

# **Constrained Application Protocol (CoAP) over Bundle Protocol (BP)**

## **draft-gomez-core-coap-bp-04**

Intended Status: Standards Track

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# Status

- draft-gomez-core-coap-bp
  - -00 presented in IETF 119
    - CoRE and DTN WGs
  - -01 presented in IETF 120
    - CoRE and DTN WGs
  - -02 presented in IETF 121
    - CoRE WG (new CoAP option, enables message aggregation)
  - -03 presented in IETF 122
    - CoRE and DTN WGs
- Revision -04
  - Address feedback
    - From IETF 122 on message aggregation
    - From a dedicated CoRE WG interim meeting (message aggregation)
  - Provide implementation status report

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## 4.3. Payload-length option

- Indicates the CoAP message payload size
  - Allows message aggregation, **over various transports**
    - Aggregate message: a concatenation of Single messages that carry the Payload-length option
- Definition:

No.	C	U	N	R	Name	Format	Length	Default
TBD	x	x	-		Payload-length	uint	0 or more	(none)

C = Critical, U = Unsafe, N = NoCacheKey, R = Repeatable  
(\*) See below.

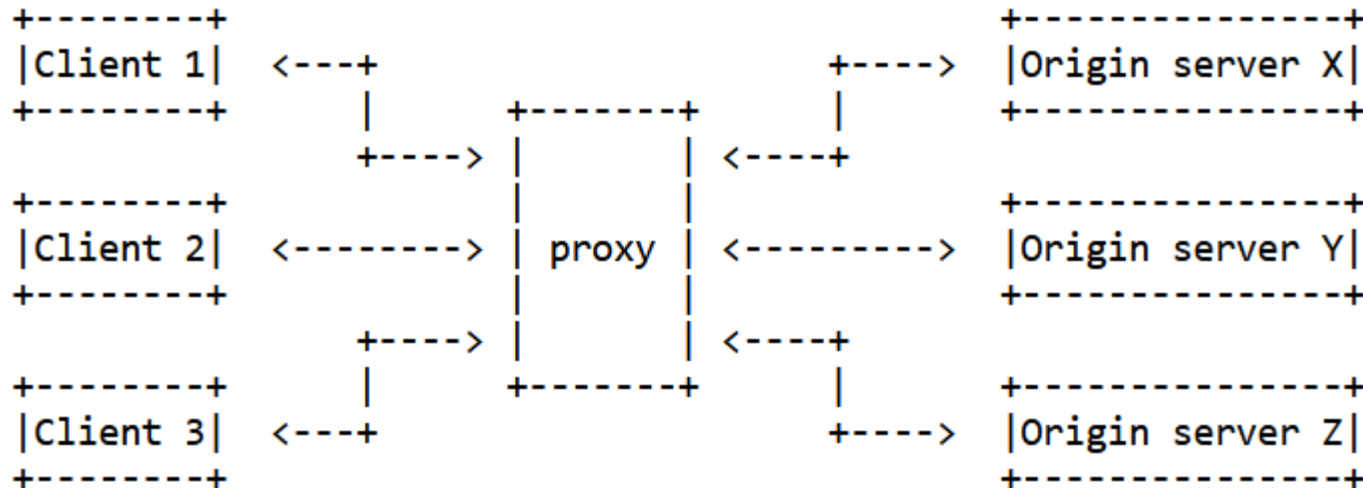
- First currently available suitable option number not actually low...

## 4.3.1. Payload-length option and OSCORE

- The Payload-length option is “Class U” (“Unprotected”) for OSCORE
- OSCORE-protected CoAP message and Payload-length:
  - 1st: the OSCORE message is created based on the CoAP message (RFC 8613)
  - 2nd: Payload-length option is inserted in the OSCORE message
    - The payload size indicated by Payload-length option is the OSCORE message payload size

## 9.3. Proxy operation and message aggregation

- A proxy that supports message aggregation disaggregates a received Aggregate message
  - Then proceeds “normally” (as in RFC 7252)
- A proxy MAY aggregate messages destined for the same endpoint



# 13. Implementation Status

- As recommended by RFC 7942
  - Section to be removed before eventual publication
- 13.1. Space CoAP
  - Organization: UPC (Main people: M. Karpov, A. Calveras)
  - Scenarios with and without proxies supported, based on aiocoap (CoAP) and  $\mu$ D3TN (BP)
  - Compliant with draft-gomez-core-coap-bp-03
  - Level of maturity: research
  - Details and GitHub links in the draft
    - Demo video: <https://github.com/ENTEL-WNG/CoAPoverBP-proxy-version>
- 13.2. Other implementations
  - taraCoAP, BoAP
  - Prior to this I-D

