LPWAN WG

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Minutes are taken *
This meeting is recorded **
Presence is logged ***

* Scribe; please contribute online to the minutes at: [http://etherpad.tools.ietf.org:9000/p/lpwan](http://etherpad.tools.ietf.org:9000/p/lpwan)
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*** From the Webex login
Agenda bashing

16:05> Opening, agenda bashing (Chairs) [7min]
   • Note-Well, Scribes, Agenda Bashing
   • Approval minutes from last meeting
   • Review last interim todos
   • Terminology

16:12> LPWAN Overview Presentation and Discussion (Stephen Farrel) [5min]
   • https://datatracker.ietf.org/doc/draft-ietf-lpwan-overview/
   • Status on Steve’s issues on ML
   • Publication?

16:17> Static Context Header Compression for IPv6 and UDP (Ana, Laurent) [10min]
   • https://datatracker.ietf.org/doc/draft-ietf-lpwan-ipv6-static-context-hc/

16:27> LPWAN Static Context Header Compression (SCHC) for CoAP (Laurent) [15min]

16:42> Static Context Header Fragmentation (Carles) [15min]
   • https://datatracker.ietf.org/doc/draft-ietf-lpwan-ipv6-static-context-hc/

16:57> AOB  [QS]
Status

WG formed October 14th

• Charter item #1  (Informational document)
  – Baseline technology description

• Charter item #2  (Standards track document)
  – Enable the compression and fragmentation of a CoAP/UDP/IPv6 packet over LPWA networks
## Charter - Milestones

<table>
<thead>
<tr>
<th>Date</th>
<th>Milestone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jul 2017</td>
<td>Submit CoAP compression mechanism to the IESG for publication as a Proposed Standard</td>
</tr>
<tr>
<td>May 2017</td>
<td>Submit IP/UDP compression and fragmentation mechanism to the IESG for publication as a Proposed Standard</td>
</tr>
<tr>
<td>Apr 2017</td>
<td>Submit LPWAN specification to the IESG for publication as an Informational Document</td>
</tr>
<tr>
<td></td>
<td>Done Adopt CoAP compression mechanism as a WG item</td>
</tr>
<tr>
<td></td>
<td>Done Adopt IP/UDP compression and fragmentation mechanism as a WG item</td>
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<tr>
<td></td>
<td>Done Adopt LPWAN specifications as WG item</td>
</tr>
</tbody>
</table>
Last meeting Action items

- JCZ, DD: Review IP/UDP drafts
- CB, MV: Review CoAP draft
- SF: Send revision, WG to review by May, 30\textsuperscript{th}
- CG: CFN/AFN, new ideas around fragmentation
LPWAN Overview

Editor: Stephen Farrell
(many contributors)
Terminology

• Status?

• AAA Server vs Low-Power Backend Server (LBES)

• WG review and good to go?
SCHC Compression

draft-ietf-lpwan-ipv6-static-context-hc-03

Authors:
Ana Minaburo <ana@ackl.io>
Laurent Toutain <laurent.toutain@imt-atlantique.fr>
Carles Gomez <carlesgo@entel.upc.edu>
SCHC Compression

• Diego Review’s
  – "SCHC uses a context where header information is kept in order." Is there any other scheme? Is there is another order?
  • Define the way the information is in the context, at least be clear
  – Just for the sake of clarity, from the introduction, I can deduce this draft only concentrates on a protocol and a mechanism. The protocol is SCHC and the mechanism is Fragmentation. The protocol usage is justified by two properties of LPWANs and the mechanism is justified by the lack of support on part of the LPWAN technologies.
    • My conclusion is, we need to rewrite the introduction.
    • SCHC header compression must be used always and the fragmentation part may be used when needed, I’m not agree about one is a protocol and the other mechanisms or vs.
SCHC Compression

- "A Field Position (FP) indicating if several instances of the field exist in the headers which one is targeted.” Expression not clear
  - It is the reference for the header fields
  - Use for CoAP

- "A Target Value (TV) is the value used to make the comparison with the packet header field. The Target Value can be of any type (integer, strings,...). It can be a single value or a more complex structure (array, list,...). It can be considered as a CBOR structure."

