**3GPP TSG-SA5 Meeting #143-e *S5-223113***

e-meeting, 9 - 17 May 2022

**Source: Ericsson**

**Title: Updating solution 2.1 with SMSF and AMF**

**Document for: Approval**

**Agenda Item: 7.5.3**

# 1 Decision/action requested

**Include the proposed changes in TR 28.827.**

# 2 References

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

# 3 Rationale

Solution 2.1. can also cover the case where the CTF is in the AMF and SMSF, the solution 2.3 is therefore combined with 2.1.

Used Session Based Charging (SBC) to cover both SCUR and ECUR, since the flows for these are the same except that the cannot be an update for ECUR.

# 4 Detailed proposal

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| **First change** |

##### 7.2.1.1.3 Use case #2c: Home MNO charging subscriber for SMS provided at roaming

This use case focuses on visited MNO and home MNO business roles.

The visited MNO to home MNO charging is based on number of SMS sent or received by the home MNO UEs served by the visited MNO’s network considering of the following aspects:

- RAT type;

- Location

Number of SMS sent or received under the above aspects needs to be reconciliated between home MNO and visited MNO.

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| **Second change** |

#### 7.2.4.1 Solution #2.1: V-CHF communicating with H-CHF for retail charging of 5G

##### 7.2.4.1.1 General

A possible solution for key issues #2a, #2b, #2f, #2g, #2h and #2i retail charging for 5G data connectivity, 5G connection and mobility, and SMS usage provided to the home MNO’s users by the visited MNO, in the case of local breakout.

##### 7.2.4.1.2 Reference architecture



Figure 7.2.4.1.2-1: Roaming 5G scenario in service-based interface representation

The visited CHF does converged charging for interconnect (wholesale), while the home CHF does converged charging for the subscriber (retail).



Figure 7.2.4.1.2-2: Roaming 5G scenario in reference point representation

##### 7.2.4.1.3 Message flows

Figure 7.2.4.1.3-1 shows a scenario for Session Based Charging (SBC) with CHF to CHF communication. Applicable for SMF, without update also applicable for SMSF and AMF.



Figure 7.2.4.1.3-1: SBC - Session based charging with CHF to CHF communication

**1) Request for service delivery:** A request for session establishment is received in the NF (CTF). The service is configured to be authorized by the vCHF before start.

**2) Units determination:** the NF (CTF) determines the number of units depending on the service requested by the UE in "Decentralized Units determination" scenario.

**3) Charging data request [Initial, Quota requested]:** The NF (CTF) sends the request to the vCHF for the service to be granted authorization to start, and to reserve the number of units if determined in item 2.

**4) Determine hCHF:** the vCHF determines that it need to interact with hCHF and which hCHF it should contact.

**5) Charging home request [Initial, Quota requested]:** The vCHF sends the request to the hCHF for the service to be granted authorization to start, and to reserve the number of units if determined in item 2.

**6) Account, Rating, Reservation control:** the hCHF rates the requests either based on the number of units requested or on internal unit determination, checks if corresponding funds can be reserved on the user's account balance. If the account has sufficient funds, the hCHF performs the corresponding reservations.

**7) Open CDR:** based on policies, the hCHF opens a CDR related to the service.

**8) Charging home response [Initial, Quota granted]:** The hCHF grants authorization to vCHF for the service to start, with the reserved number of units.

**9) Open CDR:** based on policies, the vCHF opens a CDR related to the service.

**10) Charging data response [Initial, Quota granted]:** The vCHF grants authorization to NF (CTF) for the service to start, with the reserved number of units.

**11) Granted units supervision:** the NF (CTF) monitors the consumption of the granted units.

**12) Start of service delivery:** the NF (CTF) starts to deliver the content/service based on the reserved number of units.

**13) Quota management trigger:** A trigger associated to quota management is met. Unit determination is performed when applicable.

**14) Charging data request [Update, Unit used, Quota requested]:** the NF (CTF) sends the request to the vCHF, for more units to be granted for the service to continue and reporting the used units.

**15) Charging home request [Update, Unit used, Quota requested]:** the vCHF sends the request to the hCHF, for more units to be granted for the service to continue and reporting the used units.

**16) Account, Rating, Reservation control:** The hCHF performs the process related to the reported usage and the requested reservation, involving rating entity and user's account balance.

**17) Update CDR:** based on policies, the hCHF updates the CDR with charging data related to the service.

**18) Charging home response [Update, Quota granted]:** The hCHF grants quota to vCHF for the service to continue, with the reserved number of units.

