SCHC Context lifecycle and management

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draft-dumay-schc-context-lifecycle

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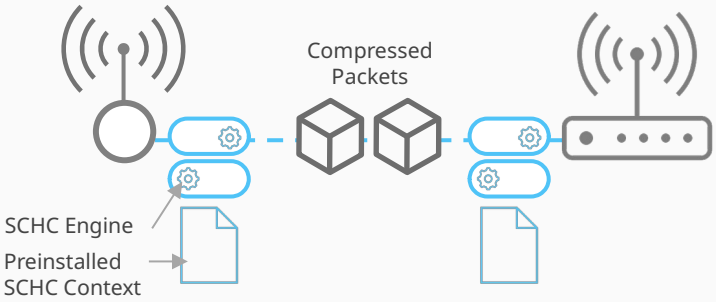
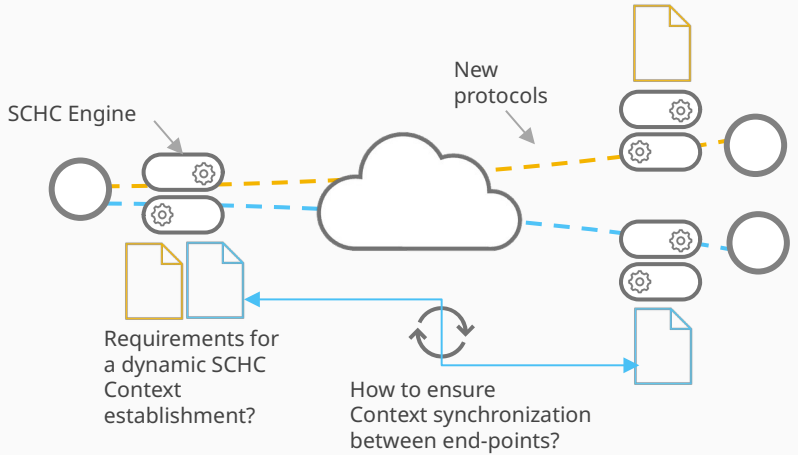
Problem statement

SCHC operation is based on a common static Context stored at the two (or more) ends of a communication.
As the scope of SCHC becomes broader, the static Context needs to evolve towards a more dynamic Context.





The origins: SCHC over LPWANS

In the future: SCHC over multi-hop networks with remote endpoints

How do we get from here to there?

Laying the foundations the future evolution of SCHC

From the Charter for Working Group

The WG will work on:

- Produce an informational document describing how a carried protocol can use SCHC.
- Produce Standard Track documents for SCHC Rule Discovery and Parameter Negotiation, including the specification of how work from the IETF security area is leveraged to secure these operations.
- Produce Standard Track documents for SCHC Rule Provisioning, including the specification of generic SCHC rules that can be instantiated, e.g., to apply to a certain node or within a certain network.

Objectives of the draft “SCHC Context lifecycle and management”

- Agree on terminology (sometimes inconsistent).
- Identify the interactions of the Context with other components when operating SCHC, and the requirements for managing a dynamic Context.
- Identify and describe the various stages of the Context lifecycle.
- Ensure that this work is linked to other drafts, such as SCHC architecture, Coreconf management, etc.

