**3GPP SA4 #129-e S4 -241498**

**Online, 19 August 2024**

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| *CR-Form-v12.0* |
| **PSEUDO CHANGE REQUEST** |
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|  | **26.822** | **CR** | pseudo | **rev** | **-** | **Current version:** | **0.0.1** |  |
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| *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)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network | **x** | Core Network | **x** |

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| ***Title:***  | **[FS\_5G\_RTP\_Ph2] Control-Plane Solution to the Key Issue on Enhancements of Data Burst Marking**  |
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| ***Source to WG:*** | Qualcomm Incorporated |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | FS\_5G\_RTP\_Ph2 |  | ***Date:*** | 08/19/2024 |
|  |  |  |  |  |
| ***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 canbe 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)* |
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| ***Reason for change:*** | This addresses Key Issue #12: Enhancements of Data Burst MarkingXR traffic may be periodic with relatively infrequent updates of the traffic periodicity, e.g., by changing the frame rate from 30 FPS to 60 FPS.The data burst information can be carried along with the XR data, but it may not be efficient. It is beneficial to investigate the control-plane approach. |
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| ***Summary of change:*** | The proposed control plane solution to data burst indication may be more efficient. |
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| ***Consequences if not approved:*** | Incomplete scoping of potential solutions to the key issue. |
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| ***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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

\* \* \* \* 1st change (New text) \* \* \* \*

6.X.1 Key Issue mapping

This maps to Key Issue #12.

6.X.2 Description

XR traffic may be periodic with the periodicity adjusted infrequently to the network condition. A design option is to signal the traffic pattern in the control plane.

There is an existing mechanism, Time Sensitive Communication Assistance Information (TSCAI) in 3GPP TS23.501 and TS38.413, to signal a traffic pattern in the control plane. TSCAI carries the periodicity as a mandatary field, Burst Arrival Time, Burst Arrival time window among others as optional fields. The Burst Arrival Time is the latest possible time when the first packet of the (first) data burst arrives at either the ingress of the RAN (downlink flow direction) or the egress of the UE (uplink flow direction).

TSCAI is constructed by SMF based on information provided by the application to the 5G system. TSCAI can assist the RAN in scheduling. It can also support time-varying traffic patterns. When the traffic pattern changes, SMF can send an updated TSCAI to the RAN.

**Observation 1:** The current TSCAI mechanism can convey the burst traffic pattern to the RAN and, if the traffic pattern changes, can convey an update of the burst traffic pattern.

The inclusion of Burst Arrival Time in TSCAI seems unavoidable if the RAN wants to know when the new traffic pattern starts because IP packets do not indicate time information to the network. The drawback is that this requires to synchronize the clock at the application and the 5G clock, which may not be feasible for all real-world implementations. Additionally, for XR deployments, this means that the XR traffic source needs to be able to predict when the data burst will arrive at the gNB with high accuracy, which in turn requires the XR taffic source to know the delay to the gNB, which may be difficult to know in practice.

**Observation 2:** The current TSCAI mechanism requires time synchronization between the application and the 5G clock and this may not be always feasible.

The PDU Set based QoS framework in Rel-18 leads to the definition of the PDU Set RTP header extension which carries the PDU Set Sequence Number (PSSN) [2]. This provides a convenient alternative to the current Burst Arrival Time. Specifically, the application can indicate at which PDU Set the new traffic pattern will start, and the RAN considers the new traffic pattern starts when the PDU Set arrives. To give the RAN lead time for scheduling, a time offset may be also indicated.

An example is shown in Figure 6.x.2, where the control plane signaling conveys that “The new traffic pattern with new periodicity 16.7ms starts time\_offset (in ms) after the arrival of the first PDU of the PDU Set with PSSN=8”.



Figure 6.x.2 An example on control plane signaling of change in traffic pattern

**Observation 3:** The PDU Set Sequence Number (PSSN) can synchronize the update of a traffic pattern between the application and the 5G system.

The traffic source may have multiple traffic flows destined to the receiver, e.g., text and video. The packets of low-latency traffic may be in PDU Sets and other packets may not. The traffic pattern is the supposition of the PDU Sets and other packets. Then the question is whether using PSSN will convey wrong information about the burst traffic pattern. This is not the case because what the RAN needs to do is to timely accommodate the bursts of low-latency traffic and can buffer the other packets (which are non-low-latency traffic) until it gets an opportunity to transmit the buffered packets to the UE. The delay from buffering is acceptable for the other packets (which are non-low-latency traffic).

**Observation 4:** The PDU Set Sequence Number (PSSN) based traffic pattern start indication can ensure the low delay for low-latency traffic while at the expense of non-low-latency traffic which is acceptable.

**Pros:**

* For scenarios where the traffic burst pattern is periodic and the periodicity changes infrequently, the control plane approach is more efficient than the user plane approach.
* The control plane approach can be implemented by slightly augmenting the existing TSCAI framework.

**Cons:** For other scenarios, the control plane approach is less efficient than the user plane approach.

The above observations and analysis lead to the following proposal.

**Proposal:** TSCAI can be enhanced by incorporating the PDU Sequence Number (PSSN) and possibly a time offset to indicate the start time of a traffic pattern.

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