CoAP over GATT

(Bluetooth Low Energy Generic Attributes)
`amsuess-core-coap-over-gatt-08`

Christian Amsüss

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Why?
Flashback almost exactly 5 years ago

All the same reasons as for CoAP-over-WS

- Extend CoAP, especially OSCORE, to applications with limited APIs

  "Smart" phone apps, browsers[1]
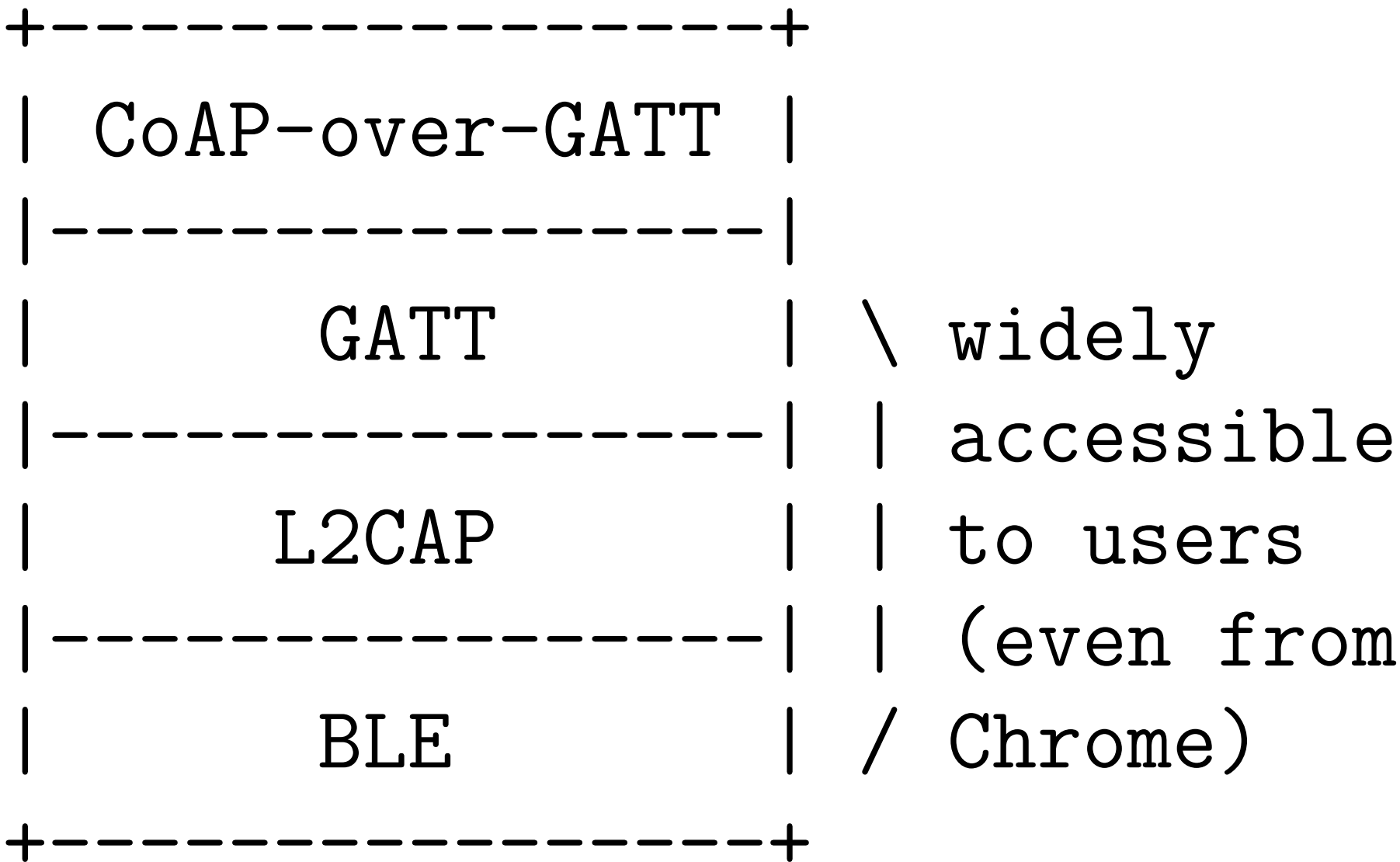
- ~~Too lazy to implement IPSP~~

