**3GPP TSG-SA WG4 Meeting #130S4-242106**

**Orlando, Florida, USA, 18 – 22 November 2024** *revision of S4- 242019*

**Source: InterDigital Canada**

**Title: [FS\_ARSpatial] Pseudo-CR on Relevant Standardization Work**

**Spec: 3GPP TR 26.819**

**Agenda item: 9.9**

**Document for: Agreement**

**1. Introduction**

The Study on Spatial Computing for AR Services (FS\_ARSpatial) was approved during the SA#104 meeting with version 0.1.0 of TR 26.819 approved in the SA4#129-e meeting. Clause 5 in the TR skeleton is dedicated to on-going standardization efforts.

**2. Reason for Change**

Adding additional information on standardization efforts and related work.

**3. Proposal**

It is proposed to agree the following changes to 3GPP TR 26.819.

\* \* \* 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".

[2] 3GPP TR 26.928: "Extended Reality (XR) in 5G".

[3] 3GPP TR 26.998: "Support of 5G glass-type Augmented Reality / Mixed Reality (AR/MR) devices".

[4] ARCore SLAM, https://developers.google.com/ar/develop/fundamentals

[5] ARKit VIO, https://developer.apple.com/documentation/arkit/arkit\_in\_ios/configuration\_objects/understanding\_world\_tracking

[6] ARCore Cloud Anchor, <https://codelabs.developers.google.com/codelabs/arcore-cloud-anchors#0>

[7] ARKit World Map, <https://developer.apple.com/documentation/arkit/arworldmap>

[8] Meta Quest Spatial Anchor, <https://developer.oculus.com/documentation/unity/unity-spatial-anchors-overview/>

[9] HoloLens, https://learn.microsoft.com/en-us/windows/mixed-reality/design/spatial-mapping

[10] Meta Space Setup, <https://www.uploadvr.com/quest-v64-undocumented-features-furniture-recognition-multimodal/>

[11] Apple RoomPlan, <https://developer.apple.com/augmented-reality/roomplan/>

[12] Google Scene Semantics, <https://developers.google.com/ar/develop/scene-semantics>

[13] Unity Documentation - Collision, <https://docs.unity3d.com/2023.1/Documentation/Manual/collision-section.html>

[14] Blender Documentation – Collisions, https://docs.blender.org/manual/en/latest/physics/rigid\_body/properties/collisions.html

[15] Unity Documentation - Compound Colliders, <https://docs.unity3d.com/Manual/compound-colliders-introduction.html>

[16] Unity Documentation - Mesh Colliders, <https://docs.unity.cn/Manual/mesh-colliders-introduction.html>.

[17] ARCore Ligthing Estimation, <https://developers.google.com/ar/develop/lighting-estimation>

[18] Cast Shadow <https://ieeexplore.ieee.org/document/9018202>

[19] Macario Barros, A., Michel, M., Moline, Y., Corre, G., & Carrel, F. (2022). A comprehensive survey of visual slam algorithms. Robotics, 11(1), 24.

[20] Khronos OpenXR

[21] ETSI Industry Specification Group AR Framework ([ISG ARF](https://www.etsi.org/committee/1420-arf)), <https://www.etsi.org/committee/1420-arf>

[22] ETSI GS ARF 004-2, Augmented Reality Framework (ARF); Interoperability Requirements for AR components, systems and services - Part 2: World Storage and AR Authoring functions.

[23] ETSI GS ARF 005, Augmented Reality Framework (ARF); Open APIs for the Creation and Management of the World Representation.

[24] ISO/IEC 23090-14, Text of ISO/IEC FDIS 23090-14 2nd edition Scene description, April 2024.

[25] 3GPP TS 26.119: “Media Capabilities for Augmented Reality”

[26] 3GPP TS 26.143: “Messaging Media Profiles”

[27] 3GPP TS 26.264: “IMS-based AR Real-Time Communication”

[28] 3GPP TR 26.812: “QoE metrics for AR/MR services”

[29] 3GPP TR 23.700-21: Study on Application architecture for enabling mobile metaverse applications.

[30] Open Geospatial Consortium: https://www.ogc.org/

[31] Open AR Cloud: <https://www.openarcloud.org/>

[32] 3GPP TR 22.856: "Feasibility Study on Localized Mobile Metaverse Services".

[x] <doctype> <#>[ ([up to and including]{yyyy[-mm]|V<a[.b[.c]]>}[onwards])]: "<Title>".

\* \* \* Next Change \* \* \*

## 5.1 3GPP

The Feasibility Study on Localized Mobile Metaverse Services (TR 22.856) [32] investigates specific use cases and service requirements for 5GS support of enhanced XR-based services as well as potentially other functionality, to offer shared and interactive user experience of local content and services, accessed either by users in the proximity or remotely. The technical report documents several use cases which require the handling of XR Spatial Descriptions, including: a localized mobile metaverse service enabler, a spatial anchor enabler, and a spatial mapping and localization service enabler.

3GPP has also conducted studies on support for XR services (TR 26.928) [2] in general and AR services (TR 26.998) [3] in particular with documented use cases where he knowledge of the real world is essential for the localization of the AR device and for a seamless insertion of virtual content into the user’s real environment. The potential work identified by TR 26.998 includes specifying support for AR relevant functionalities such split-rendering or spatial computing on top of a 5G System based on a generic architecture for real-time media delivery.

In Release 18, support for AR anchoring has been defined in TS 26.119 [25] and TS 26.143 [26] based on the MPEG\_anchor glTF extension. A visualization space format defining a volume free of obstacles to insert virtual content into the user’s environment is defined in TS 26.119 [25] and TS 26.264 [27]. Quality of Experience (QoE) metrics related to AR anchoring are defined in the TR 26.812 [28].

3GPP has also been working on a study on an application enablement architecture for mobile metaverse services. The technical report of this study, TR 23.700-21 [29], defines a spatial mapping service which includes procedures to produce, update, and delete spatial maps, to subscribe to event related to spatial maps, to get localization service, to register spatial map service provided by 3rd party application server, and to augment VAL UEs into spatial maps.

\* \* \* End of Changes \* \* \*