**3GPP TSG-SA WG6 Meeting #60 draft S6-241458**

**Changsha, China 15th – 19th April 2024 (revision of S6-241048)**

**Source: China Mobile**

**Title: Pseudo-CR on key issue of support of virtual number**

**Spec: 3GPP TR 23.700-92 v0.4.0**

**Agenda item: 8.2**

**Document for: Approval**

**Contact: liuyueyjy@chinamobile.com**

**1. Introduction**

This pCR proposes text for key issue of support of virtual number. Virtual number is a widely used value added calling service which the real number of user is hid by the service provider to protect the privacy of user. The virtual number can be used by either the caller or the callee or both of them. This feature is different from the existing Terminating Identification Restriction (TIR) service specified in 3GPP TS 22.173. The virtual number looks like a real phone number rather than an anonymous number. A virtual number may either pre-configured to the caller or assigned to the caller dynamically on demand of a user and the there may be more than one virtual number for the same caller in different calls.

The network may assign a virtual number to the user on demand, and maintains the mapping between the user’s real number and the virtual number. A user may be assigned many different virtual number in the call with different parties. This is a service level feature that cannot be handled in IMS/5GC. Therefore, virtual number is a necessary value added service and needed to be supported by eMMTel Enabler layer.Study how to provide virtual number can be covered by the 4th objective of this study item.

**2. Reason for Change**

Contribution with new text.

**4. Proposal**

It is proposed to agree the following changes to 3GPP TR 23.700-92 v0.4.0.

\* \* \* First Change \* \* \* \*

## 6.X Key Issue #X: Support of virtual number

### 6.X.1 Description

Virtual number is a widely used value added calling service which the real number of user is hid by the service provider to protect the privacy of user. This virtual number is used by one or both parties in a call and is not used in multi-device scenario, i.e. used by the secondary devices, as specified in GSMA PRD NG.110 [X]. This feature is also different with the third-party identities in IMS sessions described in KI#4 in 3GPP TR 23.700-77 which allows the called party using a third-party specific identities in a IMS session.

This feature is different from the existing Terminating Identification Restriction (TIR) service specified in 3GPP TS 22.173. The virtual number looks like a real phone number rather than an anonymous number. A Virtual number may either pre-configured to the caller or assigned to the caller dynamically on demand of a user. There may be one or multiple virtual numbers for the same caller/callee in different calls or some caller may share a same virtual number. In addition, in some cases the callee can use the virtual number to call the caller back after their call is finished or to call the caller back when the call is not answered, but in some cases the virtual number cannot used to call back the caller. There are some examples of virtual number usage in different use cases listed below (This is not an exhaustive list and the arrows in the figures below points from the caller to the callee.):



Figure 6.x.1-1 AX mode of virtual number

a) AX mode of virtual number is shown in Figure 6.x.1-1. When a caller A1 wants to hide its real number in every call, A1 can request a virtual number from the MMTel service provider, i.e. MNO, in AX mode. The MMTel service provider will assign a virtual number, e.g. a MSISDN for this specific usage, to A1. This virtual number applies to A1 in every call until A1 cancels this service from MMTel service provider. If AX mode virtual number applies, the following characteristics apply to the call:

- outgoing calls: when A1 calls other users, other users, e.g. B1, B2 and B3, will see the caller number is x1 and number of A1 will be hid;

- incoming calls: when other users call the virtual number x1, the call will go to A1.



Figure 6.x.1-2 AXB mode of virtual number

b) AXB mode of virtual number is shown in Figure 6.x.1-2. In this mode, the virtual number applies to a specific caller-callee pair. If user A1 wants to hide its real number in the call with user B1only, A1 can request a virtual number x1 from the MMTel service provider, i.e. MNO, in AXB mode. If user A2 wants to hide its real number in the call with user B2only, A2 can also requests a virtual number x1 from the MMTel service provider, i.e. MNO, in AXB mode. The virtual number x1 can be re-used in different caller-callee pair and applies to all calls between this caller-callee pair until A1 or A2 cancels this service from MMTel service provider. If AXB mode virtual number applies, the following characteristics apply to the call:

- outgoing calls: when A1 calls B1, the callee B1 will see the caller number is x1 and number of A1 will be hid, when A1 calls other callees, the callees will see the real number of A1. Similarly, when A2 calls B21, the callee B2 will see the caller number is x1 and number of A2 will be hid, when A2 calls other callees, the callees will see the real number of A2.

- incoming calls: when B1 calls the virtual number x1, the call will go to A1. Similarly, when B2 calls the virtual number x1, the call will go to A2. If users other than B1 and B2 call the virtual number x1, the call cannot to to any user.

- When A1 wants to use virtual number in the call with different users, e.g. B1, B2 or B3, different virtual number x1, x2 and x3 are needed to be requested from the MMTel service provider.