- ~~But with IPSP I'll have to have a full IP stack~~

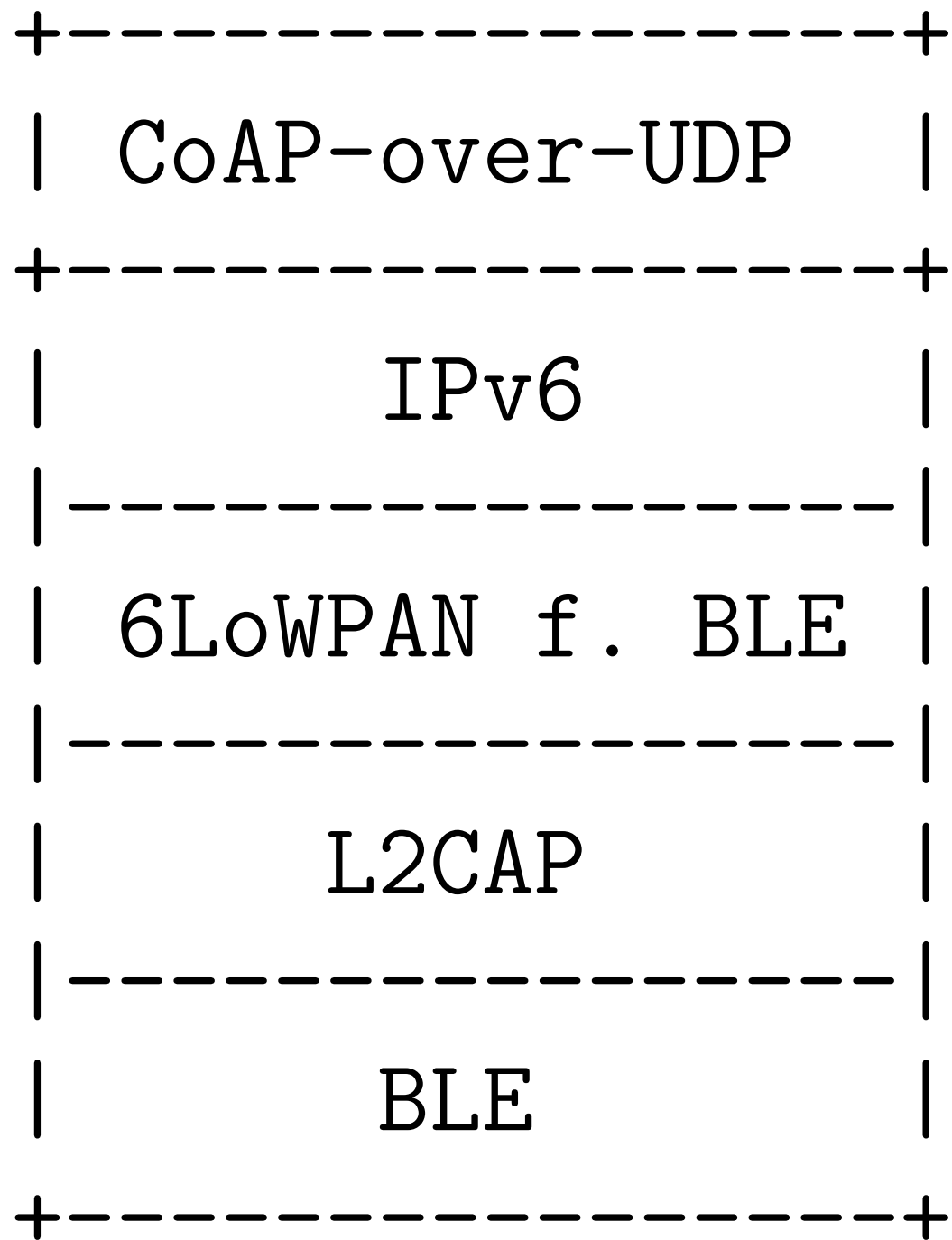- Explain non-CoAP GATT values to CoAP devices through SCHC $^?$

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[1]Not generally approved; future versions on future protocols (WebRTC data channel?).

