

Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [802.15.4 Profile for IETF SCHC]

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Re: [SC IETF topic for SCHC header compression]

Abstract: [Discussion about ways to use SCHC with 802.15.4]

Purpose: [Develop document text for IETF [lpwan] submission]

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SCHC – Static Context Header Compression

- Static Context:
 - Topology
 - Application (i.e., kind of traffic)
 - Packets always delivered in order
- Fragmentation modes
 - Never Ack
 - Always Ack
 - Ack on Error

SCHC Fragment Header sizes

- RuleID: two or three bits minimum
- Dtag: can be zero
- W: at least one bit if windows are used
- FCN: probably at least two bits

Let's say one byte.

Plus, MIC

Comparing Fragmentation

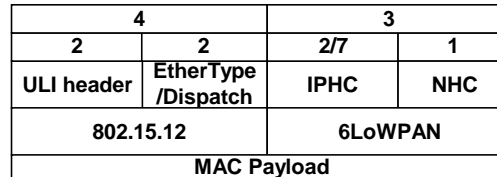
- For SCHC, fragmentation overhead is:
 - ~1 byte / fragment
 - + SCHC MIC
 - ❖ Request SC IETF to recommend Profile setting MIC=0, since 802.15.4 *will* check
 - + 802.15.4 header per fragment (5-7 bytes)
 - ❖ How much can we compress MHR?

Goal 1: Optional SCHC MIC

- No need to have FCS and MIC on every reassembled frame, may well be identical
- Can ask as individual, but would be likely be better to also have validation from the SC IETF composed of 802.15 experts

Frame Composition

Figure 3



2	1	2	2	0	2	1	4	1	4	3	Max Frame Size-?all other fields	4	2
Octets: 2	0/1	0/2	0/2/8	0/2	0/2/8	1	0/4	0/1/5/9	4	3/8	Variable	0/4/8/16	2/4
Frame Control	Sequence Number	Dest PAN ID	Dest Addr	Source PAN ID	Source Addr	Security Control	Frame Counter	Key Identifier	ULI Header	6LoWPAN Header	Data Payload	MIC	FCS
MHR									MAC Payload				MFR

Using Data Payload to convey higher layer data

Figure 4a

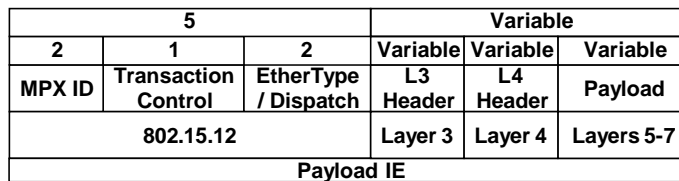
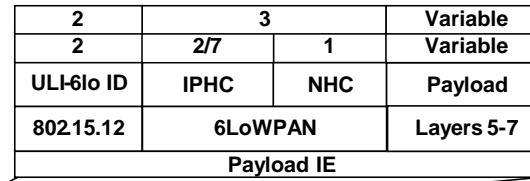


Figure 4b



2	1	2	2	0	2	1	4	1	0	Variable	Max Frame Size-?all other fields	4	2
Octets: 2	0/1	0/2	0/2/8	0/2	0/2/8	1	0/4	0/1/5/9	Variable	Variable	Variable	0/4/8/16	2/4
Frame Control	Sequence Number	Dest PAN ID	Dest Addr	Source PAN ID	Source Addr	Security Control	Frame Counter	Key Identifier	Header IEs	Payload IEs	Data Payload	MIC	FCS
MHR									MAC Payload				MFR

Using IEs to convey higher layer data

802.15.4 Fragmentation overhead

- 802.15.4 only defines for LECIM
- FCSD IE required prior to fragments (4)
- Fragment acknowledge – Table 23-4
- Fragment header (2)
- FICS on every fragment – (2) or (4)

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➤ This seems to always be substantially more overhead than SCHC

Minimal 802.15.4 frame format

- General frame format defined in 7.2
- 3 bits for Frame type
- 0 bits for PAN IDs, Source/Dst Address
- 0 bits for IEs
- 2/4 bytes for FCS

Frame type values

Frame type value	Description
$b_2 b_1 b_0$	
'000	Beacon
'001	Data
'010	Acknowledgment
'011	MAC command
'100	Reserved
'101	Multipurpose
'110	Fragment or Frak
'111	Extended
The Fragment and Frak formats are defined in 23.3.3 and 23.3.6.2, respectively.	

Possibility for a new Frame Type

- Frame type 0b'100' is “Reserved”
- Frame type 0b'111' is “Extended”
- Frame type 0b'110' is “Interesting”

If a new frame type is possible, the next bits could be the SCHC header

➤ RuleID, DTAG, W, ...

Questions

- How to minimize 802.15.4 MAC header overhead?
- Should the document be only for 15.4w?
- Should we consider specifying an extended frame type?
- Does SCHC require security? How shall we compare 802.15.4 security versus SCHC security?

Observations

- 802.15.4 MIC is cryptographically secure and typically is done on-chip
- SCHC MIC is a CRC checksum and not secure. Should call it FCS, not MIC