**3GPP TSG-SA5 Meeting #141-e *S5-221671***

**e-meeting, 17 -26 January 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **32.240** | **CR** | **0439** | **rev** |  | **Current version:** | **17.4.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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|  | | | | | | | | | | |
| ***Title:*** | Charging architecture for additional roaming scenarios and actors | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Vodafone | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | | 2022-01-17 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Addition of charging principles for Edge Computing in Local Breakout and MVNO charging | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Addition of new reference point between vSMF and hCHF  Addition of charging principles for local breakout scenario  Addition of charging principles wih MVNO involved  Referencing Edge Computing charging principles | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Charging for LBO services is incomplete | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.3, 4.4.3, 5.5.3, 6 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 32.255,32.290,32.291 | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

***First change***

## 3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

3G 3rd Generation

3GPP 3rd Generation Partnership Project

5GC 5G Core Network

5GS 5G System

5G DDNMF 5G Direct Discovery Name Management Function

ABMF Account Balance Management Function

AF Application Function

AMF Access and Mobility Management Function

AoC Advice of Charge

API Application Program Interfaces

APN Access Point Name

AS Application Server

BD Billing Domain

BGCF Breakout Gateway Control Function

BS Bearer Services

BSC Base Station Controller

BSS Base Station Subsystem

BTS Base Transceiver Station

CAMEL Customized Applications for Mobile network Enhanced Logic

CAP CAMEL Application Part

CCS Converged Charging System

CDF Charging Data Function

CDR Charging Data Record

CG Charging Gateway

CGF Charging Gateway Function

CHF Charging Function

CN Core Network

CP Control Plane

CS Circuit Switched

CSCF Call Session Control Function (I-Interrogating; E-Emergency; P-Proxy; and S-Serving)

CTF Charging Trigger Function

EATF Emergency Access Transfer Function

EBCF Event Based Charging Function

ECUR Event Charging with Unit Reservation

EIR Equipment Identity Register

EPC Evolved Packet Core

ePDG Evolved Packet Data Gateway

EPS Evolved Packet System

E-UTRAN Evolved Universal Terrestrial Radio Access Network

FQPC Fully Qualified Partial CDR

GGSN Gateway GPRS Support Node

GMLC Gateway MLC

GMSC Gateway MSC

GPRS General Packet Radio Service

GSM Global System for Mobile communication

gsmSCF GSM Service Control Function

gsmSSF GSM Service Switching Function

GSN GPRS Support Node (either SGSN or GGSN)

HLR Home Location Register

HPLMN Home PLMN

HSCSD High Speed Circuit Switched Data

IBCF Interconnect Border Control Function

ICS IMS Centralized Services

IE Information Element

IEC Immediate Event Charging

IETF Internet Engineering Task Force

IMEI International Mobile Equipment Identity

IMS GWF IMS GateWay Function

IMS IP Multimedia Subsystem

IMSI International Mobile Subscriber Identity

IP Internet Protocol

ISC IMS Service Control

ISDN Integrated Services Digital Network

ITU-T International Telecommunication Union - Telecommunications standardization sector

LAC Location Area Code

LAN Local Area Network

LCS Location Services

LRF Location Retrieval Function

LTE Long Term Evolution

MAP Mobile Application Part

MBMS Multimedia Broadcast and Multicast Service

ME Mobile Equipment

MGCF Media Gateway Control Function

MGW Media GateWay

MLC Mobile Location Center

MME Mobility Management Entity

MMI Man-Machine Interface

MMS Multimedia Messaging Service

MMSE Multimedia Messaging Service Environment

MMTel MultiMedia Telephony

MNO Mobile Network Operator

MnS Management Service

MO Mobile Originated

MOC MO Call

MRF Media Resource Function

MRFC MRF Controller

MS Mobile Station

MSC Mobile Services Switching Centre

MSISDN Mobile Station ISDN number

MT Mobile Terminated

MTC MT Call

MVNO Mobile Virtual Netork Operator

NE Network Element

NF Network Function

NWDAF Network Data Analytics Function

OCF Online Charging Function

OCS Online Charging System

OFCS Offline Charging System

OMR Optimal Media Routing

PCEF Policy and Charging Enforcement Function

PCF Policy Control Function

PCRF Policy and Charging Rules Function

PDG Packet Data Gateway

PDN Packet Data Network

PDP Packet Data Protocol, e.g. IP

PLMN Public Land Mobile Network

PoC Push-to-talk over Cellular

ProSe Proximity-based Services

PS Packet-Switched

PSPDN Packet-Switched Public Data Network

QoS Quality of Service

RF Rating Function

RNC Radio Network Controller

RNS Radio Network Subsystem

RPC Reduced Partial CDR

SBCF Session Based Charging Function

SCCP Signalling Connection Control Part

SCEF Service Capability Exposure Function

SCF Service Control FunctionSCS Services Capability Server

SCUR Session Charging with Unit Reservation

SGSN Serving GPRS Support Node

SIM Subscriber Identity Module

SMS Short Message Service

SMF Session Management Function

SSF Service Switching Function

TAP Transferred Account Procedure

TDF Traffic Detection Function

TR Technical Report

TRF Transit and Roaming Function

TS Technical Specification

TWAG Trusted WLAN Access Gateway

UE User Equipment

UMTS Universal Mobile Telecommunications System

UPF User Plane Function

USIM Universal SIM

VAS Value Added Service

VLR Visitor Location Register

VMSC Visited MSC

VPLMN Visited PLMN

WLAN Wireless LAN

***Next change***

### 4.4.3 Charging services Reference point

The common charging architectures are mapped into the specific domain/subsystem/service charging architectures in the respective middle tier TSs, which contain in their reference point representation, the following reference points:

