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History156

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

- shall** indicates a mandatory requirement to do something
- shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

- should** indicates a recommendation to do something
- should not** indicates a recommendation not to do something
- may** indicates permission to do something
- need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

- can** indicates that something is possible
- cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

- will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

0 Scope

The present document provides details concerning information to be stored in the different entities storing data within a 3GPP network concerning mobile subscriber. A list of entities storing subscriber data is provided in clause 1.

Clause 2 contains all details concerning the definition of the parameters, often given by reference to other specifications, and where the parameter is to be stored.

Table 1 in clause 3 gives a summary overview and clause 4 identifies the reference information required for accessing the information.

In this specification, if there is no specific indication, the following principles apply:

- "SGSN" refers to an SGSN which may support the Gn and Gp interfaces or the S4 interface or both.
- "S4-SGSN" refers to an SGSN which only supports the S4 interface.
- "Gn/Gp-SGSN" refers to an SGSN which only supports the Gn and Gp interfaces.

0.1 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".
- [3] Void
- [4] Void
- [5] 3GPP TS 23.003: "Numbering, addressing and identification".
- [6] 3GPP TS 23.007: "Restoration procedures".
- [7] 3GPP TS 23.009: "Handover procedures".
- [8] 3GPP TS 23.012: "Location Management Procedures".
- [9] 3GPP TS 23.015: "Technical realization of Operator Determined Barring (ODB)".
- [10] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".
- [11] 3GPP TS 22.060: "General Packet Radio Service (GPRS); Service description; Stage 1".
- [12] 3GPP TS 23.067: "Enhanced Multi-Level Precedence and Preemption service (EMLPP); Stage 2".
- [13] Void
- [14] 3GPP TS 23.081: "Line identification supplementary services; Stage 2".
- [15] Void
- [16] Void

- [17] Void
- [18] 3GPP TS 23.085: "Closed User Group (CUG) Supplementary Service; Stage 2".
- [19] Void
- [20] Void
- [21] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service Description; Stage 2".
- [22] Void
- [23] Void
- [24] Void
- [25] 3GPP TS 23.135: "Multicall supplementary service; Stage 2"
- [26] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".
- [27] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".
- [28] 3GPP TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".
- [29] 3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface".
- [30] 3GPP TS 42.032: "Digital cellular telecommunications system (Phase 2+); Immediate Service Termination (IST) Service description - Stage 1".
- [31] 3GPP TS 43.020: "Digital cellular telecommunications system (Phase 2+); Security-related network functions".
- [32] 3GPP TS 43.035: "Digital cellular telecommunications system (Phase 2+); Immediate Service Termination (IST); Stage 2".
- [33] 3GPP TS 43.068: "Digital cellular telecommunications system (Phase 2+); Voice Group Call Service (VGCS); Stage 2".
- [34] 3GPP TS 43.069: "Digital cellular telecommunications system (Phase 2+); Voice Broadcast Service (VBS); Stage 2".
- [35] 3GPP TS 23.071: "Location Services (LCS); Functional Description; Stage 2".
- [36] GSM 12.03: "Digital cellular telecommunications system (Phase 2+) (GSM); Security management".
- [37] 3GPP TS 52.008: "GSM Subscriber and equipment trace".
- [38] ITU-T Recommendation Q.763: "Signalling System No. 7 - ISDN User Part formats and codes".
- [39] ANSI T1.113: "Signalling System No7 (SS7); Integrated Services Digital Network (ISDN) User Part"
- [40] 3GPP TS 32.250: "Telecommunication Management; Charging management; Circuit Switched (CS) domain charging".
- [41] 3GPP TS 32.251: "Telecommunication Management; Charging management; Packet Switched (PS) domain charging".
- [42] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".
- [43] 3GPP TS 29.228: "IP Multimedia (IM) Subsystem Cx and Dx interfaces; Signalling flows and message contents".

- [44] 3GPP TS 29.229: "Cx and Dx Interfaces based on the Diameter protocol; Protocol details".
- [45] IETF RFC 3261: "SIP: Session Initiation Protocol".
- [46] IETF RFC 2396: "Uniform Resource Identifiers (URI): Generic Syntax".
- [47] Void
- [48] IETF RFC 4282: "The Network Access Identifier".
- [49] 3GPP TS 33.203: "3G security; Access security for IP-based services".
- [50] 3GPP TS 23.002: "Network Architecture".
- [51] IETF RFC 3588: "Diameter Base Protocol".
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- [120] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".
- [121] 3GPP TS 23.273: "5G System (5GS) Location Services (LCS); Stage 2".
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0.2 Abbreviations

For the purposes of the present document, the abbreviations listed in 3GPP TR 21.905 [1] apply.

GEO	Geosynchronous Orbit
LEO	Low Earth Orbit
MEO	Medium Earth Orbit
NCGI	NR Cell Global Identity
NR	New Radio
RG	Residential Gateway

1 Introduction

1.1 Definition

The term subscriber data is used to designate all information associated with a subscription which is required for service provisions, identification, authentication, routing, call handling, GPRS mode transmission, charging, subscriber tracing, operation and maintenance purposes. Some subscriber data are referred to as permanent subscriber data, i.e. they can only be changed by administration means. Other data are temporary subscriber data which may change as a result of normal operation of the system.

Unless shown to be conditional, all data items are considered to be mandatory.

1.2 Storage facilities

This specification considers subscriber data stored by the following types of network functions:

- Home subscriber server (HSS) which contains all permanent subscriber data and all relevant temporary subscriber data to support the call control and session management entities of the different Domains and Subsystems.
- Home location register (HLR) which contains all permanent subscriber data and all relevant temporary subscriber data for all mobile subscribers permanently registered in the HLR for CS and PS Domains.