Terminology

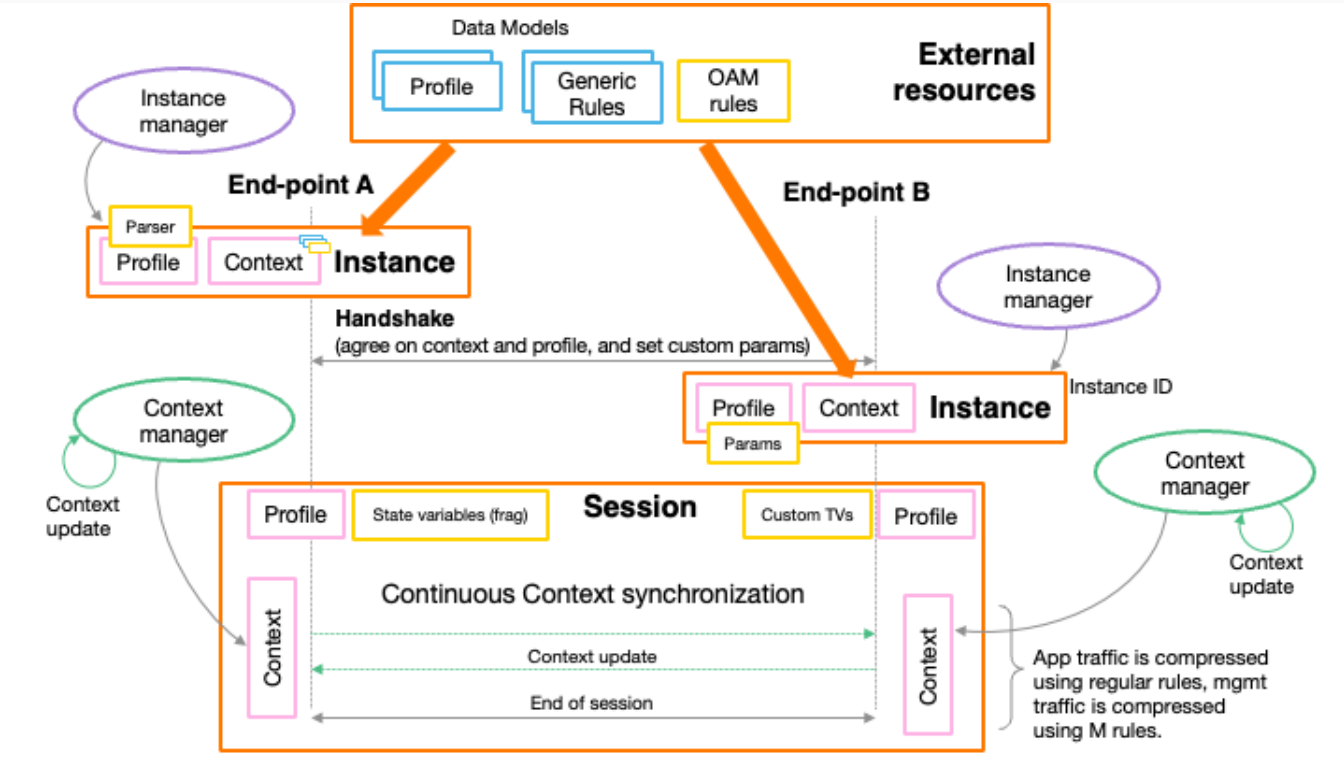
This is a brief overview, please read the draft

Simple reminders

- Rule
- Context
- Profile

New definitions

- Instance
- Instance Manager
- Session
- Context Manager
- Parser
- Data Model



Interactions: towards further modularity

This figure identifies the interactions between the various components of SCHC.

YANG data models are the cornerstone of future SCHC operations.

Several protocol data models can be combined according to the communication needs.

Rules must be valid as specified in the SCHC Rules Data Model, thus ensuring interoperability and a unified Context management.

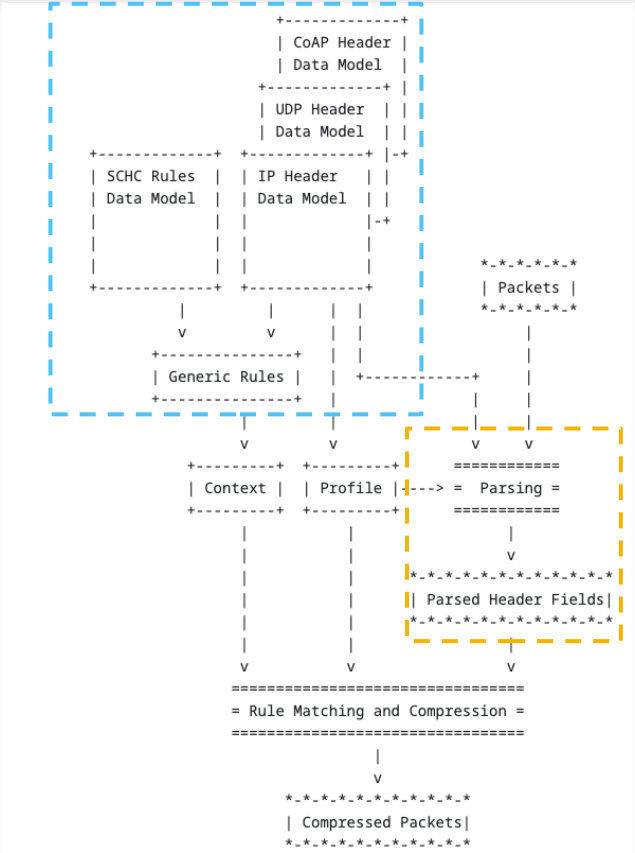


Figure 1: Profile and Context Overview

The packet parsing step has never been shown before.

Yet the way headers are interpreted directly affects the matching of the Rules.

The way CoAP options are parsed is a perfect example (c.f. draft-toutain-schc-universal-option).

Stages of the Context lifecycle

The document provides a starting point for discussion on identifying and managing the various stages in a dynamic Context lifecycle.

The questions to be addressed are the following:

- how a Context is provisioned,
- how to make a Context evolve over time,
- how to ensure that a Context keeps synchronized among all end- points,
- how to detect and correct possible errors,
- how to manage a context's end-of-life.

Suggested stages (work in progress):

- Provisioning: Initial creation or assignment of Profile and Context.
- Activation: Association of a Context to a SCHC Instance.
- Operation: Normal data compression and decompression.
- Modification: Modify Rules and keep Contexts synchronized, handle possible errors.
- Deactivation: Termination of a SCHC session.
- Retirement: Final cleanup.

