

LPWAN
Internet-Draft
Updates: [5172](#) (if approved)
Intended status: Standards Track
Expires: 23 October 2021

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21 April 2021

SCHC over PPP
draft-thubert-intarea-schc-over-ppp-03

Abstract

This document extends [RFC 5172](#) to signal the use of SCHC as the compression method between a pair of nodes over PPP. Combined with [RFC 2516](#), this enables the use of SCHC over Ethernet and Wi-Fi.

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[1.](#) Introduction

The Point-to-Point Protocol (PPP) [[RFC5172](#)] provides a standard method of encapsulating network-layer protocol information over serial (point-to-point and bus) links. "A Method for Transmitting PPP Over Ethernet (PPPoE)" [[RFC2516](#)] transports PPP over Ethernet between a pair of nodes. It is compatible with a translating bridge to Wi-Fi, and therefore enables PPP over Wi-Fi as well.

PPP also proposes an extensible Link Control Protocol and a family of Network Control Protocols (NCPs) for establishing and configuring different network-layer protocols. "IP Version 6 over PPP" [[RFC5072](#)] specifies the IPv6 Control Protocol (IPV6CP), which is an NCP for a PPP link, and allows for the negotiation of desirable parameters for an IPv6 interface over PPP. "Negotiation for IPv6 Datagram Compression Using IPv6 Control Protocol" [[RFC5172](#)] defines the IPv6 datagram compression option that can be negotiated by a node on the link through the IPV6CP.

PPP is not commonly used in Low-Power Wide Area Networks (LPWAN) but the extreme compression techniques that are defined for use in LPWAN may be applicable to more traditional links where PPP applies.

The "Static Context Header Compression (SCHC) and fragmentation for LPWAN, application to UDP/IPv6" [[SCHC](#)] is a new technology that can provide an extreme compression performance but requires a same state to be provisioned on both ends before it can be operated.

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The "SCHC Architecture" [[I-D.pelov-lpwan-architecture](#)] enables a peer to peer SCHC operation in addition to the classical device to network LPWAN paradigm, e.g., over a PPP connection. To enable SCHC over PPP and therefore Ethernet and Wi-Fi, this specification extends [[RFC5172](#)] to signal SCHC as an additional compression method for use over PPP.

An example use case for SCHC over PPP over Ethernet (SCHCoPPPoE) is to apply SCHC to periodic flows and maintain them at a protocol-independent size and rate. The constant size may be too small for a particular flow or protocol. The SCHC fragmentation can then be used to transport a protocol data unit (PDU) as N compressed SCHC fragments, in which case the effective PDU rate is the TSN frame rate divided by N.

This can be useful to streamline the frames and simplifies the scheduling of Deterministic Networking [[DetNet](#)] and Operational Technology (OT) control flows over IEEE Std 802.1 Time-Sensitive Networking (TSN) [[IEEE802.1TSNTG](#)] or one of the RAW Technologies [RAW Technologies].

2. [BCP 14](#)

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [BCP 14](#) [[RFC2119](#)][RFC8174] when, and only when, they appear in all capitals, as shown here.

3. Extending [RFC 5172](#)

With this specification, a PPP session defines a virtual link where a SCHC context is established with a particular set of Rules, which is indicated at the set up of the PPP session as follows:

[RFC5172] defines an IPV6CP option called the IPv6-Compression-

Protocol Configuration option with a type of 2. The option contains an IPv6-Compression-Protocol field value that indicates a compression protocol and an optional data field as shown in Figure 1:

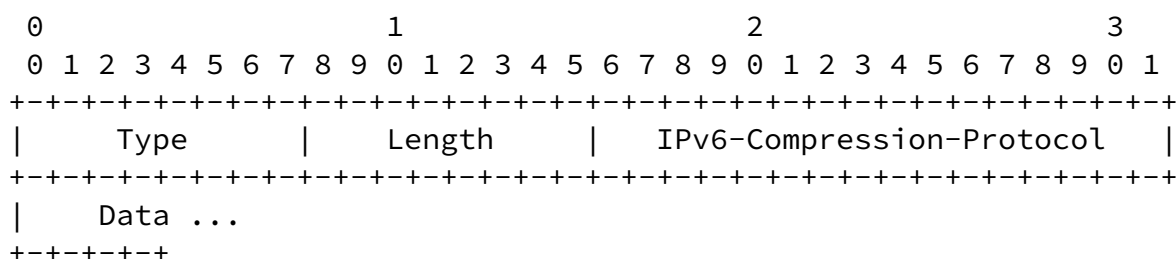


Figure 1: The IPv6-Compression-Protocol Configuration Option

This specification indicates a new IPv6-Compression-Protocol field value for [SCHC] (see [Section 5](#)), and enables to transport a Uniform Resource Identifier (URI) [RFC3986] of the set of rules in the optional data. The default format for the set of rules is YANG using the "Data Model for SCHC" [SCHC DATA MODEL] encoded in JSON as specified in [RFC7951]. The size of the URL is computed based on the Length of the option as Length-4. If the encoding is asymmetrical, the initiator of the session is considered downstream, playing the role of the device in an LPWAN network.

