**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 16th. 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)

**[Huawei]**

**Position:**

Support Option 1 and 3.

Support Option 2.3 if SA4 agrees to define necessary extension within Rel-18 timeline. Support for this option might be done in WI phase or next release if SA4 progress is not enough when SA2 close study phase in Nov.

**Justification**:

Option 1 reuses existing IETF specs, which means wider support from application aspect.

Option 2 defines 3GPP specific protocol headers, and relies on support of application on such protocol headers:

* Option 2.1 request application server to support GTP-U protocol, which is questionable considering GTP-U was mainly defined and used in 3GPP domain.
* Option 2.2 requests UPF to support MASQUE proxy, which we have concerns on the performance downgrade caused by the HTTP proxy in UPF, and also the maturity of MASQUE which is still under development in IETF. It’s also not clear which SDO should define extension to HTTP to transfer the necessary PDU Set information between AS and UPF.
* Option 2.3 is fine if SA4 agrees to define the corresponding extensions. However, option 2.3 relies on SA4 progress hence might be only done during WI phase or next release depends on SA4 progress.

Option 3 should be supported to allow vendor-specific UPF implementation to identify necessary information based on standardized or property protocols used by the application.

Option 4 may cause some performance issue if a separated NWDAF is used. If UPF/NWDAF must be collocated, it should be considered as an UPF with big data analysis capability, as a subset of option 3.

### 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

**[Huawei]**

**Position: Support Option 1.**

**Justification**: PDU Sets with different priority level can be transferred via different QoS Flows with corresponding QoS parameters (e.g. PER/PSER). Option 1 can reuse existing RAN capability for such PDU Set importance-based scheduling. Option 2.1 and 2.2 break current QoS Flow framework without clear benefits, and will also cause significant impacts to RAN DRB based scheduling.

One main concern on option 1 was the potential packet dis-ordering caused by different QoS flows. However, we don’t think it’s a really issue due to the following reasons:

1) Different QoS Flows can have different priority but same PDB/PSDB values, since the delay requirements are same no matter whether the PDU Set is important or not. Once PDB/PSDB is satisfied, disorder should be avoidable.

2) The intervals between frames are usually > 10ms (e.g.16.6 ms for 60fps video), where the PDB requirement of XRM services are on the same level or even lower. The possibility of disordering between sequent frames should be very low considering the big interval comparing to the PDB.

3) Media layer protocols like RTP, are able to deal with disorder if it happens using the timestamp info in the RTP header.

### 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.

**[Huawei]**

**Position: Prefers to Option 3, but open to discuss the feasibility of Option 1/2.**

**Justification**:

We have concerns on the feasibility of option 1. Identifying accurate dependency relationship between frame/slice. Option 2 tries to simplify the solution by identify the I-frames and non I-frames only, while it is limited to certain scenarios.

PDU Set importance could denote whether a PDU Set is depended by others or not (see RTP NRI, ‘I’/‘D’ fields as explained in e.g. solution 24/17/18). But we are open to discuss the feasibility of supporting option 1/2.

### Q4. Support to hierarchical PDU Set:

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

**[Huawei]**

**Position: Support option 2.**

**Justification**: Hierarchical PDU Set brings complexities considering one PDU might belongs to multiple PDU Sets in different levels, which leads to a complicated handling determination for the PDU. The use cases are not fully justified yet.

### 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.

**[Company view]**

**Position: Support option 1.**

**Justification**:

The media server could provide more accurate valid time of PDU Set, i.e. how long time a PDU Set will considered as useful by the application. Such a time may be different based on the application codec configuration, e.g. ‘--ref’ parameter in x265 codec (https://x265.readthedocs.io/en/master/cli.html#cmdoption-ref).