**3GPP TSG-SA WG4 Meeting #130S4-241800**

**USA, Orlando, 18 – 22 November 2024**

**Source: Huawei, HiSilicon**

**Title: FS\_5G\_RTP\_Ph2 Solution KI#1 PDU Set Size overprovisioning**

**Spec: 3GPP TR 26.822 version 1.0.1**

**Agenda item: 10.6**

**Document for: Agreement**

**1. Introduction**

Causes of deviations between PDU Set Size at RTP sender and receiver are described in TS 26.522 and TR 26.822.

Experimental data in TR 26.822 shows that in currently proposed solutions these inaccuracies persists.

Currently there is no defined accuracy range for PDU Set Size (it is assumed to be byte accurate).

As such accuracy is not achievable in practice, an alternative solution is to specify accuracy range and target *overprovisioning.*

Based on feedback from our RAN colleagues, a PDU Set Size that is smaller can result in violations of delay budget as re-allocation of RAN resources can take some time. On the other hand slight overprovisioning of RAN Network resources does not introduce such issues.

To accommodate to the situation, we suggest an alternative approach based on *overprovisioning* and specifying accuracy of the PDU Set Size field explicitly.

**2. Reason for Change**

Exact values of PDU Set Size are assumed in different 3GPP Specifications.

SA4 mechanisms for RTP PDU Set Header Extension cannot guarantee byte exact PDU Set size between sender and receiver.

Therefore, it is worth to consider if a PDU Set Size with a well specified accuracy range can be beneficial.

In this solution text the problem is discussed and it is proposed to consider the feasibility of this approach using *overprovisioning*.

**3. Conclusions**

Current solutions do not address the target requirement of specifying exact PDU Set Size to a receiver. Therefore, in this solution an alternative is to change the requirement targeting a well-defined PDU Set Size with accuracy bounds that can be used in practice. This solution should be documented in the TR, and normative work could be started after receiving feedback from RAN 2 and SA 2 working groups.

**4. Proposal**

It is proposed to agree the following changes to 3GPP TR 26.822

\* \* \* First Change (All New Text) \* \* \* \*

## 6.X Solution #X: PDU Set Size and Over Provisioning in RTP HE for PDU Set Marking

### 6.X.1 Key Issue mapping

This is a solution to key issue #1.

### 6.X.2 Description

#### 6.X.2.1 General

PDU Set Size is a field in the RTP Header Extension that can be used by the network to retrieve the PDU Set Size in bytes.

The accuracy of this field is a topic studied in KI #1.

Clause 6.4 and clause 6.7 contain solutions to KI #1.

A solution is also provided in TS 26.522 as well to include the IP packet overhead in the signalled PDU Set Size.

The reasons for deviation between PDU Set size at 5GS and sender are discussed in clause 6.4 and related problems in clause 5.1.

Data in 6.4 indicates that for a PDU sets of 22 Kbytes, a total deviation of up to 1000 bytes may occur e.g. up to maximum of 5 percent (to be confirmed via communication with RAN 2).

#### 6.X.2.2 Usage of PDU Set Size in NG-RAN



Figure 6.X.2.2-1

Figure 6.X.2.2-1 illustrates the signalling of PDU Set Size A from AS to UPF to NG-RAN.

Application server can add the PDU Set Size to RTP Packets using the RTP Header Extension, signalling PSSize A.

At the UPF after traversal through the network UPF may see PSSize plus or minus X (deviation due to network traversal).

This value A+-x is shared with NG-RAN with NG-RAN.

NG-RAN will allocate resources for timely transmission of the PDU Set based in this value.

This operation takes a bit of time, as NG-RANs allocates necessary resources for transmitting the PDU Set.

For this reason re-allocation is undesirable, as it may introduce additional delay.

Under-provisioning may lead to PDU Set delay budget not being met.

Therefore for NG-RAN it is better to do a *slight overprovisioning* instead of accidental *under-provisioning.*

Experiments in 6.4 and also comparing the potential header overhead, 5 percent is the upper bound, i.e. up to 1000 bytes for 23 Kb PDU Sets.

Highly accurate solutions are attempted in TS 26.522 and 6.4 with different mechanisms (out of band signalling) and taking into account specific protocol aspects such as IPv4 versus IP6 usage and IP header overhead.

However, it seems the PDU Set Size is still not fully accurate and *under-provisioning can still occur*. This implies that if an NG-RAN node receives a PDU Set Size that is too small, it allocates resources for it, but when the actually PDU Set is larger it needs to again allocate resources increasing the total delay for transmitting the PDU Set. This may lead to issues especially when the delay budget is small.

**Observation:** Even with the mechanisms in clause 6.4 and TS 26.522 PDU Set Size inaccuracy is still possible, and *under-provisioning* can occur.

Given this observation: *over-provisioning* is an alternative to avoid re-allocation of resources at NG-RAN due to under provisioning.

In this solution we propose to consider *over provisioning*, and enable explicit overprovisioning.

1. SA4 could recommend over-estimating PDU Set size by a certain percentage (e.g. 5 percent to account for deviations along the way)

**Or**

 B) SA4 can align with SA2 and RAN 2 on this matter aiming to adopt a guideline that up to a certain percentage of deviation compared to the *estimated PDU Set Size* from the RTP Header Extension*.*

This would simplify TS 26.522 and avoid problematic *under provisioning*.

#### 6.X.2.3 Discussion

The following analysis of the solution is provided.

**Pro 1:** simpler solution, no out of band signalling, no need for transmission protocol specific operation.

**Pro 2:** explicit about inaccuracy, avoid under provisioning at NG-RAN.

**Con 1**: Some additional resources may be allocated in NG-RAN for PDU Set Transmission, but this is up to RAN implementation and not part of the normative work.

### 6.X.3 Proposal

Inaccuracy in PDU Set Size exists in all current proposals.

Overprovisioning can be a practical approach, mainly targeting to avoid *under provisioning*.

In this solution we propose to consider *over provisioning*, and enable explicit overprovisioning.

1. SA4 could recommend over-estimating PDU Set size by a certain percent based on RAN requirements and achievability (e.g. 5 percent), to be confirmed based on requirements from RAN

**Or**

 B) SA4 can align with SA-2 and RAN 2 on this matter aiming to adopt a guideline that up to a certain percentage more resources may be allocated compared to the *estimated PDU Set Size* from the RTP Header Extension*.*

This can enable simplifying TS 26.522 avoiding transport specific operations.

This solution introduces some overhead at NG-RAN, but experimental and evaluation of the overhead in RTP packets, the overhead is bound the percentage of the PDU Set Size (assuming trivial issues like IP fragmentation etc. are avoided).

A benefit is that delay budgets are more likely to be met using this solution as *underprovisioning* can be avoided.

Communication with SA2 and RAN-2 will be useful to get feedback on this solution.

With regard to overprovisioning of resources at RAN, this is up to the implementation of the RAN.

|  |
| --- |
| END of Changes |