NOTE 0: according to 3GPP TS 23.002 [50] HLR is a subset of the HSS functionality.

- CSG subscriber server (CSS) which contains Closed Subscriber Group information data for inbound roaming UEs to enable VPLMN autonomous CSG roaming in CS and PS domains.
- Visitor location register (VLR) which contains all subscriber data required for call handling and other purposes for mobile subscribers currently located in the area controlled by the VLR.
- Serving GPRS Support Node (SGSN) which contains all subscriber data required for GPRS mode transmission and other purposes for mobile subscribers currently located in the area controlled by the SGSN.
- Gateway GPRS Support Node (GGSN) which contains all subscriber data required for GPRS mode transmission for mobile subscribers using any service provided by the GGSN.
- Mobility Management Entity (MME) which contains all subscriber data required for EPS mode transmission and other purposes for mobile subscribers currently located in the area controlled by the MME.
- Serving GW (S-GW) which contains all subscriber data required for EPS mode transmission for mobile subscribers currently served by the S-GW.
- PDN GW (P-GW) which contains all subscriber data required for EPS mode transmission for mobile subscribers using any service provided by the P-GW.
- ePDG which contains all subscriber data required for EPS mode transmission for mobile subscribers currently served by the ePDG via a non 3GPP access.
- Gateway Mobile Location Center (GMLC) which contains all subscriber data required for external clients of the Location Services (LCS).
- In GSM, Serving Mobile Location Center (SMLC) which contains all LMU data required to manage location measurements in LMUs.

NOTE 1: A type A LMU is a network entity that shares many of the attributes of an MS including subscription data in the HLR and identification using an IMSI.

- Serving Call Session Control Function (S-CSCF) which handles the session states in the IP Multimedia (IM) Subsystem. Further definition of the S-CSCF is provided in 3GPP 23.228 [42].

- SUPL (Secure User Plane Location) Location Platform (SLP) provides user location information to the ProSe Function. Further information is provided in 3GPP TS 23.303 [98].
- ProSe Function is the logical function that is used for network related actions required for Proximity services more details are provided in 3GPP TS 23.303 [98].
- ProSe Application Server stores EPC ProSe User IDs and ProSe Function IDs and performs the mapping of Application Layer User IDs and EPC ProSe User Ids (see 3GPP TS 23.303 [98]).
- V2X Control Function is the logical function that is used for network related actions required for V2X services more details are provided in 3GPP TS 23.285 [107].
- UDM, AMF, SMF, SMSF, AUSF and NEF in 5G System (see 3GPP TS 23.501 [112] and 3GPP TS 23.502 [113]).

NOTE 2: Whether a node stores data for later usage in the UDR (externally) is not reflected, the description only reflects that the node holds data logically. Whether storage of data is performed internally or externally is out of scope of this specification.

In addition, subscriber data may also be stored in the following functional unit:

- Group Call Register (GCR) which contains all data required for configuration, set-up and handling of voice group and voice broadcast calls. This encompasses subscribers identities (mobile as well as fixed network) who are nominated as dispatchers for one or several groups within the area controlled by the GCR.

NOTE 3: The data stored in the GCR is not strictly "subscriber data". Description of GCR data is therefore out of scope of this specification and is covered in the corresponding specifications for enhanced Multi Level Precedence and Pre-emption Service (eMLPP), Voice Group Call Service (VGCS) and Voice Broadcast Service (VBS) instead (3GPP TS 23.067 [12], 3GPP TS 43.068 [33] and 3GPP TS 43.069 [34]).

NOTE 4: The MME, SGSN and ePDG Emergency Configuration Data, which are applied for all emergency bearer services, are not subscriber data and therefore out of the scope of this specification. See 3GPP TS 23.401 [74], 3GPP TS 23.060 [21] and 3GPP TS 23.402 [77].

1.3 Subscriber data in other functional units

The individual Subscriber Authentication Key Ki defined in 3GPP TS 43.020 [31] is stored in the Authentication Centre (AuC); it is also stored in the SIM and therefore available in the MS. Version numbers of algorithms A3 and A8 may also be stored in the AuC.

Bootstrapping Server Function (BSF) handles subscriber's bootstrapping information after bootstrapping procedure in Generic Authentication Architecture (GAA) system. A bootstrapping procedure creates security association between an UE and a BSF. Using the stored user's bootstrapping information and the security association the BSF can provide security services to network application functions (NAF) contacted by the UE. Functions of the BSF are defined in 3GPP TS 33.220 [58] and 3GPP TS 29.109 [59].

NOTE: It is for further study whether or not other types of functional units containing mobile subscriber parameters are to be included in this specification. Such units could include encryption key distribution centres, maintenance centres, etc.

1.4 Subscriber data in WLAN-IW functional units

This specification considers subscriber data stored in the following types of functional unit for I-WLAN:

- 3GPP AAA Server which contains all subscriber data necessary to maintain WLAN Direct IP Access and WLAN 3GPP IP Access.
- 3GPP AAA Proxy which contains subscriber data necessary to perform AAA proxy functionality in the VPLMN and to provide charging inter operator settlement functionality.
- Packet Data Gateway (PDG) which contains all subscriber data necessary to manage WLAN 3GPP IP Access tunnels.

- WLAN Access Gateway (WAG) which contains all subscriber data necessary to manage a per user firewall between the WLAN-AN and PLMN and to perform per tunnel charging.

2 Definition of subscriber data for CS and PS domain

2.1 Data related to subscription, identification and numbering

2.1.1 Data defining the subscription profile

2.1.1.1 International Mobile Subscriber Identity (IMSI)

International Mobile Subscriber Identity (IMSI) is defined in 3GPP TS 23.003 [5].

