

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>
- ** 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) <ul style="list-style-type: none">• Note-Well, Scribes, Agenda Bashing, Approval minutes from last meeting• Review todo• Status of drafts	10mn
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

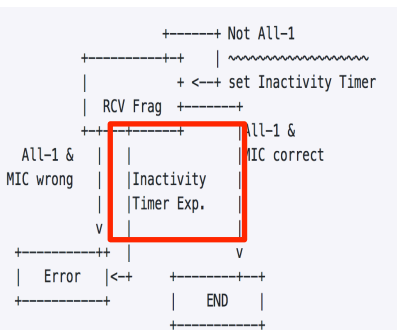
- **TIMERS**
 - Retransmission Timer – error
 - Inactivity Timer – abort **(NEW)**
 - Use of All-* empty to ask retransmission
 - Add a new section describing timers
- **Counter**
 - Attempts (MAX_ACK_REQUEST)

SCHC side Meeting • (NEW) ((LPWAN))

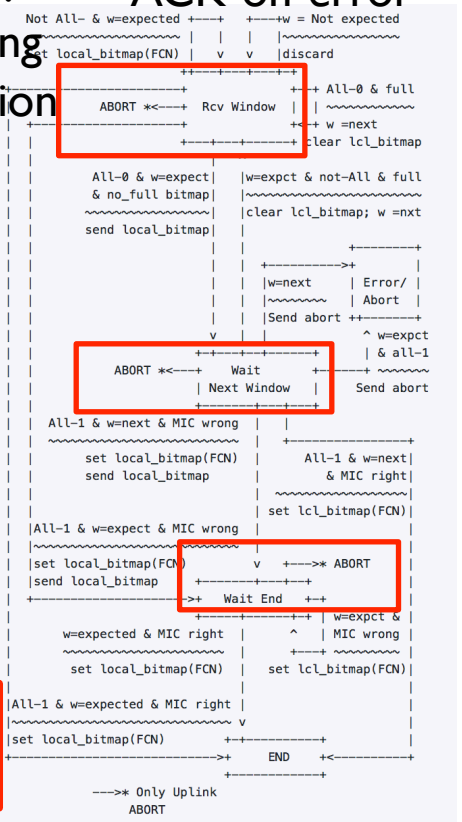
- Include an Inactivity Timer in the FSM to Abort the fragmentation on case of error (receiver FSM)

The Inactivity Timer: ACK-on-error

- Init at the beginning
 - Init after a reception
- No ACK**

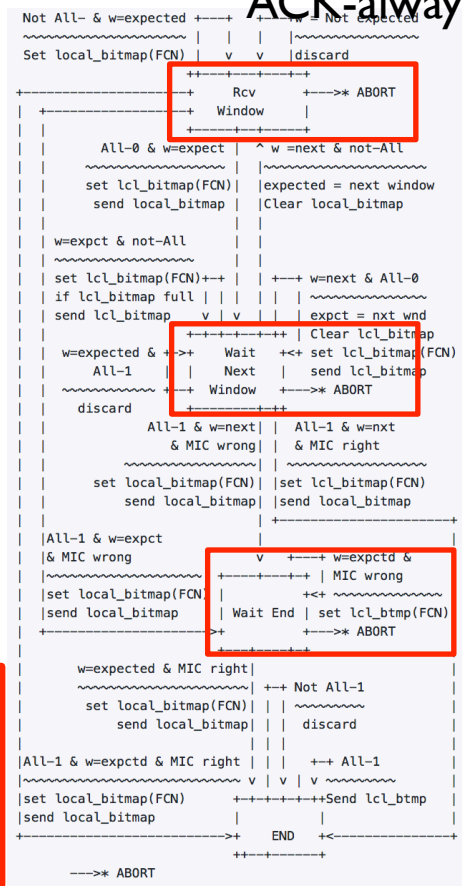


---->* Only Uplink
 ABORT
 ~~~~~  
 Inactivity\_Timer = expires



---->\* ABORT  
 ~~~~~  
 Inactivity_Timer = expires
 When DWN_Link
 IF Inactivity_Timer expires
 Send DWL Request
 Attemp++
 DWL Request = ACK