# 14. Security considerations

- Payload-length is not protected by OSCORE
- Risk:
  - An attacker might infer some features of the communication based on the payload size of the messages
- Possible solutions:
  - Not using the Payload-length option, but then message aggregation not possible
  - Lower-layer security (e.g., BPSec) if available



# **WG adoption?**

# **Thanks!**

## **Questions? Comments?**

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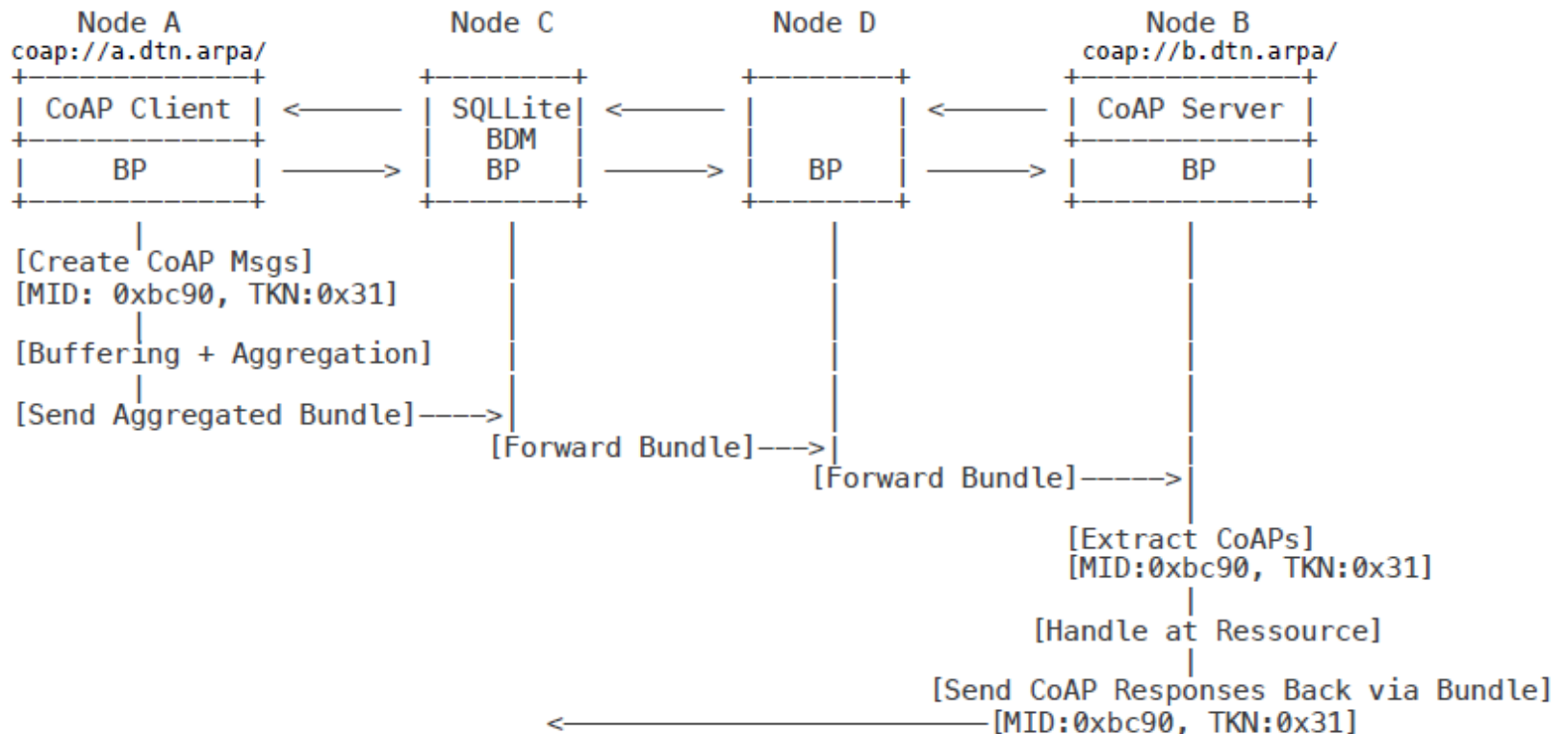
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# **Annex: implementation main characteristics**