IMSI is permanent subscriber data. IMSI is stored in HLR, HSS, CSS, VLR, SGSN, S4-SGSN, GGSN, MME, S-GW, P-GW, ePDG, SCEF and SMLC. For Anonymous Access, IMSI is not used in SGSN nor in GGSN. The IMSI serves as the root of the subscriber data pseudo-tree.

For emergency attached UEs without IMSI (e.g; UICCless UE) or with an unauthenticated IMSI, IMEI is used instead of IMSI to identify the UE.

2.1.1.2 Network Access Mode (NAM)

The Network Access Mode (NAM) defines if the subscriber is registered to get access to the CS domain (non-GPRS/EPS), to the PS domain (GPRS/EPS) or to both domains using 3GPP access networks. NAM describes the first level of the subscriber data pseudo-tree below the IMSI root. It is permanent subscriber data stored in the HSS/HLR and the SGSN with the Gs interface option, and the MME with the SGs interface option.

2.1.1.3 IMSI Unauthenticated indicator

For an emergency attached UE with an unauthenticated IMSI, the IMSI Unauthenticated indicator is set to reflect that the IMSI is unauthenticated. See 3GPP TS 23.401 [74], 3GPP TS 23.060 [21] and 3GPP TS 23.402 [77].

The IMSI Unauthenticated indicator is a temporary subscriber data stored in the MME, S-GW, P-GW, SGSN, S4-SGSN, GGSN and ePDG.

2.1.2 Mobile Station International ISDN Number (MSISDN)

Mobile Station ISDN Number (MSISDN) is defined in 3GPP TS 23.003 [5].

The MSISDN is permanent subscriber data and is conditionally stored in HLR, VLR, SGSN, GGSN, HSS, MME, S-GW, P-GW, SCEF, 3GPP AAA Server and ePDG(for GTP-based S2b only), and is optionally stored in CSS. If the mult numbering option applies, the MSISDN stored in the VLR and in the Gn/Gp-SGSN is the Basic MSISDN, see clause 2.1.3.1.

2.1.3 MSISDNs for mult numbering option

If the HPLMN allocates different MSISDNs for different Basic Services (see 3GPP TS 29.007 [28]), these numbers are conditionally stored as permanent data in the HLR.

2.1.3.1 The Basic MSISDN indicator

The Basic MSISDN is defined in 3GPP TS 23.012 [8]. The Basic MSISDN indicator marks the MSISDN to be used as Basic MSISDN.

It is permanent subscriber data stored conditionally in the HLR.

2.1.3.2 The MSISDN-Alert indicator

The MSISDN-Alert is defined in 3GPP TS 23.040 [10]. The MSISDN-Alert indicator marks the MSISDN to be used as MSISDN-Alert.

It is permanent subscriber data stored conditionally in the HLR.

2.1.4 Temporary mobile subscriber identity (TMSI)

Temporary mobile subscriber identity (TMSI) is defined in 3GPP TS 23.003 [5].

The TMSI is temporary subscriber data and is conditionally stored in the VLR.

2.1.5 Packet-Temporary Mobile Subscriber Identity (P-TMSI)

Packet-Temporary Mobile Subscriber Identity (P-TMSI) is defined in 3GPP TS 23.003 [5]. Its usage is described in 3GPP TS 23.060 [11]. P-TMSI is accompanied by the P-TMSI Signature, see clause 2.3.7.

The P-TMSI is temporary subscriber data and is conditionally stored in the SGSN.

2.1.6 Temporary Link Layer Identifier (TLLI)

Temporary Link Layer Identifier (TLLI) is defined in 3GPP TS 23.003 [5]. It is derived from the P-TMSI by the MS and occurs in the variants Local TLLI and Foreign TLLI. The TLLI is temporary subscriber data and is conditionally stored in the SGSN. For use of TLLI see 3GPP TS 23.060 [11].

2.1.7 Random TLLI

Random TLLI is chosen randomly by the MS. It is defined in 3GPP TS 23.003 [5]. Random TLLI is short living temporary subscriber data and is conditionally stored in the SGSN. For use of Random TLLI see 3GPP TS 23.060 [11].

A Random TLLI may be used if no valid P-TMSI is available.

2.1.8 Local Mobile Station Identity (LMSI)

Local Mobile Station Identity (LMSI) is defined in 3GPP TS 23.003 [5]. The LMSI is temporary subscriber data. The LMSI may be stored in the VLR; if it is received in the HLR it must be stored there.

2.1.9 International Mobile Equipment Identity (IMEI)

International Mobile Equipment Identity (IMEI) is defined in 3GPP TS 23.003 [5]. The IMEI is temporary subscriber data and is conditionally stored in the HSS, SGSN, S4-SGSN, GGSN, MME, SGW, PGW, ePDG and 3GPP AAA Server.

2.1.10 External Identifier Set

The External Identifier set contains one or more External Identifier as defined in 3GPP TS 23.003 [5].

Any one of the External Identifier from the IMSI's External Identifier Set shall uniquely identify a single subscriber (IMSI).

The External Identifier Set is permanent subscriber data and is stored in the HSS and conditionally in the SCEF.

2.1.11 UE radio capability ID

The UE radio capability ID is defined in 3GPP TS 23.003 [5]. Its usage is described in 3GPP TS 23.401 [74].

The UE radio capability ID is temporary subscriber data and is conditionally stored in the MME.

2.2 Data related to Mobile Station types

2.2.1 Mobile Station Category

Mobile Station Category has a structure identical to that of "Calling Party's Category" defined in ISUP (ITU-T Recommendation Q.763 [38]).