**N28:** Reference point between PCF and CHF defined in TS 23.501[215]**.**

**N40:** Reference point between SMF and the CHF in the same PLMN defined in clause 4.2 of TS 32.255 [15].

**N41:** Reference point between AMF and CHF in HPLMN defined in clause 4.2.2 of TS 32.256 [16].

**N42:** Reference point between AMF and CHF in VPLMN defined in clause 4.2.2 of TS 32.256 [16].

**N44:** Reference point between NEF and CHF defined in clause 4.4 of TS 32.254 [14].

**N45:** Reference point between IMS Node and CHF defined in clause 4.4 of TS 32.260 [20].

**N46:** Reference point between SMS Node and CHF defined in clause 4.4 of TS 32.274 [34].

**N47: Reference point between SMF and the CHF in different PLMNs defined in clause x.y of TS 32.255 [15].**NOTE: N47 reference point is also used when an additional actor (i.e. MVNO) performs retail charging for its own subscribers. In such a case N47 is the reference point between SMF in the MNO and CHF in the MVNO.

***Next change***

#### 5.5.3.8 Charging Principles for roaming architecture for voice over IMS with home routed traffic

The roaming architecture for voice over IMS with home routed traffic is described in the TS 23.228 [209]. The breakout point for both the IMS signalling and media traffic is in the home network for a roaming UE, i.e. for 3GPP systems, the P-GW/GGSN/SMF-UPF for a roaming UE is in the HPLMN of the UE.

Based on GSMA BA.27 [500], the VPLMN will not have awareness of the services being used over the IMS APN and cannot support service-aware wholesale charging. Data roaming charges will apply for all traffic traversing S8 or Gp interface per the existing data roaming agreement. The HPLMN operator will be responsible for all interworking connectivity and call termination fees associated with call or service termination.

Specifically, the serving PLMN identifier of the UE is needed for the home network.

Details are described in the TS 32.260 [20].

#### 5.5.3.9 Charging Principles for 5G Roaming architecture with Local Breakout

The 5G System roaming architecture with local breakout is specified in TS 23.501 [215]. The breakout point for both the control plane signalling and user plane traffic is in the VPLMN, i.e. the vSMF and vUPF respectively.

The VPLMN charging mechanism collects charging information related to the 5G data connectivity usage for each UE detected as in-bound roamer. The information collected include details of the services used by the visiting subscriber and it is conveyed to both the CHF in VPLMN and to the CHF in the HPLMN.

The CHF in the VPLMN uses the collected charging information to handle service-aware wholesale charging towards the HPLMN.

The CHF in the HPLMN uses the collected charging information for retail charging towards the home subscriber while roaming.

Charging for Roaming with Local Breakout is covered by the 5G data connectivity domain converged charging architecture specified in TS 32.255 [15], using the SMF embedding the CTF.

#### 5.5.3.10 Charging Principles for 5G Mobile Virtual Network Operators charging

For scenarios in which subscribers have a subscription with an MVNO which allows usage of 5G data connectivity while in the home MNO, the MNO shall be able to collect charging information related to 5G data connectivity usage for each MVNO, for wholesale. The MVNO deploys their own billing and charging (CHF), but no other NFs.

The charging mechanism in the MNO collects charging information related to the 5G data connectivity usage for each UE and conveys this charging information to the MVNO for each UE.

The MVNO uses the charging information collected for retail charging (MVNO to subscriber). Charging for MVNO scenario is covered by the 5G data connectivity domain converged charging architecture specified in TS 32.255 [15].

# 6 Service specific charging

## 6.1 Introduction

There are services that spans domains, systems and functions to provide the service, this clause gives an overview of these services and which specifications that could be used to charge for the service.

## 6.2 5G LAN-type service charging

The 5G LAN-type service charging specified in the clause 5.34.10 of TS 23.501[215], including the 5G LAN VN Group membership management and 5G LAN VN Group Communication.

The 5G LAN VN Group membership management charging is covered by TS 32.254 [14], using the NEF embedding the CTF.

The 5G LAN VN Group Communication charging is coved by 5G data connectivity domain converged charging architecture specified in TS 32.255 [15], using the SMF embedding the CTF.

## 6.3 5G Edge Computing services charging

Edge Computing support in 5GS is defined in TS 23.501, TS 23.502 and TS 23.548. The architecture for enabling Edge Applications is specified in TS 23.558.

The charging principles for the Edge Computing domain are specified in TS 32.257.

The architecture of Edge Computing in Local Breakout roaming scenario is specified in TS 23.501 [215] and charging for Edge Computing in local breakout follows the principles in subclause 5.5.3.9.

***End of changes***