**3GPP TSG-SA5 Meeting #146Bis-e *S5-231127***

Electronic meeting, 16 - 19 January 2023

**Source: Ericsson**

**Title: Adding solution in clause 7.2 dual CHF interaction**

**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

Adding a solution on V-CHF communicating with H-CHF for retail charging of 5G using dual session to V-CHF in clause 7.2 for key issues #2a, #2b, #2f, #2g, #2h and #2i covering requirements REQ-CH\_CVTOH-01, REQ-CH\_CVTOH-02, REQ-CH\_CVTOH-03, REQ-CH\_CVTOH-04, REQ-CH\_CVTOH-05, and REQ-CH\_CVTOH-06.

# 4 Detailed proposal

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| **First change** |

#### 7.2.4.x Solution #2.x: V-CHF communicating with H-CHF for retail charging of 5G, dual session to V-CHF

##### 7.2.4.x.1 General

A possible solution for key issues #2a, #2b, #2f, #2g, #2h and #2i covering requirements REQ-CH\_CVTOH-01, REQ-CH\_CVTOH-02, REQ-CH\_CVTOH-03, REQ-CH\_CVTOH-04, REQ-CH\_CVTOH-05, and REQ-CH\_CVTOH-06, retail charging for 5G data connectivity provided, 5G connection and mobility, and SMS usage to the home MNO’s users by the visited MNO, in the case of local breakout.

There is dual charging session between NF (e.g., V-SMF) and V-CHF. For the NF communicating with the H-CHF, the NF is responsible for generating the charging information to H-CHF and V-CHF.

There is a one to two relationship between the PDU session and the charging session towards the V-CHF, since one PDU session results intwo charging sessions towards the V-CHF.

##### 7.2.4.x.2 Reference architecture

The reference architecture would be the same as in solution #2.1 clause 7.2.4.1.

##### 7.2.4.x.3 Message flows

Figure 7.2.4.x.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. During the PDU session establishment, NF (e.g., V-SMF) establishes dual charging sessions for reporting charging information to V-CHF and H-CHF.



Figure 7.2.4.x.3-1: SBC - Session based charging with CHF-to-CHF communication

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

**2) Charging data request [Initial]:** NF (CTF) sends an initial charging data request to V-CHF for the service to be granted authorization to start.

**3) Open CDR:** based on policies, V-CHF opens a CDR related to the service.

**4) Charging data response [Initial]:** V-CHF grants authorization to NF (CTF) for the service to start.

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

**6) Charging data request [Initial, Quota requested]:** NF (CTF) sends an initial charging data request to V-CHF for the service to be granted authorization to start, and to reserve the number of units if determined in step 5.

**7) Determine H-CHF:** V-CHF determines that it need to interact with H-CHF and which H-CHF it should contact and generates an initial charging home request to H-CHF.

**8) Charging home request [Initial, Quota requested]:** V-CHF sends the request to H-CHF for the service to be granted authorization to start, and to reserve the number of units if determined in step 5.

**9) Account, Rating, Reservation control:** H-CHF rates the charging home 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, H-CHF performs the corresponding reservations.

**10) Open CDR:** based on policies, H-CHF opens a CDR related to the service.

**11) Charging home response [Initial, Quota granted]:** H-CHF grants authorization to V-CHF for the service to start, with the reserved number of units.

**12) Charging data response [Initial, Quota granted]:** V-CHF forwards the granting of quota to NF (CTF) for the service to continue, with the reserved number of units.

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

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

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

**16) Charging data request [Update, Unit used]:** NF (CTF) sends an intermediate charging data request to the V-CHF, if the quota management trigger is also applicable for the reporting to V-CHF, reporting the used units.

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

**18) Charging data response [Update]:** V-CHF informs NF (CTF) of the result of the request.

**19) Charging data request [Update, Unit used, Quota requested]:** NF (CTF) sends an intermediate charging data request to the V-CHF, for more units to be granted for the service to continue and reporting the used units.

**20) Charging home request [Update, Unit used, Quota requested]:** V-CHF forwards an intermediate charging home request to H-CHF, for more units to be granted for the service to continue and reporting the used units.

**21) Account, Rating, Reservation control:** H-CHF performs the process related to the reported usage and the requested reservation, involving rating entity and user's account balance.

