

Continuation bit Encoding

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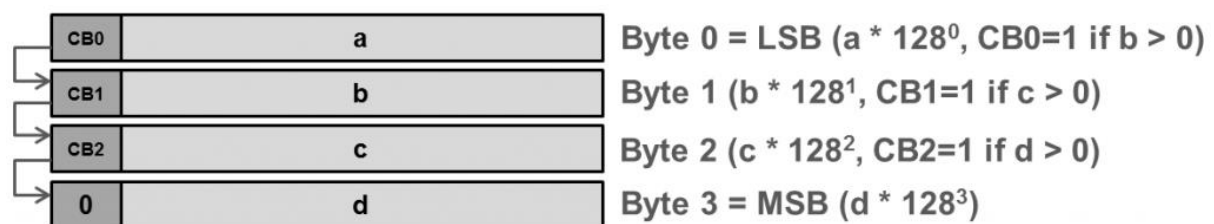


Remaining Length – Continuation Bit

Encoding

MQTT was designed for devices with very limited capabilities such as battery-driven sensor nodes and wireless devices. This implies that the protocol needs to be very efficient because any excess byte transmitted over a wireless link would consume precious battery capacity. As a consequence, many fields in the MQTT protocol are optional, so they are only transmitted when needed. Another interesting field is the remaining length field indicating the actual length of an MQTT message. The second byte of the fixed header contains the remaining length which is, length of variable header + the length of the payload. Remaining length can use up to 4 bytes in which each byte uses 7 bits for the length and the MSB bit being a continuation flag. If the continuation flag bit of a byte is 1, it means the next byte is also part of the remaining length. And if the continuation flag bit is 0, it means that byte is the last one of the remaining length. The length of the remaining length field is between 1 and 4 bytes depending on the payload size that is the actual user message.

The most significant bit of a remaining length field byte has the meaning continuation bit (CB). If more bytes follow, it is set to 1. Remaining length is encoded as $a * 128^0 + b * 128^1 + c * 128^2 + d * 128^3$ and placed into the RL field bytes as follows:



MSB: Most Significant Byte

LSB: Least Significant Byte

The following examples show the encoding for single byte (1) and multi-byte remaining field lengths (2).

Example 1: $RL = 364 = 108 \cdot 128^0 + 2 \cdot 128^1$, $a=108$, $CB0=1$, $b=2$, $CB1=0$ (c , d , $CB2=0$)

Example 2: $RL = 25'897 = 41 \cdot 128^0 + 74 \cdot 128^1 + 1 \cdot 128^2$, $a=41$, $CB0=1$, $b=74$, $CB1=1$, $c=1$, ($CB2$, $d=0$)

The encoding of the remaining length field requires a bit of additional bit and byte handling, but the benefit is that only a single byte is needed for most messages while preserving the capability to send larger message up to 268435455 bytes.

THE END