**Agenda item:** **10.8**

**Source:** Qualcomm, Lenovo, Nokia, Interdigital

**Title: [5G\_RTP] RTP Header Extension for PDU Set Marking**

**Document for** Agreement

#  Introduction

SA4 agreed according to [1] work on and finalize by SA4#124 a RTP Header Extension (HE) for PDU Set information consisting of the following fields:

- PDU Set Sequence Number.

- Indication of End PDU of the PDU Set.

- PDU Sequence Number within a PDU Set.

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

-Optionally, PDU Set Size in bytes.

The document proposes a design for the RTP HE format that supports the above information. It further takes into consideration the analysis provided in [2] and the latest burst indication SA2 requirements as per [3].

As per RFC 8285 alignment is not needed for different extension elements if 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 may not always be aware of the PDU set size.

#  RTP Header Extension for PDU Set Marking

The RTP Header Extension for PDU Set marking shall support both RTP Header Extension formats (i.e., the one-byte and the two-byte formats) according to RFC 8285.

If the RTP Header Extension for PDU Set marking is the only RTP header extension used, the endpoints shall use the 1-byte header format for maximum savings. If other 2-byte RTP header extension elements are used, then the 2-byte header may be used.

NOTE: The headers are not shown with padding as this depends on other prospective extension elements in use, as per RFC 8285 alignment specifications.

## 2.1 One-byte RTP Header Extension Format

The one-byte RTP Header Extension for the marking of PDU Sets and End of Bursts is defined as follows:

 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

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

 | 0xBE | 0xDE | length |

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

 | ID | L=5 |E| EDB | PSI | PSSN | PSN |

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

 | PSSize |

 +.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+.+

## 2.2 Two-byte RTP Header Extension Format

The two-byte RTP Header Extension for the marking of PDU Sets and End of Bursts is defined as follows:

 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

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

 | 0x100 | appbits | length |

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

 | ID | L=6 |E| EDB| PSI | PSSN

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

 | PSN | PSSize |

 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+.+.+.+.+.+.+.+.+

## 2.3 Semantics

The semantics of the fields of the RTP Header Extension for the marking of PDU Set and End of Bursts are defined as follows:

* **End PDU of the PDU Set [E] (1 bit):** This field is a flag that shall be set to 1 for the last PDU of the PDU Set and set to 0 for all other PDUs of the PDU Set.
* **End of Data Burst [EDB] (3 bits):** The EDB field is 3 bits in length and indicates the end of a Data Burst. The 3 bits encode the End of Data Burst indication as per the encoding and guidelines provided in Clause 2.4.1.
* **PDU Set Importance [PSI] (4 bits):** The PDU Set Importance field indicates the importance of this PDU Set compared to other PDU Sets within the same RTP stream. The default value shall be 8. Lower values shall indicate a higher importance PDU Set with the highest importance PDU Set indicated by 0 and the lowest importance PDU Set indicated by 15.

NOTE: The Application Server may use a different base value for different RTP Streams for the case of multiplexing, to indicate for instance, that PDU Sets from the audio stream are of higher priority than those coming, e.g., from an RTP stream that carries PDU Sets of an eye buffer.

NOTE2: A complete set of guidelines for setting the PSI field for various audio/video codecs are provided in Clause 2.4.2

* **PDU Set Sequence Number [PSSN] (10 bits):** The field encodes the sequence number of the PDU Set to which the current PDU belongs acting as a 10-bit numerical identifier for the PDU Set.

NOTE: This value wraps around at 1023, however, using the RTP packet sequence number and PSSN pair a receiver may uniquely distinguish between any PDU Sets.

* **PDU Sequence Number within a PDU Set [PSN] (6 bits):** The sequence number of the current PDU within the PDU Set. The PSN shall be set to 0 for the first PDU in the PDU Set and incremented monotonically for every PDU in the PDU set in order of transmission from the sender.

NOTE: A receiver may use the RTP packet sequence number together with the PSN to distinguish between PDUs within a PDU Set that contains more than 64 PDUs.

* **PDU Set Size [PSSize] (24 bits):** The PDU Set Size indicates the total size of all PDUs of the PDU Set to which this PDU belongs. This field is optional and subject to an SDP signaling offer/answer negotiation, where the Application Server may indicate whether it will be able to provide the size of the PDU Set for that RTP stream. If not enabled, the field should not be present. If enabled, but the Application Server is not able to determine the PDU Size for a particular PDU Set, it should set the value to 0 in all PDUs of that PDU Set. The PSSize shall indicate the size of [a PDU Set including RTP/UDP/IP header encapsulation overhead of its corresponding PDUs] / [sum of RTP payload sizes of all PDUs present in a PDU Set]. The PSSize is expressed in bytes.

NOTE: This field may be optionally present given the signaling of the “pdu-set-size” extension attribute in the SDP offer/answer negotiation as per Clause 2.4.

NOTE2: Guidelines to set the PDU Set Size in bytes by an Application Server are provided in Clause 2.4.3.

## 2.4 SDP Signaling

The URN for the PDU Set marking shall be set to “**urn:3gpp:pdu-set-marking:rel-18**”. 3GPP should register this header extension identifier with IANA as maintained in [Real-Time Transport Protocol (RTP) Parameters (iana.org)](https://www.iana.org/assignments/rtp-parameters/rtp-parameters.xhtml#rtp-parameters-10).

The ABNF syntax for the extmap attribute for the signaling of PDU Set Information and End of Burst marking is defined as follows:

*extmap-attr="a=extmap:" 1\*5DIGIT ["/" direction] SP "urn:3gpp:pdu-set-marking:rel-18" SP extensionattributes*

*extensionattributes = \*3(format / "pdu-set-size")*

*format = "short" / "long"*

## 2.4 Detailed Guidelines for PDU Set Marking Semantics

## 2.4.1 End of Data Burst Field

NOTE: These detailed guidelines are FFS.

## 2.4.2 PDU Set Importance Field

NOTE: These detailed guidelines are FFS.

## 2.4.3 PDU Set Size Field

NOTE: These detailed guidelines are FFS.

# 3 Proposal

We propose to add Clause 2 to TS 26.522 and notify SA2 on the progress of the RTP Header Extension for PDU Set Marking.

# References

[1] LS out to SA2, S4-230419, TSG SA4 #122 Meeting, Athens.

[2] Tdoc S4aR230062: [5G\_RTP] Observations about PDU set information fields, Source: Lenovo, TSG SA4 RTC SWG Ad-hoc Post-#122 Meeting, Online Meeting, Status: Agreed.

[3] LS in from SA2, S4-230465, TSG SA4 #123e Meeting.