

draft-ietf-lpwan-ipv6-static-context-hc-10

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Updates from IETF I00 to IETF I01



- -08 (Dec 17th)
 - Shuffled some sections
 - Added entries to Terminology section
 - Moved drawings of fragmentation Finite State Machine to Appendix
 - Improved text describing the fragmentation, fragment format drawings
- -09 (Dec 22nd)
 - Text cleanup, mostly on fragmentation
 - Improved drawing of timing diagrams and state machines (Appendices B and C)
- WGLC started Dec 22nd, extended to Feb 5th

Reviews

- Thanks to all the reviewers for your valuable inputs:
 - Dominique Barthel,
 - Edgar Ramos,
 - Juan Carlos Zuñiga,
 - Stephen Farrell
 - Pascal Thubert,
 - Rahul Jadhav
 - Soshi Sakane
 - Nicolas Sornin
- As a result, issued -10 on Feb 28th

Editorial Updates from 09 to 10

- Many editorial changes
- Reduced Abstract
- Added Terminology: Abort, ACK, L2,
- Added Sections:
 - SCHC overview => diagram showing the compression/decompression on top of fragmentation
 - Rule ID section => clarifying use of Rule Ids for compression/decompression and fragmentation
 - Padding Section => when it is needed, when and how it is performed
- To avoid confusion, elimination of Window in the name of the Fragmentation modes:
 - New names: No-ACK, Ack-on-Error, Ack-Always
- Fixed the Ack-on-Error receiver FSM figure (Appendix C)
- Updated the IP and UDP compressed headers section
- Updated SCHC examples and fragmentation examples

Closed Tickets- Interim Meetings

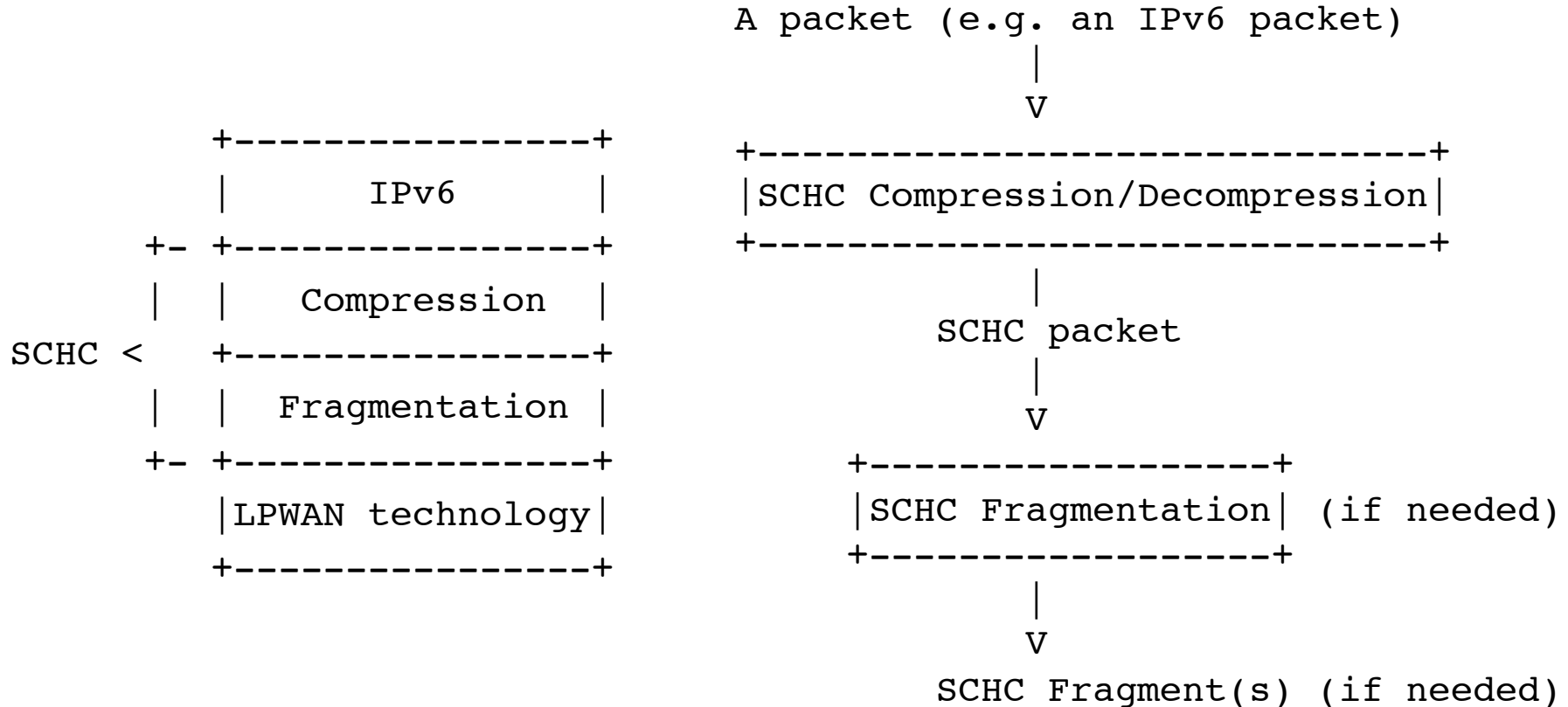
- [#2 Rule ID default size](#) => Out of Scope, we need a new document for this problem
- [#3 Zip bomb](#) => Added in the Security part
- [#8 Different Rule ID's with same DTAG](#) => Yes, as DTAG defines packets
- [#9 Reordering between RGW and NGW](#) => no « out of sequence » delivery
- [#7 Hop Limit default values](#) => SCHC doesn't define field default values.
- [#6 Can a window be partially filled? \(All-0, All-1\)](#) => All-1: of course; All-0: only possible in ACK-always.
- [#4 DNS lookup](#) => This needs to be defined in a new document for Rule ID

