**3GPP TSG-SA1 Meeting #96e *S1-21xxxx***

**Electronic Meeting, 8 – 18 November 2021** *(revision of S1-21xxxx)*

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **22.847** | **CR** | **<CR#>** | **rev** | **-** | **Current version:** | **18.0.0** |  |
|  | | | | | | | | |
| *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 |  | Radio Access Network | **x** | Core Network | **x** |

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| ***Title:*** | Resolving the Editor’s Notes in clause 5.1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | SA1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_TACMM | | | | |  | ***Date:*** | | | 2021-10-13 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | There are several editor’s notes in clause 5.1, and it is proposed to resolve these remaining issues:   * Considering the end-to-end latency requirement of one way < 5ms, it is proposed to update the service area to “typically < 100 km2” * As to the potential requirements related to “synchronization threshold”, it is proposed to update them to service exposure requirements and KPI requirement. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * Update the service area for this use case * Revise the potential requirements as service exposure requirements and the KPI requirement | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Unsolved ENs. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.1.6 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**--------- The 1st change ---------**

5.1.6 Potential New Requirements needed to support the use case

[PR 5.1.6-1] The 5G System shall provide the network connection to address the KPIs for immersive multi-modal VR applications, see table 5.1.6-1.

**Table 5.1.6-1 – Potential key performance requirements for immersive multi-modality VR applications**

| **Use Cases** | **Characteristic parameter (KPI)** | | | **Influence quantity** | | | | **Remarks** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Max allowed end-to-end latency** | **Service bit rate: user-experienced data rate** | **Reliability** | **Message size (byte)** | **# of UEs** | **UE Speed** | **Service Area** |
| Immersive multi-modal VR (UL: device 🡪 application sever) | 5 ms  (note 2) | 16 kbit/s -2 Mbit/s  (without haptic compression encoding);  0.8 - 200 kbit/s  (with haptic compression encoding) | [99.9%] (without haptic compression encoding)  [99.999%] (with haptic compression encoding) | 1 DoF: 2-8  3 DoFs: 6-24  6 DoFs: 12-48  More DoFs may supported by the haptic device | - | Stationary or Pedestrian | typically  < 100 km2  (note 3) | Haptic feedback |
| 5 ms | < 1Mbit/s | [99.99%] | MTU | - | Stationary or Pedestrian | typically  < 100 km2  (note 3) | Sensing information e.g. user poisoning and view |
| Immersive multi-modal VR (DL: application sever 🡪 device) | 10 ms  (note1) | 1-100 Mbit/s | [99.9%] | 1500 | - | Stationary or Pedestrian | typically  < 100 km2  (note 3) | Video |
| 10 ms | 5-512 kbit/s | [99.9%] | 50 | - | Stationary or Pedestrian | typically  < 100 km2  (note 3) | Audio |
| 5 ms  (note 2) | 16 kbit/s -2 Mbit/s  (without haptic compression encoding);  0.8 - 200 kbit/s  (with haptic compression encoding) | [99.9%] (without haptic compression encoding)  [99.999%] (with haptic compression encoding) | 1 DoF: 2-8  3 DoFs: 6-24  6 DoFs: 12-48 | - | Stationary or Pedestrian | typically  < 100 km2  (note 3) | Haptic feedback |
| NOTE 1: Motion-to-photon delay (the time difference between the user’s motion and corresponding change of the video image on display) should be less than 20ms, the communication latency for transfer the packets of one audio-visual media is less than 10ms, e.g. the packets corresponding to one video/audio frame are transferred to the devices within 10ms.  NOTE 2: Refer to IEEE 1918.1 [3] as for haptic feedback, the latency should be less than 25ms for accurately completing haptic operations. As rendering and hardware introduce some delay, the communication delay for haptic modality should be reasonably less than 5ms, i.e. the packets related to one haptic feedback are transferred to the devices within 10ms.  NOTE 3: In practice, the service area can vary depends on the actual deployment. In some cases a local approach (e.g. the application servers are hosted at the network edge) is preferred in order to satisfy the requirements of low latency and high reliability. | | | | | | | | |

[PR 5.1.6-2] To support immersive multi-modal VR applications, the 5G system shall support the following key performance requirements for synchronisation thresholds in order to avoid having a negative impact on the user experience (i.e. viewers detecting lack of synchronisation).

**Table 5.1.6-2: Potential key performance requirements for synchronization thresholds for immersive multi-modality VR applications**

|  |  |  |
| --- | --- | --- |
|  | **synchronisation threshold** | |
| **audio-tactile** | audio delay:  [50 ms] | tactile delay:  [25 ms] |
| **visual-tactile** | visual delay:  [15 ms] | tactile delay:  [50 ms] |

[PR 5.1.6-3] The 5G system shall support a means for an authorized 3rd party to provide 5GS with synchronization threshold(s) between the multiple flows (e.g., haptic, audio and video) associated with a multi-modal communication session.

[PR 5.1.6-4] The 5G system shall support a means to assist a 3rd party application to coordinate the transmission of multiple flows (e.g., haptic, audio and video) of a multi-modal communication session to enable presenting the related tactile and multi-modal data to the user within a certain time.