**3GPP TSG-SA5 Meeting #142-e *S5-22xxxx***

**e-meeting, 4th -12th April 2022**

**Source: Huawei**

**Title: Discussion Paper for CHROAM**

**Document for: Discussion**

**Agenda Item:**

# 1 Decision/action requested

***This DP discusses the key issues for the local breakout roaming scenarios charging.***

# 2 References

[1] 3GPP TS 23.501 System architecture for the 5G System (5GS)

[2] 3GPP TS 32.255 5G data connectivity domain charging; Stage 2

# 3 Rationale

## 3.1 Background

5G System roaming architecture in the case of local break out scenario using the reference point representation.



Figure 1: Roaming 5G System architecture - local breakout scenario in reference point representation

Based on the conclusion of the TR 28.827, the local breakout roaming charging architecture is present as the following:



Figure 2: LBO Roaming 5G System charging architecture

## 3.2 Technical Justification

#### 3.2.1 Key Issue 1: Roaming Charging Profile

The following questions are discussed for the key issue1:

- Question #1.1: What is the purpose of Roaming charging profile.

- Question #1.2: Whether the Roaming charging profile is required for LBO

- Question #1.3: How to use the Roaming charging profile for LBO.

- Question #1.4: The Roaming charging profile can be changed during the PDU session or not.

As per the TS 32.255, for home routed roaming,

*when QoS flow Based Charging is used in a context of roaming, a "Roaming Charging Profile" is defined to allow, when shared, QBC synchronized between both PLMNs and includes:*

*- The set of chargeable events as per Table 5.2.1.6.1 and associated category.*

*- The set of thresholds for chargeable events based on trigger thresholds.*

*- An indication on whether the "Default partial record" or the "Individual partial record" mechanism per clause 5.2.3, is used by CHF.*

*…*

The roaming charging profile is not used for information by the SMF and CHF, which will be used for setting triggers and thresholds in SMF and deciding the CDR generation (Individual Partial or Default Partial) used by CHF.

For Question #1.1: the purpose of roaming charging profile:

- Trigger setting: Set of the chargable events for QBC and indication about partial CDR.

- Negotiation: QBC synchronized between both PLMNs.

Whether the roaming charging profile is used for negotiation or not is mainly depended on the reconciliation and conflict resolution is required by HPLMN and VPLMN.

For Question #1.2 and #1.3:

- If the negotiation is required for local breakout roaming, the "Roaming Charging Profile" should be used to synchronize the charging information reporting between both PLMNs. In the message flows, during PDU session establishment, VCHF sets the triggers by "Roaming Charging Profile" on V-SMF for trigger setting, the V-SMF transfers the "Roaming Charging Profile" to H-CHF for negotiation, H-CHF sents the "Roaming Charging Profile" for negotiation and seeting to S-SMF the V-SMF sents the "Roaming Charging Profile" to V-CHF (information if the partial CDR is not need to cover in the "Roaming Charging Profile")

- If the netogitation is not required and the chargeable enent of QBC setting is used by CHF for local breakout roaming, the the "Roaming Charging Profile" should be used to set the chargeable events, associated category and threshold for QBC. In that way, V-CHF and H-CHF can set their own triggers by "Roaming Charging Profile".

- If the netogitation is not required and the chargeable enent of QBC setting is local configured for local breakout roaming, the the "Roaming Charging Profile" is not used for the local breaktou roaming.

For Question 1.4# The Change of roaming charging profile:

As per the TS 32.255, clause 5.2.1.7 Roaming QoS flow Based charging (QBC)

*The "Roaming Charging Profile" resulting from the exchange between the VPLMN and HPLMN at PDU session establishment shall remain unchanged during the PDU session lifetime, unless there is a V-SMF change.*

*At each V-SMF change in Home routed scenario, the "Roaming Charging Profile" may be renegotiated between the VPLMN and HPLMN and shall remain unchanged during the PDU session lifetime with the actual V-SMF.*

*…….*

Normamly, The "Roaming Charging Profile" shall remian unchange during the PDU session lifetime,

As per the TS 32.255, Table 5.2.1.6.1: Default Chargeable events in SMF for QBC, the capability for CHF to enable/disable and change the category of the triggers for QBC,

As per the TS 32.255, clause 5.2.1.7 Roaming QoS flow Based charging (QBC)

*The capability specified in clause 5.2.1.2.1 for the CHF to be able to update the triggers after the PDU session is established for a given VPLMN shall not be applicable for Roaming QBC.*

**Questions for clarification:**

- The capability of CHF to change the QBC only can be done by "Roaming Charging Profile" of the H-PLMN?

- Should the "Roaming Charging Profile" from HPLMN be transferred to the VPLMN via V-SMF for negotiation?

**Suggestion:**

- The usage of the "Roaming Charging Profile" is depended on whether the negotiation and synchronization is required.

- If "Roaming Charging Profile" is not provided, the setting of the triggers fro QBC can be extended to the Multiple QFI container in the charging data response message from CHF, not only in the "Roaming Charging Profile".

#### 3.2.2 Key Issue 2: Charging Granularity (QBC and FBC)

The following questions are discussed for the key issue 2:

- Question 2.1: For Local breakout, whether both FBC and QBC are used in the HPLMN

- Question 2.2: For Local breakout, whether both FBC and QBC are used in the VPLMN.

As per the TS 32.255, For the home routed roaming case,

*A Roaming QBC CHF CDR is used to collect charging information related to Roaming QBC in V-SMF, and the PDU session charging CHF CDR is used to collect charging information related to Roaming QBC in H-SMF.*

*…*

*Based on roaming agreements between the V-PLMN and the H-PLMN, in Home Routed scenario, for each UE roaming in VPLMN:*

*- The SMF in VPLMN (V-SMF) shall be able to collect charging information per QoS Flow within a PDU session when UE is determined as an in-bound roamer, for CDR generation in VPLMN.*

*- The SMF in HPLMN (H-SMF) shall be able to collect charging information per QoS Flow within a PDU session when UE is determined as an out-bound roamer, for CDR generation in HPLMN.*

*- Optionally, the "Roaming Charging Profile" negotiated between the VPLMN and the HPLMN.*

For home routed roaming scenario, the QBC are used for the VPLMN and the both FBC and QBC are user for HPLMN.

For Local breakout scenario, the credit control and account management are hanlded by H-PLMN.

For Question #2.1, QBC is used for VPLMN.

For Question #2.2, FBC is used for HPLMN, how about the QBC? If the "Roaming Charging Profile" is used for negotiation and synchronization in the key issue1, the QBC is also required for HPLMN.

#### 3.2.3 Key Issue 3: Charging Method (with quota and without quota)

The following questions are discussed for the key issue 3:

- Question 3.1: For Local breakout, whether both with quota and without quota management are used in the HPLMN

- Question 3.2: For Local breakout, whether both with quota and without quota management are used in the VPLMN

As per TS 32.254, the AMF supports the both with quota and without management for HPLMN, only support the without quota management for VPLMN.

*In roaming, for registration management charging, the AMF in VPLMN:*

*- may support PEC, IEC or ECUR scenario with H-CHF in HPLMN;*

*- shall support PEC scenario with V-CHF in VPLMN.*

For Local breakout, the credit control and account management are hanlded by H-PLMN.

If the Roaming Charging Profile is required and active for both H-PLMN and V-PLMN (Key issue 1), in that way, the

- For Question #3.1, both with quota and without quota management are used in the HPLMN

- For Question #3.2, Only without quota management are used in the VPLMN

# 4 Detailed Proposal

Take the above clarification into account for CHROM about TS 32.255 CRs.