- [#15 SCHC technology specific parameters](#) => needs to be updated from v07 to v10 in order to be closed

Open Tickets

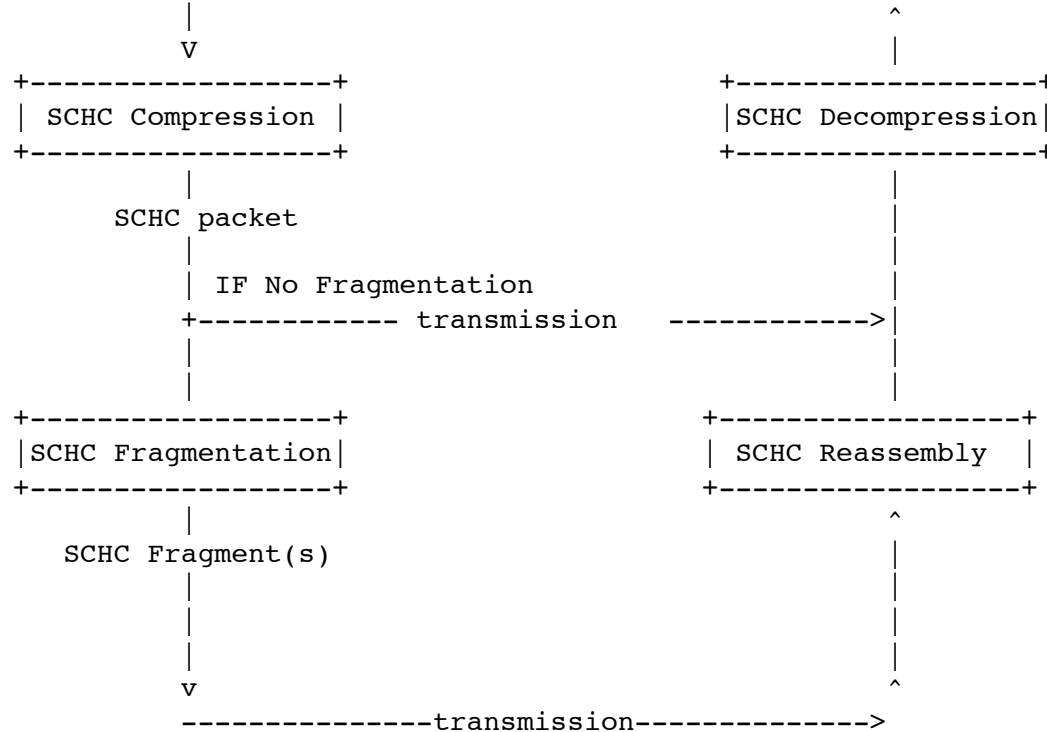
- #5 Decoupled Fragmentation and SCHC compression
- #10 Interleave different packets
- #11 ACK format
- #12 Padding place
- #13 Terminology Sublayers
- #14 Legacy devices
- #17 Compression Terminology
- #18 MSB/LSB argument
- #19 Fragmentation Terminology
- #20 Byte Boundary
- #21 C bit in ACK
- #22 Fragmentation use
- #23 NB-IoT
- #24 DTag
- #25 Rules not synchronized
- #26 How is ACK matched to fragments

