

Constrained Application Protocol (CoAP) Performance Measurement Option

draft-ietf-core-coap-pm-01

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Motivation

A mechanism to measure the performance in CoAP can be useful to verify and meet the operational requirements.

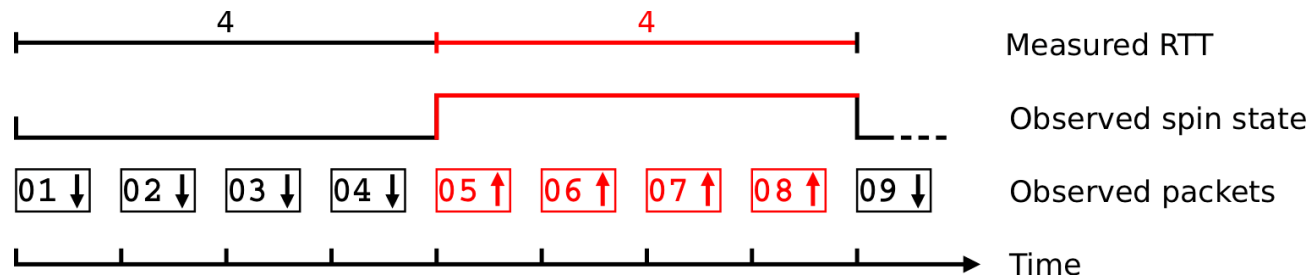
- It is resource consuming to read IDs / sequence numbers and store timestamps for constrained nodes.
- ✓ Performance Measurement in constrained environment needs straightforward methodologies!
- ✓ It must be a simple mechanism for network diagnostic requiring just a minimal amount of collaboration from the endpoints.

Explicit Flow Measurement (EFM) techniques employ few marking bits, inside the header of each packet, for loss and delay measurement.

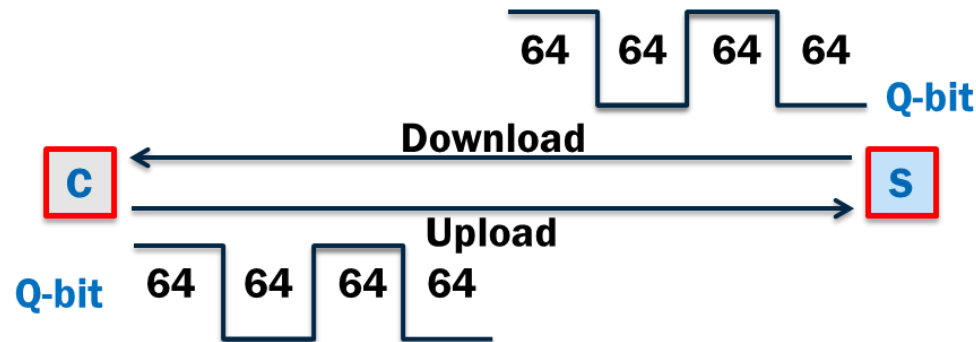
- They are described in **RFC 9506 (just published!)**

Spin Bit and sSquare Bit

- The **Spin bit** idea is to create a square wave signal on the data flow, using a bit, whose length is equal to RTT. It is optional in QUIC ([RFC 9000](#) and [RFC 9312](#))

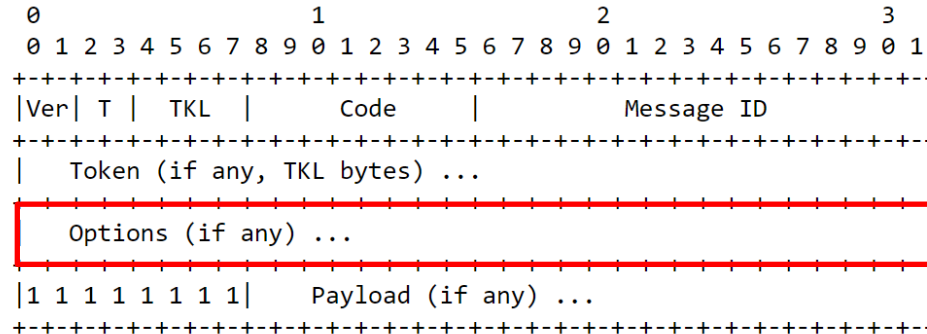


- The **sSquare bit** creates square waves of a known length as defined in the Alternate Marking ([RFC 9341](#)). This can be used for packet loss (and delay) measurements.



COAP PM Option

- A new option for CoAP carrying PM bits (Spin bit and sSquare Bit) can be introduced



- The PM Option Value can be defined with the following bits:
 - sSquare Bit (Q) for Packet Loss measurement in both directions.
 - Spin Bit (S) for RTT measurement.
 - Combined sSquare Bit (C) can reinforce Q with Delay information.
 - The Event bits can be used to communicate loss and delay events.

