**3GPP TSG-SA4 Meeting #115-e *S4-*** ***211121***

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  | | | | | | | | |
| *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 |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | [FS\_5GSTAR] Updates on clause 6 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Samsung Electronics Co. Ltd. | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | FS\_5GSTAR | | | | |  | ***Date:*** | | | 2021-08-18 |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | | 17 |
|  | *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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Minor updates / clarification for missing part in clause 6 of TR 26.998 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.1, 6.2, 6.3, 6.4 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

**\*\*\* Start change 1 \*\*\***

# 6 Mapping to 5G System Architecture

## 6.1 General

Based on the identified use cases in clause 5.1, this clause documents how AR/MR service scenarios can be supported in 5G system architecture.

There already exist developed 5G system architectures relevant to deliver immersive media depending on the underlying functionalities, such as real-time communications, adaptive delivery, QoS guarantee, and a support of network node processing. An architecture of 5G Media Streaming (5GMS) for both downlink and uplink is specified in TS26.501[6.1.a] and is being further extended to support the edge media processing in TR26.803[6.1.b]. In addition, MTSI architecture extended to 5G system [4.3.d] may be applied to AR/MR conversational scenarios to guarantee the specific service QoS. In the following clauses, these relevant architectures will be analysed to identify potential standardisation areas for each scenario.

Note that only STAR UE and EDGAR UE in Table 4.2.2.1-1 are taken into account, as WLAR UE as well as WTAR UE have similar functionalities with STAR UE from a 5G system perspective. Specifically, STAR UE (and WLAR/WTAR UEs) possibly has an on-device decoding and rendering capability for immersive media and may rely on support from 5G cloud/edge for a certain condition. On the other hand, EDGAR UE always requires 5G cloud/edge for immersive media decoding and rendering, and the conventional 2D media is exchanged in Uu interface.

Table 6.1-1 provides a list of AR/MR service scenarios and the associated use cases for each. Note that some use cases may be duplicated as they address multiple features.

Table 6.1-1: List of service scenario mapping to use cases

|  |  |  |
| --- | --- | --- |
| Service Scenario | Clause | Relevant Use Case |
| Immersive media downlink streaming | 6.2 | 2. AR Sharing1)  14. AR Streaming with Localization Registry  17. AR remote advertising  18. Streaming of volumetric video for glass-type MR  Devices |
| 5G interactive immersive service | 6.3 | 1. 3D Image Messaging  2. AR Sharing1)  4. AR guided assistant at remote location (industrial  services) 1)  5. Police Critical Mission with AR1)  15. 5G Shared Spatial Data  16. AR remote cooperation1)  21. AR gaming |
| 5G cognitive immersive service | 6.4 | 4. AR guided assistant at remote location (industrial  services) 1)  5. Police Critical Mission with AR1)  14. AR Streaming with Localization Registry1)  16. AR remote cooperation1)  20. AR IoT control |
| AR conversational service | 6.5 | 3. Real-time 3D Communication  4. AR guided assistant at remote location (industrial  services) 1)  7. Real-time communication with the shop assistant  8. 360-degree conference meeting  9. XR Meeting  10. Convention / Poster Session  11. AR animated avatar calls  12. AR avatar multi-party calls  13. Front-facing camera video multi-party calls  16. AR remote cooperation1)  19. AR Conferencing |
| 1) may be duplicated into multiple scenarios | | |

## 6.2 Immersive media downlink streaming

### 6.2.1 Introduction

This clause introduces the case where immersive AR/MR media is streamed to a 5G AR UE using basic functionalities as defined in 5G Media Streaming for downlink (5GMSd).

### 6.2.2 Relevant use cases

The following use cases are relevant to this scenario.

- UC#2: AR sharing

- UC#14: AR Streaming with Localization Registry

- UC#17: AR remote advertising

- UC#18: Streaming of volumetric video for glass-type MR Devices

An immersive video which was pre-captured or pre-generated are stored in the server of an application provider. On a user’s request, the desired immersive video is streamed to 5G AR UE throughout 5GMS architecture. The user can play, pause, stop, and enjoy the trick play while watching the video.

### 6.2.3 Architectures

#### 6.2.3.1 STAR-based

Figure 6.2.3.1-1 provides a basic extension of 5G Media Streaming for immersive media downlink using a STAR UE, when all essential AR/MR functions in a UE are available for typical media processing use cases. In addition to media delivery, also scene description data delivery is included.



Figure 6.2.3.1-1: STAR-based 5GMS Downlink Architecture

#### 6.2.3.2 EDGAR-based

Figure 6.2.3.2-1 provides a basic extension of 5G Media Streaming download for immersive media using an EDGAR UE. In this context, it is expected that the edge will pre-render the media based on pose and interaction information received from the 5G EDGAR UE. It is also highlighted, that the 5G EDGAR UE may consume the same media assets from an immersive media server as the STAR UE according to Figure 6.2.3.1-1, but the communication of the edge server to this immersive server is outside of the considered 5G Media Streaming architecture.



Figure 6.2.3.2-1: EDGAR-based 5GMS Download Architecture

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

**\*\*\* Start change 2 \*\*\***

## 6.3 Interactive immersive services

### 6.3.1 Introduction

This clause introduces the case where interactive immersive service. In this case, pose and other interactions are sent in uplink in order for the Interactive Server to render the scene accordingly.

### 6.3.2 Relevant use cases

The following use cases are relevant to this scenario.

- UC#1: 3D Image Messaging

- UC#2: AR Sharing

- UC#4: AR guided assistant at remote location (industrial services)

- UE#5: Police Critical Mission with AR

- UE#15: 5G Shared Spatial Data

- UE#16: AR remote cooperation

- UC#21: AR gaming

In this scenario, a user interaction is sent from a UE to a server, so that the server handles the user’s request to the immersive media scene (e.g., chainging the context such as translation, rotation, and scaling). The processed scene is sent back to a UE in a similar manner of immersive media streaming case.

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

**\*\*\* Start change 3 \*\*\***

## 6.4 5G cognitive immersive service

### 6.4.1 Introduction

This clause introduces the case of cognitive immersive service. In this case, media and other interactions are sent uplink in order for the cognitive server to create semantical perception.

### 6.4.2 Relevant use cases

The following use cases are relevant to this scenario.

- UC#4: AR guided assistant at remote location (industrial services)

- UE#5: Police Critical Mission with AR

- UE#14: AR Streaming with Localization Registry

- UE#16: AR remote cooperation

- UC#20: AR IoT control

In this scenario, a media captured in a UE may be sent to a cognitive server to request semantical perception. The server processes and outputs the perception results, then responds the outputs to the UE. For example, a UE regularly scans his/her environments and send the captured media such as video, depth-maps, and sensor output to the cognitive server. The server identifies each component in the environments and sends back to the UE the identified perception outputs so that the UE can render in textual or visual overlays.

**\*\*\* End of change 3 \*\*\***