#5 #13- SCHC Overview



#5 #13- SCHC Overview

A packet (e.g. an IPv6 packet)

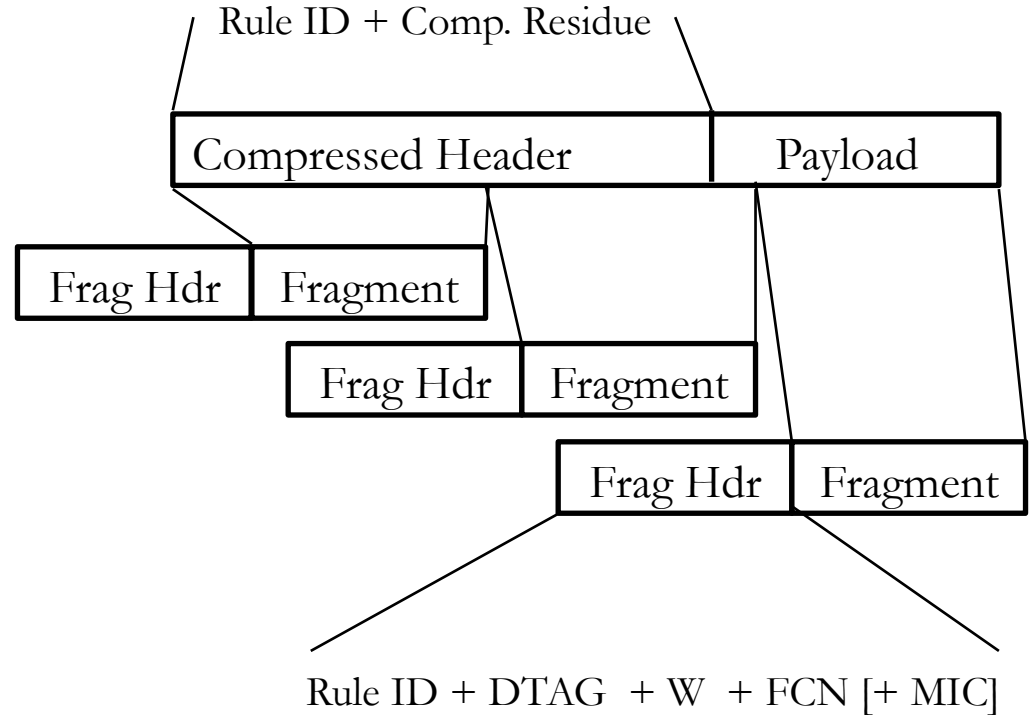


Sender

Receiver

#17- Terminology

- SCHC packet
- SCHC Fragments



#17- Terminology

- SCHC ACK (draft - I I)

```

<-----ACK Header----->
      <- T -> 1

+----- ... --+... -+--+----- ... -----+
| Rule ID  | DTag |W|encoded Bitmap|
+----- ... --+... -+--+----- ... -----+
  