Figure 6.x.1-3 XB mode of virtual number

c) XB mode of virtual number is shown in Figure 6.x.1-3. This mode may used by a group of users in a enterprise to reduce the cost of number. If a enterprise wants to hide the every single number in the enterprise and different members in the enterprise can share the same virtual number in different time, the enterprise can request a virtual number from the MMTel service provider, i.e. MNO, in XB mode. This virtual number applies to the group of users in the enterprise until the enterprise cancels this service from MMTel service provider. If XB mode virtual number applies, the following characteristics apply to the call:

- outgoing calls: XB mode can not apply.

- incoming calls: when other users call the virtual number x1, the call will go to A1, A2 or A3 respectively in different time.



Figure 6.x.1-4 AXE mode of virtual number

d) AXE mode of virtual number is shown in Figure 6.x.1-4. This mode may used by a group of users in a enterprise to reduce the cost of number and the call can reach every specific member in the enterprise. The enterprise can request a virtual number and a series of extension from the MMTel service provider, i.e. MNO, in AXE mode. This virtual number plus the extensions applies to the group of users in the enterprise until the enterprise cancels this service from MMTel service provider. If AXE mode virtual number applies, the following characteristics apply to the call:

- outgoing calls: AXE mode can not apply.

- incoming calls: when other users call the virtual number x1 plus extension 101, 102 or 103, the call will go to A1, A2 or A3 respectively.



Figure 6.x.1-5 AXYB mode of virtual number

e) AXYB mode of virtual number is shown in Figure 6.x.1-5. This mode is an enhancement of AX mode. When both caller A1 and callee B1 want to hide the real number in every call, A1 and B1 can request a virtual number x1 and y1 from the MMTel service provider respectively, i.e. MNO, in AXYB mode. In this mode, A1 and B1 do not know the real number of the other party. If AXYB mode virtual number applies, the following characteristics apply to the call:

- outgoing calls: when A1 wants to call B1 or B2, A1 should call the number y1 or y2 respectively. B1 and B2 will see the caller number is x1 and number of A1 will be hid;

- incoming calls: when B1 or B2 wants to call A1, B1 or B2 should call the number x1.A1 will see virtual number y1 or y2 respectively and number of B1 and B2 will be hid.

The user may request the network to assign virtual number(s), and the enterprise may request the network to assign a virtual number(s) for its employee(s). The virtual number(s) will be assigned in one or multiple modes listed above. The network may assign a virtual number to the user on demand, and maintains the mapping between the user’s real number and the virtual number according to the requested mode(s). Considering the high flexibility requirement of the virtual number assignment and maintaining, this feature is not suitable to be handled in IMS. Therefore, the virtual number is expected to have no impact on IMS.

Considering most use cases of eMMTel listed in 3GPP TR 22.873 [10], e.g. AR call used in emergency call, AR call used in remote cooperation, and AR call used in consumer-to-business call, are applied between end user and an application/enterprise, when enable eMMTel service to application providers/Vertical service provider, providing virtual number service for the end user is needed to be considered as a necessary value added service, i.e. virtual number is needed to be supported by eMMTel Enabler layer.

This key issue aims to study how to support the virtual number service in the eMMTel Enabler layer:

1. How to manage the virtual number in eMMTel Enabler layer, e.g. how to assign a virtual number(s) on demand of a user in one or multiple requested mode.

2. How to maintain the relationship between the virtual number and real number in the requested mode(s) and the related number translation procedures in the call.

Editor’s note 1: whether the capabilities provided by SA2, i.e. IMS capability exposure in the context of IMS data channel session, can support the virtual number studied by SA6 is FFS. Coordination with SA2 is needed.

Editor’s note 2 whether the virtual number related procedures have impact on the procedures in 5GC/IMS is FFS and coordination with SA2 is needed.

\* \* \* Next 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 TS 22.261: "Service requirements for the 5G system".

[3] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS)".

[4] OMA-AD-NGSI-V1\_0-20120529-A: "Next Generation Service Interfaces Architecture".

[5] OMA-TS-REST\_NetAPI\_ThirdPartyCall-V1\_0-20130212-C: "RESTful Network API for Third Party Call".

[6] OMA-TS-REST\_NetAPI\_CallNotification-V1\_0-20200226-C: "RESTful Network API for Call Notification".

[7] OMA-TS-REST\_NetAPI\_AudioCall-V1\_0-20200226-C: "RESTful Network API for Audio Call".

[8] 3GPP TS 23.198: "Open Service Access (OSA)".

[9] 3GPP TS 23.222: "Functional architecture and information flows to support Common API Framework for 3GPP Northbound APIs; Stage 2".

[10] 3GPP TR 22.873: "Study on evolution of the IP Multimedia Subsystem (IMS) multimedia telephony service".

[11] GSMA NG.129: "IMS Data Channel White Paper v0.1".

[12] GSMA TGY.02: "Business Voice Calling".

[13] 3GPP TR 23.700-87: "Study on system architecture enhancement for next generation real time communication".

[14] 3GPP TS 26.114: "IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction"

[15] GSMA NG.134: "IMS Data Channel, Version 1.0".

[16] GSMA TS.66: "IMS data channel API specification".

[x] GSMA NG.110: "Multi Device".

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