4. Profiling SCHC for high speed links

[Appendix D](#) of [SCHC] specifies the profile information that technology specifications such as this must provide. The following section address this requirement.

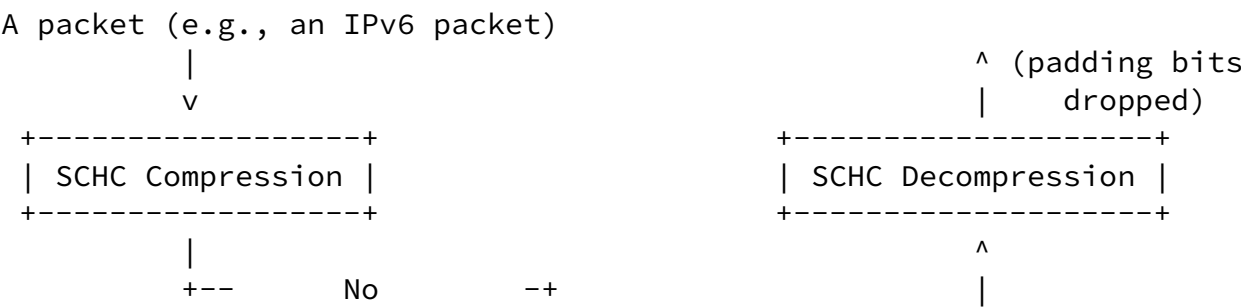
4.1. Mapping the SCHC Architecture

This specification leverages SCHC between an end point that is an IP Host and possibly a serial DTE (Data Terminal Equipment), and another that is an IP Node (either another IP Host or a Router) and possibly a serial DCE (Data Control Equipment), or a more modern physical or emulated endpoint, e.g., Ethernet devices that exchange IP packets over PPPoE.

Both endpoints MUST support the function of SCHC Compressor/Decompressor (C/D) as shown in Figure 2.

4.2.1. Resulting Packet Format

In the case of PPPoE, the sequence of compression and encapsulation is as follows:



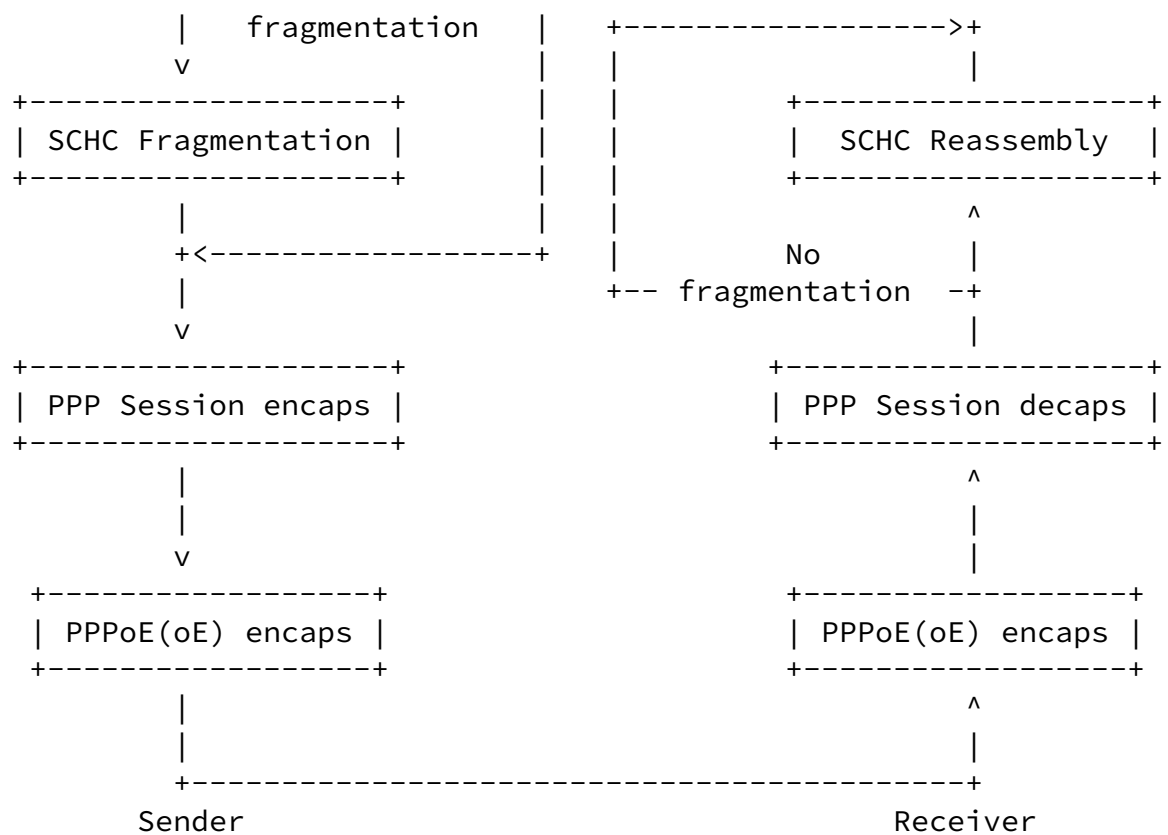


Figure 5: Stack Operation (no fragment)