The following values of category shall be supported:

- ordinary subscriber.

The category is assigned per IMSI.

Mobile Station Category is permanent subscriber data and is stored in HLR and VLR.

2.2.2 LMU Identifier (GSM only)

The LMU identifier is part of the subscriber data for a Type A LMU, when associated with an NSS based SMLC, and serves to distinguish a Type A LMU from a normal MS.

2.2.3 International Mobile Equipment Identity and Software Version (IMEISV)

International Mobile Equipment Identity and Software Version (IMEISV) is defined in 3GPP TS 23.003 [5]. The IMEISV is temporary subscriber data and is conditionally stored in the VLR, SGSN, HLR, S4-SGSN, GGSN, MME, SGW, PGW, ePDG and 3GPP AAA Server.

2.3 Data related to authentication and ciphering

2.3.1 Random Number (RAND), Signed Response (SRES) and Ciphering Key (Kc)

Random Number (RAND), Signed Response (SRES) and Ciphering Key (Kc) form a triplet vector used for authentication and encryption as defined in 3GPP TS 43.020 [31].

For GSM users, triplet vectors are calculated in the 2G AuC and provided to the 2G HLR (see GSM 12.03 [36]), and for UMTS users triplet vectors are derived from quintuplet vectors in the 3G HLR or 3G VLR, if needed (see 3GPP TS 33.102 [52]).

A set of up to 5 triplet values are sent from the 2G HLR to the VLR and the SGSN on request. These data are temporary subscriber data conditionally stored in the VLR and the SGSN.

2.3.2 Random Challenge (RAND), Expected Response (XRES), Cipher Key (CK), Integrity Key (IK) and Authentication Token (AUTN), KASME

Random Challenge (RAND), Expected Response (XRES), Cipher Key (CK), Integrity Key (IK) and Authentication Token (AUTN) form a quintuplet vector used for user authentication, data confidentiality and data integrity as defined in 3GPP TS 33.102 [52].

Random Challenge (RAND), Expected Response (XRES), Key for Access Security Management Entity (KASME) and Authentication Token (AUTN) form an EPS vector used for user authentication, data confidentiality and data integrity as defined in 3GPP TS 33.401 [73].

When both HLR and VLR or SGSN are 3G, a set of quintuplet vectors are calculated in the AuC, and up to 5 quintuplets are sent from the HLR to the VLR and to the SGSN on request (see 3GPP TS 29.002 [27]). These data are temporary subscriber data conditionally stored in the HLR, the VLR and the SGSN.

When the HLR is 2G and the VLR or SGSN are 3G, quintuplet vectors are derived by the 3G VLR or SGSN from the received triplet vectors from the HLR, if needed (see 3GPP TS 33.102 [52]).

2.3.3 The Ciphering Key Sequence Number (CKSN)

The Ciphering Key Sequence Number (CKSN) is used to ensure GSM authentication information (K_c) consistency between the MS and the VLR and between the MS and the SGSN.

CKSN and its handling are defined in 3GPP TS 24.008 [26] and 3GPP TS 43.020 [31]. It is a temporary subscriber data and is stored in the VLR and in the SGSN.

2.3.4 The Key Set Identifier (KSI)

The Key Set Identifier (KSI) is used to ensure UMTS authentication information (CK and IK) consistency between the MS and the VLR and between the MS and the SGSN.

For EPS the Key Set Identifier (KSI also noted KSI_{ASME}) is used to ensure EPS authentication information (K_{ASME}) consistency between the MS and the MME.

KSI and its handling are defined in UMTS TS 24.008 [26] and UMTS TS 33.102 [52]. It is temporary subscriber data and is stored in the VLR and the SGSN.

KSI_{ASME} and its handling are defined in 3GPP TS 23.401[74]. It is temporary subscriber data and is stored in the MME.

2.3.5 Selected Ciphering Algorithm

Selected Ciphering Algorithm is defined in 3GPP TS 23.060 [21].

Selected Ciphering Algorithm is temporary subscriber data stored in the SGSN.

2.3.6 Current K_c

Current K_c is defined in 3GPP TS 43.020 [31].

Current K_c is temporary subscriber data stored in the SGSN.

2.3.7 P-TMSI Signature

P-TMSI Signature is defined in TSs 3GPP TS 23.003 [5] and 3GPP TS 23.060 [21]. It is used for identification checking purposes.

P-TMSI Signature is temporary subscriber data and is conditionally stored in the SGSN.

2.3.8 Access Network Identity (ANID)

Access Network Identity is defined in TSs 3GPP TS 24.302 [82] and 3GPP TS 29.273 [78].

ANID is temporary subscriber data stored in HSS and 3GPP AAA server.

2.3.9 Key Status

Key Status is defined in 3GPP TS 25.413 [120].

Key Status is temporary subscriber data stored in VLR and SGSN.

2.4 Data related to roaming

2.4.1 Mobile Station Roaming Number (MSRN)

Mobile Station Roaming Number (MSRN) is defined in 3GPP TS 23.003 [5].

NOTE: There may be more than one MSRN simultaneously per IMSI.

The MSRN is short-lived temporary subscriber data stored in the VLR.

2.4.2 Location Area Identification (LAI)

Location Area Identification (LAI) is defined in 3GPP TS 23.003 [5].

The LAI is temporary subscriber data and is stored in the VLR.

2.4.3 Routing Area Identification (RAI)

Routing Area Identification (RAI) is defined in 3GPP TS 23.003 [5].

The RAI is temporary subscriber data and is stored in the SGSN.

2.4.4 Void

2.4.5 VLR number

VLR number is defined in 3GPP TS 23.003 [5].

