LPWAN WG

WG Chairs:
Alexander Pelov <a@ackl.io>
Pascal Thubert <pthubert@cisco.com>

AD: Suresh Krishnan
<suresh@kaloom.com>
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This meeting is recorded **
Presence is logged ***

* Scribe; please contribute online to the minutes at: https://etherpad.tools.ietf.org/p/lpwan
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*** From the Webex login
## Agenda bashing

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

**17:15** SCHC padding - Dominique

**17:35** SCHC Tickets and Discussed options - Ana + Laurent

**17:55** AOB

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Interim, May 30th, 2018
Action items

• Milestone Dates to revisit
• SCHC UDP checksum => refer to RFC 6282
• Find reviewers for drafts
  • CoAP
  • IP/UDP SCHC
• Adoption of Technology dependent specs
• Todos
  – Laurent to propose text on ticket 18
  – Pascal to propose text on UDP checksum compression
<table>
<thead>
<tr>
<th>Date</th>
<th>Milestone</th>
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<tr>
<td>Jul 2018</td>
<td>Submit CoAP compression mechanism to the IESG for publication as a Proposed Standard</td>
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<td><strong>Done</strong> Submit LPWAN specification to the IESG for publication as an Informational Document</td>
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draft-ietf-lpwan-ipv6-static-context-hc-13
Single padding proposal

Authors:
Laurent Toutain <Laurent.Toutain@imt-atlantique.fr>
Carles Gomez <carlesgo@entel.upc.edu>
Ana Minaburo <ana@ackl.io>
Dominique Barthel <dominique.barthel@orange.com>
Current Padding situation

#11 #12 - Padding Section

- Padding is not mandatory and depends on the L2 technology
- On the way forward, padding is done at most twice:
  - After SCHC compression
  - Last fragment (All-1) of fragmentation
  - Padding length is implicit, not transmitted
  - Overall, at most 14 superfluous bits are transmitted
- On the return path, ACKs may be padded, too.
Proposed Padding

• Padding done at most once:
  – At most 7 superfluous bits transmitted (for a byte-oriented L2 technology)

• How?
Current Padding mechanism (1/3)
Current Padding mechanism (2/3)

Interim, May 30th, 2018
Current Padding mechanism (3/3)
Proposed Padding mechanism (1/3)

- Padding done only for transmission
  - Either for transmitting the SCHC packet unfragmented
  - Or for transmitting the last fragment
Proposed Padding mechanism (2/3)

Compressed Header

Payload

Frag Hdr

Fragment

Frag Hdr

Fragment

Frag Hdr

Fragment

Rule ID + Comp. Residue

Integer number of bytes

Either one of the other

Rule ID + DTAG + W + FCN [+ MIC]

Integer number of bytes

Either one of the other
Proposed Padding mechanism (3/3)

- SCHC Reassembly by itself does not know the padding boundary
- MIC must be over payload and padding bits
- Extra bits will be dropped at Decompression anyway
Proposed notion of L2 Word

- Will usually be a Byte, but can be one bit
- Padding adds strictly less than an L2 Word
- If L2 Word == 1 bit, then padding adds 0 bit
- Simplifies description: one single mechanism
- SCHC ACK Bitmap shortened to L2 Word boundary. Better than today’s situation.
- L2 Word size MUST be defined
Value of padding bits

- Padding bits included in MIC computation
- Their value MUST be defined
  - Either in generic SCHC specification (not my favorite)
  - Or in technology-specific document (together with MIC formula)
Discussion on padding included in MIC

• Pros:
  – Does not require feedback from decompressor to find splitting point between last fragment payload and padding

• Cons:
  – A reception error on padding bits creates a reject on the reassembly buffer
    • Maximum 7 padding bits vs 100’s or 1000’s of payload bits, L2 CRC,
Discussion on layering

- Philosophical debate on adding bits at fragmentation and removing them at decompression
  - My take
    - Padding bits not processed, simply dropped
    - “The re-assembly buffer MAY contain unused bits at the end”
    - SCHC Packet (if transmitted unfragmented) already comes with extra bits appended, that decompressor must deal with
    - Decompressor works from left to right in incoming buffer and drops whatever is leftover
    - Decompressor does not analyse the extra bits
My (biased) conclusions

• Less bits on the wire(less)
• Simpler description
• Solves tickets #12, #20

• But Acklio’s implementation needs to be changed to see running code
• Thank you
  – questions?
#12 Padding place

• Is it possible to put padding between SCHC fragment header and payload to align the byte boundary so to easily put and take the payload?

