3GPP TSG SA WG 1 Meeting #106 S1-241249

Jeju, Korea, 27-31 May 2024 *(revision of S1-241236)*

*(Merge of S1-241081, S1-241179)*

**Title: [DRAFT] Reply LS on clarification on mobile metaverse services**

**Response to: LSs S3-241497 and** **S6-242734 to request clarification on mobile metaverse services from SA3**

**Release: Release 19**

**Work Item: FS\_Metaverse\_Sec, Metaverse**

**Source: SA1**

**To: SA3, SA6**

**Cc: SA2, SA4**

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**Attachments: -**

# 1 Overall description

SA1 thanks SA3 for their LS in S3-241497 to request clarification on mobile metaverse services.

Considering the related SA1 normative work on Mobile Metaverse Services (TS 22.156) following the feasibility study (TR 22.856 “Feasibility Study on Localized Mobile Metaverse Services”), SA1 would like to provide the following answers to the questions raised by SA3. SA1 has also considered the input from SA6 in S6-242734 as part of this reply.

***Question 1****:* *For the purpose of digital asset access and management, does each digital asset need a unique identifier?*

**Answer 1:** Yes, as specified in TS 22.156 a digital asset needs to be uniquely identified. The definition of *digital asset* is quoted below:

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| **digital asset**: digitally stored information that is uniquely identifiable and can be used to realize value according to their licensing conditions and applicable regulations. Examples of digital assets include digital representation (avatar), software licenses, gift certificates, tokens and files (e.g., music files) that have been purchased. This is not an exhaustive list of examples. |

***Question 2****:* *What is the definition of digital identifier and how that is related to the digital asset(s)?*

**Answer 2:** SA1 does not have a definition for digital identifier.

***Question 3****:* *Whether SA1 and/or SA6 is considering to use user identifier to identify a digital asset?*

**Answer 3:** SA1 has not discussed to use user identifier to identify a digital asset.

***Question 4****:* *If answer to above question is no, then which identifier is used to identify a digital asset and who has control over the namespace for the identifiers?*

**Answer 4:** As per Answer 1, SA1 assumes that each digital asset has its own identifier. How identifiers are managed is out of scope of SA1.

***Question 5****:* *Does the term “digital asset identifier” in the enclosed proposal define the identifier for digital asset?*

**Answer 5:** SA1 has not discussed whether “uniquely identifiable” refers to a single mobile metaverse service or globally. SA1 leaves it to stage 2/3 to decide.

***Question 6****:* *In digital asset definition in clause 3 of TS 22.156, it describes "Examples of digital assets include digital representation (avatar), software licenses, gift certificates, tokens and files (e.g., music files) that have been purchased". In the same clause and clause 5.2.3 (Digital asset management), it mentioned that EU digital identity wallet management is one example of digital asset management. In 4.2 of TR 23.700-21, it specially mentioned "digital assets with clear ownership rights", For example, a user designed and produced a digital human image which can be sold to others.*

*According to above information, can we understand there're four types of digital asset:*

*… …*

*If so, which type of the digital asset will be managed in 3GPP defined digital asset container? Which type of the digital asset will be used in 5G defined metaverse services and how will the digital asset be used??*

**Answer 6:** SA1 has not classified digital assets into types or groups. However, all these types of digital asset (mentioned in the question 6) have been considered in SA1 study. In particular, type a (National ID, passport etc.) and type b (credit card etc.) digital assets are mentioned as examples of “digital credentials” in the “digital wallet” definition in TS 22.156, although the term “digital credential” was not defined by SA1. The definition of *digital wallet* is quoted below:

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| **digital wallet**: one type of digital asset container, also known as e-wallet or mobile wallet. It is a software application that securely stores digital credentials typically part of personal data, such as payment information, loyalty cards, tickets, and other digital assets. It allows users to make electronic transactions, such as payments and transfers, conveniently and securely using their digital credentials.  NOTE 4: Digital wallets typically employ encryption and authentication mechanisms to protect the stored information and ensure the security of transactions. |

Subject to regulatory requirements and dependant on operators’ business models, all types of the digital asset can be considered to be managed in 3GPP defined digital asset container. However, there is no assumption by SA1 as whether a single “digital asset container” (e.g. provided by operators) can be used to store all types of digital assets, this is left to stage 2/3 to decide. The examples of how digital asset (including avatar) is used can be found in many use cases described in TR 22.856.

***Question 7****:* *How is a digital asset associated with a user (i.e. owner of the digital asset) or a 3GPP subscription?*

*a. Is it an 1:m, an n:1 or an n:m relation (and is this different for avatars)?*

*b. Are these relationships stable or can they change (can user release ownership / acquire ownership of digital assets / trade digital assets)?*

**Answer 7:** The relation between a digital asset and a user has been considered in SA1 (see [R-5.2.3-001], [R-5.2.3-002] and [R-5.2.3-006] of TS 22.156). The detailed solution is out of scope of SA1.

a. SA1 has defined requirements to associate a single digital asset with “one or more User Identities” (defined in TS 22.101), see [R-5.2.3-005] and [R-5.2.3-006] of TS 22.156. Note that a digital asset can be authorised to be used by multiple users.

b. SA1 has not discussed this.

