interoperability
    - Careful tuning can make the implementation lightweight
  - A TCP implementation following guidance in this document
    - Intended to be compatible with a TCP endpoint compliant with TCP standards
      - Possibly with lower performance in some aspects

Updates (III/VIII)

- 3. Characteristics of CNNs relevant for TCP
  - Structure:
    - 3.1. Network and link properties (former section 2)
    - 3.2. Usage scenarios (former section 3)
    - 3.3. Communication and traffic patterns
  - Traffic patterns
    - Unidirectional transfers
    - Request-response transfers
    - Bulk data transfers
  - Constrained-to-constrained possible

Updates (IV/VIII)

- 4.2. Maximum Segment Size (MSS)
  - Redundancy removed (editorial update)

- 4.3. Window size
  - Devices that support a larger TCP window size may benefit from Fast Retransmit and Fast Recovery
    - Window of 5 MSS needed (i.e. 6100 bytes for 1220-byte MSS)
  - Bulk data transfers may benefit from Limited Transmit

Updates (V/VIII)

- 4.4. RTO estimation
  - Trade-off more explicitly described
    - Aggressive vs conservative
  - There exists margin for RTO algorithm tuning
    - CoCoA cited as an example

Updates (VI/VIII)

- 4.8. Delayed Acknowledgments
  - Problem
    - Single-MSS window sender transmitting to a receiver that uses Delayed ACKs (e.g. outside the CNN)
  - Workaround: “Split hack”
    - Split the data into two segments of smaller size
    - Downside: overhead of two packets
- 5. Security considerations
  - BCP for securing TCP also applies in CNNs
    - E.g. TLS
  - Sec considerations of the mechanisms discussed apply

Updates (VII/VIII)

- 7.1. Annex: uIP
  - In case of a retransmission, the application must be able to reproduce the same **user data**
  - “Split hack”
- 7.5. Annex: TinyOS
  - The application is responsible for buffering
    - Send buffer available
    - Multiple-MSS window
- References
  - Better distinction: normative vs informative

Updates (VIII/VIII)

More details welcome!

- Annex

		uIP	lwIP orig	lwIP 2.0	RIOT	OpenWSN	TinyOS
Memory	Data size	*	*	*	*	*	*
	Code size (kB)	< 5	~9 to ~14	*	*	*	*
TCP features	Window size (MSS)	1	Multiple	Multiple	1	1	Multiple
	Slow start	No	Yes	Yes	No	No	Yes
	Fast rec/retx	No	Yes	Yes	No	No	Yes
	Keep-alive	No	*	*	No	No	No
	TFO	No	No	*	No	No	No
	ECN	No	No	*	No	No	No
	Window Scale	No	No	Yes	No	No	No
	TCP timestamps	No	No	Yes	No	No	No
	SACK	No	No	Yes	No	No	No
	Delayed ACKs	No	Yes	Yes	No	No	No

Potential changes for -02

- Possible reorganization of Section 4 contents
  - Change the order of some subsections
    - E.g. “Delayed ACKs” subsection, more relevant than the “ECN” one
  - Other approaches
    - Single-MSS vs multiple-MSS window size

Thanks!

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