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IP Number for SCHC

Abstract

This document requests an Internet Protocol Number assignment for SCHC so that SCHC can be used for IP independent SCHC of other transports such as UDP and ESP.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on 6 February 2023.

Table of Contents

1. Introduction

LPWAN Static Context Header Compression (SCHC) Architecture [lpwan-architecture] originally envisioned SCHC used at the Network layer, encompassing IP and Transport, by the network provider. Then SCHC would be used by the application; this would include any security envelope.

This approach brakes down when dealing with Diet ESP [diet-esp]. When Next Header is ESP, it is challenging for the ESP process to determine if an incoming ESP payload is regular ESP [RFC4303] or a diet ESP payload. Careful allocation of the incoming SPI [ikev2-diet-esp] can mitigate this and have an implicit SCHC header, but it is not sound protocol design. If the Next Header in the IP header were SCHC, not ESP, a clear segregation of incoming traffic is directly supportable.

Additionally, SCHC can then be the Next Header within the ESP header with 'regular' SCHC rules for processing this content. This approach will greatly simplify [diet-esp].

DTLS 1.3 [RFC9147] adds further complications. DTLS 1.3 headers themselves are typically already very compressed and SCHC would not provide much value. But the UDP header in front of DTLS would benefit of a separate compression from the IP Header compression. Where it is possible with ESP's SPI to mitigate inbound packet processing challenges implicit SCHC would generate, DTLS header does not safely even provide this and a SCHC IP number is necessary to separate traffic.

1.1. Basic use case for SCHC as an IP Number

A mobile node, or network, may use different links over a period of time. In some cases the node has the multiple interfaces and, in

theory, could tune the compression to each interface. In other cases, it is the whole network that is mobile and individual nodes have no "knowledge" of which link with what characteristics is actively handling the traffic. In either case, the node administrator is aware that some links are constrained and use of SCHC compression is highly recommended.

One example is an UA that uses different links over the duration of an operation (i.e. flight).

- *Operation starts using Veriport's WiFi service.
- *On gaining altitude, UA transitions to a Cellular service.
- *On gaining more altitude, UA transitions to a constrained 700MHz UHF service.
- *On approach to destination vertiport, link transition is reversed.

The UA could use SCHC compression only on the UHF link, but this may complicate the implementation.

A more complex example is an Unmanned Cargo Aircraft that has multiple avionics systems, all Ethernet connected to an onboard router that has the multiple interfaces. Here the nodes each manage their own secure path to their ground-based server, but have no knowledge of which link is in use to intelligently use compression.

2. Terms and Definitions

2.1. Requirements Terminology

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. Internet Protocol Number for SCHC

SCHC as the IP payload SHOULD be indicated in the IPv4 "Protocol" field or the IPv6 "Next Header" field with a value of TBD1 (recommended: 144) as shown below:

Decimal	Keyword	Protocol	IPv6 Extension Header	Reference
TBD1 (144)	SCHC	Static Context Header Compression		This RFC

Table 1: Internet Protocol Numbers

The SCHC compressed header with payload is shown below. The size of the SCHC RuleID is variable as described in [RFC8724]. An implementation should have a table of source IP address and RuleID size. The addresses should be represented in prefix format to allow for groups of addresses having the same RuleID size.

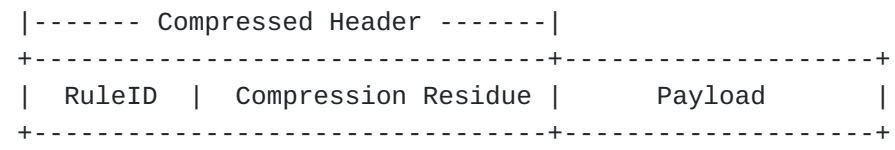

Figure 1: SCHC Packet

The RuleID may be statically configured per [RFC8724], or may be negotiated within a protocol as in IKE [ikev2-diet-esp].

4. IANA Considerations

4.1. IANA IP Number Registry Update

This document requests IANA to make the following change to the "Assigned Internet Protocol Numbers" [IANA-IPN] registry:

IP Number:
This document defines the new IP Number value TBD1 (suggested: 144) (Section 3) in the "Assigned Internet Protocol Numbers" registry.

Decimal	Keyword	Protocol	IPv6 Extension Header	Reference
TBD1 (144)	SCHC	Static Context Header Compression		This RFC

Table 2

5. Security Considerations

TBD

6. References

6.1. Normative References

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RFC2119, March 1997, <https://www.rfc-editor.org/info/rfc2119>.

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6.2. Informative References

[diet-esp] Migault, D., Guggemos, T., Bormann, C., and D. Schinazi, "ESP Header Compression and Diet-ESP", Work in Progress, Internet-Draft, draft-mglt-ipsecme-diet-esp-08, 13 May 2022, <https://datatracker.ietf.org/doc/html/draft-mglt-ipsecme-diet-esp-08>.

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[RFC8724] Minaburo, A., Toutain, L., Gomez, C., Barthel, D., and JC. Zuniga, "SCHC: Generic Framework for Static Context Header Compression and Fragmentation", RFC 8724, DOI 10.17487/RFC8724, April 2020, <https://www.rfc-editor.org/info/rfc8724>.

[RFC9147] Rescorla, E., Tschofenig, H., and N. Modadugu, "The Datagram Transport Layer Security (DTLS) Protocol Version 1.3", RFC 9147, DOI 10.17487/RFC9147, April 2022, <https://www.rfc-editor.org/info/rfc9147>.

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