ACK-always



SCHC side Meeting

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

• (NEW)

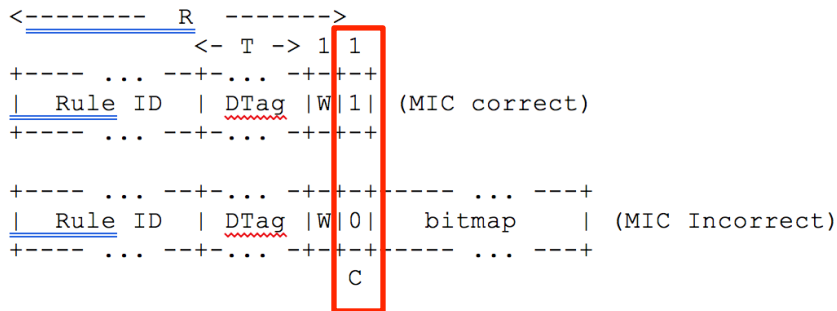
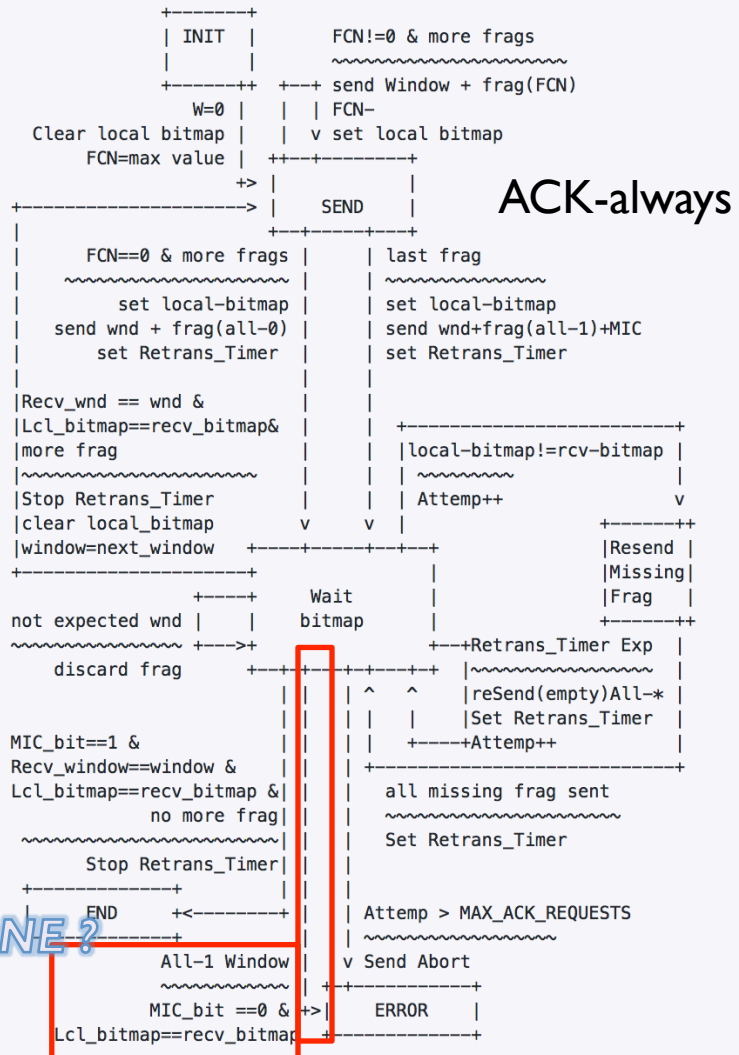


Figure 10: Format of an ACK for All-1 windows

WHICH ALGORITHM WILL BE THE DEFAULT ONE?



