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Static Context Header Compression (SCHC) Architecture
draft-pelov-lpwan-architecture-00

Abstract

This document defines the SCHC architecture.

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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1. Introduction

The base operation and the definition of the SCHC compression & Fragmentation are now described in several documents published by the LPWAN working group.

Among them:

- The [rfc8724] defines the generic compression and fragmentation mechanisms for SCHC and applies it to IPv6 and UDP.

- The [I-D.ietf-lpwan-coap-static-context-hc] extend the compression to CoAP and OSCORE.

- The [I-D.ietf-lpwan-schc-yang-data-model] defines a rule representation using the YANG formalism.

As [I-D.ietf-lpwan-coap-static-context-hc] states, the SCHC compression and fragmentation mechanism can be implemented at different levels and/or managed by different organizations. For instance, as represented figure Figure 1, IP compression and fragmentation may be managed by the network SCHC instance and end-to-end compression between the device and the application. The former can itself be split in two instances since encryption hides the field structure.

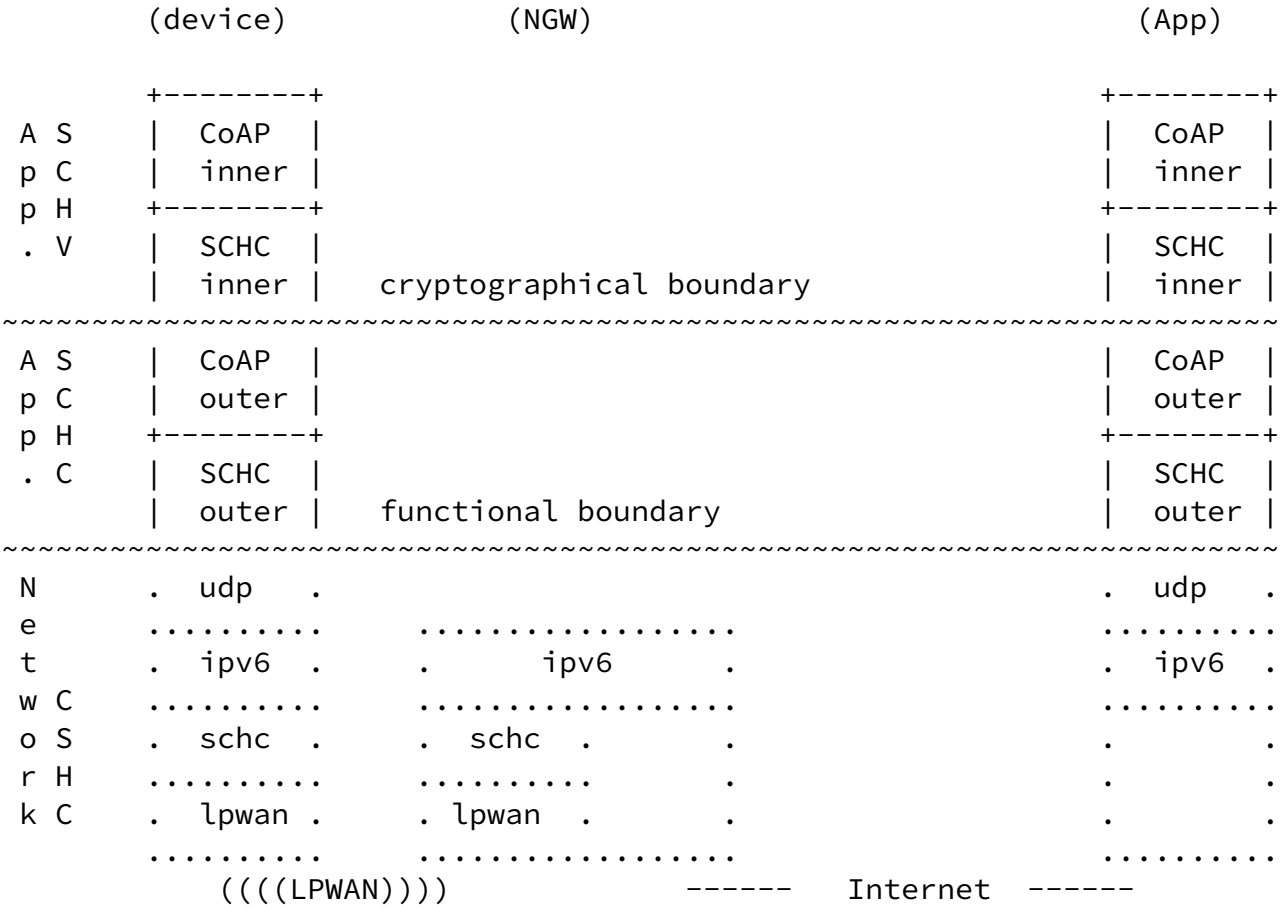

Figure 3: OSCORE compression/decompression.