Why…
… even do non-IP transport for IETF protocol?

```
                                              +----------------+
                                              | CoAP-over-UDP  |
      +----------------+                      +----------------+
      | CoAP-over-GATT |                      |      IPv6    | |
      |----------------|                      |----------------|
      |      GATT      | \ widely             | 6LoWPAN f. BLE |
      |----------------| | accessible         |----------------|
      |     L2CAP      | | to users           |     L2CAP    | |
      |----------------| | (even from         |----------------|
      |      BLE       | / Chrome)            |      BLE     | |
      +----------------+                      +----------------+

       CoAP-over-GATT                              BLE IPSP
```

Same reasons as for CoAP-over-WebSockets: Can't escape limited APIs.

Why? *2025 Edition.*

All the same reasons as for CoAP-over-WS

- Extend CoAP, especially *all of EDHOC/OSCORE*, to applications with limited APIs

  "Smart" phone apps, browsers[2]

- ~~Too lazy to implement IPSP~~
  …and if the alternative is custom GATT, I'd rather take CoAP-over-non-IP.

- ~~But with IPSP I'll have to have a full IP stack~~
  …and sometimes options are limited by power over efficient BLE modules.

- ~~Explain non-CoAP GATT values to CoAP devices through SCHC~~
  …is still around as an idea, but not so charming without OSCORE.

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[2]*Still Chrome-only; small movement at Mozilla, no known activity for higher-level BLE interface.*
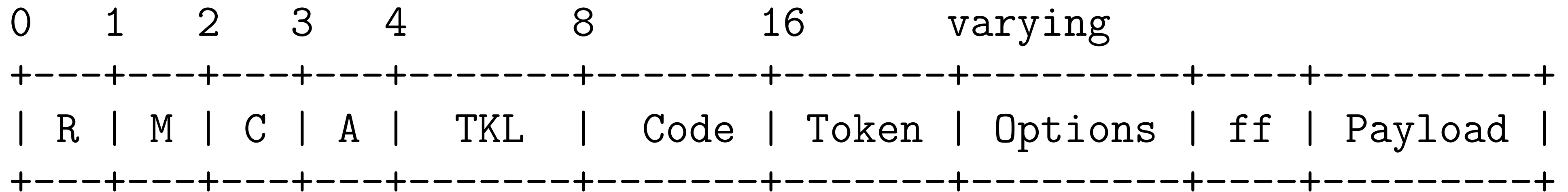
Capabilities
Similar to CoAP-over-UDP

- Requests and responses in either direction

- Concurrent requests (using tokens)

- Non-traditional responses (no special-casing needed)

- Reliable and unreliable transport

- Optional message deduplication

- Implicit flow control

Methods

Diverging from -UDP due to different lower-layer guarantees[3]

- M-bit is single-bit message ID equivalent

- C-bit requests confirmation

- A-bit mirrors last C message's M-bit

- No timer used: GATT's reliability mechanism suffice

```
0   1   2   3   4        8        16      varying
+---+---+---+---+-------+-------+-------+---------+---+---------+
| R | M | C | A |  TKL  |  Code | Token | Options | ff | Payload |
+---+---+---+---+-------+-------+-------+---------+---+---------+
```

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[3]Reliable transmission, total order

Implementation experience

- Student project at RIOT OS, implements -07
  Embedded device at both sides. Found difficulties, led to -08.

- Part of CoAP/ACE-OAuth PoC demo, being updated to -08
  Device mimicking industrial control device without other network;
  technician connects with browser (PWA), authenticates using
  ACE/EDHOC profile and reconfigures.

State

Interest from the WG?