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# Comparison of 6lo and SCHC
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## Abstract

6lo and 6lowpan have standardized a stateless IPv6 and UDP compression method for mesh networks. SCHC proposes a generic compression mechanism that can be applied to any protocol stack. The lpwan working group is focusing on star topologies for IPv6, UDP and CoAP header compression and fragmentation.

This document summarizes the differences between 6lo and SCHC and possible combination of SCHC and 6lo.

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## 1. Introduction

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## 2. Comparison

### 2.1. Stateless compression.

Both compression protocols are stateless regarding the compression/ decompression process. Each packet is compressed and decompressed independently of the others and no information is stored during compression or decompression.

The SCHC name comes from the fact that it is a generic mechanism and the context tells how to compress a specific packet.

### 2.2. Meshed vs Star

6lo is defined for meshed network therefore all the node must be able to manipulate any 6lo packet.

SCHC is defined for star network and compression is done at both ends. SCHC offers the possibility to have different compression scheme for each branch of the star. This scheme is described though a context.

If SCHC had to be used in a mesh network, all the intermediary nodes will have to know the rules used in the network.

### 2.3. Alignment

6lo preserves alignment on bye boundary when sending header fields. SCHC is bit oriented and padding can be added when the packet is sent.

## 3. Uniform vs specific compression rules.

6lo focuses mainly on IPv6 header and predefine a compression scheme known by all the nodes in a 6lo network.

SCHC defines a generic compression mechanism based on fields. A field is an abstract notion. A field has several properties:

- An ID identifying a specific field.
- A position when a field is repeated several times in a header.
- A length with can either be a size in bit or a function indicating how the size is computed.
- A direction which makes sense in a star topology since traffic is originating from a node or is for a node.

The rule contains some functions:

- Matching Operator: this information is used to select candidate rules for compression. A rule is selected if all the fields in the packets matches all the fields in the rule. Current MO are:
  - "ignore" (any value is possible),
  - "equal",
  - "MSB" (Most Significant Bits) or
  - "Matching".

- Compression Decompression Action: if a compression rule is selected, then compression action tells how to compress header fields into residues. Current CDA are:
  - Not-sent: the field is elided. This behavior is found also in 6lo as elided.
  - Value-sent: the field is sent. If the field was defined as variable, the length can be sent before the residue. This behavior is found also in 6lo, but only for well-known length fields.
  - LSB (Less Significant Bit): the less significant bits are sent.
  - Matching-sent: an index is sent instead of the value. 6lo has something similar for hop-limit. 3 well-known values are defined.

### 3.1. Bitmap vs Rule ID

6lo defines a dispatch indicating the nature of the 6lo packet and for IPHC defines a bitmap to indicates the nature of the header compression.

SCHC uses a rule ID to identify the nature of the SCHC packet. Rule ID have a variable length, most frequent rules may use shorter values. The rule ID space is split between compression and decompression rules. The rule ID refers to a context which contains the nature of the rule and associated parameters.

In a sense the combination dispatch and bitmap for compression are equivalent to the rule ID, the main difference is that the rules are implicit in 6lo and the same rules are shared by all the node and explicit in SCHC. Context synchronization is needed between both ends.

### 3.2. Fragmentation

SCHC implement a fragmentation mechanisms dedicaded to LPWAN networks. 3 modes exists:

- NoAck mode is an optimisitc mode, a RCS (rassembly Check Sequence) is added in the last fragment. unvalid received messages are discarded. No retransmission is done.
- Ack Always is base on a "jumping window", sender must received a acknowledgement to jump to the next window.

- Ack on Error is more efficient. The message is cut into tiles of a specific length. Tiles are regrouped into windows. Tiles are sent into fragments. Fragment size may vary during transmission. Receiver generate

## 4. Applicability of SCHC in a 6lo network.

To apply SCHC in a 6lo meshed network, the following requirements are needed:

- A SCHC dispatch to indicate that a SCHC rule ID follows,
- A context synchronization among all the 6lo nodes to share the context, or predefined rules,
- The rule should not contain a direction indicator.

## 5. Normative References

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