**Source:** Nokia Corporation[[1]](#footnote-2)

**Title:** [5G\_RTP] RTP Header Extension for PDU set information

**Document for** Agreement

**Agenda item:** 10.8

# Introduction

As per [S2-2301379.zip](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_154AHE_Electronic_2023-01/INBOX/S2-2301379.zip), SA2 has agreed that the following information will be required in the PDU set information consists of the following:

- PDU Set Sequence Number.

- Indication of End PDU of the PDU Set.

- PDU Sequence Number within a PDU Set.

- PDU Set Size in bytes.

- PDU Set Importance, which identifies the importance of a PDU Set within a QoS Flow.

The document proposes a design for the RTP header extension that supports the above information. It further takes into consideration the analysis provided in Tdoc S4aR230062 and burst indication requirements.

As per RFC 8285 alignment is not needed for different extension elements as long as all the extension elements and possible padding fit to a 32-bit boundary. The design proposes an extensible header with a fixed format for the mandatory fields. The 24-bit PDU set size field is not added as mandatory to limit the size of the header, since the sender of the PDU set information may not always be aware of the PDU set size.

If the PDU set HE is the only extension used, the endpoints use the 1-byte header for maximum savings. If other 2-byte extension elements are used, then the 2-byte header can be used. The headers are not shown with padding as these would depend on the other extension elements in use.

# Potential solution for RTP Header Extension for PDU Set Information

An RTP header extension (HE) for PDU set information may be negotiated between an Application Server, MRF or MCU and UE for a downlink stream using the URN urn:3gpp:pdu-set-info in the SDP extmap attribute. In the description that follows, the term “sender” is used for the RTP sender that inserts the PDU set information RTP HE. Both the one-byte and two-byte RTP header extension formats can be used for the PDU set information RTP HE. The RTP HE shall carry the following fields:

- PDU Set Sequence Number (PSSN): A 4-bit cyclic numerical identifier for the PDU set with a range of 0-15.

- End bit (E) : A 1-bit field that is set to 1 for a PDU that is the last PDU in the PDU set and set to 0 for all other PDUs.

- PDU Sequence Number within a PDU Set (PSN): A 10-bit field that is set to 0 for the first PDU in the PDU set and incremented monotonically for every PDU in the PDU set in the order of transmission from the sender.

- PDU Set Importance (I) : A 4-bit field which identifies the importance of a PDU Set within a QoS Flow. A value of 0 is used when the PDU set importance is not set by the sender. Values 1-15 can be used for setting the importance of the PDU set such that a higher value indicates a higher importance.

- Burst indication (B): A 3-bit field that provides information about the burst.

- Rsv: A 2-bit field reserved for future use.

NOTE: It is not required for the UPF to set the importance field in the GTP-U header exactly as communicated in the RTP HE by the sender. NOTE: The PDU set information RTP HE is limited to downlink during Release 18.

The 1-byte header for PDU set information is shown below.

0 1 2 3

0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

| ID | L=2 | PSSN |E| PSN | I | B |Rsv|

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

Figure X.1 PDU set information RTP HE using a 1-byte header

The 2-byte header for PDU set information is shown below.

0 1 2 3

0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

| ID | L=3 | PSSN |E| PSN |I|

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

| I | B |Rsv|

+-+-+-+-+-+-+-+-+

Figure X.2 PDU set information RTP HE using a 2-byte header

The Rsv bits are reserved for future use. The PDU set information header may be extended using extension attribute in the SDP extmap as described in section 2.1. When the header is not extended and no other extensions are used, the sender shall use the 1-byte header for maximum bit saving.

## Extensions

## 2.1.1 PDU set size

The PDU set information header may include an additional 24 bit field for PDU set size in bytes. A sender shall include a 24-bit field after the Rsv field of the PDU set information RTP HE (as shown in Figures X.1 and X.2) indicating the size of the PDU set in bytes by using the extension attribute pssize in the SDP extmap attribute, as shown in the example below:

a=extmap:7 urn:3gpp:pdu-set-info pssize

Editor’s Note: Further extensions to PDU set information RTP HE can be added by using similar extension attributes in the SDP negotiation and are FFS. Guidelines on how to set the PSSN field are FFS.

