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SCHC over Sigfox LPWAN
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Abstract

The Static Context Header Compression (SCHC) specification describes a header compression scheme and fragmentation functionality for LPWAN (Low Power Wide Area Network) technologies. SCHC offers a great level of flexibility that can be tailored for different LPWAN technologies.

The present document provides the optimal parameters and modes of operation when SCHC is implemented over a Sigfox LPWAN.

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1. Introduction

The Static Context Header Compression (SCHC) specification [I-D.ietf-lpwan-ipv6-static-context-hc] defines a header compression scheme and fragmentation functionality that can be used on top of all the LWPAN systems defined in [I-D.ietf-lpwan-overview]. These LPWAN systems have similar characteristics such as star-oriented topologies, network architecture, connected devices with built-in applications, etc.

SCHC offers a great level of flexibility to accomodate all these LPWAN systems. Even though there are a great number of similarities between LPWAN technologies, some slight differences exist with respect to the tranmission characteristics, payload sizes, etc. Hence, there are optimal parameters and modes of operation that can be used when SCHC is used on top of a specific LPWAN.

This document describes the optimal parameters and modes of operation when SCHC is implemented over a Sigfox LPWAN.

2. Terminology

The reader is assumed to be familiar with the terms and mechanisms defined in [I-D.ietf-lpwan-overview] and in [I-D.ietf-lpwan-ipv6-static-context-hc].

3. Static Context Header Compression

Static Context Header Compression (SCHC) avoids context synchronization because data flows are highly predictable in LPWAN networks. Contexts must be stored in both ends, and they can be learned by a provisioning protocol, by out of band means, or they can be pre-provisioned. The way the context is learned on both sides is out of the scope of this document.

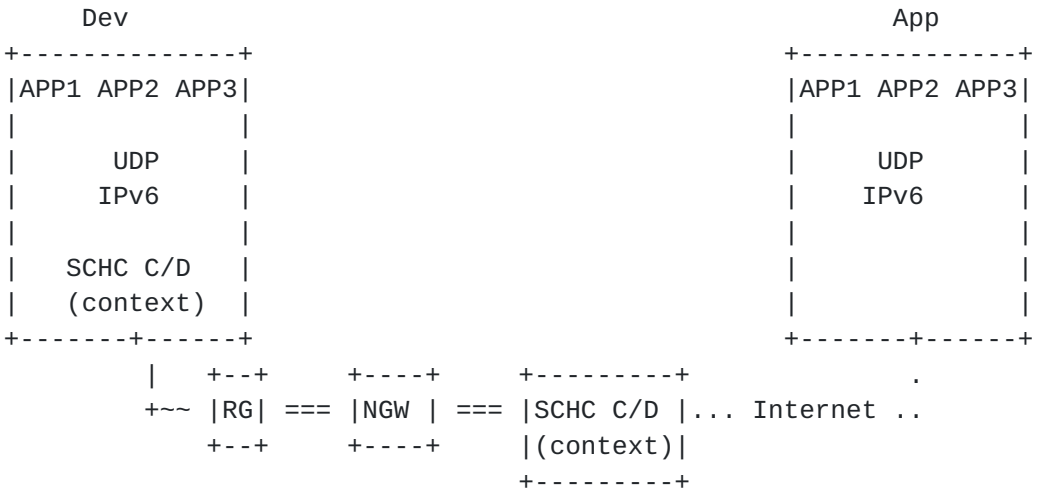

Figure 1: Architecture

Figure 1 represents the architecture for compression/decompression and fragmentation, which is based on [I-D.ietf-lpwan-overview] terminology.

The Device is sending applications flows that are compressed (and/or fragmented) by a Static Context Header Compression Compressor/ Decompressor (SCHC C/D) to reduce headers size and/or fragment the packet. The resulting information is sent to a layer two (L2) frame to a LPWAN Radio Network (RG) which forwards the frame to a Network Gateway (NGW).

The NGW sends the data to an SCHC C/D for decompression (and/or reassembly) which shares the same rules with the Dev. The SCHC C/D can be located on the Network Gateway (NGW) or in another place as long as a tunnel is established between the NGW and the SCHC C/D. The SCHC C/D in both sides must share the same set of Rules. After decompression (and/or reassembly), the packet can be forwarded to one or several LPWAN Application Servers (App).

The SCHC C/D process is bidirectional, so the same principles can be applied in both uplink and downlink.

3.1. SCHC Rules

TBD

3.2. Packet processing

TBD

4. Fragmentation

The SCHC specification [I-D.ietf-lpwan-ipv6-static-context-hc] supports several modes of operation to fragment packets. These modes have different advantages and disadvantages depending on the specific of the underlying LPWAN technology. This section describes how the SCHC fragmentation functionality SHOULD optimally be used over a Sigfox LPWAN.

4.1. Fragmantation headers

A list of fragmentation header fields, their sizes and related details for SCHC fragmentation over Sigfox are provided below:

TBD

4.2. Uplink fragment transmission

TBD

4.3. Downlink fragment transmission

In some LPWAN technologies, as part of energy-saving techniques, downlink transmission is only possible immediately after an uplink transmission. This allows the device to go in a very deep sleep mode and preserve battery, without the need to listen to any information from the network. This is the case for Sigfox devices, which can only listen to downlink communications after performing an uplink transmission.

When there are multiple fragments to be transmitted in the downlink, an uplink message is required to trigger the downlink communication. In order to avoid potentially high delay for fragmented datagram transmission in the downlink, the fragment receiver MAY perform an uplink transmission as soon as possible after reception of a fragment that is not the last one. Such uplink transmission may be triggered by sending a SCHC message, such as an ACK.

5. Security considerations

TBD

6. Informative References

[I-D.ietf-lpwan-ipv6-static-context-hc]
Minaburo, A., Toutain, L., and C. Gomez, "LPWAN Static Context Header Compression (SCHC) and fragmentation for IPv6 and UDP", draft-ietf-lpwan-ipv6-static-context-hc-07 (work in progress), October 2017.

[I-D.ietf-lpwan-overview]
Farrell, S., "LPWAN Overview", draft-ietf-lpwan-overview-07 (work in progress), October 2017.

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