**22) Update CDR:** based on policies, H-CHF updates the CDR with charging data related to the service.

**23) Charging home response [Update, Quota granted]:** H-CHF grants quota to V-CHF for the service to continue, with the reserved number of units.

**24) Charging data response [Update, Quota granted]:** V-CHF forwards the granting of quota to NF (CTF) for the service to continue, with the reserved number of units.

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

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

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

**28) Charging data request [Termination,** **Unit used]:** NF (CTF) sends a terminate charging data request to the V-CHF, for charging data related to the service termination with the final used units.

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

**30) Charging data response [Termination]:** The V-CHF informs the NF (CTF) on the result of the terminate charging data request.

**31) Charging data request [Termination,** **Unit used]:** NF (CTF) sends a terminate charging data request to the V-CHF, for charging data related to the service termination with the final used units.

**32) Charging home request [Termination,** **Unit used]:** V-CHF forwards a terminate charging home request to the H-CHF, for charging data related to the service termination with the final consumed units.

**33) Account, Rating control:** The H-CHF performs the service termination process involving rating entity and user's account balance.

**34) Close CDR:** based on policies, the H-CHF closes the CDR with charging data related to the service termination and the last reported units.

**35) Charging home response [Termination]:** The H-CHF informs the V-CHF on the result of the terminate charging home request.

**36) Charging data response [Termination]:** The V-CHF forwards the information to the NF (CTF) on the result of the terminate charging data request.

Figure 7.2.4.x.3-2 shows a scenario for Immediate Event Charging (IEC) with CHF-to-CHF communication. Applicable for SMSF and AMF.



Figure 7.2.4.x.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 NF (CTF). The service is configured to be authorized by V-CHF before start.

**2) Charging data request [Event, Units]:** NF (CTF) sends the request to V-CHF for the service to be granted authorization to start.

**3) Create CDR:** based on policies, V-CHF creates a CDR related to the service.

**4) Charging data response [Event]:** The V-CHF grants authorization to NF (CTF) for the service to start.

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

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

**7) Determine H-CHF:** V-CHF determines that it need to interact with H-CHF and which H-CHF it should contact and generates a charging home request to H-CHF.

**8) Charging home request [Event, Units]:** V-CHF forwards the request to H-CHF for the service to be granted authorization to start, and to allow the number of units if determined in step 7.

**9) Account, Rating control:** H-CHF rates the charging home requests and checks if corresponding funds are available on the user's account balance. If the account has sufficient funds, H-CHF performs the corresponding reservations.

**10) Create CDR:** based on policies, H-CHF creates a CDR related to the service.

**11) Charging home response [Event, Units]:** H-CHF grants authorization to V-CHF for the service to start, with the allowed number of units.

**12) Charging data response [Event, Units]:** V-CHF forwards the granting of authorization to NF (CTF) for the service to start, with the allowed number of units.

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

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

Figure 7.2.4.x.3-3 shows a scenario for Post Event Charging (PEC) with CHF to CHF communication. Applicable for SMSF and AMF.



Figure 7.2.4.x.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 NF (CTF). The service is configured not to be authorized by CHF before start.

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

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

**4) Create CDR:** based on policies, V-CHF creates a CDR related to the service.

**5) Charging data response [Event]:** V-CHF informs NF (CTF) on the result of the charging data request.

**6) Charging data request [Event, Units]:** NF (CTF) sends a charging data request to V-CHF with the units used for recording, and possibly accounting and rating control.

**7) Determine H-CHF:** V-CHF determines that it need to interact with H-CHF and which H-CHF it should contact and generates a charging home request to H-CHF.

**8) Charging home request [Event, Units]:** V-CHF forwards the request to H-CHF with the units used for recording, and possibly accounting and rating control.

**9) Account, Rating control:** H-CHF may rate the charging home request based on the number of units used and update the user's account balance.

**10) Create CDR:** based on policies, H-CHF creates a CDR related to the service.

**11) Charging home response [Event]:** H-CHF informs V-CHF on the result of the charging home request.

**12) Charging data response [Event]:** V-CHF forwards the information to NF (CTF) on the result of the charging data request.

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| **End of changes** |