- Two proxy and one non-proxy scenario
- CoAP Client and Server with multiple Bundle Nodes
- Contact plan scheduling for delay simulation
- Persistent storage on bundle node with bundle decision maker
- PUT, POST, GET, DELETE methods
- NON and CON message handling
- Hop-based token and MID matching. Round Trip is Piggybacked for simplicity
- Extended Message ID to 24 bit and Timers according to IETF draft
- Message aggregation and payload\_length option field
- Space CoAP Lua dissector
- CoAP over Bundle URI Scheme

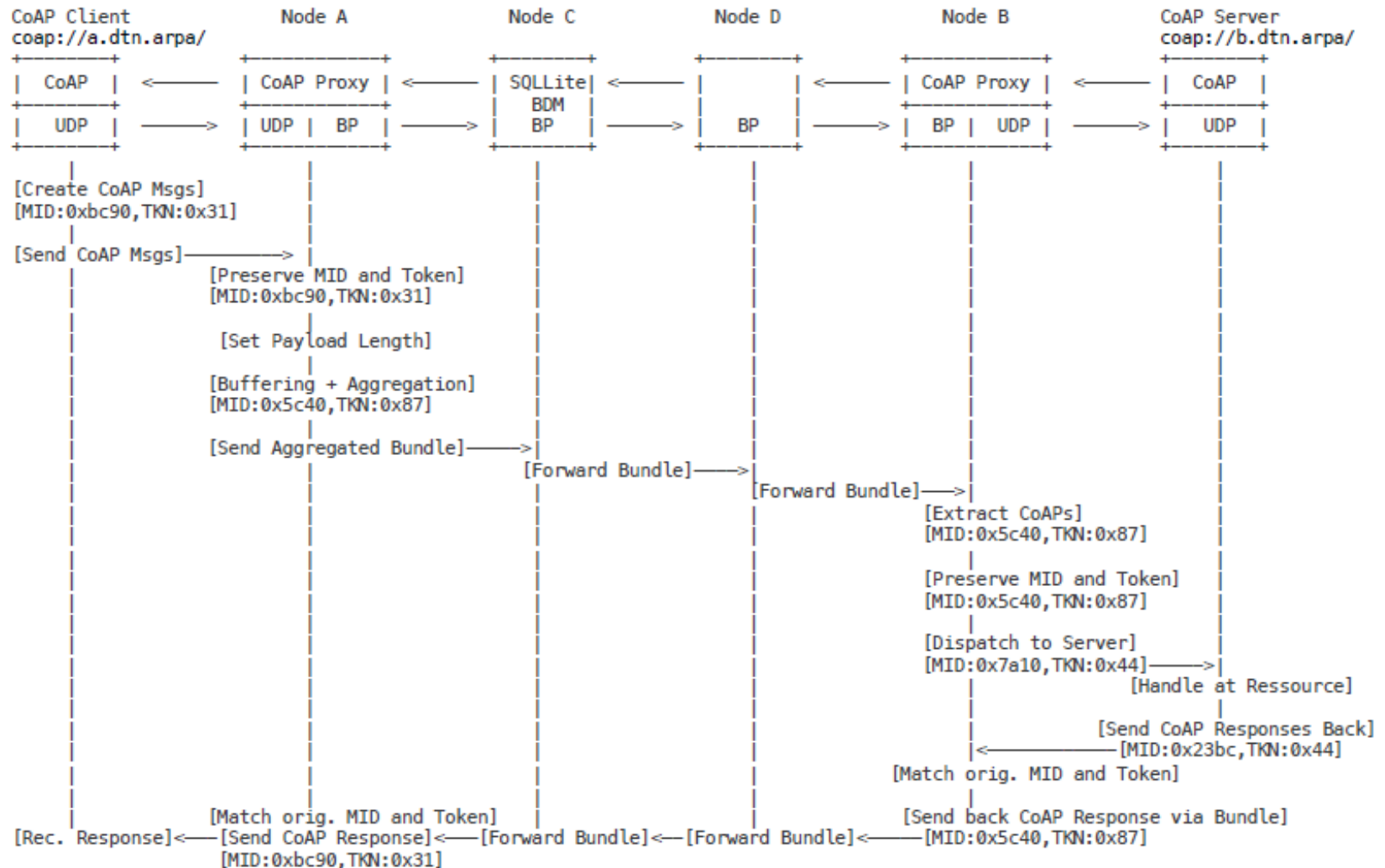
# Non-Proxy Scenario

## Topology and Logic



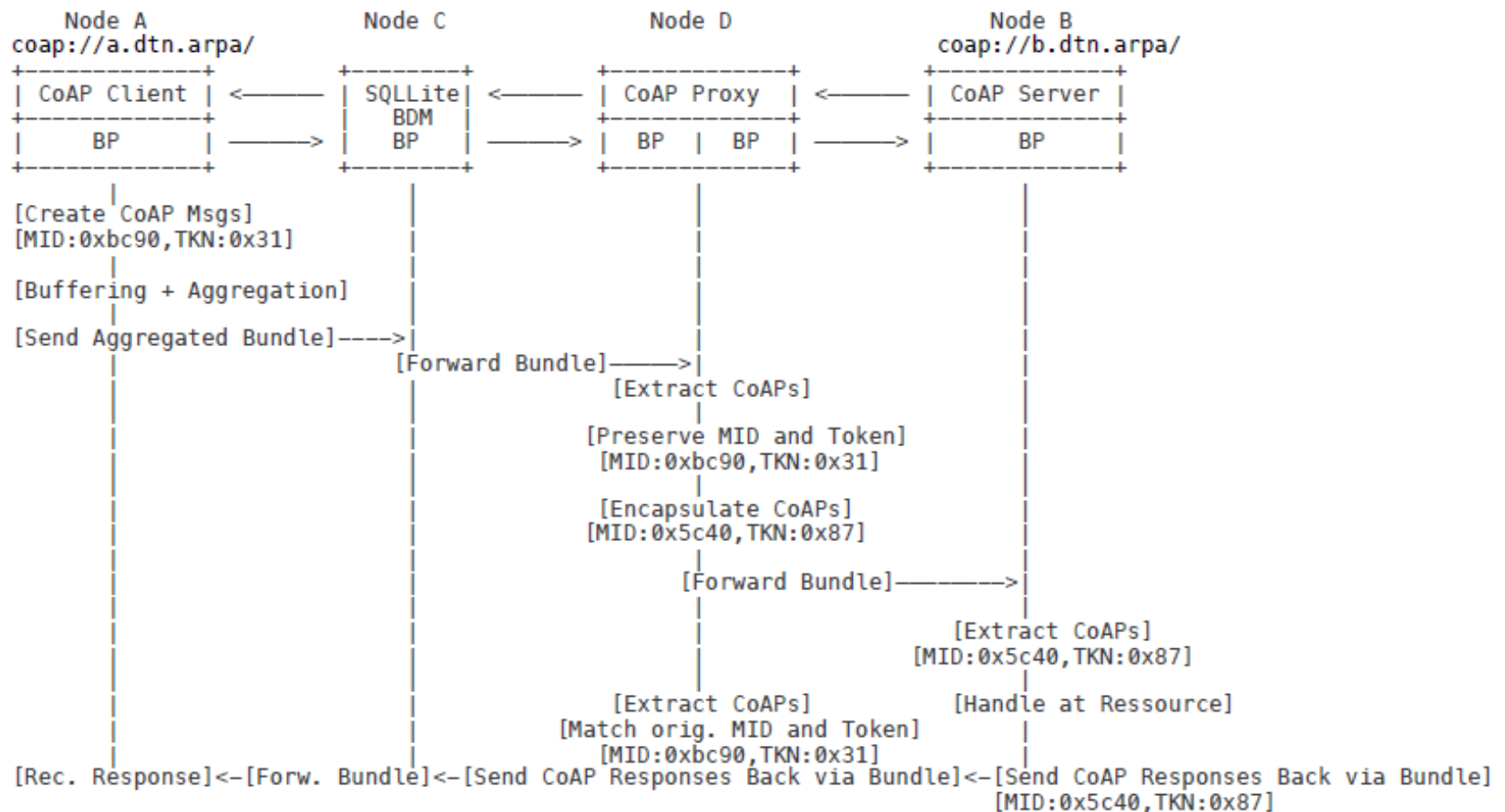
# CoAP over UDP/BP Proxy Scenario

## Topology and Logic



# CoAP over BP Proxy Scenario

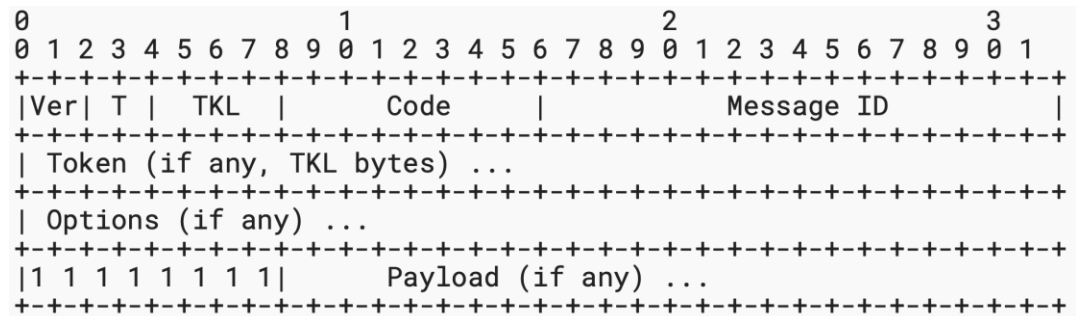
## Topology and Logic



# Main modifications

## Changes to aiocoap library according to draft-gomez-core-coap-bp-03

- CoAP Message  
Format defined in  
RFC 7252



- CoAP Message  
Format as defined  
in the draft



# Main modifications

## Changes to aiocoap library according to draft-gomez-core-coap-bp-03

Area	Original CoAP Behavior	Modification	Reason / Benefit