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|P|
+---- ... --+-... -+--+--+
|          byte 1          |          byte 2          |          byte 3          |
```

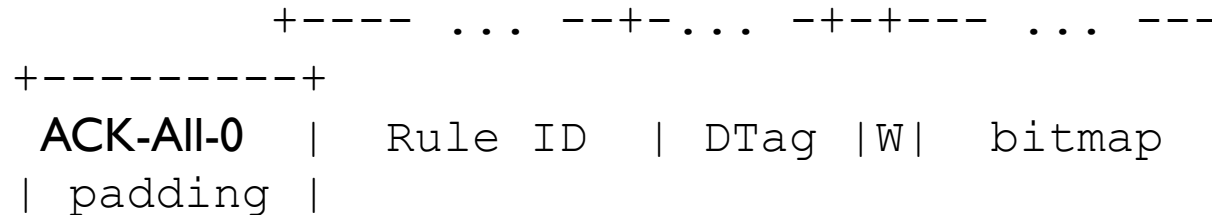
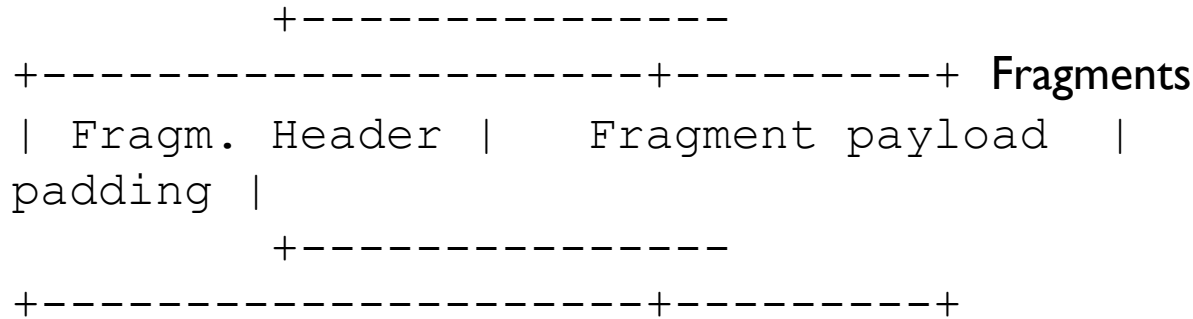
Received Bitmap:

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

LOCAL BITMAP ≠ RCVD

SCHC side Meeting

- Padding



SCHC side Meeting



- Abort.
 - Sender All-I 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|P|
+---- ... --+... -+----+
|         byte 1         |         byte 2         |         byte 3         |
```

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

```
Abort:
+---- ... --+... -+----+
| Rule ID | DTag |W|1|1|1|1|1|1|1|1|1|1|1|1|1|
+---- ... --+... -+----+
|         byte 1         |         byte 2         |
```