The related requirements and the definition of *User Identity* are quoted below:

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| [R-5.2.3-001] Subject to operator policy, regulatory requirements and user consent, the 5G system shall be able to provide functionality to store digital assets associated with a user, and to remove such digital assets associated with a user.  [R-5.2.3-002] Subject to operator policy, regulatory requirements and user consent, the 5G system shall provide a means to allow a user to securely access and update their digital assets.  [R-5.2.3-005] The 5G system shall be able to associate a stored digital asset with one or more User Identities.  [R-5.2.3-006] Subject to operator policy, regulatory requirements and user consent, the 5G system shall support a mechanism for users to define conditions (e.g., based on user location information) to restrict the access to, and management of, stored digital assets associated with User Identity. |
| **User Identity:** information representing a user in a specific context. A user can have several user identities, e.g. a User Identity in the context of his profession, or a private User Identity for some aspects of private life. |

***Question 8****:* *What exactly is a digital asset, i.e. is it only data or does it encompass an execution environment to model interaction and render the digital asset?*

**Answer 8:** As in TS 22.156, digital asset is defined as digitally stored information. SA1 has not discussed the possibility to also encompass an execution environment to model interaction and render the digital asset. The definition of *digital asset* is as quoted in Answer 1.

***Question 9****:* *Where does the digital asset reside when not being actively used (operator controlled NF, external AF, and/or UE)?*

**Answer 9:** SA1 has specified the service requirements on digital asset management in TS 22.156 at “5G system” level (see e.g. [R-5.2.3-001] as quoted in Answer 7). The detailed solution is out of scope of SA1.

***Question 10****:* *Where does the digital asset reside when being actively used (same NF, AF, UE as when not being actively used, or moved to different entity for execution)?*

*a. Is a digital asset considered to be mobile, i.e. can it be moved between platforms while not being actively used and/or while being actively used??*

**Answer 10:** SA1 has discussed several use cases (as described in TR 22.856, e.g. clauses 5.3, 5.6, 5.7, 5.9, 5.10, 5.11, 5.12, 5.13, 5.14, 5.15, 5.16 , 5.17, 5.18, 5.19, 5.22, 5.24, 5.26, 5.28) on how a digital asset (e.g. an avatar) is managed and/or actively used. It is foreseen that digital assets can be transferred across different entities. The detailed solution is out of scope of SA1.

a. SA1 has not discussed such aspect.

***Question 11****:* *Can a digital asset/avatar be copied and does the copied digital asset retain the digital asset identifier after copying?*

**Answer 11:** SA1 has not discussed such aspects.

***Question 12****:* *Can a digital asset/avatar be modified and does the modified avatar retain the digital asset identifier after modification?*

*a. Who can modify an avatar (user/operator/ external entity) and how (modifying the data directly or calling APIs)?*

*b. Who can set/change the avatar identifier that is being displayed to the parties interacting with the avatar??*

**Answer 12:** A digital asset/avatar may be modified/updated. Whether the modified digital asset retains the digital asset identifier after modification has not been discussed in SA1.

a. SA1 has specified (in TS 22.156) the following requirement to allow a user to modify the digital asset/avatar:

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How to make such modification is left to stage 2/3 to decide.

b. The following requirement has been specified (in TS 22.156) for the 5G system to support mechanisms to uniquely identify an avatar.

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SA1 has not discussed if the avatar identifier can be changed.

***Question 13****:* *In case an avatar represents a user in communication, is it only one digital asset representing a user, or multiple (i.e. are skins / behaviours of an avatar part of one digital asset that that represents a user or are there several digital assets representing that user?)*

**Answer 13:** This is left to stage 2/3 to decide.

***Question 14****:* *In case an avatar represents a user in communication, do all digital assets reside on servers / devices under control of one entity, i.e. is there the necessity of interaction of different metaverse platforms?*

*a. Do all avatars reside on operator controlled servers, or can they also reside on UEs / external AFs?*

*b. Where are the avatars rendered?*

**Answer 14:** SA1 has not discussed in detail where digital assets reside.

a. SA1 has not discussed this.

b. The following service requirement has been specified at “5G system” level. The detailed solution is out of scope of SA1.

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***Question 15****:* *In case of XR, when several XR applications are running at the same time in the same location, are the digital artefacts of the applications expected to interact with each other?*

*a. When the applications are run by the same user*

*b. When the applications are run by different users?*

**Answer 15:** SA1 has not discussed such aspects.

***Question 16****:* *What could be other use cases of avatar besides non-IMS based Avatar communications?*

**Answer 16:** SA1 has discussed several use cases of avatar for both IMS based and non-IMS based avatar communications. Detailed description can be found in TR 22.856 (e.g. clauses 5.6, 5.7, 5.9, 5.10, 5.12, 5.15, 5.16, 5.17, 5.18, 5.22, 5.24, and Annex A) and in annex A of TS 22.156.

# 2 Actions

**To SA3 and SA6**

**ACTION:** SA1 kindly asks SA3 and SA6 to take into account of the above answers.

# 3 Dates of next TSG SA WG 1 meetings

SA1#107 19-23 Aug 2024 Maastricht, Netherlands

SA1#108 18-22 Nov 2024 Orlando, Florida, USA