Focus on Context provisioning and activation

Preliminary suggestion to start thinking

According to the application/communication needs, the Instance Manager of the end-point initiating the communication may select a corresponding Profile and Context. They are obtained either locally or online, or the Profile and Context may be retrieved directly from the partner end-point.

This figure shows the the generic steps of the handshake procedure for synchronizing the Profile and Context information.

- The first step consists of one end-point sending an advertisement message with its SCHC preferences or capabilities.
- The other end-point may reply with an acknowledgement and additional parameters so that the interlocutor can fine-tune his Context.
- Finally, the end-point that initiated the handshake concludes the transaction with an acknowledgement, then the SCHC operation can start.

The Context may be loaded from a remote location. This loading procedure can take place before or during the advertisement phase and may happen twice, once for each end- point.

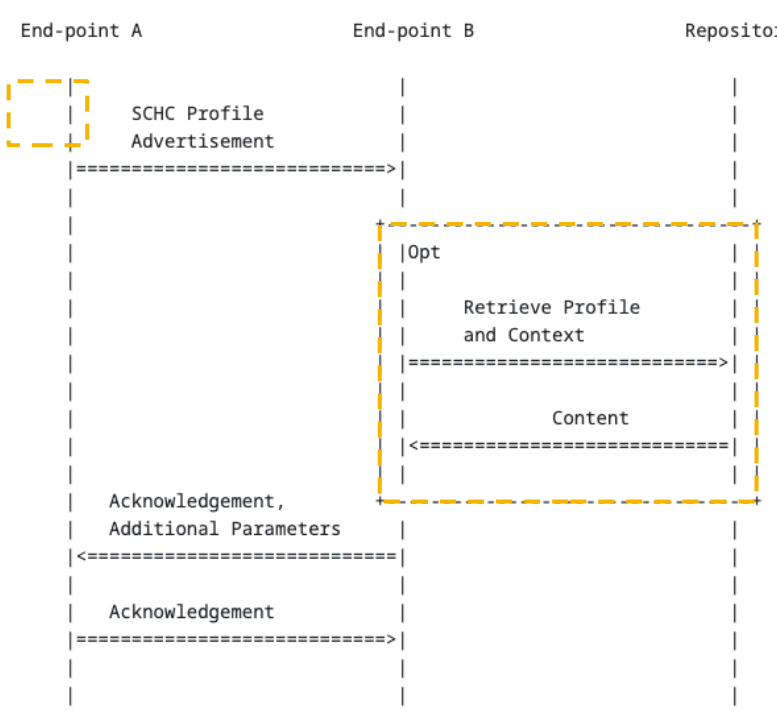


Figure 2: Three-way handshake for Profile and Context initialization

Thank you

Remaining work

- Structure the document.
- Detail each stage of the life cycle.
- Ensure consistency with architecture and management drafts.
- Discuss the status of the document when it is more mature..

Help wanted

- Read the draft and send your comments to the mailing list.
- Feel free to contribute to this work - your help is most welcome.

Terminology: Full text

Rule : A description of the header fields to be compressed/decompressed or fragmented/reassembled, and the operations to be performed on the fields.

Context / Set of Rules : A context, also known as Set of Rules, contains one or more Rules of various types such as compression, no compression, fragmentation, and management.

Profile: A Profile indicates a particular set of parameters. Both ends of a SCHC communication must be provisioned with the same Profile information and with the same Context before the communication starts, so that there is no ambiguity in how they expect to communicate. Profile parameters are for example the RuleID numbering scheme (fixed-size or variable-size RuleIDs), the fragmentation-related settings, the list of protocols to be processed within the present SCHC Session, and the associated data model(s).

Instance: The SCHC Instance is defined by a Profile and Context pair, selected and parameterized for a given communication. In particular, the Context includes customized Target Values needed to compress/decompress headers, or to fragment/ reassemble a packet.

Instance Manager: The Instance Manager is in charge of creating a SCHC Instance, i.e. loading a Profile and a Context with the appropriate initial parameters/values for a given communication.

Session: The SCHC Session is an active relationship between hosts sharing the same Instance. The session between two end-points whose Instances are static is implicit. Otherwise, a Session is a dynamic space with a beginning and an end.

Context Manager: The Context Manager is in charge of managing the Context within a SCHC Instance, in particular handling Rule modifications during a SCHC Session.

Parser : A parser analyzes and interprets packets. Its main role is to break them down into understandable and structured elements such as fields, allowing for the processing or extraction of relevant information. A given protocol can be broken down in different manners depending on the Parser used, and/or the underlying data model, potentially leading to different SCHC processing (different Rules).

Data Model : A Data Model allows a formal description of the format of packets to be processed with SCHC, as well as a formal description of Rules. Relying on formal models facilitates Context provisioning and interoperability between SCHC nodes.