**3GPP TSG-SA4 Meeting #0-e (AH) RTC SWG post 130 *S4aR250022***

**Online, , 26th Nov 2024 - 5th Feb 2025**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **26.522** | **CR** | **0008** | **rev** | **-** | **Current version:** | **18.1.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network | **x** |

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| ***Title:***  |  |
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| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | S4 |
|  |  |
| ***Work item code:*** | 5G\_RTP\_Ph2 |  | ***Date:*** | 2025-01-13 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-19 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | TR 26.822 conclusions 7.10 states: Furthermore, it is recommended to add guidelines to TS 26.522 [2] for RTP senders that use multiplexing. |
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| ***Summary of change:*** | Add a guidline on how to use RTP HE in case of multiplexed content |
|  |  |
| ***Consequences if not approved:*** | RTP HE not that useful for majority of case with multiplexed RTP Streams |
|  |  |
| ***Clauses affected:*** | 4.2.6 (new sub clause) |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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| \*\*\* CHANGE (new clause all new text)\*\*\* |

#### 4.2.6.X Guidelines for RTP HE usage for multiplexed content

An RTP sender could also include RTP HE for multiplexed streams.

One possibility is RTP multiplexing when different RTP Streams exist (e.g. audio + video).

Another possibility is RTP multiplexing when different RTP Streams exist and RTCP packets exist.

Another possibility is a multiplex in which RTP packets may contain different media types and in addition RTCP packets can be present (e.g. MPEG-2 TS over RTP).

Also cases may exist with multiple video streams.

To illustrate this, Table 4.2.6.X-1 provides some examples on different multiplexing scenarios and the corresponding guidelines for setting RTP HE are further given in Table 4.2.6.X-2.

The description of each scenario is given and the implication for RTP HE marking in the Tables.

Table 4.2.6.X-1: Example of Multiplexing scenarios

|  |  |  |  |
| --- | --- | --- | --- |
| Scenario | Multiplex Type | Description | Implications for RTP Header Extension for PDU Set Marking for sender |
| sc1 | audio + video RTP multiplex | Native Audio and Video streams are carried in separate RTP streams with different SSRC, and different PT Packets contain either audio or video. | Typically, RTP HE is used for the video stream, audio packets can be unmarked.If both audio and video RTP packets are marked into PDU Sets, the RTP HE for PDU Set is usually applied to video and audio RTP streams separately. RTP video packets and audio packets are usually marked as separate PDU Sets, not as part of the same PDU Set. |
| sc2 | audio + video , RTCP  | Same as above, but in this case also RTCP packets exist. Packets contain audio, video or RTCP. | Same as above for audio and video with following addition. RTP HE cannot be used for RTCP packets, and these will be handled as unmarked/lone PDUs. For a PDU Set comprising a single PDU marking may not be needed.  |
| sc3 | audio, video native multiplex  | Stream packets can contain both audio and video. In this case an RTP packet can contain both audio and video content. In addition, packets can also contain other metadata related to the streams. | In this case, single PDU Sets will contain different media types; additional guidance is provided to handle this case in Table 4.2.6.X-2 |
| sc4 | audio, video native multiplex + RTCP  | same as above adding RTCP | same as above including RTCP packets [4] that cannot carry RTP Header Extension |
| sc5 | video + video or audio + audio  | Similar to sc1, but multiple native audio or multiple native video streams are carried in separate RTP streams with different SSRC, either with different PT field or sharing same PT field. Packets contain content from a single SSRC. | Different RTP streams are marked as separate PDU Sets, not mixing separate RTP streams (SSRC) in a single PDU Set. |
| sc6 | video + video or audio + audio + RTCP | Same as above adding RTCP | Same as above including RTCP packets [4] that cannot carry RTP Header Extension |

Table 4.2.6.X-2: Guidelines for applying RTP HE in different example multiplexing scenarios