New patterns may be added based on the methods in [RFC 9506](#)

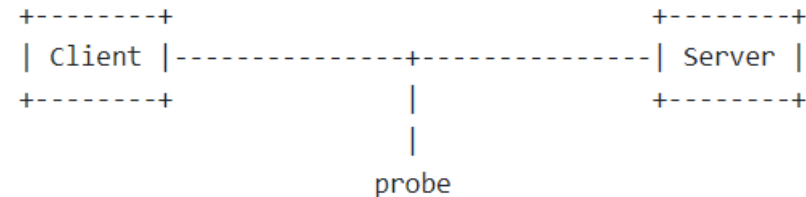
Application Scenarios (1/2)

➤ Non-proxying endpoints

The CoAP PM Option can be applied end-to-end between client and server and, since it is Elective, it can be ignored by an endpoint that does not understand it.

Measurements:

- e2e (Client-Server)
- on-path upstream and downstream (Probe)
- on-path intra-domain portion (with more Probes)

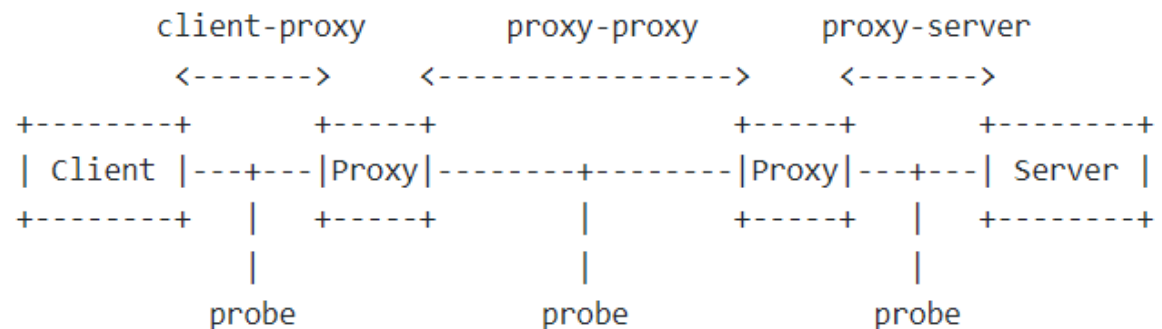


➤ Collaborating proxies

The CoAP PM Option can be applied end-to-end between client and server (or between collaborating Proxies).

Measurements *in case of collaborating proxies*:

- between Client-Server, Proxy-Proxy, Proxy-Server
- on-path upstream and downstream (Probe and/or Proxy)
- on-path intra-domain portion



Application Scenarios (2/2)

➤ Non-collaborating proxies

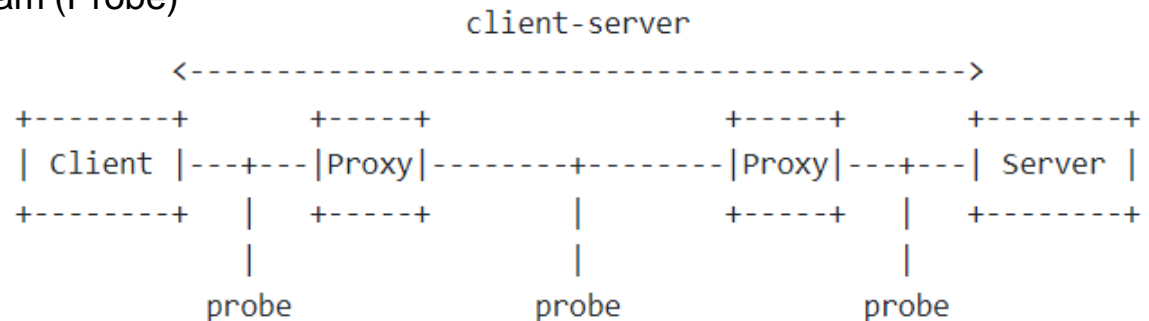
The PM Option is Proxy Unsafe and is unsafe for forwarding by a proxy that does not understand it.

- If there are non-collaborating and caching proxies, the measurements would not be possible.

An implementation MAY consider the PM Option as Safe-to-Forward if the proxies are non-caching

Measurements *in case of non-collaborating and non-caching proxies:*

- e2e (Client-Server)
- on-path upstream and downstream (Probe)
- on-path intra-domain portion



➤ DTLS

When a client uses a collaborating proxy the separated sessions are secured using DTLS but can still be measured. An on-path probe cannot perform the measurements in any case.

➤ OSCORE

If an OSCORE endpoint sends both outer and inner option, the inner is for measuring the connection to the end-to-end peer, and the outer can be used for measuring the connection to next proxy.

Next Steps

- This draft is based on well-known methodologies applied in RFC9000 (SpinBit) and RFC9341 (sSquare Bit).
- RFC9506 on EFM has just been published

Welcome questions, comments

Thank you