**3GPP SA4 #128 S4-241097**

**Jeju, Korea, May 20-May 24 2024**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **PSEUDO CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26.822** | **CR** | pseudo | **rev** | **-** | **Current version:** | **0.0.1** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | **[FS\_5G\_RTP\_Ph2] Definition of the PDU Set for Application-Layer FEC** | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_5G\_RTP\_Ph2 | | | | |  | ***Date:*** | | | 05/20/2024 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)*  *Rel-17 (Release 17)*  *Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | One aspect of Key issue #3: Enhancements for application-layer FEC support  To address the issue, we need to define the PDU Set for AL-FEC with which there are both source packets and repair packets. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Discuss options for the definitions of the PDU Set. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | It will be difficul to discuss other aspects of Key Issue #3 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

.

# Proposed changes

Add the following to the References clause:

\* \* \* \* 1st change \* \* \* \*

[WebRTC-code] WebRTC source code: <https://source.chromium.org/chromium/chromium/src/+/main:third_party/webrtc>, retrieved May 1, 2024.

\* \* \* \* End of 1st change \* \* \* \*

Add the following to Clause 6.x:

\* \* \* \* 2nd change \* \* \* \*

## 6.X Solution #X: Definition of the PDU Set for Application-Layer FEC

### 6.x.1 Key Issue mapping

This maps to Key Issue #4.

### 6.x.2 Description

In Rel-18, the PDU Set was defined without the consideration of AL-FEC. When AL-FEC is used, the RTP source typically generates both source packets and repair packets. A natural question is whether we need to conglomerate the source packets and the repair packets of an ADU into a single PDU Set or into two PDU Sets. To answer this question, we need to consider how the source packets and the repair packets are multiplexed because the multiplexing has an impact on the QoS provisionsing.

Regardint the definition of the PDU Set in the case of AL-FEC, there are two options:

* **Option 1** (separate PDU Sets): A PDU Set includes only the source packets of an ADU and another PDU Set includes only the repair packets of the same ADU
* **Option 2** (the same PDU Set): A PDU Set includes both the source packets and the repair packets of an ADU

There are three ways to multiplex the source packets and the repair packets:

* **Scheme 1** (in a single RTP stream): The source packets and the repair packets of an ADU are sent in the same RTP stream, which is identified by an SSRC. This multiplexing scheme is used for ULPFEC in the WebRTC implementation [WebRTC-code].
* **Scheme 2** (in different RTP streams of an RTP Session): The source packets and the repair packets of an ADU are sent in two separate RTP streams of the same RTP session, and the streams are identified by two different SSRC’s. This multiplexing scheme is used for FlexFEC in the WebRTC implementation [WebRTC-code].
* **Scheme 3** (in different RTP sessions (IP 5-tuples)): The source packets and the repair packets of an ADU are sent in two separate RTP sessions, which are identified by two different IP 5-tuples. This is recommended in RFC 5109 [13], although we are not aware of any such commercial implementation.

In TS 23.501, the QoS for PDU Sets is provisioned on a per QoS flow basis. A QoS flow is typically identified by an IP 5-tuple. The network identifies which IP 5-tuple a PDU Set is associated with and then provisions QoS. With schemes 1 and 2, the source packets and the repair packets of an ADU are still associated with the same IP 5-tuple, allowing for both options for the definition of the PDU Set. However, if option 1 is used, the network needs to correlate the two PDU Sets and this incurs additional complexity. Therefore, option 2 is preferred.

In contrast, with scheme 3, the source packets and the repair packets of an ADU are associated with different IP 5-tuples. For option 1 of the PDU Set definition, i.e., the source packets and repair packets forming two PDU Sets, the network needs to correlate the two PDU Sets for QoS provisioning. For option 2 of the PDU Set definition, a PDU Set is split into two QoS flows, and it will be difficult for the network to provision QoS to the two QoS flows jointly to meet the QoS for a single PDU Set.

The complexity for PDU Set QoS provisioning is summarized in the table below:

Table 6.x: Complexity for PDU Set QoS Provisioning

|  |  |  |  |
| --- | --- | --- | --- |
|  | Complexity for PDU Set QoS provisioning | | |
| Multiplexing Scheme 1  (in a single RTP stream) | Multiplexing Scheme 2  (in two RTP streams of an RTP session) | Multiplexing Scheme 3  (in two RTP sessions or with two IP 5-tuples) |
| Option 1: separate PDU Sets | High | High | High |
| Option 2: the same PDU Set | Low | Low | High |

**NOTE:** Scheme 1 and Scheme 2 are deployed commercially, while commercial deployment of Scheme 3 has not been found.

Based on the summary, we see that option 2 of the PDU Set definition has the advantage of having lower complexity for PDU Set QoS provisioning. Therefore, we arrive at the following conclusion:

**Observation 1:** To minimize the complexity for PDU Set QoS provisioning in the case of AL-FEC, a PDU Set is defined to include both the source packets (PDUs) and the repair packets (PDUs) of an ADU.

\* \* \* \* End of 2nd change \* \* \* \*