<b>Message ID Range</b>	16-bit MID (0..65535)	24-bit MID (0..16777215)	Support more concurrent exchanges, fewer MID collisions in challenged environments.
<b>Message Header Parsing</b>	2 bytes for MID	Adjusted to accommodate 24-bit MID, MID parsing changed to 3 bytes	Maintain compatibility with the expanded MID range.
<b>Option: Payload Length</b>	Not present	New option PAYLOAD_LENGTH = 65000	Supports message aggregation. (Used to determine, where the next CoAP message starts in an aggregated bundle).
<b>Transport Parameters: ACK_TIMEOUT</b>	2 seconds	2642 seconds	Finetuned retransmission timing for challenged environments.
<b>Transport Parameters: ACK_RANDOM_FACTOR</b>	1.5	1.0	Set to minimum.
<b>Transport Parameters: MAX_RETRANSMIT</b>	4 retries	0 retries	Disable retransmissions entirely for very lossy links where repeated transmission is impractical.
<b>Transport Parameters: MAX_LATENCY</b>	100 seconds	10000 seconds	Supports long network delays in challenged environments.
<b>Wire Inspection</b>	Standard CoAP Wireshark dissector	Custom Lua dissector for Space CoAP (24-bit MID support and payload_length option)	Enables packet inspection and validation of modified Space CoAP traffic.



# Video Scenario Details

- Creation of new resource as a single sent CoAP message over Bundle