In the case of PPPoE, a frame that transports an IPv6 packet compressed with SCHC with no fragmentation shows as follows:

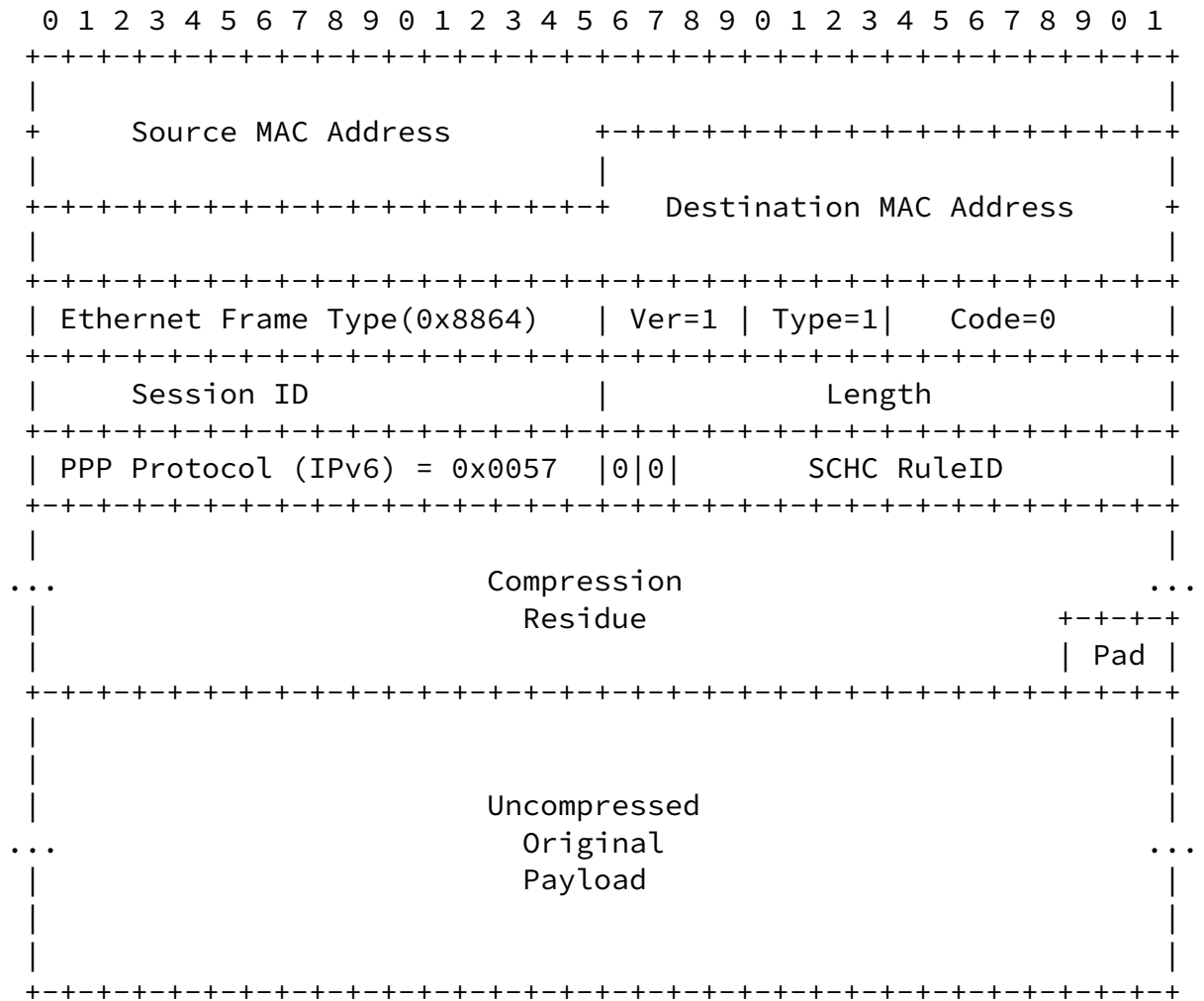


Figure 6: SCHC over PPP over Ethernet Format

4.3. Security Considerations

This draft enables to use the SCHC compression and fragmentation over PPP and therefore Ethernet and Wi-Fi with PPPoE. It inherits the possible threats against SCHC listed in the "Security considerations" section of [SCHC].

5. IANA Considerations

This document requests the allocation of a new value in the registry "IPv6-Compression-Protocol Types" for "SCHC". A suggested value is proposed in Table 1:

Value	Description	Reference
4	Static Context Header Compression (SCHC)	This document

Table 1: IP Header Compression Configuration Option Suboption Types

6. Acknowledgments

7. Normative References

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