LPWAN WG

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Note Well

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Definitive information is in the documents listed below and other IETF BCPs. For advice, please talk to WG chairs or ADs:

BCP 9 (Internet Standards Process)
BCP 25 (Working Group processes)
BCP 25 (Anti-Harassment Procedures)
BCP 54 (Code of Conduct)
BCP 78 (Copyright)
BCP 79 (Patents, Participation)

Reminder:

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

* Scribe; please contribute online to the minutes at: https://etherpad.tools.ietf.org/p/lpwan
** Recordings and Minutes are public and may be subject to discovery in the event of litigation.
*** From the Webex login
Agenda bashing

17:05 Opening, agenda bashing (Chairs) 5mn
  • Note-Well, Scribes, Agenda Bashing, Approval minutes from last meeting
  • Review todo
  • Status of drafts

17:10 SCHC padding - Dominique 10mn

17:20 SCHC Tickets and Discussed options – Ana 30mn

17:50 SCHC CoAP – Laurent 10mn

18:00 AOB QS
Action items

• SCHC UDP checksum text
  – Pascal sent proposal to ML

• Find reviewers for drafts
  • CoAP
  • IP/UDP SCHC – Charlie Perkins confirmed for the moment (waiting for others)
draft-ietf-lpwan-ipv6-static-context-hc-13

Single padding proposal

Authors:
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Carles Gomez <carlesgo@entel.upc.edu>
Ana Minaburo ana@ackl.io
Dominique Barthel <dominique.barthel@orange.com>
Discussed at last interim (May 30th)

- See last interim slides for technical description
Benefits

• When padding to bytes, at most 7 added bits
  – Instead of at most 14
• Simpler, cleaner description
• Solves issue (?):
  – currently, fragmentation assumes byte padding
Status

• Acklio’s implementers say change is no-brainer
• Text already written
  – In a git branch, ready to be merged
  – Diff available for everybody to inspect
• Interim meeting discussion showed a priori positive reaction to the proposed change
• Two weeks have elapsed since interim meeting
• Two additional wake-up calls on mailing list
• Got 6 positive answers on ML, 0 negative
Adoption of change?

• If yes
  – we’ll schedule a work session with Ana to solve *merge conflicts* (editorial) between the master and the single_padding branches
    • mostly several ASCII art diagrams, which diverged in the two branches
  – New revision published end of this week
END of single padding slides
draft-ietf-lpwan-ipv6-static-context-hc-13

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Dominique Barthel <dominique.barthel@orange.com>
Open Tickets

- #12 Padding place
- #20 Byte Boundary
- #21 C bit in ACK
- #22 Fragmentation use (TbC)
- #23 NB-IoT (TbC)
- #24 DTag (TbC)
- #25 Rules not synchronized (TbC)
- #26 Frags and Acks (TbC)
- #28 ACK-Always baseline mechanism description to be rephrased
- #29 Rephrase Bitmap Encoding section

- #15 SCHC technology specific parameters => updated to version 11 (Todo: update to last version)
#22 Fragmentation Use

• The use of fragmentation over NB-IoT is useless because the L2 has its own segmentation protocol
  – Out of Scope but…

• Technology Specific Document for NB-IoT MUST:
  – Define the use of SCHC Compression and SCHC Fragmentation in the corresponding bearers and use case.
#23 NB-IoT

• The Multi-Rat Network Propagation is out of the scope of this draft, where Star topology is retained, but…

• Technology Specific Document for NB-IoT MUST:
  – Define the use of SCHC Compression and SCHC Fragmentation for this kind of propagation
#24 DTag

• What happens when Dtag is not present?
  – There can only be 1 SCHC Packet in transit. After all the fragments has been transmitted another SCHC Packet may be sent.