**19) Update CDR:** based on policies, the vCHF updates the CDR with charging data related to the service.

**20) Charging data response [Update, Quota granted]:** The vCHF grants quota to NF (CTF) for the service to continue, with the reserved number of units.

**21) Granted units supervision:** the NF (CTF) monitors the consumption of the granted units.

**22) Service delivery ongoing:** the NF (CTF) continues the service delivery based on the granted quota.

**23) Service released:** the service is terminated or released.

**24) Charging data request [Termination,** **Unit used]:** the NF (CTF) sends the request to the vCHF, for charging data related to the service termination with the final consumed units.

**25) Charging home request [Termination,** **Unit used]:** the vCHF sends the request to the hCHF, for charging data related to the service termination with the final consumed units.

**26) Account, Rating control:** The hCHF performs the service termination process involving rating entity and user's account balance.

**27) Close CDR:** based on policies, the hCHF closes the CDR with charging data related to the service termination and the last reported units.

**28) Charging home response [Termination]:** The hCHF informs the vCHF on the result of the request.

**29) Close CDR:** based on policies, the vCHF closes the CDR with charging data related to the service termination and the last reported units.

**30) Charging data response [Termination]:** The vCHF informs the NF (CTF) on the result of the request.

Figure 7.2.4.1.3-2 shows a scenario for Immediate Event Charging (IEC) with CHF to CHF communication. Applicable for SMSF and AMF.



Figure 7.2.4.1.3-2: IEC - Immediate event charging with CHF to CHF communication

**1) Request for content/service delivery:** A request for session establishment is received in the NF (CTF). The service is configured to be authorized by the vCHF before start.

**2) Units determination:** the NF (CTF) determines the number of units depending on the service requested by the UE in "Decentralized Units determination" scenario.

**3) Charging data request [Event, Units]:** The NF (CTF) sends the request to the vCHF for the service to be granted authorization to start, and to allow the number of units if determined in item 2.

**4) Determine hCHF:** the vCHF determines that it need to interact with hCHF and which hCHF it should contact.

**5) Charging home request [Event, Units]:** The vCHF sends the request to the hCHF for the service to be granted authorization to start, and to allow the number of units if determined in item 2.

**6) Account, Rating control:** the hCHF rates the requests and checks if corresponding funds are available on the user's account balance. If the account has sufficient funds, the hCHF performs the corresponding reservations.

**7) Create CDR:** based on policies, the hCHF creates a CDR related to the service.

**8) Charging home response [Event, Units]:** The hCHF grants authorization to vCHF for the service to start, with the allowed number of units.

**9) Create CDR:** based on policies, the vCHF creates a CDR related to the service.

**10) Charging data response [Event, Units]:** The vCHF grants authorization to NF (CTF) for the service to start, with the allowed number of units.

**11) Granted units supervision:** the NF (CTF) monitors the consumption of the allowed units.

**12) Content/service delivery:** the NF (CTF) starts to deliver the content/service based on the allowed number of units.

Figure 7.2.4.1.3-3 shows a scenario for Post Event Charging (PEC) with CHF to CHF communication. Applicable for SMSF and AMF.



Figure 7.2.4.1.3-3: PEC - Post event charging with CHF to CHF communication

**1) Request for content/service delivery:** A request for session establishment is received in the NF (CTF). The service is configured not to be authorized by CHF before start.

**2) Content/service delivery:** the NF (CTF) starts to deliver the content/service.

**3) Charging data request [Event, Units]:** The NF (CTF) sends the request to the vCHF with the units used for recording, and possibly accounting and rating control.

**4) Determine hCHF:** the vCHF determines that it need to interact with hCHF and which hCHF it should contact.

**5) Charging home request [Event, Units]:** The vCHF sends the request to the hCHF with the units used for recording, and possibly accounting and rating control..

**6) Account, Rating control:** the hCHF may rate the request based on the number of units used and update the user's account balance.

**7) Create CDR:** based on policies, the hCHF creates a CDR related to the service.

**8) Charging home response [Event]:** The hCHF informs vCHF on the result of the request.

**9) Create CDR:** based on policies, the vCHF creates a CDR related to the service.

**10) Charging data response [Event]:** The vCHF informs NF (CTF) on the result of the request.

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| **Third change** |

#### 7.2.4.3 Solution #2.3: V-CHF communicating with H-CHF for SMS charging reconciliation between MNOs

Covered by clause 7.2.4.1.

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| **End of changes** |