draft-minaburo-lpwan-RoHCapplicability-00

Ana Minaburo (ana@ackl.io)
Laurent Toutain (Laurent.Toutain@telecom-bretagne.eu)
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 RObast 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 is 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);
  }
}
```
RoHCv2

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

Formal Notation
- Packet Description to produce new profiles
- Fields Compression
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 (RFC 4997) + 122p (RFC 5225)) 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