Here I have a conflict on the idea of header field and value, when to know each representation
  - The Rule-ID will be used for these cases

- "equal: a field value in a packet matches with a field value in a rule if they are equal” Is any of those values a TV?
  - No, The SCHC C/D are actions in order to decide which information will be sent
LPWAN CoAP SCHC

Authors:
Ana Minaburo <ana@ackl.io>
Laurent Toutain <laurent.toutain@imt-atlantique.fr>
CoAP differences: large values

- Regular CoAP client will use « large » ID
  - May be reduced in LPWAN
- Use Proxy (out of the scope)
CoAP Differences: Proxy to reduce the size

- Regular CoAP client will use « large » ID
  - May be reduced in LPWAN
- Use Proxy (out of the scope)
COAP DIFFERENCES: PROXY REDUCES THE SIZE

- MID: TV=0x0000 MO=MSB(12) CDF=LSB(4)
- TOK: TV= MO=ignore CDF=value-sent

proxy
CoAP differences: multiple fields

CON GET MID=0x000A
Token 0x1A
Uri-Path foo
Uri-Path bar
Uri-Path ADF=

- /foo/bar is different from /bar/foo
- Add position for MO
CoAP differences: Position in MO

CON GET MID=0x000A
Token 0x1A
Uri-Path foo
Uri-Path bar
Uri-Path ADF=

• Uri-Path: TV=foo   MO=equal(1)   CDF=not-sent
• Uri-Path: TV=bar   MO=equal(2)   CDF=not-sent
CoAP difference: variable field length

CON GET MID=0x000A
Token 0x1A
Uri-Path foo
Uri-Path bar
Uri-Path ADF=

• Variable length:
  – Send CoAP option (including length)

  • Uri-Path: TV= MO=ignore(3) CDF=value-sent
CoAP differences: asymmetry

CON GET MID=0x000A
Token 0x1A
Uri-Path foo
Uri-Path bar
Uri-Path ADF=

ACK 2.05 MID=0x000A
Token 0x1A
Content 0x51

value
Direction in the entry rule

• A new entry in the rule:
  ► Upstream
  ► Downstream
  ► Bidirectionnal (by default)

• MO applies only for the appropriate direction

• Depending of the scenario
  ► Thing is server: request is downstream
  ► Thing is client: request is upstream
**Example**

<table>
<thead>
<tr>
<th>FID</th>
<th>TV</th>
<th>MO</th>
<th>CDF</th>
<th>Dir</th>
</tr>
</thead>
<tbody>
<tr>
<td>version</td>
<td>1</td>
<td>Equal</td>
<td>Not-sent</td>
<td>bi</td>
</tr>
<tr>
<td>Type</td>
<td>CON</td>
<td>Equal</td>
<td>Not-sent</td>
<td>down</td>
</tr>
<tr>
<td>Type</td>
<td>{ACK:0, RST:1}</td>
<td>Match-mapping</td>
<td>Mapping-sent</td>
<td>up</td>
</tr>
<tr>
<td>TKL</td>
<td>1</td>
<td>Equal</td>
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<tr>
<td>Code</td>
<td>{2.05:0, 4.04:1}</td>
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<td>Mapping-sent</td>
<td>up</td>
</tr>
<tr>
<td>MID</td>
<td>0x0000</td>
<td>MSB(12)</td>
<td>LSB(4)</td>
<td>bi</td>
</tr>
<tr>
<td>Token</td>
<td>Ignore</td>
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</tr>
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<td>down</td>
</tr>
<tr>
<td>Uri-Path</td>
<td>Bar</td>
<td>Equal 2</td>
<td>Not-sent</td>
<td>down</td>
</tr>
<tr>
<td>Uri-Path</td>
<td>Ignore 3</td>
<td>Value-sent</td>
<td>Value-sent</td>
<td>down</td>
</tr>
<tr>
<td>Content</td>
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<td>Equal</td>
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ACK 2.05 MID=0x000A
Token 0x1A
Uri-Path foo
Uri-Path bar
Uri-Path ADF= 4+8+24 = 36 bits

