**3GPP TSG-SA WG4 Meeting #128S4-241017**

**South Korea, Jeju, 20 – 24 May 2024**

**Source: Nokia Corporation**

**Title: [FS\_5G\_RTP\_Ph2] Sol KI#2: Application-specific PSI mapping for lonely PDUs**

**Agenda item: 10.8**

**Document for: Agreement**

# Introduction

In the SA4#127-bis-e, the key issue #2 on QoS handling requirements for lonely PDU was incorporated into TR 26.822. The key issue proposes to study two aspects:

*- whether there is any issue when applying PDU Set QoS parameters to the lonely PDUs from the application layer perspective?*

*- how to handle the issue of missing PDU Set Information in case of lonely PDUs*

This contribution handles the second aspect and proposes a solution for compensating for the missing PDU Set Information for lonely PDUs.

# Proposal

A solution to KI#2 is proposed for incorporation into TR 26.822.

**========================= CHANGE 1 (all new) =============================**

6.X Solution #X: Application-specific PSI mapping for lonely PDUs

6.X.1 Key Issue mapping

This solution addresses the key issue #2.

6.X.2 Description

6.X.2.1 Background

In Rel-18, SA2 has agreed that the PSA UPF marks, in the downlink, each N6-unmarked PDU (“lonely PDU”) with PDU Set Information into a PDU Set. If the UPF receives a PDU that does not belong to a PDU Set based on Protocol Description for PDU Set identification, the UPF still maps it to a PDU Set and determines the PDU Set Information by implementation-specific means.

Currently, there is no mechanism to mark PDUs carrying different protocol data such as RTCP, STUN, etc. Furthermore, the sender may prefer not to mark RTP PDUs that carry certain media types. For example, overhead of adding the RTP HE for PDU Set marking may be considered prohibitive by the sender due to low bitrates of audio and haptics streams. Consequently, lonely PDUs carrying such protocol data or media types are assigned to a PDU Set by the UPF and their PDU Set Information is set based on the UPF pre-configuration.

In this case, the UPF may be able to obtain most elements of the PDU Set Information reliably based on the UPF implementation. However, the UPF cannot reliably obtain the PSI from the media payload if the media stream is encrypted. Even if the stream is unencrypted, the UPF would have to parse the RTP payload and derive the PSI from the NAL unit headers. This is not feasible considering that the UPF processes data from several endpoints simultaneously under tight latency constraints.

Setting the PSI based on a default pre-configuration may not be accurate as the importance of different lonely PDU types may vary depending on the application. For example, some types of RTCP messages may be considered more important for applications requiring low latency.

6.X.2.1 Solution description

In this solution, the sender creates a mapping between a set of PSI values and PDU types that can be used by the network to determine the PSI values of the lonely PDUs. PDU type may e.g. refer to the payload type for RTP or packet type for RTCP. In RTP, the payload type is carried in the RTP header. For example, the sender may be using the dynamic payload types 97 for H.264 and 98 for AMR-WB, respectively. In RTCP, packet type is carried in the RTCP header and defined for different RTCP messages by the related specifications (e.g. 200 for sender reports, 206 for payload-specific messages). For RTCP feedback messages, further differentiation is provided by the feedback message type (FMT).

The sender can define session-specific PSI values for all or some of the network protocols and payload types carried in the session. These can be PDUs of non-RTP protocols and PDUs carrying non-video payload types such as audio or haptics data. The sender can create such mapping based on the application requirements.The sender sends the PSI-to-PDU type mapping to the network via control plane signaling. For example, the AF may signal this information to the network as part of the PDU Set assistance information in the Protocol Description. The network can use this mapping to determine the PSI for the lonely PDU Sets. Whenever a lonely PDU is received, the network can look up the PSI value and assign it to the lonely PDU.

NOTE: The candidate solution #29 in TR 23.700-70 enables the network to differentiate multiplexed streams sent in the same media transport such that they can mapped to distinct QoS flows according to their QoS requirements. However, for lonely PDUs, the UPF currently has to rely on pre-configuration to obtain the PDU Set Information that is sent by the UPF to the RAN, as lonely PDUs are not marked by the sender.

The benefit of this solution is that the network does not have to rely on UPF configuration to determine the PSI values and can make a more reliable decision based on the mapping provided by the sender.

The sender may consider the relative importance of different media types for the receiver application while establishing the PSI mapping. For example, the sender may map audio PDUs to PSI=1 and haptics PDUs to PSI=15, if audio is considered critical and haptics optional by the sender.

The sender may also differentiate the PSI values assigned to different RTCP message types based on their importance for the application. For example, in one case, the sender may choose to map RTCP sender/receiver reports to PSI=1 while mapping RTCP XR messages to the lowest PSI=15. In another case, the sender may prefer to map sender/receiver reports to PSI=5 since they are transmitted with a higher frequency, and thus loss of one report would have less impact.

The sender may also consider the RTCP mode of operation while determining the PSI values for different RTCP message types. E.g. RTCP messages sent in the Immediate Feedback mode (as defined in the RTP/AVPF profile) may be assigned a lower PSI than those sent in the regular RTCP mode, if the sender prefers to send the more critical RTCP messages in the Immediate Feedback mode.

Editor’s Note: This solution requires coordination with SA2.