

TCP Usage Guidance in the Internet of Things

draft-ietf-lwig-tcp-constrained-
node-networks-03

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Status

- Since IETF 101
 - draft-ietf-lwig-tcp-constrained-...-03
 - Feedback from IETF 101
 - Completed few sections

Updates (I/IV)

- Section 4.1.2. ECN
 - ECN can be incrementally deployed
 - Guidance on usage of ECN in RFC 7567
 - Benefits (throughput, delay, etc.) in RFC 8087
 - Number of TCP stacks supporting ECN is increasing
 - ECN allows applying congestion control measures early, decreases packet losses and retries
 - Useful for CNNs in general
 - Useful for transactional traffic with small data size
 - There may be no 3 duplicate ACKs with small windows
 - RTO expiration would slow down the transfer

Updates (II/IV)

- Section 6: Security Considerations
 - Added text on *shrew* DoS attacks
 - One or more sources generate packets to coincide with consecutive retry attempts of a victim node, triggered by RTO expiration
 - In CNNs, small window sizes relatively frequent
 - Constrained nodes may be appealing victims of this attack
 - Mitigation techniques
 - RTO randomization
 - Attack blocking by routers, based on traffic pattern

Updates (III/IV)

- 8. Annex
 - Intro: added notes
 - Survey limited to open source stacks
 - Not intended to be all-encompassing
 - Based on information available as of the writing
 - Added notes on absence of recent activity
 - OpenWSN, TinyOS TCP implementations

Updates (IV/IV)

	uIP	lwIP orig	lwIP 2.0	RIOT	OpenWSN	TinyOS	FreeRTOS	uC/OS	
Memory	Code size (kB)	<5 (a)	~9 to ~14 (T1)	~40 (b)	<7 (T3)	N/A	N/A	<9.2 (T2)	N/A
	Win size (MSS)	1	Mult.	Mult.	1	1	Mult.	Mult.	Mult.
	Slow start	No	Yes	Yes	No	No	Yes	No	Yes
T	Fast rec/retx	No	Yes	Yes	No	No	Yes	No	Yes
C	Keep-alive	No	No	Yes	No	No	No	Yes	Yes
P	Win. Scale	No	No	Yes	No	No	No	Yes	No
f	TCP timest.	No	No	Yes	No	No	No	Yes	No
e	SACK	No	No	Yes	No	No	No	Yes	No
a	Del. ACKs	No	Yes	Yes	No	No	No	Yes	Yes
u	Socket	No	No	Optional	(I)	Yes	Subset	Yes	Yes
r	Concur. Conn.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
e									
s									

(T1) = TCP-only, on x86 and AVR platforms

(T2) = TCP-only, on ARM Cortex-M platform

(T3) = TCP-only, on ARM Cortex-M0+ platform (NOTE: RAM usage for the same platform is ~2.5 kB for one TCP connection plus ~1.2 kB for each additional connection)

(a) = includes IP, ICMP and TCP on x86 and AVR platforms

(b) = the whole protocol stack on mbed

(I) = interface inspired by POSIX

Mult. = Multiple

N/A = Not Available

Plan for -04

- Addressing the editorial TODOs
 - Section 5.2. TCP connection lifetime
 - Section 5.3. Number of parallel connections
- Getting ready for WGLC ?
 - Heads-up already done in TCPM

Thanks!

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