• Non, the padding is put after the payload, because as the payload is also not aligned is better to align once and not twice.

Edgar: comment about the whole padding thing. NB-IOT does not need byte alignment of the payload. There is padding a Layer 2 anyway. Does padding need to be here, or should be left to the technology document?

JCZ: agree to remove it from the general SCHC document, and leave it to the technology documents.

Ana: several months ago, decided that padding was best put at the end.

Edgar: padding here is to achieve byte alignment. Also filling a transport block. Leave the latter to the L2. The former may not be needed on some technologies.

Carles: the SCHC doc could mention the two options (padding between header and payload or at the end). Leave to the tech document to select.

Edgar: rather have only one specified, and activate it or not. Otherwise interop will be hard, especially multi-RAT networks.

Laurent: in LoRa, we (Acklio) use the FPort byte to carry the Rule ID, in one full byte. Some form of padding!

Ana: suggests to have a DEFAULT specification in the SCHC document, and leave it to the technology document to specify differently if it wants!
#20 Byte Boundary

<Ana> The term is not good to express what we want to.
• Normally the idea is to have an integer number of bytes to complete the fragmentation header format, the term used was byte boundary but this creates the idea of 1 byte and in some cases, this will not probably be possible, so inputs to get a term that represents "AN INTEGER NUMBER OF BYTES" instead of byte boundary

JCZ: I prefer not to limit the protocol to byte boundaries

Ana: I agree that this will depend on technology L2, but:
• We need a term to identify for example in Abort message the first number of entire bytes to add one byte with FF
• We need to identify the number of bytes for Bitmap
• So we need to agree on how to name: "an integer number of bytes"
draft-ietf-lpwan-ipv6-static-context-hc-13

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Open Tickets

• #10 Interleave different packets (TbC)
• #11 ACK format (TbC)
• #12 Padding place
• #14 Legacy devices (TbC)
• #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
• #15 SCHC technology specific parameters => updated to version 11 (ToDo: update to last version)
#10 Interleaving different packets

- This is possible because they have different DTAG
- The use in a specific technology needs to be studied and reflected in the specific technology document

- Technical Group Meeting
  - Out of scope: Add to Ticket 15
    - Addressed on the NB-IoT technology document
    - If the SF (LoRaWAN) change during the transmission of fragments a possible solution of the abort needs to be used
  - Technologies will try to give a possible solution or the correct use of abort if it applies
#11 ACK Format

- Almost all the discussion about the padding on ACK is done
- Changes in Dtag of section 7.2 (done for next version)
  - ACK with bitmap does not need padding
  - ACK without bitmap or with full bitmap are padded as needed
  - The Receiver-Abort is padded as needed
#12 Padding Place

- 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)
- Single-padding proposal … (discussion)
#14 Legacy Devices

- Need to be addressed in another document
- The uses of Rules for specific uses and devices are out of the scope of this document
- This draft gives the base for this devices (Study the usages of Rule ID and create a new document) => For recharter
#20 Byte Boundary

• 'Byte Boundary’ does not means what we want
  – Byte Boundary = 1 byte is not what we need

• Bitmap before transmission

  <-----       Bitmap bits       ---->
  | Rule ID  | DTag  | W|1|0|1|1|1|1|1|1|1|1|1|1|1|1|1|1|
  |-INTEGER NUMBER OF BYTES-| 1 byte next  | 1 byte next  |

  ⇒ By byte Boundary, we didn’t mean 1 byte but an INTEGER NUMBER OF BYTES

• Bitmap, encoded for transmission

  <--------  R  -------->
  <- T -> 1

  +---- ... --+... -+++++++  
  | Rule ID  | DTag  | W|1|0|

  +---- ... --+... -+++++++  
  |---- byte boundary ----|

#20 Byte Boundary

• | <-------- byte boundary --------> |

• Replaced with

• | next byte boundary -> |
#21 C bit in ACK

- For the moment consensus
  - Option 1: AM, DB, CG, LT, JCZ
- So: Update Ticket 15 with the warning that last fragment is 1 bit shorter because of the use of C bit and the bitmap may be reduced
#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
Next Steps

• Finish all the modifications and close the tickets
• Update Ticket 15 to last version
• Publish last version (when?)
• More Questions?
  – Thanks
AOB ?