SCHC for 802.15.4 lpwan applications
draft-perkins-lpwan-schc-802154-00

Abstract

This document provides guidelines for creating Rules for Static Context Header Compression for IEEE 802.15.4. Since 802.15.4 provides layer-2 acknowledgements, some complexities that were designed for more general systems can be avoided.

Status of This Memo

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

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at https://datatracker.ietf.org/drafts/current/.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on January 12, 2019.

Copyright Notice

Copyright (c) 2018 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to BCP 78 and the IETF Trust’s Legal Provisions Relating to IETF Documents (https://trustee.ietf.org/license-info) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.
1. Introduction

Static Context Header Compression (SCHC) [I-D.ietf-lpwan-ipv6-static-context-hc] is a solution for header compression, highly specialized for very predictable IPv6 packets to and from an LPWAN node with significant resource constraints (especially power). This document provides guidelines for creating Rules for Static Context Header Compression (SCHC) for IEEE 802.15.4 [dot4]. Since 802.15.4 provides layer-2 acknowledgements, some complexities that were designed for more general systems can be avoided.

The Low-Power, Wide-Area IEEE 802.15.4w task group (LPWA) has been chartered to specify modifications to 802.15.4 MAC and PHY parameters that would be needed to make the technology more suitable for LPWAN applications [lpwa_par], [lpwa_csd]. Although 801.15.4g [dot4g] and 802.15.4k [dot4k] were previously designed for such systems, recent experiments and further experience with new use cases have indicated the need for additional specification and wider applicability.

LPWA has listed different use-cases that may be relevant for LPWAN in a study group document [lpwa_use_cases]. The LPWAN use-cases discussed in that document are characterized as follows:

- Focusing on uplink data
- Typical Payload data length less than 16 bytes
The LPWA also determined that it would be useful to produce a document for the IETF lp-wan Working Group to suggest parameters for the use cases. The discussion so far in LPWA has resulted in the document [lpwa_schc].

```
+-----+
|     | Gateway (default) router
+-----+

+-----+
|     | LPWA access point
+-----+

```

Figure 1: Representative Architecture for 802.15.4w Use Cases

A typical 802.15.4w use case is illustrated in Figure 1. The header compression context is statically configured for the transmission and reception of packets between the LPWA access point and the individual low-power devices (indicated as 'o'). Most of the rules follow the recommended practice in [I-D.ietf-lpwan-ipv6-static-context-hc] for compressing the IPv6 addresses and UDP ports; the same rulesets can be used for the possibly thousands of low-power devices, only changing the IPv6 address for the particular device relevant to the context.

2. 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 [RFC2119].

This document uses the following definitions:

LPWA
3. SCHC parameters

In this section we provide details about parameter selection for a static compression context to be used over 802.15.4, according to the guidelines in [minaburo_email]. The method by which the context is agreed upon by sender and receiver is left unspecified. For the purposes of this document, the rule-ID, rule parameters, and other uncompressed information is to be considered as a normal L2 payload that will be decompressed before delivery to L3.

3.1. Size of the Rule ID

Size of the Rule ID should be 3, to allow for up to 8 rules.

3.2. Use of Padding

Pad to a multiple of 8 bits in the L2 payload.

3.3. Fragmentation Delivery Reliability Option

802.15.4 link acknowledgement should be used, since the static context as defined should be decompressed after delivery over a single link.

3.4. MAX_ACK_REQUEST

MAX_ACK_REQUEST SHOULD be set to 3, following usual practice in 802.15.4.

3.5. FCN

FCN SHOULD be set to 0, since unfragmented traffic is expected for most use cases under consideration in 802.15.4w.

3.6. DTag

Similarly, DTag SHOULD be set to 0, since unfragmented traffic is expected for most use cases under consideration in 802.15.4w.
3.7. MAX_ACK_REQUEST

MAX_ACK_REQUEST SHOULD be set to 3, following usual practice in 802.15.4.

3.8. L2 CRC

Either CRC-16 or CRC-32 as defined in 802.15.4 could be used.

3.9. Fragmentation ACK Parameters (not used)

Since acknowledgments SHOULD be handled at Layer 2, no specification is made here for the following:

- The timer size for Fragmentation ACK Always
- When to abort in ACK Always
- MAX_ATTEMPTS counter size
- The timer size between windows in ACK On Error.

4. Security Considerations

This document does not introduce any security mechanisms, and does not have affect existing security mechanisms.

5. IANA Considerations

This document does not specify any IANA actions.

6. Acknowledgements

This document has benefitted from discussions with the following people, in alphabetical order: Pat Kinney

7. References

7.1. Normative References

[I-D.ietf-lpwan-ipv6-static-context-hc]

7.2. Informative References


Authors' Addresses

Joerg Robert
Friedrich-Alexander Universitaet Erlangen-Nuernberg
Am Wolfsmantel 33
Erlangen 91058
Germany

Phone: +49-9131-85-25373
Email: joerg.robert@fau.de
Charles E. Perkins
Futurewei Inc.
2330 Central Expressway
Santa Clara, CA  95050
USA

Phone: +1-408-330-4586
Email: charliep@computer.org