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Static Context Header Compression Over 5G
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Abstract

This document describes a possible integration of Static Context Header Compression [RFC8724] into 5G networks.

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

This document defines a solution for how Static Context Header Compression and fragmentation (SCHC) can be used in 5G. It proposes a new architecture that integrates SCHC within the 5G core network. This architecture can handle both full-IP flows and SCHC flows while ensuring compatibility with full-IP application servers, based on 3GPP specifications. The document also describes the SCHC parameters needed to support SCHC over the 5G architecture. (to be done)

2. 5G Architecture

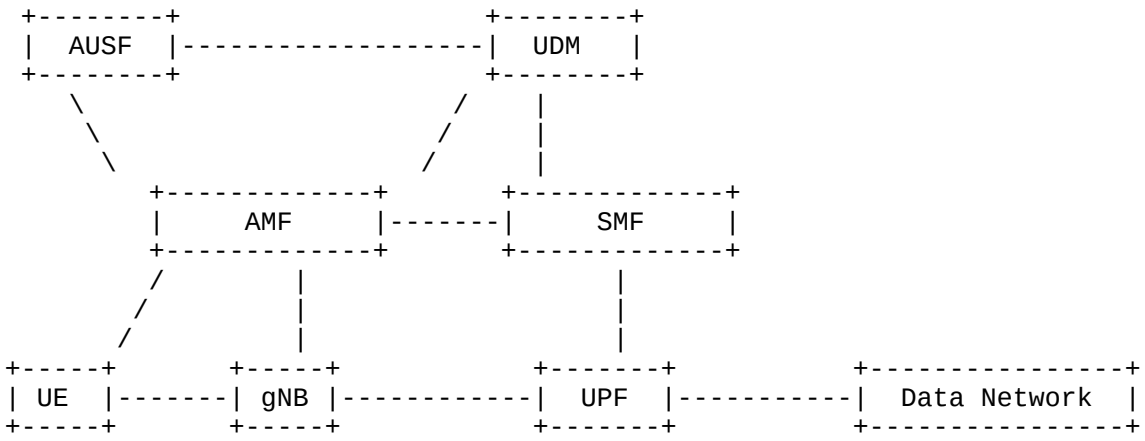


Figure 1: 3GPP 5G Core Architecture simplified

The 5G network architecture is illustrated in Figure 1 . Below is a brief explanation of the main components

The 5G system consists of the following main components

* User Equipment (UE) It includes all devices that can connect to 5G networks, such as smartphones, IoT devices, etc.

* Radio Access Network (RAN) It consists of new radio technologies responsible for wireless communication between the UE and the 5G core network. One of its main components is:

  gNodeB (gNB) It represents the 5G node base station.

* 5G Core Network (5GC) It is a service-based architecture that comprises various network functions (NFs). These include:

  - AMF — Manages registration, authentication, and mobility.

  - SMF — Handles PDU session establishment and IP address assignment.

  - UPF — Routes and forwards user packets between UE and DN.

  - UDM — Manages user identity and authorization.

  - AUSF — Authenticates UE and manages key materials.