The VLR number is temporary subscriber data and is stored in the HLR. Absence of the VLR number in HLR indicates that the mobile station is deregistered for non-GPRS or the subscriber has not a non-GPRS subscription in the HLR. The VLR number is stored in the SGSN with the Gs interface option. For usage of the VLR number in SGSN, please refer to 3GPP TS 23.060 [21].

The VLR number is temporary subscriber data and is stored in the CSS. Absence of the VLR number in the CSS indicates that no subsequent update of the CSG subscription information is needed at the VLR upon CSG subscription change.

2.4.6 MSC number

MSC number is defined in 3GPP TS 23.003 [5].

The MSC number is temporary subscriber data and is stored in the HLR and conditionally in the VLR. For absence of the MSC number in the HLR, the remarks on VLR number apply accordingly, see clause 2.4.5.

2.4.7 HLR number

HLR number is defined in 3GPP TS 23.003 [5].

The HLR number may be stored in the VLR and Gn/Gp-SGSN. It is received as a mandatory parameter in the updating location accepted message. This data may be needed to retrieve subscribers to be restored after HLR reset.

The HLR number is temporary subscriber data and may optionally be stored in the VLR and Gn/Gp-SGSN.

2.4.8 GSN number

2.4.8.0 General

GSN number occurs as SGSN number and as GGSN number.

2.4.8.1 SGSN number

SGSN number is the SS7 address of the SGSN . It is defined in 3GPP TS 23.003 [5].

The SGSN number is temporary subscriber data and is stored in the HLR for a GPRS subscription. It is conditionally stored in the VLR if the Gs interface is installed. Absence of the SGSN number in the HLR indicates that the mobile station is deregistered for GPRS or the subscriber has no GPRS subscription in the HLR. Absence of the SGSN number in the VLR indicates that there is no association between the VLR and the SGSN for this MS. The SGSN number is to be distinguished from the SGSN address described in clause 2.13.10.

The SGSN number is temporary subscriber data and is stored in the CSS. Absence of the SGSN number in the CSS indicates that no subsequent update of the CSG subscription information is needed at the SGSN upon CSG subscription change.

2.4.8.2 GGSN number

GGSN number is the SS7 address of the GGSN .It is defined in 3GPP TS 23.003 [5]. Its usage is described in 3GPP TS 23.060 [21]. It is contained in the GGSN-list stored in the HLR and does not appear as separate subscriber data. Cf. clause 2.13.11.

2.4.8.3 IWF number

IWF number is the SS7 address of the IWF. It has the same format as a "VLR number" or "SGSN number" which are defined in 3GPP TS 23.003 [5]. Its usage is described in 3GPP TS 29.305 [83].

2.4.9 MLC number

The MLC number occurs as an SMLC number and as a GMLC number.

2.4.9.1 SMLC number (GSM only)

The SMLC number is the E.164 address of an NSS based SMLC.

The SMLC number is permanent data that may be stored in an MSC in association with either a set of IMSIs belonging to LMUs controlled by the SMLC or a set of cell identifiers belonging to the geographic area served by the SMLC.

2.4.9.2 GMLC number

The GMLC number is the E.164 address of the GMLC. One or more GMLC numbers may be stored in the MS subscriber data in the HLR and downloaded to the VLR and SGSN. These GMLC numbers identify the GMLCs for the particular MS from which a location request for this MS may be confined for particular LCS clients.

2.4.10 Subscription restriction

Subscription restriction is a parameter indicating whether or not certain restrictions apply to the subscription. The parameter takes either of the following values (see also GSM 02.13 [36]):

- accessible area for service;
- all GSM PLMNs;
- one national and all foreign GSM PLMNs;
- regionally restricted (part of a GSM PLMN in one country);
- regionally restricted plus all other GSM PLMNs.

The HLR/HSS associates location updating information with subscription restriction. It deregisters the MS if the PLMN is not allowed and sets:

- the MSC area restricted flag if the MSC area is not allowed, see clause 2.4.12;

- SGSN area restricted flag if the SGSN area is not allowed, see clause 2.4.14.

Handling of Regionally Restricted Subscription is defined in clause 2.4.11. By operator agreement, regional restriction in parts of different GSM PLMNs is also possible.

The subscription restriction is permanent subscriber data and is stored in the HLR.

2.4.11 Regional Subscription Information

If a mobile subscriber has a regional subscription, the HLR/HSS shall store a list of up to ten Regional Subscription Zone Identities (RSZIs) per Network Destination Code (NDC) of the PLMN involved. The structure of RSZI is defined in 3GPP TS 23.003 [5]; since it is composed of the PLMN identification (CC NDC) and the Zone Code it is sufficient to store the Zone Code List per CC NDC.

On updating the MME, VLR or the SGSN, the HLR/HSS identifies the VPLMN and NDC given by the VLR or SGSN number or VPLMN-Id and transfers the pertaining Zone Code List to the VLR or SGSN or MME. The VLR or SGSN or MME derives from the Zone Code List the allowed and not allowed MSC or SGSN or MME areas and location areas; it sets the "LA not allowed flag" should the target LAI of the mobile station be excluded, and it informs the HLR/HSS should the MSC or SGSN or MME area be excluded. Signalling of cause value "location area not allowed" towards the mobile station is defined in TSs 3GPP TS 29.002 [27] and 3GPP TS 24.008 [26].

2.4.11.1 RSZI lists

The RSZI lists are permanent subscriber data stored conditionally in the HLR/HSS.

2.4.11.2 Zone Code List

The VLR and the SGSN and the MME shall store as permanent and conditional subscriber data at least those Zone Codes by which they are affected.