```

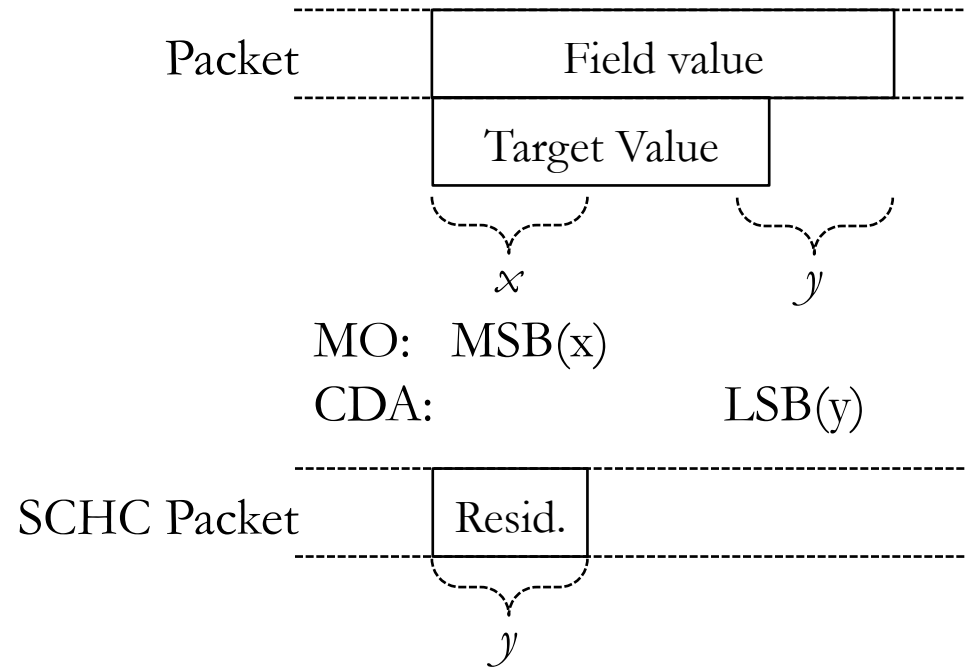
- Field Description

Rule 0

Field	FL	FP	DI	Value	Match Opera.	Comp Decomp Action
IPv6 version	4	1	Bi	6	equal	not-sent

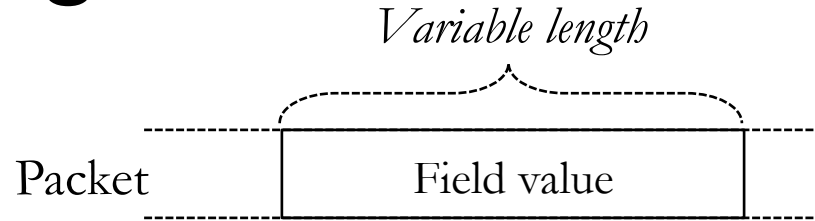
#18- Terminology

- MSB/LSB arguments
 - They are used to choose the number of bits to be matched against and to be sent
 - x and y are number of bits
 - y is optional. If absent, equates to $size(Field)-x$

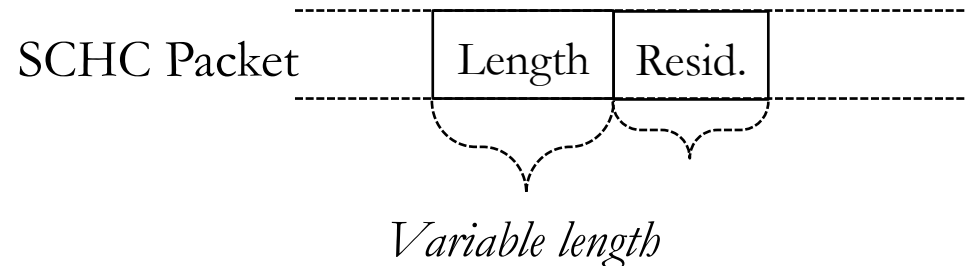


#18 Variable Length Fields

- Variable Length Fields meant for CoAP URIs
- Intended MO + CDA
 - Ignored + Value-sent
 - MSB + LSB
 - Send original length (in bytes) and residue

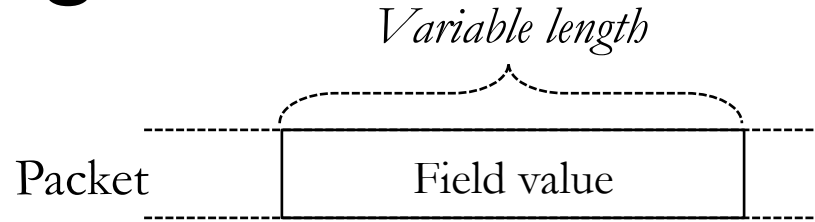


MO: Ignored
CDA: Value-sent

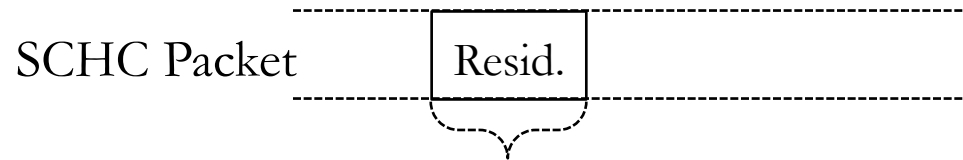


#18 Variable Length Fields

- Variable Length Fields meant for CoAP URIs
- Other possible MO + CDA
 - Match-mapping + Mapping-sent
 - Original length not sent
 - Residue (== index) sent



MO: Match-Mapping
 CDA: Mapping-Sent



#5 #14 Rule ID section

- Draft does not specify the size of the Rule ID (out of the scope), nor even any numbering system
 - The technology documents will describe if Rule ID is constrained by any alignment
 - SCHC in itself is not aligned to any natural boundary (but bits!)
- New Rule ID Section defines that Rule ID is used/needed:
 - In the SCHC C/D context, to identify the compression rule.
 - In SCHC Fragmentation, to identify the specific modes and settings
 - at least one Rule ID MAY be reserved to the case where SCHC C/D is not possible **and** SCHC fragmentation is not needed.