3. SCHC over 5G

3.1. SCHC Placement in 5G

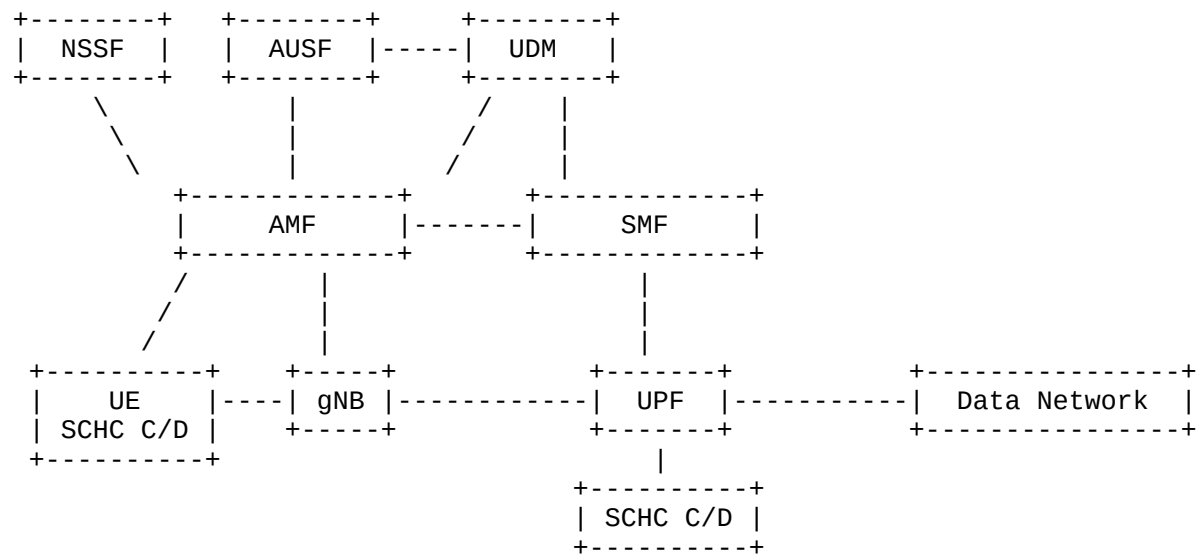


Figure 2: 5G Architecture with SCHC Integration Points

The proposed solution is depicted in Figure 2. A modified User Plane Function (UPF), designated as SCHC-UPF and referred to as S-UPF, is introduced. The UPF is a key component of the 5G core network, responsible for routing and forwarding user data packets between the User Equipment (UE) and the Data Network (DN). The S-UPF handls SCHC compression and decompression processes. It is capable of redirecting packets from devices that support SCHC to the SCHC compression/decompression (C/D) unit.

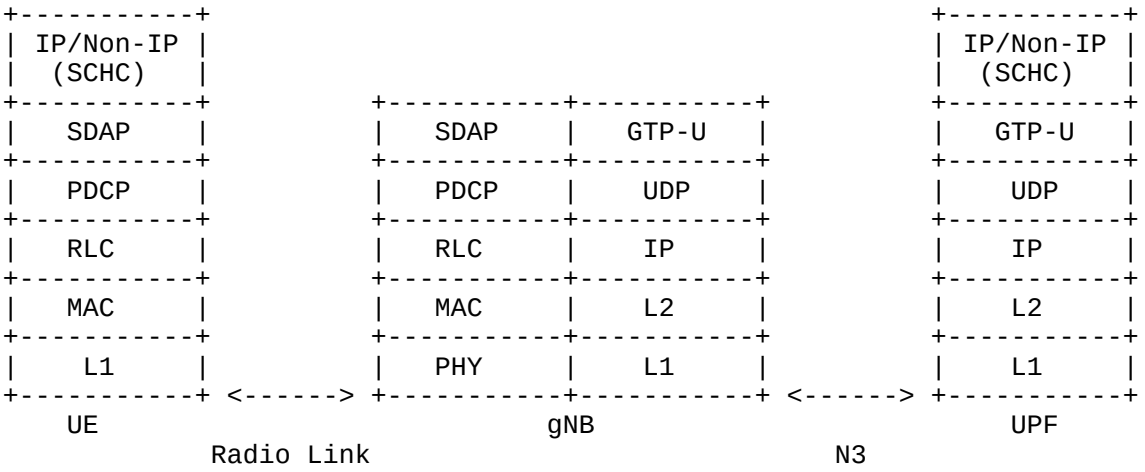


Figure 3: SCHC Integration in 5G User Plane Stack

3.2. SCHC Capability Signaling

This subsection describes how endpoints can signal SCHC support during setup.

