**3GPP SA WG2 Meeting #162 S2-2405098**

**Changsha, China, 15-19 April 2024**

Title: [Draft] LS on Application-Layer FEC Awareness at RAN

Response to: -

Release: Release 19

Work Item: FS\_XRM\_Ph2

Source: SA2

To: RAN2, SA4

Cc: -

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Attachments: -

**1. Overall Description:**

SA2 is studying enhancements to support for XR and media services. In this context, solutions have been proposed to provide information about the presence of application layer forward error correction (AL-FEC) to NG-RAN to enable NG-RAN to discard obsolete AL-FEC PDUs. Obsolete AL-FEC PDUs refers to PDUs that are not needed at the UE because enough PDUs to reconstruct the actual content have already been successfully sent to the UE. The details of these proposals are documented as solutions #1, #2, #3, #4 and #21 in TR 23.700-70. In SA2, some companies are of the opinion that such solutions are useful to efficiently handle XR applications, e.g., XR split rendering and cloud gaming services that are using AL-FEC schemes regardless of the access technology that is used for the application's traffic. Other companies' view is that XR applications should not use Al-FEC over NR in the first place as NR provides efficient means for reliable delivery.

Related to this, SA2 would like to request SA4 and RAN2 to provide feedback on the following questions.

Questions for SA4:

* SA2 understands that different AL-FEC mechanisms exist (e.g., maximum-distance separable (MDS) schemes like RaptorQ and Reed-Solomon, FlexFEC, etc.) and is discussing for which AL-FEC mechanisms to enable AL-FEC awareness at RAN. Can SA4 identify one commonly used AL-FEC mechanisms (not necessarily 3GPP defined), which should be supported for AL-FEC awareness at RAN from SA4's perspective? If not, can SA4 provide a list of AL-FEC mechanisms, which should be supported for AL-FEC awareness at RAN?
* Does SA4 see a need (from a general application perspective) to support both static and dynamic redundancy ratios for AL-FEC awareness at RAN?
* Does SA4 see a need for the application layer to distinguish RAN's intentionally dropped obsolete FEC packets from other congestion related drops, and related to this, the need for specific application behaviour, e.g., to reduce the sending rate? The background to this question is the following:
* Some companies in SA2 raised the concern that applications need to reduce the sending rate in general in response to packet loss and hence will reduce their sending rate in response to NG-RAN discarding obsolete AL-FEC PDUs.
* Other companies argued that there is no need for reducing the sending rate when NG-RAN discards obsolete AL-FEC PDUs as long as NG-RAN can still meet the QoS characteristics of the other QoS flows in the same cell (i.e., because there is no fairness issue in this case).
* One solution (solution #3 in TR 23.700-70) proposed that an application may signal the required content ratio for a PDU Set (i.e., the required ratio of PDUs of a PDU Set needed by the receiver to reconstruct the original content) by first providing a mapping between content ratio levels and PDU Set Importance (PSI) values in the control plane to 5GS and by then signaling different content ratios as different PSI values as part of the PDU Set Information. Does SA4 consider this a feasible option?

Questions for RAN2:

* Can NG-RAN determine whether a PDU was successfully delivered over an unacknowledged mode data bearer? If so, does NG-RAN get this information sufficiently early to decide whether or not to drop subsequent AL-FEC packets?
* Can NG-RAN support dynamic redundancy ratios, i.e., a different ratio of PDUs that need to be successfully transferred to the UE for different PDU Sets within the same QoS flow?

**2. Actions:**

**To RAN2, SA4:**

**ACTION:** Kindly provide feedback on the questions above and provide additional feedback on the solutions, if any.

**3. Date of Next TSG SA WG2 Meetings:**

TSG-SA2 Meeting #163 27-31 May 2024 Jeju, KR

TSG-SA2 Meeting #164 19-23 August 2024 Maastricht, NL