## Guidelines for setting the Burst indication

NOTE: To be defined later.

## Guidelines for setting the Importance

NOTE: To be defined later.

# Proposed Text for TR 26.522

Definitions:

PDU Set: A PDU Set is composed of one or more PDUs carrying the payload of one unit of information generated at the application level (e.g. a frame or video slice for XRM Services), which are of same importance requirement at application layer. All PDUs in a PDU Set are needed by the application layer to use the corresponding unit of information. In some cases, the application layer can still recover parts of the information unit, when some PDUs are missing.

Data Burst: A data burst is set of multiple PDUs generated and sent by the application such that in a short period of time. there is an idle period between two bursts. A Data Burst can be composed of one or multiple PDU Sets.

# X.1 RTP Header Extension for PDU Set Information

X.1.1 Overview

An RTP sender may have the capability to indicate in an RTP HE information related to PDU sets within an RTP stream. An RTP sender capable of sending the PDU set information HE shall support the following fields:

PDU Set Sequence Number (PSSN): A [4-bit] cyclic numerical identifier for the PDU set with a range of [0-15].

- End bit (E) : A 1-bit field that is set to 1 for a PDU that is the last PDU in the PDU set and set to 0 for all other PDUs.

- PDU Sequence Number within a PDU Set (PSN): A 10-bit field that is set to 0 for the first PDU in the PDU set and incremented monotonically for every PDU in the PDU set in the order of transmission from the sender.

- PDU Set Importance (I) : A [4-bit] field which identifies the importance of a PDU Set within a QoS Flow. A value of 0 is used when the PDU set importance is not set by the sender. Values 1-15 can be used for setting the importance of the PDU set [such that a higher value indicates a higher importance].

An RTP sender capable of sending the PDU set information HE may support the following fields:

EoDB: A [x-bit] field indicator for the End of Data Burst.

PDU Set Size: A [24-bit] indicating the size of the PDU set in bytes.

NOTE: The PDU set information RTP HE is limited to downlink during Release 18.

X.1.2 SDP Negotiation

RTP senders capable of sending the PDU set information HE shall negotiate the use of the HE with the RTP receiver when the HE is to be used. The PDU set info HE shall use the URN urn:3gpp:pdu-set-info in the SDP extmap attribute. The syntax is shown below:

a=extmap:7 urn:3gpp:pdu-set-info [extensionattribute]

If any optional fields as defined X.1.4 are supported, the appropriate extension will be indicated using extensionattribute. When no extensionattribute is added in the SDP, the basic PDU set information HE format as defined in X.1.3 shall be used.

NOTE: The URN will be registered with IANA.

NOTE: Not all receivers need to understand this RTP HE and can simply ignore it. Further details on how to handle this needs to be defined.

X.1.3 PDU Set information HE Format

RTP senders capable of sending the PDU set information HE should support both 2-byte and 1-byte HE formats.

<TBA: Figure X.1 PDU set information RTP HE using a 1-byte header>

<TBA: Figure X.2 PDU set information RTP HE using a 2-byte header>

X.1.4 Extensions

X.1.4.1 PDU Set Size

The PDU set information header may include an additional [24-bit] field for PDU set size in bytes. A sender shall include a 24-bit field after the [last] field of the PDU set information RTP HE (as shown in Figures X.1 and X.2) indicating the size of the PDU set in bytes by using the extension attribute pssize in the SDP extmap attribute, as shown in the example below:

a=extmap:7 urn:3gpp:pdu-set-info pssize

[X.1.4.2 Burst Indication]

<Other extensions may be added but support in RAN during Rel-18 may be limited based on SA2 work>

X.1.5 Guidelines for RTP senders

X.1.5.1. Guidelines for Importance Field

<TBD>

X.1.5.2. Guidelines for Burst Indication

<TBD>

# Proposal

We propose to include section 2 in 5G\_RTP Permanent document as a potential solution and section 3 in TS.

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