* During Registration procedure

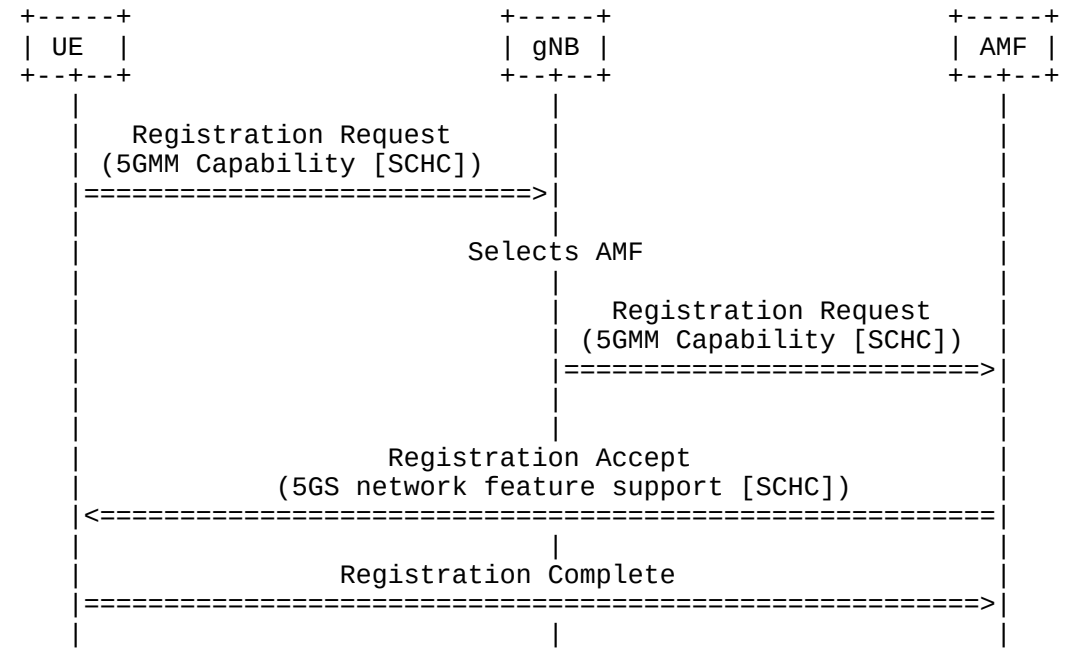


Figure 4: SCHC Capability Signaling During 5G Registration

* During PDU Session establishment procedure

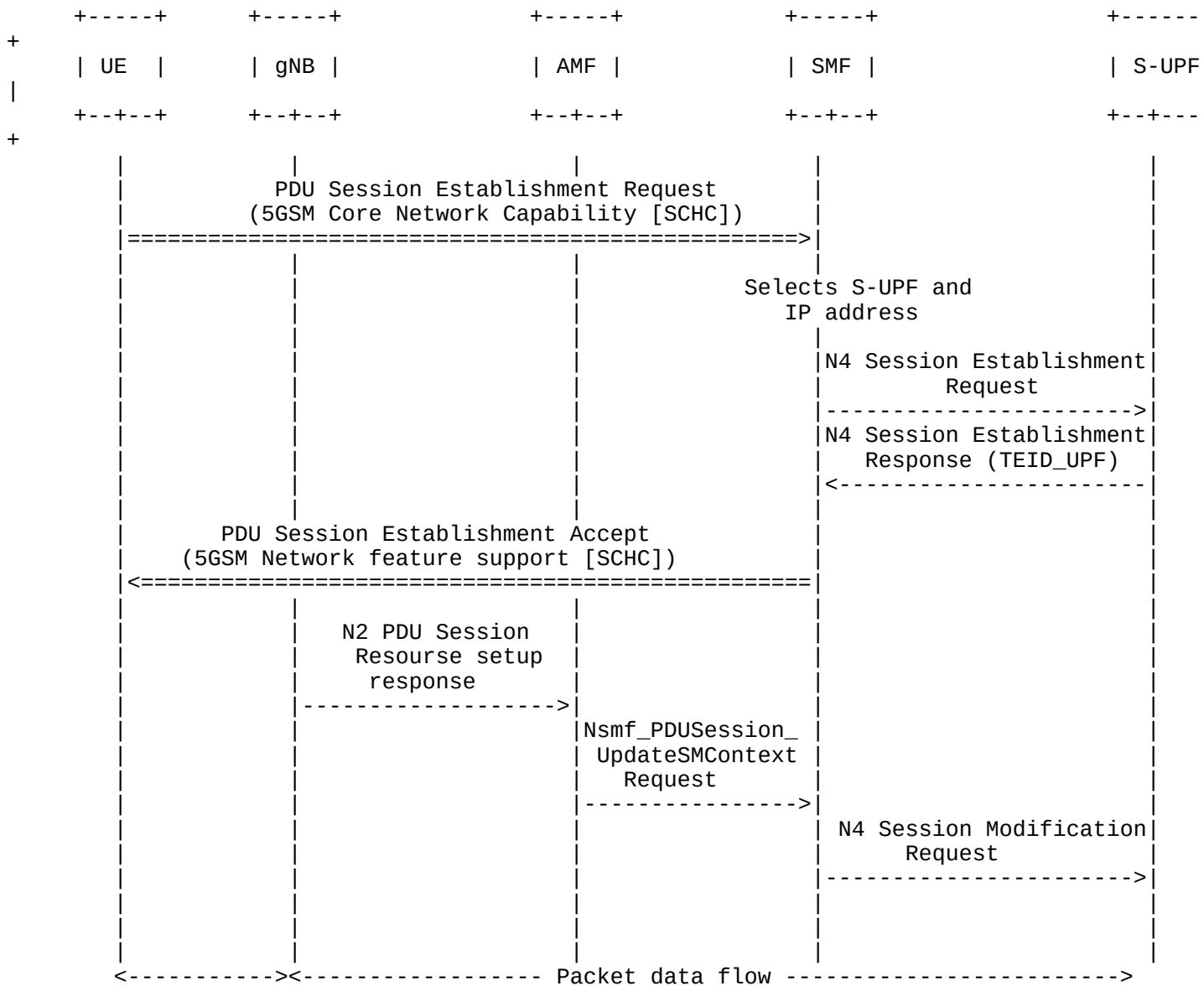


Figure 5: SCHC Capability During PDU Session Establishment

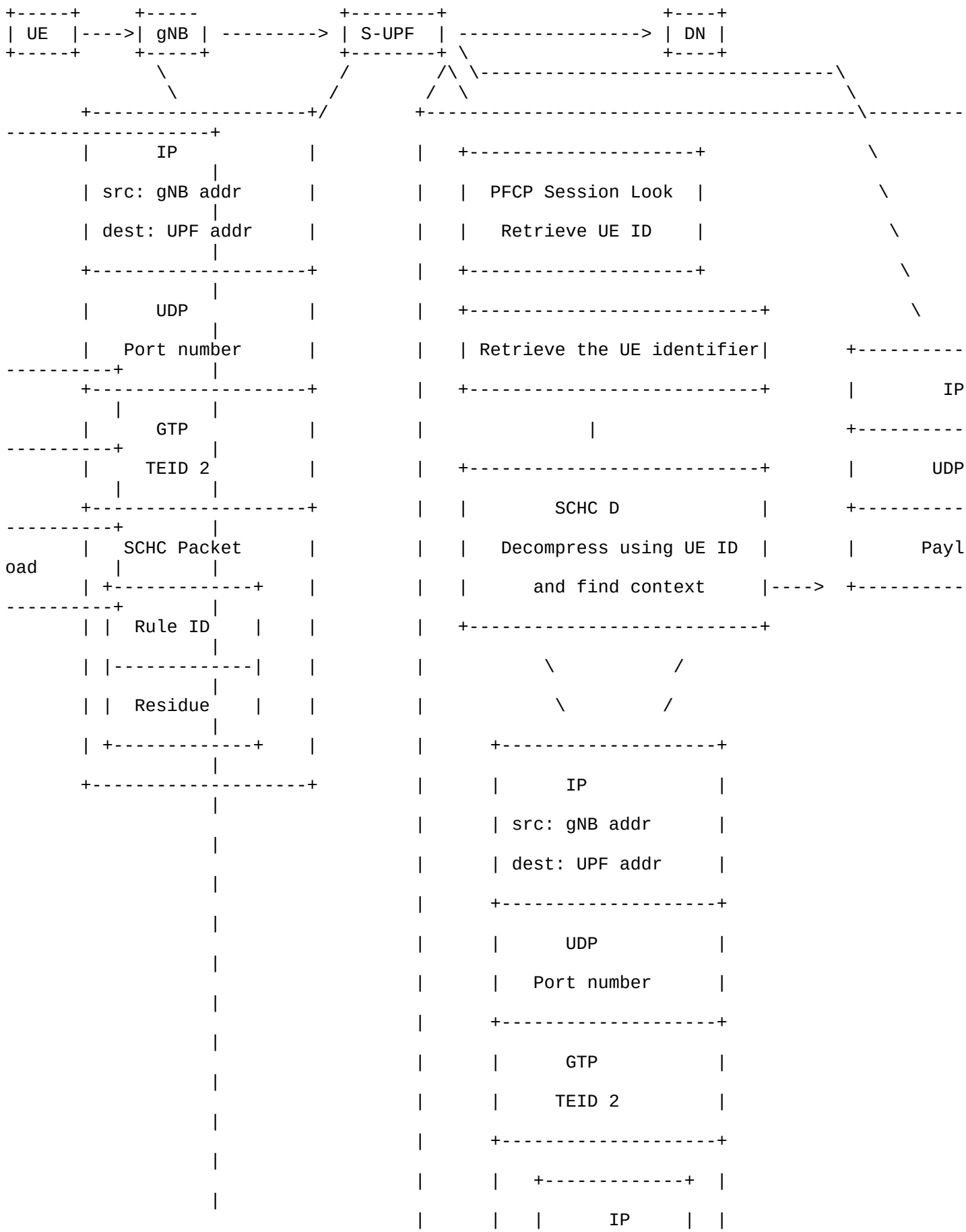
3.3. SCHC Context Identification

The SCHC C/D unit stores the contexts of many devices connected to the network. When a packet arrives, it must be recognized by the SCHC