• Complete Ticket with answer
  – Close Ticket
#25 Rule ID Synchronization

- The usages and applications for the Rule ID space is out of the scope of this document
  - Need to be study and referenced in another document (re-charter)
#26 Matching Acks with Frags

- Rule ID is chosen during the Fragmentation procedure
- ACK copy the same Rule ID as the one used in the fragments
- The Rule ID gives the context to refer to
- ToDo: ACK must have the same Rule ID and Dtag values than the one used in the fragments
#28 ACK-Always baseline description to be rephrased

- Section 7.5.2 of version 13 specifies:
  - When the FCN reaches value 0 and there are more SCHC Fragments to be sent after, the sender transmits the last SCHC Fragment of this window using the All-0 fragment format, it starts the transmitted is the last SCHC Fragment of the SCHC Packet, the sender uses the All-1 fragment format, which includes a MIC.

- It seems that the sentence is incomplete or ill-formed.

- Yes, something was delete since version 11, from version 10 in red:
  - When the FCN reaches value 0 and there are more SCHC Fragments to be sent after, the sender transmits the last SCHC Fragment of this window using the All-0 fragment format, it starts the Retransmission Timer and waits for an ACK. On the other hand, if the FCN has reached 0 and it is the last fragment of the SCHC Packet, the sender uses the All-1 fragment format, which includes a MIC.
#29 Rephrase Bitmap Encoding section

- Section 7.4.3.1 (Bitmap Encoding) of version 13 states:
  - In order to reduce the resulting frame size, the encoded Bitmap is shortened by applying the following algorithm: all the right-most contiguous bytes in the encoded Bitmap that have all their bits set to 1 MUST NOT be transmitted.

- This phrasing gives to the reader the feeling that the bitmap can be encoded as a standalone bit string. It seems that this is not the case: the bytes with bits set to 1 should be removed from the bit string resulting from the concatenation of the ACK header and of the bitmap.
#12 Padding Place

- Single-padding proposal … (Dominique presentation)
- More discussion
  - Rewrite section 8. Padding is done before transmission either after SCHC Compression or after SCHC Fragmentation
  - Depends on L2
  - MIC computed with padding
  - Padding on the draft is a default solution, technologies may define another solution if needed (add Ticket 15)
#12 Padding Place

- Single-padding proposal
  - The ML has received some positive answers
  -
#20 Byte Boundary

- | <------- byte boundary -------> |
- Replaced with:
  - Option 1 | next byte boundary -> |
  - Option 2 | L2 Word -> |
- ML consensus is for Option 2
#21 C bit in ACK

• For the moment consensus
  – Option 1: AM, DB, CG, LT, JCZ

• So: Update Ticket 15 with the warning to adjust MAX_WIND_FCN accordingly, if L2 technology constrains Bitmap size
Next Steps

• Finish all the modifications and close the tickets
• Update Ticket 15 to last version
• Publish last version (when?)
• More Questions?
  – Thanks
New section: SCHC Compression Process

- Use of SCHC for CoAP
- Use of SCHC for all the stack
Modification

• Change text to explain the difference between CoAP and UDP/IPv6

• Explain how each field must be compress
  • Version: MUST be compressed
  • Type:
    • Explain how to split value in two sets and mapping list
    • Mandate a rule to send RST to client
  • Code:
    • Same as type
    • Mandate a rule to process error codes
Message ID

• Dev is client:
  • Size can be reduced with MSB
  • How to define the size?

• Dev is server:
  • Use a proxy to reduce the size
  • More difficult to process
  • Security issue if flooding? Rate limitation?
Worst case

- MAX_TRANSMIT_SPAN = ACK_TIMEOUT * (2 * MAX_RETRANSMIT - 1) * ACK_RANDOM_FACTOR
- MAX_LATENCY
- PROCESSING_DELAY
- EXCHANGE_LIFETIME
- NON_LIFETIME

Sender: Do not re-use Message ID, Receiver: filter duplicate Message ID
Message ID

Retransmission time < EXCHANGE_LIFETIME
-> anticipation window = EXCHANGE_LIFETIME / period

MID size = log2(anticipation window)
Message ID

LoRa Class A / Sigfox:
- Ack can be received in response to the uplink
LoRa Class A / Sigfox:
- Ack can be received in response to the uplink
- Ack can be delayed until the next transmission
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Hypothesis:
- Retransmission are sent within the regular periodic traffic
### Worst case

