LPWAN WG

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

AD: Suresh Krishnan
<suresh@kaloom.com>
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Minutes are taken *
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

Interim, December 5th, 2017
Agenda bashing

17:05 Opening, agenda bashing (Chairs) 10mn
   • Note-Well, Scribes, Agenda Bashing, Approval minutes from last meeting
   • Review todo
   • Status of drafts

17:15 SCHC Fragmentation update from IETF 100 30mn

17:45 Fragmentation comments (Carles) 20mn

18:00 AOB 0mn
Last meeting Action items

- Update SCHC draft
LPWAN SCHC Fragmentation

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

• TIMERS
  • Retransmission Timer – error
  • Inactivity Timer – abort (NEW)
    • Use of All-* empty to ask retransmission
  • Add a new section describing timers

• Counter
  • Attempts (MAX_ACK_REQUEST)
SCHC side Meeting • **NEW**

- Include an Inactivity Timer in the FSM to Abort the fragmentation on case of error (receiver FSM)

The Inactivity Timer:
- Init at the beginning
- Init after a reception

No ACK

ACK-always

ACK-on-error

--- Only Uplink ABORT

Inactivity_Timer = expires

When DWN_Lk

If Inactivity_Timer expires

Send DWL Request

Attempt++

DWL Request = ACK
SCHC side Meeting

- Include MIC control bit to abort in case of MIC error
- Error in L2
- SM desynchronization

Use of C checked bit

Figure 10: Format of an ACK for All-1 windows
SCHC side Meeting

- **Bitmap Optimization**: not a choice but the way it is

Local Bitmap:

```
+---- ... ---+... -+++++++
| Rule ID | DTag |W|C|0|1|0|1|1|1|0|1|1|1|1|1|1|1|1|1|1|P|
+---- ... ---+... -+++++++
| byte 1   | byte 2   | byte 3   |
```

Received Bitmap:

```
+---- ... ---+... -+++++++--------+
| Rule ID | DTag |1|1|0|1|0|1|1|1|0|1|1|
+---- ... ---+... -+++++++--------+
| byte 1   | byte 2   |
```

Local Bitmap: No Error

```
+---- ... ---+... -+++++++
| Rule ID | DTag |W|C|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|P|
+---- ... ---+... -+++++++
| byte 1   | byte 2   | byte 3   |
```

Received Bitmap:

```
+---- ... ---+... -+++++++
| Rule ID | DTag |W|C|1|
+---- ... ---+... -+++++++
| byte 1   |
```

Interim, December 5th, 2017
SCHC side Meeting

• Padding

+---------------------+---------+
| Fragments           |
| Fragn. Header       |
| Fragment payload    |
| padding             |
+---------------------+---------+

+---- ... --+-... -+-+--- ... ---+

ACK-All-0  |  Rule ID  | DTag | W | bitmap
| padding   |

Interim, December 5th, 2017
Abort.

- Sender All-1 No MIC and No payload
- Receiver: special ACK (ACK-FF)

Local Bitmap: No Error

```
+---- ... --+-... -+-+-+-+
 |  Rule ID  | DTag |W|C|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|P|
+---- ... --+-... -+-+-+-+
 |    byte 1     |    byte 2     |    byte 3     |

Received Bitmap:

```
+---- ... --+-... -+-+-+-+
 |  Rule ID  | DTag |W|C|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|P|
+---- ... --+-... -+-+-+-+
 |    byte 1     |    byte 2     |    byte 3     |

Abort:

```
+---- ... --+-... -+-+-+-+
 |  Rule ID  | DTag |W|C|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|1|P|
+---- ... --+-... -+-+-+-+
 |    byte 1     |    byte 2     |    byte 3     |
```

Interim, December 5th, 2017
SCHC side Meeting

- ACK-on-error
- Ask ACK with All-1 empty to end the SM
THANKS

Questions?
LPWAN SCHC Fragmentation

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

• Added text for Downlink frag and ACK Always

• Added clarification on multiple window size support
  – The same window size MUST be used for all frags of a packet
Addition for ACK on error

• Issue in ACK on error
  – If all fragments sent and lost
    • False positive
  – To discuss: adding (the option to have) a final ACK?
    • At the end of the packet (i.e. after the last window)
    • Unconditionally
    • If the ACK is received (hopefully, likely), the sender knows a false-positive has not happened
A problem

• Retries when frag size decreases
  – Currently not supported
    • We had considered it, but found it to be complex
    • A problem for SCHC over LoRaWAN
  – Options
    • Solving it in SCHC ?
    • Solving it in SCHC over LoRaWAN ?
    • Not solving it? (i.e. if this happens, abort)
  – Solutions may be considered
    • See next slide
A problem (cont’d)

• Solutions
  – Coarse-grained
    • Keep current bitmap format
    • If all “subfragments” received, corresponding bitmap bit is 1
      – Otherwise, bitmap bit is 0
    • Retransmit all “subfragments” again while bitmap bit is 0
      – May be inefficient
  – Fine-grained
    • Extended bitmap format needed to provide subfragment-level feedback
A problem (cont’d)

• Solutions
  – Fine-grained
    • New bitmap format needed to provide subfragment-level feedback
    • Allows to resend only missing subfragments
  – Example
    - Several frags need to be resent, but frame payload size decreased
    - Each frag, requiring 5 subfrags, is resent
    - Only frags 1 and 3 not yet fully received
    - Feedback received includes 2nd-level bitmaps (subfragment-level)
Thanks!

Comments?

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