

# **Constrained Application Protocol (CoAP) Performance Measurement Option**

**draft-ietf-core-coap-pm-05**

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# Motivation

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

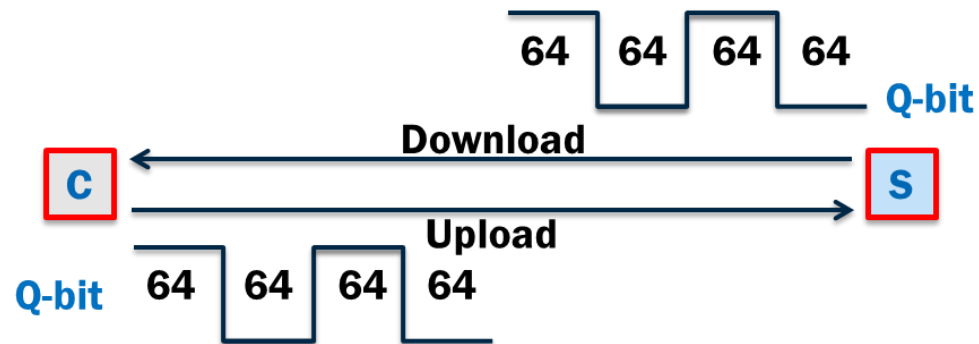
- It is resource consuming to read IDs / sequence numbers and store timestamps for constrained nodes.

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**

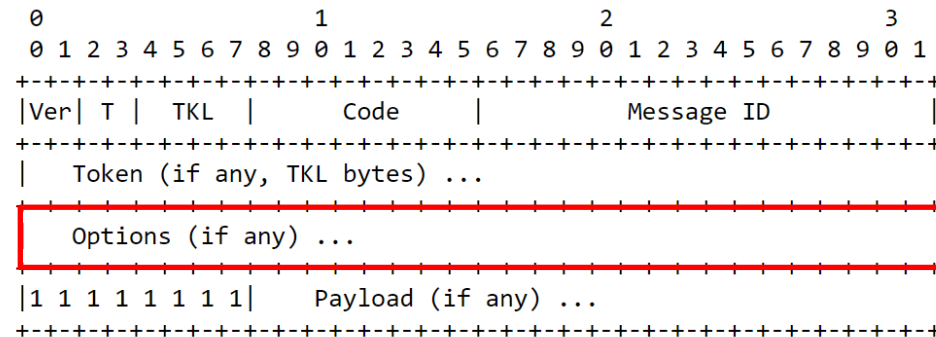
# sSquare Bit (Alternate-Marking)

- 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.

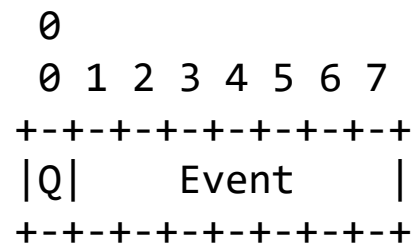


# COAP PM Option

- A new option for CoAP carrying PM bits (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.
  - The Event bits can be used to communicate loss and delay events.



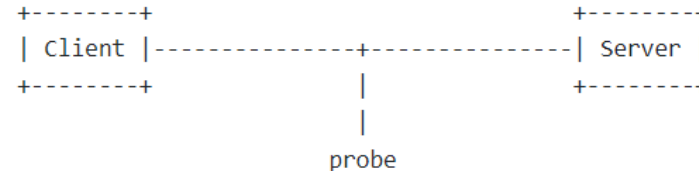
# Application Scenarios

## ➤ Non-proxying endpoints

The CoAP PM Option is applied e2e and it can be ignored by an endpoint that does not understand it (Elective).

Measurements:

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

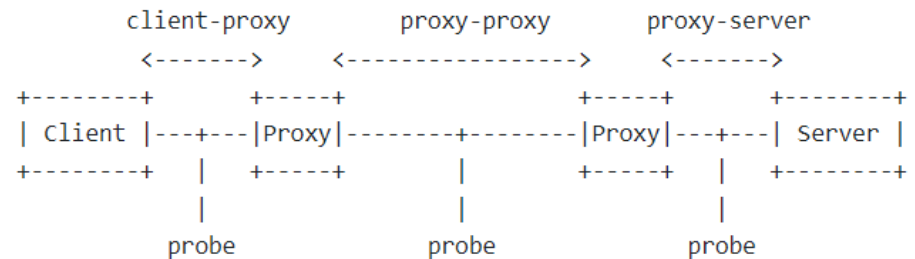


## ➤ Collaborating proxies

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



## ➤ Non-collaborating proxies

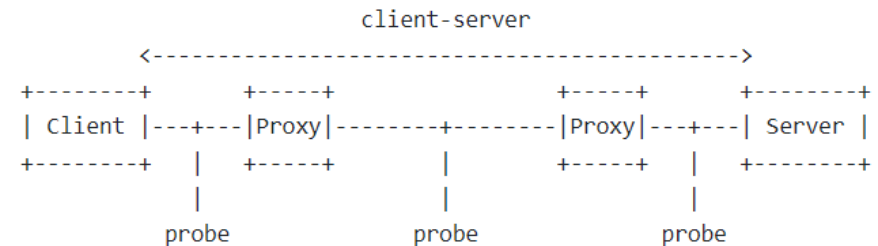
The PM Option is Proxy Unsafe and is unsafe for forwarding by a proxy that does not understand it.

- 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



Note:

DTLS: in case of collaborating proxy, the separated sessions are secured using DTLS but can still be measured.

OSCORE: If both outer and inner option are used, the inner is for e2e connection, and the outer is for the connection to next proxy.

# Implementation Status

- It has been implemented in aiocoap
  - Test of the Packet Loss measurement
  - Test of Delay measurement
  - Testing the behavior in case of Retransmission: the packet counting can be still valid by recognizing the duplication of packets on the path.

# Next Steps

- This draft is based on well-known methodologies applied in RFC9341 (sSquare Bit) and RFC9506 (EFM).
- Implementation to be concluded.

Welcome questions, comments

Thank you