**3GPP TSG-WG SA2 Meeting #154-AH-E *S3-23000xx***

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**Title: KI #4, Conclusion Update**

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**Work Item / Release:** **FS\_EDGE\_Ph2 / Rel-18**

**Abstract:** *This contribution discusses additional two use cases in PIN architecture and updates the conclusion of the #4.*

# 1. Dicussion

In this paper, we consider the two additional use cases using PIN architecture and re-consider the current features introduced by the conclusion can satify the technical aspects needed for supporting two additional use cases.

**Use case 1. XR traffic support in PIN architecture**

In addition to the ongoing study for XRM in SA2, it is important to discuss a pratical use case where the XR device is connected with the smart phone (i.e. UE) via mobile hotsport e.g., non-3GPP technology supporting very high data rate such as WiFi 6.

To our understanding, the use case connecting the XR device via the smartphone matches the architecture for Person IoT Network (PIN) where the XR device is corredponding to the PIN Element (PINE) connected to the PIN and the smart phone is corresponding to the PIN Element with Gateway Capability (PEGC) as depected Figure 1.



Figure 1. A use case of XR device tethered via UE and their functional mapping to the PIN architecture

In order to support the XR traffic requiring high datarate and low latency to the XR device connected in the PIN, it is very important to enhance 5G System’s QoS architecture to support the XR traffic for PIN Element via PEGC. It is also important to consider the feature enhancements such as L4S support in PIN Gateway Capability for XR traffic, consideration of QoS characteristics of PIN (e.g. the datarate and delay) also applies to the PIN architecture.

With regards to the PIN session model discussed during the last SA2#153e meeting, it is agreed that one PIN is serviced by the one PDU Session, therefore, it is also beneficial to discuss how to support the differentiation of the PINE traffic using 5GS QoS Flow architecture.

***Technical issue 1. PINE traffic identification information***

* In order for PEGC to map the XR traffic from XR device (PINE), PEGC needs the traffic identification information of the XR device. **The existing traffic identification information within the QoS rule is 5 or 6 tuples for IPv4, IPv6 or IPv4v6 PDU Session Type may not identify a specific PINE traffic when NAT is applied in PEGC**. Because the QoS Rule is checked by the 3GPP modem after NAT is applied in PEGC at IP layer.

***Technical issue 2. L4S support for PIN***

* ECN marking for L4S is the capability of the gateway. Since PEGC has the gateway capability, the PEGC need to support L4S if is agreed to be supported considering PIN architecture. Since L4S is supported in 5GC per QoS Flow-based, based on the current conclusion of FS\_XRM KI#3, **PEGC supporting L4S capability also support its related operation should support the feature per QoS Flow-based**.

**Use case 2. Use of PIN-AMBR for mobile hotspot scenario**

With the agreed PIN architecture, we believe the mobile hotsport scenario can be supported with the PIN architecture. As currenct practices with various operators, the PDU Session supporting the mobile hotspot traffic can be dedicated or shared with other application in the UE. These two cases are already discussed as PIN Session model in described in the existing TR 23.700-88 Annex A (informative) PIN Session Models.

The subscribers (i.e. users) may complain to the operators the excessive use of the tethered traffic without paying attention to the status of mobile hotspot. For such case, the mobile operator may want to reduce the data rate only for the mobile hotsport.

For the Dedicated PIN Session Model, it is feasible for the operators can limit the data rate by the use of the PDU Session AMBR. However, for the Shared PIN Session Model, it may not feasible since the application in the UE and the PIN traffic share the same PDU Session.

**It is proposed to introduce the PIN-AMBR to limit the maximum transmission rate for PIN for the shared PIN Session Model**. Without this feature, the operators lose an option to use the Shared PIN Session Model for this use case.

For us, those two use cases are important, therefore, it should be decide whether those can be supported in terms of the current release of PIN. Based on the discussion, it can be updated and integrated with the conclusion of the PIN study. Otherwise, it can be documented that the tehnical features supporing the use cases is not supported in the later release.

In addition to the above discussion, one PDU Session should be served by one PDU Session as discussed in SA2#153e meeting. For this, it is proposed to remove the second editor’s note in the conclusion for KI#4.