2.4.12 MSC area restricted flag

MSC area restricted flag is a parameter which can take either of the following values:

- MSC area restricted;
- MSC area not restricted.

The parameter is set in the HLR during updating of the VLR. Handling of unsupported services and information received from the VLR based on national roaming or regionally restricted subscription (clause 2.4.11) determine its value. The parameter contributes to the "MS Not Reachable" state for handling of terminating traffic in the HLR. The default value is "MSC area not restricted".

The MSC area restricted flag is temporary subscriber data and is contained in the HLR.

2.4.13 LA not allowed flag

The LA not allowed flag is set in the VLR depending on National Roaming, Regionally Restricted Subscription and Roaming Restriction Due To Unsupported Feature, see 3GPP TS 29.002. It is applied to restrict service on a location area basis.

The LA not allowed flag is temporary subscriber data stored in the VLR.

2.4.14 SGSN area restricted flag

SGSN area restricted flag is a parameter which can take either of the following values:

- SGSN area restricted;
- SGSN area not restricted.

The parameter is set in the HLR during updating of the SGSN. Handling of unsupported services and information received from the SGSN based on national roaming or regionally restricted subscription (clause 2.4.11) determine its value. The parameter contributes to the "MS Not Reachable" state for handling of terminating traffic in the HLR. The default value is "SGSN area not restricted".

The SGSN area restricted flag is temporary subscriber data and is contained in the HLR.

2.4.14a RA not allowed flag

The RA not allowed flag is set in the SGSN depending on National Roaming, Regionally Restricted Subscription and Roaming Restricted in the SGSN Due To Unsupported Feature, see 3GPP TS 29.002. It is applied to restrict service on a routing area basis.

The RA not allowed flag is temporary subscriber data stored in the SGSN.

2.4.14b TA not allowed flag

The TA not allowed flag is set in the MME depending on National Roaming, Regionally Restricted Subscription and Roaming Restricted in the MME Due To Unsupported Feature, see 3GPP TS 29.272[81]. It is applied to restrict service on a tracking area basis.

The TA not allowed flag is temporary subscriber data stored in the MME.

2.4.15 Service restriction data induced by roaming

If in the course of roaming or at updating of the VLR or SGSN or MME the HLR/HSS is informed that the VLR or SGSN or MME does not support certain sensitive services or features, or, the HLR/HSS is informed in data request that the VLR or the SGSN or the MME supports only specific services, features or phases which do not correspond to subscribed services, features or phases, the HLR/HSS takes appropriate measures to restrict service for the mobile station in that VLR or SGSN or MME by setting and sending network induced replacing services such as available services, features or phases, barring programs or the roaming restriction for the MSC or SGSN or MME area.

These network-induced data have to be kept separate in the HLR, and where possible as discussed below in the VLR, from the permanent subscriber data of the call barring supplementary services, from the barring related data that can be modified by the subscriber or from the permanent regional subscription data.

These network-induced data have to be kept separate in the HLR/HSS, and where possible as discussed below in the SGSN and MME, from the permanent regional subscription data.

The network induced data take precedence over the subscriber data of the user where they are in conflict. If, in the course of roaming, restrictions caused by a service are lifted, the original subscriber data have to be re-installed both in HLR, in SGSN, in MME and in VLR when applicable, regarding any remaining restrictions due to other service replacements.

All network-induced restriction data are temporary subscriber data.

For ODB, 3GPP TS 23.015 [9] recommends mainly barring programs to replace this feature. The replacing barring data are conditionally stored in the HLR and VLR. In the VLR they cannot be distinguished from the permanent supplementary services data with the available signalling means, and no additional storage is needed. Interrogation shall reflect in both HLR and VLR the valid setting of the replacing temporary data; to prevent interference with Subscriber Controlled Input and to inform the customer on the restriction, the "control of barring services" subscription option is also temporarily set to the value "by the service provider".

CUG is also replaced by Outgoing Call Barring as described in 3GPP TS 23.085 [18].

Roaming restriction in the MSC area due to unsupported features is used to replace AoCC, see 3GPP TS 23.086, and Zone Codes for regional subscription, see clause 2.4.11 and 3GPP TS 29.002. A flag in the HLR and the VLR, see clause 2.4.15.2, collects the sources of network-induced roaming restriction which are also kept separate by the HLR.

Roaming restriction in the SGSN area due to unsupported features is used to replace Zone Codes for regional subscription, see clause 2.4.11 and 3GPP TS 29.002. A flag in the HLR and the SGSN, see clause 2.4.15.3, collects the sources of network-induced roaming restriction which are also kept separate by the HLR.

Roaming restriction in the MME area due to unsupported features is used to replace Zone Codes for regional subscription, see clause 2.4.11 and 3GPP TS 29.272[81]. A flag in the HSS and the MME, see clause 2.4.15.3a, collects the sources of network-induced roaming restriction which are also kept separate by the HSS.

2.4.15.1 ODB-induced barring data

ODB-induced barring data are temporary data stored conditionally in the HLR; they include the necessary replacing barring programs for outgoing and incoming calls depending on the ODB profile. The subscription option "control of barring services" is set to "by the service provider". The corresponding barring supplementary services for outgoing calls are set by the HLR and sent to the VLR.

2.4.15.2 Roaming restriction due to unsupported feature

Roaming restriction due to unsupported feature is a parameter which indicates that one or several services or features are not supported by the MSC, resulting in roaming restriction in the MSC area. It can take either of the following values:

- roaming restricted;
- roaming not restricted.

The parameter governs the "LA not allowed flag" in the VLR (see clause 2.4.13) and the "MSC area restricted flag" in the HLR (see clause 2.4.12); see also 3GPP TS 29.002.