Figure 1: Different SCHC instances in a global system

This document defines a generic architecture for SCHC that can be used at any of these levels. The goal of the architectural document is to orchestrate the different protocols and data model defined by the LPWAN woeking group to design an operational and interoperable framework for allowing IP application over contrained networks.

2. Definitions

3. Global architecture

As described in [rfc8724] a SCHC service is composed of a Parser, analyzing packets and creating a list of fields what will be used to match against the compression rules. If a packet matches rules, compression can be applied following rules instructions.

If SCHC compressed packet is too large to be send in a single L2 frame, fragmentation will apply. The process is similar, device rules are checked to find the most appropriate fragmentation rule,

regarding the SCHC packet size, the link error rate, the reliability required by the application, ...

On the other direction, when a packet SCHC arrives, the ruleID is used to find the rule. Its nature allows to select if it is a compression or fragmentation rule.

The rule database contains a set of rules specific to a single device. The [rfc8724] indicates that the SCHC instance reads the rules to process C/D and F/R, rules are not modified during these actions.

A SCHC instance, summarized in the Figure 2, implies C/D and F/R present in both end. The device connected to a constrained network is in one end and the other end is either located in the core network or at the application.

In any cases, the rules must be the same in both ends to perform C/D and F/R.

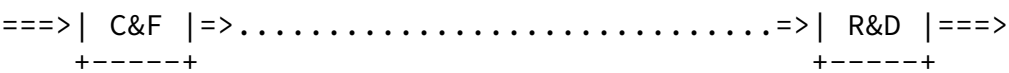

Figure 2: Summarized SCHC elements

To enable rule synchronization between both ends, a common rule representation must be defined.

4. Data management

[I-D.ietf-lpwan-schc-yang-data-model] defines an YANG data model to represent the rules. This enables the use of several protocols for rule management, such as NETCONF, RESTCONF and CORECONF. NETCONF uses SSH, RESTCONF uses HTTPS, and CORECONF uses CoAP(s) as their respective transport layer protocols. The data is represented in XML under NETCONF, in JSON under RESTCONF and in CBOR under CORECONF.

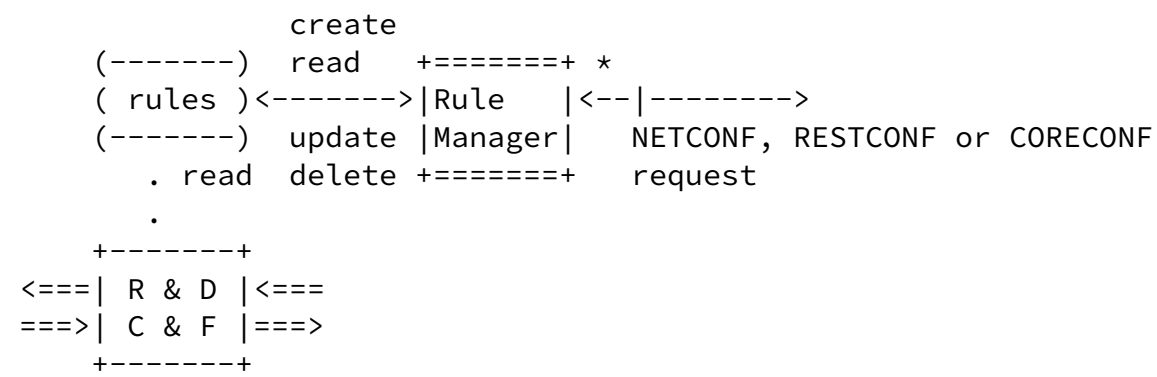

Figure 3: Summerized SCHC elements

Rule Manager (RM) is in charge of handling data derived from the YANG Data Model and apply changes to the rules database Figure 3.

The RM is a application using the Internet to exchange information, therefore:

- for the network-level SCHC, the communication does not require routing. Each of the end-points having an RM and both RMs can be viewed on the same link, therefore wellknown Link Local addresses

can be used to identify the device and the core RM. L2 security MAY be deemed as sufficient, if it provides the necessary level of protection.

- for application-level SCHC, routing is involved and global IP addresses SHOULD be used. End-to-end encryption is recommended.

Management messages can also be carried in the negotiation protocol as proposed in [I-D.thubert-lpwan-schc-over-ppp]

The RM traffic may be itself compressed by SCHC, especially if CORECONF is used, [I-D.ietf-lpwan-coap-static-context-hc] can be used.

5. Acknowledgements

The authors would like to thank (in alphabetic order):

6. Normative References

[I-D.ietf-lpwan-coap-static-context-hc]
Minaburo, A., Toutain, L., and R. Andreasen, "LPWAN Static Context Header Compression (SCHC) for CoAP", draft-ietf-lpwan-coap-static-context-hc-16 (work in progress), October 2020.

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[I-D.thubert-lpwan-schc-over-ppp]
Thubert, P., "SCHC over PPP", draft-thubert-lpwan-schc-over-ppp-01 (work in progress), June 2020.

[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>.

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