**Source: Huawei (Rapporteur)**

**Title: KI#4 and KI#5, key questions for company view collection**

This document is to collect company views on key questions of KI#4 and #5 to facilitate the following conclusion discussion. Please kindly provide your company views on the following questions before EoB of Sep 20th. The rapporteur will collect the views and propose summary/way forwards/SoH for further discussion afterwards.

### Q1: How does UPF identify DL PDU Set info?

* Option 1: use existing IETF RTP/SRTP RFC and draft
* Option 2: Define/extend N6 protocols to carry related info
  + Option 2.1: extend GTP-U protocol
  + Option 2.2: extend HTTP header (S2-2205830)
  + Option 2.3: extend RTP header
* Option 3: UPF implementation based on e.g. traffic characteristics.
* Option 4: UPF interacts with NWDAF(S2-2205838)

**[Xiaomi view]**

**Position:** Prefer Option 1 and Option 2.3

**Justification**:

Option 2.2: Typical scenarios for XR requires the content to be encoded in real-time in response to user interaction (e.g. head movement, interaction with objects, etc.). For these use cases, HTTP is thus not suited for delivering the real-time encoded content since it introduces incompressible delays due to the request/response pattern of the protocol. HTTP is better suited for on-demand content delivery and live content without any feedback loop between the receiver and the source. In addition, HTTP header are typically encrypted when HTTP is used over TLS.

Option 1 and 2.3: Since RTP headers may be visible to intermediate nodes, this solution may be considered for carrying such information from a media delivery point of view. However, other aspects should also be considered such as security, architecture, scalability, etc.

Option 3: Traffic characteristics may be very diverse from one XR service to another. For instance, one service may be using I frames which typically represent the largest type of frame in terms of bytes while another service may configure an video encoder to smooth out peaks by not using I frames such that the bitrate is more even over time. Additionally, bitrate may also vary based on the user interaction when the content is real-time encoded/packaged for each user based on the user pose. Therefore, this could be difficult to derive relevant information from traffic characteristics as the bitrate shapes can vary from one service to another and even per service.

### Q2. How to deliver PDU Set importance information to RAN:

* Option 1: use different QoS Flows with different priority level. PDU Set importance is mapped to existing QoS flow priority.
* Option 2: use one QoS flow for different PDU Set with different priority level
  + Option 2.1: use different sub-QoS Flow within one QoS Flow, and using sub-QoS flow Identifier in GTP-U header
  + Option 2.2: use PDU Set importance information in GTP-U header

**[Xiaomi view]**

**Position:** Prefer Option 1 and Option 2.2.

**Justification**:

Option 1 and 2.2 have less impact with the procedures handling from our point of view. Option 1 can reuse the current QoS model. Option 2, the RAN can reuse the priority handling with the importance information considering.

### Q3: Support to PDU Set dependency-based scheduling

* Option 1: Identify accurate dependency relationship between PDU Sets for scheduling.
* Option 2: In some scenario (e.g. closed GOP), the decoding of the non-I frames between two successive I frames always directly or indirectly relies on the 1st I frame of the two successive I frames. If the 1st I frame is in error, the non-I frames can be dropped until the next I frame. (proposed in S2-2205839)
* Option 3: If a PDU Set is depended by others, it can be considered as more important during scheduling. But the scheduling will not further consider the accurate dependency relationship.

**[Xiaomi view]**

**Position:** Open for Option 3.

**Justification**:

This kind of assumptions are hard to make since it depends on what is in the PDU set and then what exact dependency exists between the PDU sets, i.e. coding dependency, parsing dependency, etc.

### Q4. Support to hierarchical PDU Set:

* Option 1: introduces PDU Set group. (S2-2205938)
* Option 2: not support.

**[Xiaomi view]**

**Position:** Prefer Option 2 for this release.

**Justification**:

Handling of PDU set is already hard to grasp from a media delivery point of view. It is even more unclear how a PDU Set group can be beneficial. In addition, if introducing PDU Set group, whether the importance or priority between the PDU Set groups or not. It can be introduced in next release after further study about the details of PDU Set group.

### Q5. On “*Whether to drop a PDU Set in case PSDB is exceeded*”, do we need further define “*PDU Set Discard Time*” (A PDU Set shall be dropped in case this time is exceeded (sol 25 etc):

* Option 1: Support
* Option 2: not support.

**[Xiaomi view]**

**Position:** Support (Option 1) conditionally. The discard time may be difficult to correctly set.

**Justification**:

In theory, having a maximum time of reception is easy to understand and could be in general useful. However, it is more complex in case of video decoding. A frame (assuming that this is matching a PDU set) could be too late for its expected presentation time but could be needed for decoding the future frames. As a result, the discard time may be difficult to correctly set since it would require to look into the dependency between frames.

Another case is for instance a user who wants to pause the content for a certain duration. Assuming that the application will resume playback where it stopped the discard time may be completely different now for the next frames to come. As a result, the discard time may even be dynamic and dependent on user interaction with the application and not a property of the video stream itself which seems to make the use of it even more complex in practice.

In general, the PSDB is agreed as one of the baseline parameters of the PDU Set in the TR, then we support that it can be dropped conditionally in case PSDB is exceeded. With regard to the discard time, it is difficult to set correctly as justified above.