|  |  |  |
| --- | --- | --- |
| Scenario | Guideline | Additional Comments |
| sc1 | Video PDU Sets may be assigned for example for video frames or slices and PDU Set importance can be set using guidelines from 4.6.2.Audio Packets can be unmarked or in case audio frames consist of multiple packets they may be marked using RTP HE. PDU Set importance of the unmarked packet is determined by the 5G System based on a configuration, and this can also be based on the payload type. | Typically, RTP HE is used for the video stream, audio packets can be unmarked as frames are often a single packet and the marking is not beneficial for single packet pdu sets as only overhead is introduced (see the lone PDU case), or the RTP HE can also be used for the audio stream. |
| sc2 | Same as above. RTCP packets cannot be marked using RTP HE and are treated as unmarked packet in the 5G System, PDU Set importance can be determined by the 5G system. | Same as above for audio and video. End of Data burst signal may not be valid if RTCP is the last packet in a burst as no RTP HE can be added to an RTCP packet. |
| sc3 | PDU Sets can be identified by the RTP sender based on the presentation time and the RTP HE can be used to support the PDU Set based QoS handling. The PDU Set importance can be set to a configured value or the value corresponding to the importance of the most important part of the multiplexed stream using guidelines from 4.6.2 | In this case, the grouping of PDU sets will contain different media types, and therefore the guidance cannot only be based on one specific media type, which may not be appropriate. Therefore, PDU Sets could be identified and marked by the RTP sender based on other aspects such as the presentation time. The PSI can be set based on a configuration. |
| sc4 | Same as sc3RTCP packets cannot be marked and are treated as unmarked packet in the 5G System. | Same as above including RTCP packets that cannot carry the RTP Header Extension.Data burst signal cannot be used if RTCP is the last packet in a burst. |
| sc5 | Video PDU Sets may be assigned for video frames or slices and PDU Set importance can be set using guidelines from 4.6.2 for video, separating RTP streams with different SSRC into separate PDU Sets.Audio Packets can be unmarked or in case audio frames consist of multiple packets they may be marked using RTP HE, separating RTP streams with different SSRC into separate PDU Sets. | Multiple PDU Sets can be "open" at the same time, i.e., some PDUs are received from multiple different SSRC and thus different PDU Sets, which requires the marking to keep track of multiple simultaneous PDU Set contexts. |
| sc6 | Same as sc5.RTCP packets cannot be marked and are treated as unmarked packet in the 5G System. PDU Set importance can be determined by the 5G system. | Same as above including RTCP packets [4] that cannot carry the RTP Header Extension.Data burst signal cannot be used if RTCP is the last packet in a burst. |

To support multiplexed content in combination with PDU Set QoS based Handling in the 5G System, groups of packets of different media types (audio, video) but same payload type (native multiplex) may also be grouped as a PDU Set (sc3, sc4). This enables frames/groups of packets to benefit from transfer using PDU Set QoS parameters in NG-RAN (delay budget, PSIHI). In this case, each of the RTP packets can set the RTP Header Extension for PDU Set Marking to enable 5G System to identify corresponding PDU Sets.

Different options exist when applying RTP HE for multiplexed content, for which some guidelines are defined as follows:

- When RTP multiplexing (sc1, sc2, sc5 and sc6) is used, it is possible to separately mark the PDU Sets in different streams.

- When packets may combine different media types in a payload type such as in sc3 and sc4, PDU sets can be created around a common media presentation time grouping packets based on timestamps. In this case the PDU set importance can be set to a derived or default value or a value configured.

- In case only packets of single stream are marked (e.g. the video stream), and the packets of other streams are unmarked. In this case the 5G System may still identify PDU set information as detailed in Annex A based on the payload information for example or the payload type.

- In case packets cannot carry the RTP header extension (e.g. RTCP packet), packets can be handled as lone/unmarked PDU and PDU Set information may still be derived in the 5G system in some cases.

The protocol description can be used to indicate to the 5G System that PDU Sets contain multiplexed content. For example, by indicating a payloadType with a number that corresponds to a multiplexed data type (e.g. payloadType 33 for MPEG-2 TS). In this case the transport protocol would still be RTP, but the payload type could be 33 MPEG-2 TS (native multiplex) and/or a combination of format types e.g. (H.264, AAC) (in case of RTP multiplex). In such a case it is optional to provide additional format parameters.

The guidelines for PDU Set Marking for H.264 and/or H.265 can still apply but in this case, but when the PDU Set importance of MPEG-TS RTP packets cannot be identified, it can be set to a PSI value determined by the sender.

Table 4.2.6.X-3: Example protocol description for different multiplexing scenarios

|  |  |  |  |
| --- | --- | --- | --- |
| Scenario | Protocol |  rtpPayloadFormat (example) | Rtppayloadtypelist (example) |
| sc1 | RTP/SRTP | H265, PCMA | 97,8 |
| sc2 | RTP/SRTP | H265, PCMA | 97,8 |
| sc3 | RTP/SRTP | MP2T | 33 |
| sc4 | RTP/SRTP | MP2T | 33 |
| sc5 | RTP/SRTP | H264, H265 or just H265 | 97,98 or just 98 |
| sc6 | RTP/SRTP | H264, H265 or just H265 | 97,98 or just 98 |

NOTE: There currently is no way to explicitly indicate the presence of RTCP packets in the protocol description.