- PUT method used to send 4 temperatures to a temperature resource

- The 4 messages are aggregated and transmitted in a single bundle from node A to node B

- Node A is responsible for aggregation and Node B for disaggregation and dispatch to CoAP server

- Both Nodes A and B are responsible for token matching on their ends and with each other

- Persistent storage on Node C with sqlite and bundle decision maker

Config Socket	Destination	Schedule (Offset, Period, Lifetime)	Reaches	Connect via TCPCLv3
ud3tn-a.aap2.socket	dtn://c.dtn/	1s offset, 600s period, 100000s lifetime	dtn://b.dtn/, dtn://d.dtn/	localhost:4226
ud3tn-c.aap2.socket	dtn://d.dtn/	30s offset, 600s period, 100000s lifetime	dtn://b.dtn/	localhost:4227
ud3tn-d.aap2.socket	dtn://c.dtn/	1s offset, 600s period, 100000s lifetime	dtn://a.dtn/	localhost:4226
ud3tn-d.aap2.socket	dtn://b.dtn/	1s offset, 600s period, 100000s lifetime	(explicit dtn://b.dtn/rec)	localhost:4225
ud3tn-c.aap2.socket	dtn://a.dtn/	1s offset, 600s period, 100000s lifetime	(explicit dtn://a.dtn/rec)	localhost:4224
ud3tn-b.aap2.socket	dtn://d.dtn/	1s offset, 600s period, 100000s lifetime	dtn://c.dtn/, dtn://a.dtn/	localhost:4227