The flag "roaming restriction due to unsupported feature" is temporary subscriber data stored in the VLR and in the HLR.

2.4.15.3 Roaming restricted in the SGSN due to unsupported feature

Roaming restricted in the SGSN due to unsupported feature is a parameter which indicates that one or several services or features are not supported by the SGSN, resulting in roaming restriction in the SGSN area. It can take either of the following values:

- roaming restricted;
- roaming not restricted.

The parameter governs the "RA not allowed flag" in the SGSN (see clause 2.4.14a) and the "SGSN area restricted flag" in the HLR (see clause 2.4.14); see also 3GPP TS 29.002.

The flag "roaming restricted in the SGSN due to unsupported feature" is temporary subscriber data stored in the SGSN and in the HLR.

2.4.15.3a Roaming restricted in the MME due to unsupported feature

Roaming restricted in the MME due to unsupported feature is a parameter which indicates that one or several services or features are not supported by the MME, resulting in roaming restriction in the MME area. It can take either of the following values:

- roaming restricted;
- roaming not restricted.

The parameter governs the "TA not allowed flag" in the MME (see clause 2.4.14b).

The flag "roaming restricted in the MME due to unsupported feature" is temporary subscriber data stored in the MME and in the HSS.

2.4.16 Cell Global ID or Service Area ID

The Cell Global ID or Service Area ID indicates the cell global identity of the cell in GSM (see 3GPP TS 23.003 [5]) or the service area identification of the service area in UMTS (see 3GPP TS 23.003 [5]) in which the MS is currently in

radio contact or in which the MS was last in radio contact. The VLR and SGSN shall update the stored Cell Global ID or Service Area ID at establishment of every radio connection.

The cell ID is temporary subscriber data stored in the VLR and SGSN. It is conditional data, the VLR and SGSN shall store it whenever the subscriber data is marked as confirmed by radio contact.

The Cell Global ID or Service Area ID is temporary subscriber data stored in SGSN and GGSN/PDN-GW.

2.4.16A E-UTRAN Cell Global ID

The E-UTRAN Cell Global ID indicates the cell global identity of the cell in EPS (see 3GPP TS 23.003 [5]) in which the MS is currently in radio contact or in which the MS was last in radio contact.

The E-UTRAN Cell Global ID is temporary subscriber data stored in MME, PDN-GW and, when received via the SGs interface, in the VLR.

2.4.16B NR Cell Global Identity (NCGI)

The NR Cell Global Identity indicates the cell global identity of the cell in 5GS (see 3GPP TS 23.003 [5]) in which the UE is currently in radio contact or in which the UE was last in radio contact.

The NR Cell Global Identity is temporary subscriber data stored in AMF, SMF.

2.4.17 Localised Service Area Information

If a mobile subscriber has a localised service area subscription, the HLR shall store a list of up to 20 Localised Service Area Identities (LSA IDs) per PLMN. The structure of LSA ID is defined in 3GPP TS 23.003 [5].

On updating the VLR or the Gn/Gp-SGSN, the HLR identifies the VPLMN given by the VLR or SGSN number and transfers the applicable LSA ID List to the VLR or Gn/Gp-SGSN. The VLR or Gn/Gp-SGSN derives from the LSA ID List the allowed LSA(s), priority of each LSA, the preferential access indicator, the active mode support indicator and active mode indication and the "LSA only access" indicator.

2.4.17.1 LSA Identity

LSA Identity (LSA ID) is defined in 3GPP TS 23.003 [5]. The element uniquely identifies a LSA.

2.4.17.2 LSA Priority

Localised Service Area Priority (LSA Priority) is defined in GSM 08.08. The LSA Priority is permanent subscriber data stored conditionally in the HLR.

2.4.17.2A LSA Preferential Access Indicator

The Localised Service Area Preferential Access Indicator defines if the subscriber shall be favoured in cells belonging to the LSA at resource allocation compared to other subscribers. The LSA Preferential Access Indicator is permanent subscriber data stored conditionally in the HLR.

2.4.17.2B LSA Active Mode Support Indicator

The Localised Service Area Active Mode Support Indicator defines if cells belonging to the LSA shall be favoured for the subscriber compared to other cells at resource allocation. The LSA Active Mode Indicator is permanent subscriber data stored conditionally in the HLR.

2.4.17.3 LSA Only Access Indicator

The LSA Only Access Indicator defines if the subscriber is only allowed within its subscribed LSAs. The LSA Only Access Indicator is permanent subscriber data stored conditionally in the HLR.

2.4.17.4 LSA Active Mode Indicator

The Localised Service Area Active Mode Indicator defines if the LSA Identity of the cell in which the MS is currently in radio contact with shall be indicated to the subscriber in active mode. The LSA Active Mode Indicator is permanent subscriber data stored conditionally in the HLR.

2.4.17.5 VPLMN Identifier

The VPLMN Identifier identifies the VPLMN in which an LSA Identity is applicable. This identifier is not applicable to Universal LSA IDs as defined in 3GPP TS 23.003 [5]. The VPLMN identifier is permanent subscriber data stored conditionally in the HLR.

2.4.18 Access Restriction Data

The use of this data is described in 3GPP TS 23.221 [57] and in 3GPP TS 23.401 [74] clauses 4.3.28, 4.3.2a and 4.3.30.

The Access Restriction Data is permanent subscriber data and is conditionally stored per PLMN in the HLR/HSS, the VLR, the SGSN and the MME.

