draft-minaburo-lpwan-RoHCapplicability-00

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RoHC documents

- RFC 3095 ROHC: Framework and four profiles: RTP, UDP, ESP, and uncompressed
- RFC 3096 Requirements for robust IP/UDP/RTP header compression
- RFC 3828 The Lightweight User Datagram Protocol (UDP-Lite)
- RFC 3843 ROHC: A Compression Profile for IP
- RFC 4019 ROHC: Profiles for User Datagram Protocol (UDP) Lite
- RFC 4997 Formal Notation for RObust Header Compression (ROHC-FN)
- RFC 6846 ROHC: A Profile for TCP/IP (ROHC-TCP)
- RFC 5225 Robust Header Compression Version 2 (ROHCv2): Profiles RTP, UDP, IP, ESP and UDP-Lite

RoHC

- Define originally for IP/UDP/RTP streams
  - LPWAN traffic in not a stream => long convergence time
  - Bandwidth is extremely short to support IR packets (larger than a full header)
- Nodes with no resources problem
- Allows unidirectional and bidirectional links
- Low Bandwidth transmission (but not constrained)
- Learned Context Information: Send full header, followed by field deltas
  - Impossible to send full headers in LPWAN

RoHC versions

- RoHCv1: profiles: IP, IP/UDP, IP/UDP/RTP, IP/ESP

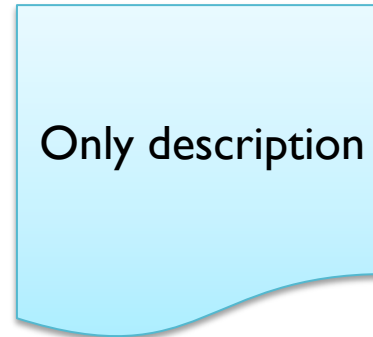- RoHCv2: RoHC framework and Formal Notation enable the definition of new profiles

RoHC Formal Notation

- Formal Notation designed to define the RoHC compression profiles

```
+----+----+---+---+---+---+---+---+
|version|type | sequence_no|
+----+----+---+---+---+---+---+---+
```

- The same description in FN is:

```
Header {
        Uncompressed{
                Version [2];
                Type [2]
                Sequence_no [4];
                }
        Compressed header {
                Version =:= uncompressed_value (3,1);
                Type =:= irregular(2);
                Sequence_no =:= Wlsb(0, -3);
                }
                }
```

Only description

RoHCv2

RoHCv1 Framework
- C/D state machines
- Mode of Operation
- Encoding Methods

Formal Notation
- Packet Description to produce new profiles
- Fields Compression

RoHCv2

RoHC Applicability

- RoHC Framework (RFC 5795)
  - Use a Master SN to manage context synchronization, control compression and reduce the header size
    - Encoded with W-LSB
  - Complex ($168p$ (RFC 3095) + $36p$ (RFC 5795) + $60p$ (RFC4997) + $122p$ (RFC5225)) vs to CoAP = $40p$ and IPv6 = $39p$
  - Does not compress CoAP header, which is asymmetric
  - For multimedia flows
  - Not routable packets
  - Control information is sent in the format packet
  - ACL for small flows = 6 bytes
  - ACL for larger flows = 3 bytes

This is an average, in reality the header size goes from 52 bytes to 4 bytes (with UDP checksum) or 2 bytes (no UDP checksum)

Next Steps

- **RoHC for LPWAN**
  - Modify and adapt the RoHC framework (complex)
  - Work on CoAP profile (using FN = not for asymmetric flows)
  - Adapt Framework to LPWAN networks
    - Asymmetric CoAP behavior – response can be a data packet
  - Patents?

- **6LoWPAN for LPWAN**
  - Adapt and Modify the 6LoWPAN compression which reduces the IPv6 addresses
  - Adapt for asymmetric links,

- Or Concentrate efforts on a specific solution for LPWANs