This computation can be done by the device and sent using TS option

---

<table>
<thead>
<tr>
<th>name</th>
<th>default value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX_TRANSMIT_SPAN</td>
<td>45 s</td>
</tr>
<tr>
<td>MAX_TRANSMIT_WAIT</td>
<td>93 s</td>
</tr>
<tr>
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<td>100 s</td>
</tr>
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<td>EXCHANGE_LIFETIME</td>
<td>247 s</td>
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</table>

#### Equations

- $\text{MAX_TRANSMIT_SPAN} = \text{ACK_TIMEOUT} \times (2^{\text{MAX_RETRANSMIT}} - 1) \times \text{ACK_RANDOM_FACTOR}$
Worst case

- MAX_TRANSMIT_SPAN = ACK_TIMEOUT * (2 \(\text{MAX_RETRANSMIT} - 1\)) * ACK_RANDOM_FACTOR

This computation can be done by the device and sent using TS option

[from Matthias Kovatsch]
Worst case

\[ \text{MAX_TRANSMIT_SPAN} = \text{ACK_TIMEOUT} \times (2^{\text{MAX_RETRANSMIT}} - 1) \times \text{ACK_RANDOM_FACTOR} \]

### Default values

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This computation can be done by the device and sent using TS option

[from Matthias Kovatsch]
Token

• Number of active REST transaction

• Two fields
  • Token Length : regular field processed normally by SCHC
  • Token Value : length is given by a specific function TKL
    • This function use the value a Token Length after decompression
    • Avoid to put directly the size in the Field Length
      • Avoid conflict between a token length value and a field length in the rule

• Token can also be shortened by a proxy
Options: Accept and Content

• recommend mapping list to reduce the size
• If sent, must be viewed as a variable length field (in Bytes)
Max-Age, Uri-Host and Uri-Port

• Regular compression
  • Elided
  • Mapping-list/MSB
  • Ignored

• Note that Max-Age is in seconds, may be not in line with LPWAN
  • A new CoAP option with Max-Age in minute ?
Uri-Path and Uri-Query

• Core of CoAP Compression
  • Use position for each elements
  • Each element can be a matching list

• What do we do with /a/b/x and /c/d/x
  • Define a matching list for each element.
    • Reduce compression efficiency (2 bits instead of 1 in the example)
    • Allows unwanted decompression /a/d, /c/b
  • Define a matching list with several elements [“/a/b”, “/c/d”]
    • No modification to SCHC, more complex implementation
    • Position remains the same (x is in position 3)
Uri-Path and Uri-Query (continued)

- Variable length options
  - Use MSB, but
    - MSB unit is in bit
    - Variable unit is in byte
  - Mandate MSB to be a multiple of 8
  - Explain the length coding in the residue
  - New subsection for MSB/LSB

```
+----------------+-----------------+----------------+----------------+
<table>
<thead>
<tr>
<th>MO</th>
<th>CDA</th>
<th>TV</th>
<th>Compression Residue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignore</td>
<td>Value-Sent</td>
<td>Length + Residue</td>
<td></td>
</tr>
<tr>
<td>MSB(x)</td>
<td>LSB</td>
<td>Length + Residue</td>
<td></td>
</tr>
<tr>
<td>Match-mapping</td>
<td>Mapping Sent</td>
<td>List</td>
<td>Residue(index)</td>
</tr>
</tbody>
</table>
```
Proxy-URI and Proxy-Scheme

• Regular compression
  • Equal
  • MSB
  • Matching list
  • Ignore
ETag, If-Match, If-None-Match, Location-Path and Location-Query

• Always ignore
Other RFC/Drafts

• Block: incompatible with LPWAN?
  • Recommend LPWAN frag (better retransmission management)?

• Observe:
  • Regular compression: MSB, mapping list, ignore

• NoResponse:
  • Regular compression

• Time Scale:
  • Regular compression
  • Push this draft in core?

• Object Security (coming soon):
  • Regular compression
AOB ?