#5 #14 Rule ID section

- Discussion
 - People have been asking about Rule ID size, Rule ID alignment constraint or generally have been assuming things about Rule ID numbering
 - Answer given so far: « it depends on the technology ».
 - Figures 9 to 23 would have you think that Rule ID is of fixed, homogeneous size (at least for fragments).
 - It is not the intention of the draft.
 - Better wording of this section is needed

Fig 9 - 23

```

<----- R ----->
      <--T--> 1 <--N-->
+-- ... --+ ... --+ ... --+-----+
| Rule ID | DTag |W| FCN | Fragment payload |
+-- ... --+ ... --+ ... --+-----+

```

```

<----- R ----->
      <--T--> <--N-->
+-- ... --+ ... --+ ... --+-----+
| Rule ID | DTag | FCN | Fragment payload |
+-- ... --+ ... --+ ... --+-----+

```

```

<----- R ----->
      <- T -> 1 <- N ->
+-- ... --+ ... --+ ... --+ ... ---+
| Rule ID | DTag |W| 0..0 | payload |
+-- ... --+ ... --+ ... --+ ... ---+

```

R seems to be a constant
but **it does not need to**
⇒ remove R from draft?

#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-I) 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.

#11, #21 ACK Format- Bitmap

- ACK FORMAT

```

<----- R ----->
      <- T -> 1
+---- ... --+... -+---+
| Rule ID | DTag |W|encoded Bitmap| (no payload)
+---- ... --+... -+---+
  
```

- Padding may be added if needed

- ACK Format, last window

```

<----- R ----->
      <- T -> 1 1
+---- ... --+... -+---+
| Rule ID | DTag |W|1| (MIC correct)
+---- ... --+... -+---+

+---- ... --+... -+---+----- ... -----+
| Rule ID | DTag |W|0|encoded Bitmap | (MIC Incorrect)
+---- ... --+... -+---+----- ... -----+
                        C
  
```

#2 IACK Format- Bitmap

- The use of C bit implies the reduction of I bit on the ACK of the last window:
 - Option 1: Warning to adjust MAX_WIND_FCN accordingly, if L2 technology constrains Bitmap size
 - Option 2: Specify that last window uses at most MAX_WIND_FCN-I fragments
- What does the WG suggest?

#20 Byte Boundary

- 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.
- In some cases, 1 byte probably will not be enough, so we're seeking inputs to get a term that represents "**AN INTEGER NUMBER OF BYTES**" instead of "byte boundary"

#20, #21, Bitmap Encoding

- Bitmap Encoding
 - Reduce the ACK size
 - Allows for Abort messages
 - It also works if the transmission is bit-aligned

#22 #23 Edgar Inputs – NB-IoT

- Q: in Abstract, “fragmentation is *mandatory* when ...”. Some LPWAN technologies provide fragmentation, don’t need SCHC’s fragmentation
- A: we’ll write “...is *needed* ...” instead
- Some other inputs
 - Specific to 3G - NB-IoT to be solved in the technology document
 - DTag, MultiRat,

#24 DTag

- Q: what happens when DTag is not present?
 - "The DTag field, if present, is set to the same value for all SCHC fragments carrying the same SCHC packet, and to different values for different datagrams.»
SCHC Packets
SCHC Packets
- A: when there is no Dtag, there can be only 1 SCHC Packet in transit. Only after all its fragments have been transmitted can another fragmented SCHC Packet be sent.

#26 Matching Acks with Frags

- Q: in presence of multiple Fragment IDs (because of multiple reliability modes and/or multiple window sizes), how does one match a SCHC ACK to its set of SCHC Fragments?
- A: could specify that same Rule ID will be used, or leave it to other documents to specify pairing mechanism
- What does the group think?

More Inputs to be addressed

These topics are out of the scope of the current SCHC document

- #10 Interleaving Fragments in different radio circuits (NB-IoT) => to be addressed on NB-IoT doc
- #10 Changing SF in the middle of fragmentation (LoRaWAN) => with this doc, works ok when no error, but when retransmission is needed the fragmentation may need to be aborted
- #14 Rule ID size and uses (Legacy devices included) => this draft will explain better
- #25 Rule ID context synchronization => device management
- #14 Legacy Devices to be addressed

Next steps

- Good news: protocol is stable
- Will issue -11 version mid-April
 - A few issues to be discussed on the mailing list
 - Will try to capture all these explanations in (clear) text
 - Let us know how well we do

END

- Thank you
 - more questions?