C/D in order to retrieve the appropriate device context. Therefore, the use of a unique identifier is essential. Among 5G identifiers, there is the Permanent Equipment Identifier (PEI), which identifies UEs capable of accessing a 3GPP network. What makes the

PEI suitable for this use is that it is known by both the 5G operator and the device owner, and it is transmitted to the UPF during the PFCP association procedure.

3.4. SCHC Packet Handling

This subsection presents how the S-UPF handle SCHC-compressed packets.


UE
gNB
S-UPF
DN
IP
src: gNB addr
dest: UPF addr
UDP
Port number
GTP
TEID 2
SCHC Packet
Rule ID
Residue
PFCP Session Look
Retrieve UE ID
Retrieve the UE identifier
SCHC D
Decompress using UE ID
and find context
Payload
IP
UDP
GTP
TEID 2

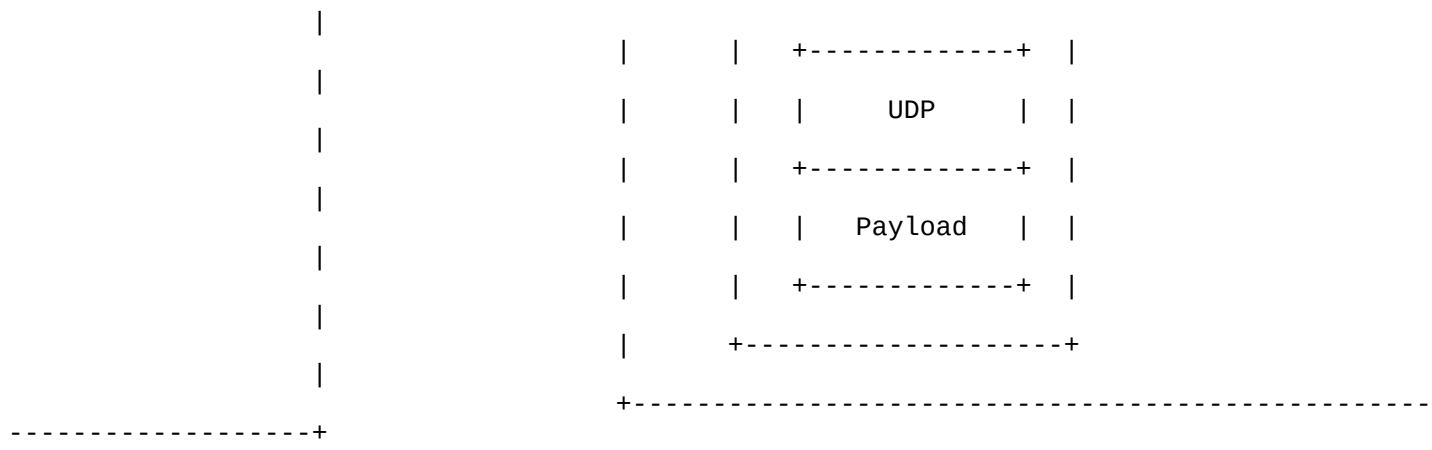


Figure 6: Uplink Data Decompression at S-UPF

4. Normative References

[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/rfc/rfc8724>.

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