3GPP TSG-WG SA4 Meeting #127-bis-e *S4-240640*

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**Source: Huawei, HiSilicon**

**Title: [FS\_5G\_RTP\_Ph2] Key Issue #X: Application-layer FEC awareness for PDU Set handling**

**Document for: Approval**

**Agenda Item: 10.8**

**Work Item / Release: FS\_5G\_RTP\_Ph2 / Rel-19**

# Introduction

As agreed in SP-240482, how to enhance the PDU Set handling with the awareness of Application-layer FEC with collaboration with SA2/RAN2 is to be studied. The Key Issue is proposed in this paper.

# 2. Text Proposal

It is proposed to capture the following changes vs. TR 26.822.

\* \* \* \* First change \* \* \* \*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[X] 3GPP TR 23.700-70:" Study on architecture enhancement for Extended Reality and Media service (XRM); Phase 2".

\* \* \* \* Second change \* \* \* \*

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

AL-FEC Application-Layer Forward Error Correction

\* \* \* \* Third change \* \* \* \*(all new text)

## 5.x Key Issue #4: AL-FEC awareness for PDU Set handling

### 5.X.1 Description

The application layer FEC mechanisms are widely used to improve packet transmission robustness in the presence of packet losses without going through packet retransmissions that create a delay often incompatible with real-time constraints. In the draft TR 23.700-70 [X] of FS\_XRM\_Ph2, Key Issue #1 is proposed to study the enhancement of PDU Set handling including Application-Layer Forward Error Correction (AL-FEC) encoded PDU Sets, as shown below:

*whether, what and how PDU Set based handling (e.g. new standardized 5QI, enhancements to Alternative QoS profiles, FEC, etc.) and PDU Set information (including Control Plane and/or User plane information) provided by the AF/AS are enhanced.*

The basic idea is to expose AL-FEC related information to the NG-RAN via the control plane or user plane. The AL-FEC related information could be redundancy information or marks to differentiate among source and repair PDUs of a PDU Set etc.. Based on the AL-FEC awareness, the NG-RAN may optimize the PDU Set delivery over the air interface accordingly (e.g., by discarding redundant PDUs of AL-FEC encoded PDU Sets). In the context of this cross-layer design, it is important to understand how to expose the AL-FEC information to the communication network (UPF, RAN) to enable intelligent resource allocation. Furthermore, there are intricate interactions to consider between the application and the network. In particular, the network dropping extra PDUs of a PDU Set encoded with AL-FEC, if any, may send a false signal to the application on the packet loss rate and the congestion level in the network. This may lead to undesired adaptation from the application such as increased redundancy ratio and reduced sending rate. It is thus important to understand the interactions between the application and the network in the case of AL-FEC and intentional packet dropping by the network and the impact on the media performance.

Therefore, it’s proposed to study:

- benefits of AL-FEC awareness for PDU Set handling given application and network interactions in the context of 3GPP, if any;

- whether and how to assist the 5GS to get aware of the AL-FEC;

- for AL-FEC awareness for PDU Set handling, how to avoid/minimize the impact to the application layer, if any.

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Editor’s Note: Collaboration with SA2/RAN2 is needed.

Editor’s Note: This Key Issue is based on the study on the Key Issue #3: Enhancements for application-layer FEC support.