ACK 2.05 MID=0x000A
Token 0x1A
Content 0x51

value

Interim, May 24th, 2017
CON GET MID=0x000A
Token 0x1A
Uri-Path foo
Uri-Path bar
Uri-Path ADF=
  4+8+24 = 36 bits
ACK 2.05 MID=0x000A
Token 0x1A
Content 0x51

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<td>Value-sent</td>
<td>down</td>
</tr>
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<td>Content</td>
<td>0x51</td>
<td>Equal</td>
<td>Not-sent</td>
<td>up</td>
</tr>
</tbody>
</table>
CoAP

- No more normative
- Description of CoAP fields compression
  - Work in progress...
- Read it!
- Questions on
  - Block / fragmentation
- Analysis of common exchanges
  - CoMi, LWM2M, IoTivity?
  - URI-path/Query not flexible: is it a problem?
- Definition of timers:
  - Impact in MID and Token size.
LPWAN SCHC Fragmentation

Authors:
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Carles Gomez <carlesgo@entel.upc.edu>
Status

• Updates since the last interim (10\textsuperscript{th} May)
• Available at https://github.com/lp-wan/ip-compression
• Thanks for the input/feedback!
• Finishing the document…
Updates

- Packet mode
  - Removed frag header for retries
  - Fragment renumbering

```
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sender</td>
<td>Receiver</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------</td>
</tr>
<tr>
<td>CFN=6</td>
<td></td>
</tr>
<tr>
<td>CFN=5</td>
<td></td>
</tr>
<tr>
<td>CFN=4</td>
<td></td>
</tr>
<tr>
<td>CFN=3</td>
<td></td>
</tr>
<tr>
<td>CFN=2</td>
<td></td>
</tr>
<tr>
<td>CFN=1</td>
<td></td>
</tr>
<tr>
<td>CFN=0</td>
<td></td>
</tr>
<tr>
<td>CFN=6</td>
<td></td>
</tr>
<tr>
<td>CFN=5</td>
<td></td>
</tr>
<tr>
<td>CFN=7</td>
<td>MIC checked</td>
</tr>
<tr>
<td>&lt;-ACK</td>
<td>Bitmap:1101011110100001</td>
</tr>
<tr>
<td>CFN=6</td>
<td></td>
</tr>
<tr>
<td>CFN=5</td>
<td></td>
</tr>
<tr>
<td>CFN=4</td>
<td>MIC checked</td>
</tr>
<tr>
<td></td>
<td>(no ACK)</td>
</tr>
</tbody>
</table>
```
Packet mode: remarks (I/II)

- **Zero ambiguity**
  - LoRaWAN
    - EU/China \((N \geq 5)\)
    - US \((N \geq 7)\)
  - Sigfox
  - EU/China \((N \geq 5)\)
  - US \((N \geq 7)\)

- **Negligible ambiguity**
  - \(N \geq 4\) (even 3…)
    - With frag renumbering
  - Sigfox
    - Uplink \((N \geq 7)\)
    - Downlink \((N \geq 8)\)

As it is right now

Not a problem in practice!
Packet mode: remarks (II/II)

• Max worst-case currently supported IPv6 packet size
  – LoRaWAN
    • ≥1280 bytes (EU/China)
    • < 800 bytes (US)
  – Sigfox
    • < 616 bytes (both uplink/downlink)
Possible future work

• Future doc(s)?

• Possible optimizations for Packet mode
  – ACK format
    • Bitmap (current) vs list vs delta-coded list
    • Multi-PDU ACK
  – Use of fountain codes
Thanks!

Comments?

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