# 2. Proposal

The following changes are proposed for TR 23.700-88 v1.2.0

\* \* \* \* 1st change \* \* \* \*

## 8.4 Conclusion on Key Issue #4

The normative work is based on the following principles

1) When the communication between a PEMC and a PINE behind a PEGC takes place via 5GC, or when the communication between PINEs requires multiple PEGCs and 5GC, the existing traffic forwarding functionalities in 5GS via UPF(s) or N6 can be applied if available.

2) PIN related Non-3GPP QoS assistance information (including QoS characteristics, PIN-AMBR for the Shared PIN Session Model, GFBR/MFBR UL/DL, MPLR UL/DL) may be sent to PEGC from SMF to assist the deriving of PIN related N3GPP QoS parameters for PIN.

a) Whether and how PEGC performs the deriving of QoS parameters and mapping procedure to be applied between the PINE and the PEGC is implementation specific and therefore it is not specified by 3GPP.

b) An indication for ECN marking supporting L4S in PEGC for the traffic associated with the QoS Flow supporting L4S.

3) Differentiated traffic routing and QoS control may be required by a PEGC.

a) The PINE traffic identification assistant information may be sent to PEGC from SMF to route the PIN traffic to the QoS Flow

b) L4S support in PEGC per QoS Flow-based with aligment to XRM KI#3 conclusion.

4) If AF for PIN is used, the AF can request the 5GC to exposes capabilities in order for the AF to provision parameters for resources configuration/deconfiguration for a PIN, QoS authorization for a PIN, QoS control for the PIN traffic, and routing control for the PIN traffic. The mechanism and criteria used by the AF to determine the need for a QoS modification for the PIN traffic are out of 3GPP scope.

5) PDU session management functionality can be used by the PEGC.

a) When the PEGC detects new packets (PIN signalling or PIN traffic or creation of PIN) from a device in the PIN, it may map the PIN or PIN packets to an existing PDU session or establish a new PDU session. The criteria for taking the decision can be based on existing mechanism or implementation.

NOTE 1: The procedure is the same used when application generating the traffic resides directly on the UE.

b) The PEGC initiates PDU Session Establishment/Modification Request with necessary information:

i) To enable 5GC to manage system resources related to a PIN, which includes one or more PEGCs.

ii) To differentiate QoS control on PIN traffic.

NOTE 2: The AF relies on PIN signalling between the PINE/PEGC/PEMC and the PIN AF, which is transferred via UP transparently to the 5G system, to determine the need for a QoS modification.

6) The procedure for supporting one PINE connected to multiple PEGCs in the same PIN and PINE to move between PEGCs is outside the 3GPP scope.

7) PIN direct communication is not specified since it is implementation specific.

8) PIN indirect communication via PEGC is managed within the PIN, which may be supported by 5GS.

9) A PEGC may establish a single or multiple PDU Sessions used for PIN communication. One PEGC may serve more than one PINs but one PIN is served by one PDU session. (See PIN Session models as described in Annex A).

10) IPv6 Prefix Delegation as described in clause 4.6.2.3 of TS 23.316 [5], or DHCP proxy by PEGC, or Framed Routing as described in clause 5.6.14 of TS 23.501 [2] are applied for IP address allocation of PINEs connected to PEGC.

NOTE 3: Framed Route support will be further considered during normative work.

11) If AF for PIN is used, the AF may provide necessary parameters to 5GC which may be considered by PCF to generate the PIN Route Selection Policy for PDU Session selection by PEGC(s) and to generate the URSP accordingly for PEMC(s).

12) Routing of traffic from/to PDU session and the PIN elements is left to implementation

13) PIN is a service that needs user subscribing from operator, the user's PIN service subscription is used by operator for policy configuration to PEGCs/PEMCs.

Editor's note: It is FFS whether PEMC UE needs a specific 5G subscription for providing PIN service.

14) UDR is enhanced to support the storage and retrieval of PIN related policy and QoS parameters.

15) The N3GPP network delay between PINE and PEGC may be signalled from PEGC to PCF, and be taken into account when PCF derives the PDB value of QoS flow for PEGC.

16) The 5G system support for anchoring PDU Sessions of PEGCs and PEMCs at same SMF based on a combination of DNN, S-NSSAI.

NOTE 4: Other possibility without anchoring at same SMF may be determined in normative phase.

17) If AF for PIN is used, the 5GC authorizes the number of PIN that the AF requests to create, which results in the number of PDU Sessions per PEGC/PEMC for PIN, according to user's PIN service subscription, which reflect the agreement between user and operator for using PIN service.

\* \* \* \* End of changes \* \* \* \*