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

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

**Source: Huawei**

**Title: Discussion Paper for evaluation of charging aspects for LBO**

**Document for: Discussion**

**Agenda Item:**

# 1 Decision/action requested

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

# 2 References

[1] 3GPP TR 28.827 Study on 5G charging for additional roaming scenarios and actors

[2] 3GPP TS 23.503 Policy and charging control framework for the 5G System (5GS); Stage 2

[3] 3GPP TS 32.291 Charging management; 5G system, charging service

[4] Discussion paper on scenarios for interaction with two CHFs

[5] Discussion paper on function for interaction with two CHFs

[6] Discussion paper on error handling for interaction with two CHFs

[7] Discussion Paper for CHROAM

# 3 Rationale

## 3.1 Background

Based on the conlusion of the TR 28.827[1], the LBO Roaming scenario charging architecture is present as the following:



Figure 1: LBO Roaming 5G System charging architecture

Based on the discussion in the 1st rapportuer call (Feb 16th), the discussion paper [4], [5], [6], [7] describes the different solutions for the Local breakout roaming scenario charging, including the trigger mechanism, charging information report and quota management (with or without).

## 3.2 Evaluation

### 3.2.1 Charging resource and Charging Operation

#### 3.2.1.1 Charging Resource

According to the TS 32.291[3], the charging resource is created by CHF and used by the SMF. In the local breakout roaming scenario, the H-CHF and V-CHF can create its own charging data resource, and V-SMF shall use the respective charging data resources for the subsequest interaction with the H-CHF and V-CHF.

*Charging Data Ref is a unique identifier for a charging data resource in a PLMN. It’s created in CHF when CHF receives a Nchf\_ ConvergedCharging\_Create request and provided to NF (CTF) in the Location header field in the Nchf\_ ConvergedCharging\_Create response. The NF (CTF) shall use the Charging Data Ref received in subsequent requests to the CHF for the same charging data resource. (From TS 32.291 Clause 6.1.3.1).*

#### 3.2.1.2 Charging Operation

Acording to the discussion papers [4], [5], [6], [7], there are 2 solutions for local breakout roaming charging, based on whether the charging operation is different or not.

* **Option 1**: the SMF in the VPLMN (V-SMF) performs the different operation (including the trigger, quota management and charging information reporting) for CHF in the VPLMN (V-CHF) and CHF in the HPLMN (H-CHF).
* **Option 2:** the SMF in the VPLMN performs the same operation (including the trigger, quota management and charging information reporting) for the CHF in the VPLMN and CHF in the HPLMN.

##### 3.2.1.2.1 Current capability

The following table 3.2.1.2-1 describers the current capabilities of H-CHF and V-CHF from three aspects of options.

Table 3.2.1.2-1: Current capability for H-CHF and V-CHF

| Key issues | V-CHF | H-CHF |
| --- | --- | --- |
| Quota management | Without quota management  (No roaming user’s account balance) | With and without quota management |
| Charging information reporting | QBC  FBC (If the RG is preconfigurated in the VPLMN) | QBC  FBC (If the RG is preconfigurated in the VPLMN) |
| Trigger setting | Yes | Yes |

##### 3.2.1.2.2 Requirement aspect

Combinding the option 1 with option 2, the following items from charging aspect and SMF aspect should be discussed:

* From the charging aspect:
  + The charging information requirement: V-CHF should get the charging information to support the reconciliation and settelement with H-CHF, H-CHF should get the charging information to charge the End user and may additional charging information to support the reconciliation and settlement. From the standpoint of the reconciliation and settlement, the charging information in V-CHF and H-CHF should be consistent.
  + Quota management: There is NO requirement for the V-CHF to credit control (with quota management). If both the V-CHF and H-CHF have the funcationaly about credit control, the coordination between the two control points (V-CHF and H-CHF) is complex.

For example, if the V-CHF grants quota about 5 M and the H-CHF grants 10 M, How to report when the granted 5 M from V-CHF is used up or the granted10 M from H-CHF is used up.

If the H-CHF can override the quota grant from V-CHF, when the quota 10 M is used up and reported, the usage reporting is greater than the quota granted from V-CHF. The credit control processing of V-CHF is incorrect.

* From the SMF aspect: the V-SMF can support the different charging data resource to V-CHF and H-CHF, which similar with the AMF LBO charging. The internal logic of V-SMF may be same or different logic, which depend on the implement.

##### 3.2.1.2.3 Reconciliation for LBO

From the perspective of conflict resolution, the following items should be taken into account for whether the charging information is consistent.

* If the reconcilation is required, according to the GSMA BCE procedure, the charging information reported by the VPLMN and HPLMN must be consistent
* If the reconciliation is NOT required, the charging information does not need to be consistent.

Whether the reconciliation is required or not is the open issue and FFS. In order to simplify the standard work, the reconciliation can be not considerd in release 17.

#### 3.2.1.3 Summary

Based on the analysis of the above key issues, the.

* Quota management: H-CHF can support with and without quota management, V-CHF only support without quota management.
* Charging information reporting and trigger:
  + If the reconciliation should be supported, the charging information reporting and trigger should be consistent. The H-CHF should support the FBC
  + If the reconciliation should NOT be supported, the charging information reporting and trigger may be consistent or inconsistent.

### 3.2.2 Suggestion on the Technical issues for local breakout roaming

Based on the above analysis, thhe following suggestion is present.

Table 3.2.2-1: Suggestion on Technical issues

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Issues** | **V-SMF for V-CHF** | **V-SMF for H-CHF** |
| Roaming Charging profile | The negotiation is required | * The "Roaming Charging Profile" should be used to synchronize the charging information reporting for V-CHF and H-CHF (synchronize the charging information reporting between different charging data resource). * QBC Trigger setting within charging data resource. | |
| The negotiation is not required | The "Roaming Charging Profile" should be used for QBC Trigger setting within charging data resource. | |
| Charging Granularity | The interaction with V-CHF and H-CHF | QBC or FBC | FBC or (FBC+QBC) |
| Charging Method | Credit control | Without quota management | with and without quota management |

# 4 Detailed Proposal

The detailed proposal is present in the CRs.