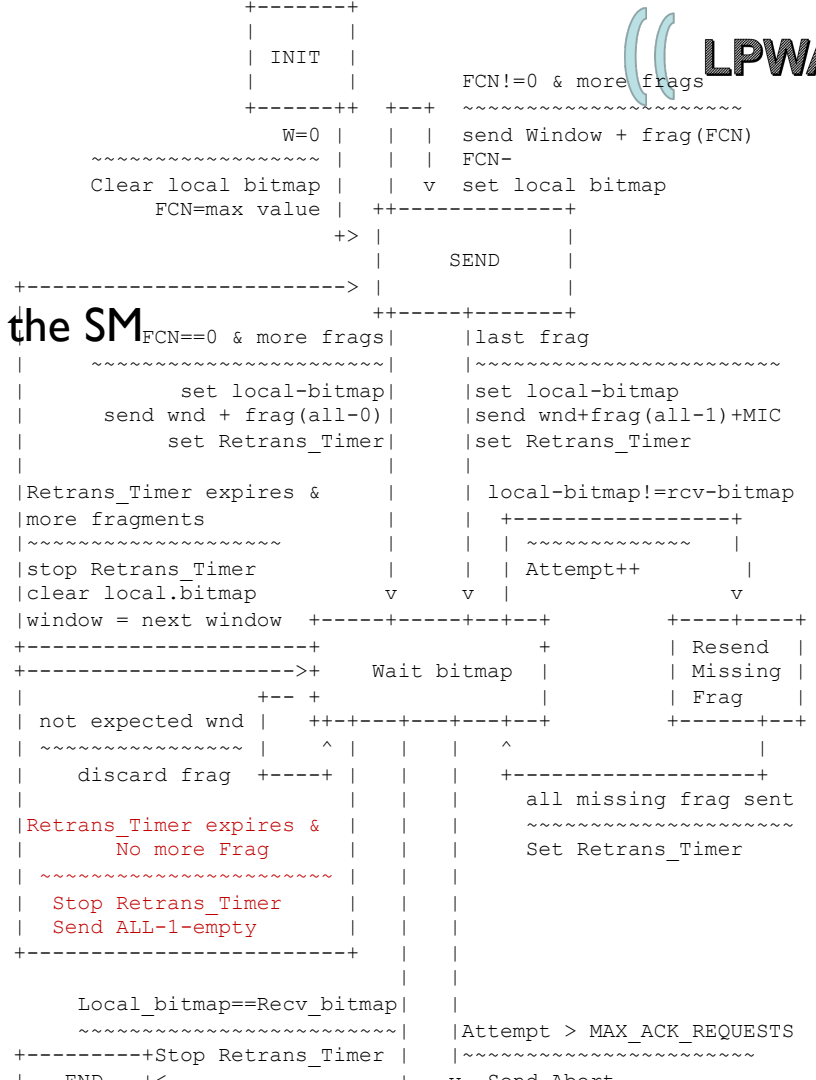
```
Local Bitmap:
+---- ... --+... -+----+
| Rule ID | DTag |W|C|0|1|0|1|1|1|0|1|1|1|1|1|1|1|1|1|P|
+---- ... --+... -+----+
|         byte 1         |         byte 2         |         byte 3         |
```

```
Received Bitmap:
+---- ... --+... -+----+
| Rule ID | DTag |W|C|0|1|0|1|1|1|0|1|1|
+---- ... --+... -+----+
|         byte 1         |         byte 2         |
```

```
Abort:
+---- ... --+... -+----+
| Rule ID | DTag |W|1|1|1|1|1|1|1|1|1|1|1|1|1|
+---- ... --+... -+----+
|         byte 1         |         byte 2         |
```

SCHC side Meeting

- ACK-on-error
 - Ask ACK with All-I 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)

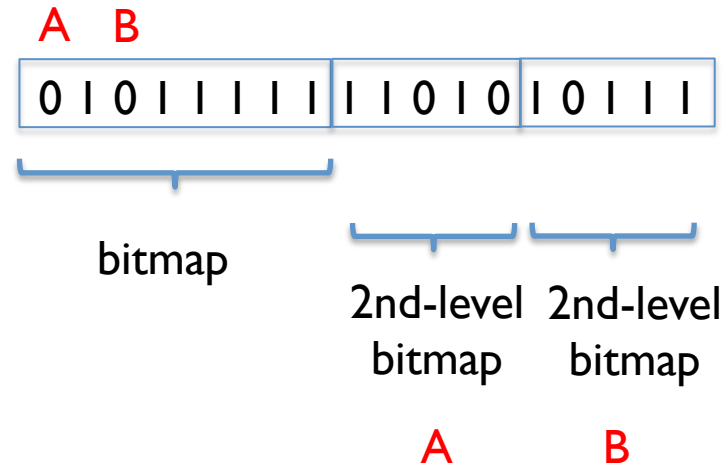
- Solutions

- 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 ?