The parameter takes either of the following values:

- GERAN not allowed, the subscriber shall not be allowed to access the network in GERAN radio access. Valid for Idle and Connected mode;
- UTRAN not allowed, the subscriber shall not be allowed to access the network in LA/RAs using a UTRAN radio access. Valid for Idle and Connected mode;
- E-UTRAN not allowed, the subscriber shall not be allowed to access the network in TAs using a E-UTRAN radio access. Valid for Idle and Connected mode;
- GAN not allowed, the subscriber shall not be allowed to access the network via GAN;
- I-HSPA-Evolution not allowed, the subscriber shall not be allowed to access the network in LA/RAs using I-HSPA-Evolution radio access. Valid for Idle and Connected mode;
- HO-To-Non-3GPP-Access not allowed, the subscriber is not allowed to get EPS services that require handover support between 3GPP and non-3GPP accesses;
- NB-IoT not allowed, the subscriber shall not be allowed to access the network in TAs using a NB-IoT radio access. Valid for Idle and Connected mode;
- Enhanced Coverage not allowed, the subscriber shall not be allowed to use enhanced coverage;
- NR as secondary RAT not allowed, the subscriber shall not be allowed to access the network using NR radio access as secondary RAT. Valid for Idle and Connected mode;
- Unlicensed Spectrum as secondary RAT not allowed, the subscriber shall not be allowed to access the network using unlicensed spectrum in the form of LAA, LWA/LWIP or NR in unlicensed bands as secondary RAT. Valid for Idle and Connected mode.
- E-UTRAN(LEO) not allowed, the subscriber shall not be allowed to access the network in TAs using a E-UTRAN(LEO) satellite access. Valid for Idle and Connected mode;
- E-UTRAN(MEO) not allowed, the subscriber shall not be allowed to access the network in TAs using a E-UTRAN(MEO) satellite access. Valid for Idle and Connected mode;
- E-UTRAN(GEO) not allowed, the subscriber shall not be allowed to access the network in TAs using a E-UTRAN(GEO) satellite access. Valid for Idle and Connected mode;
- E-UTRAN(OTHERSAT) not allowed, the subscriber shall not be allowed to access the network in TAs using a E-UTRAN(OTHERSAT) satellite access. Valid for Idle and Connected mode;
- NB-IoT(LEO) not allowed, the subscriber shall not be allowed to access the network in TAs using a NB-IoT(LEO) satellite access. Valid for Idle and Connected mode;

- NB-IoT(MEO) not allowed, the subscriber shall not be allowed to access the network in TAs using a NB-IoT(MEO) satellite access. Valid for Idle and Connected mode;
- NB-IoT(GEO) not allowed, the subscriber shall not be allowed to access the network in TAs using a NB-IoT(GEO) satellite access. Valid for Idle and Connected mode;
- NB-IoT(OTHERSAT) not allowed, the subscriber shall not be allowed to access the network in TAs using a NB-IoT(OTHERSAT) satellite access. Valid for Idle and Connected mode;
- LTE-M(LEO) not allowed, the subscriber shall not be allowed to access the network in TAs using a LTE-M(LEO) satellite access. Valid for Idle and Connected mode;
- LTE-M(MEO) not allowed, the subscriber shall not be allowed to access the network in TAs using a LTE-M(MEO) satellite access. Valid for Idle and Connected mode;
- LTE-M(GEO) not allowed, the subscriber shall not be allowed to access the network in TAs using a LTE-M(GEO) satellite access. Valid for Idle and Connected mode;
- LTE-M(OTHERSAT) not allowed, the subscriber shall not be allowed to access the network in TAs using a LTE-M(OTHERSAT) satellite access. Valid for Idle and Connected mode;

Only the access restriction for WB-E-UTRAN and NB-IoT may include a different value per PLMN.

The use of this parameter for LA/RA/TA update procedures is described in 3GPP TS 23.012 [8], 3GPP TS 23.060 [21], and 3GPP TS 23.401 [74].

2.4.19 Selected CN operator ID

The selected CN operator ID indicates which core network operator Network Sharing supporting UEs have chosen in a shared network. The use of this data is described in 3GPP TS 23.251 [61]. And this data is identified by a PLMN ID (MCC+MNC) as described in 3GPP TS 23.003 [5].

The selected CN operator ID is temporary subscriber data stored conditionally in the VLR and the SGSN in a shared network for non-GPRS and GPRS services respectively.

This data is also stored in VLR for GPRS services if the Gs interface is installed.

2.4.20 IP-SM-GW number

The IP-SM-GW number is the E.164 address of the IP-SM-GW.

The IP-SM-GW number indicates the address of the external IP-SM-GW that is registered for a subscriber to be used for delivering mobile terminated short messages. The IP-SM-GW number is temporary subscriber data and is stored conditionally in the HLR. The absence of the IP-SM-GW number in the HLR indicates that no external IP-SM-GW is registered; in this case an IP-SM-GW number pre-configured in the HLR can be used as an alternative route for delivering mobile terminated short messages.

2.4.20A IP-SM-GW Diameter Identity

The IP-SM-GW Diameter Identity indicates the Diameter Name and Realm of the external IP-SM-GW that is registered for a subscriber to be used for delivering mobile terminated short messages via Diameter. The IP-SM-GW Diameter Identity is temporary subscriber data and is stored conditionally in the HSS.

2.4.21 Paging Area

As an option, and for paging optimization purpose, the VLR may control Paging Areas. A Paging Area is a list of up to 5 Location Areas. The structure of the Location Area is specified in 3GPP TS 29.002 [27]. The Paging Area is temporary data stored in the VLR and in the HLR.

The use of this data is described in TS 23.012 [8] and in TS 23.018 [70].

2.4.22 Closed Subscriber Group Information

If a mobile subscriber has a Closed Subscriber Group (CSG) subscription, the HLR/HSS shall store Closed Subscriber Group Information which is a list of up to 50 CSG-Ids per PLMN and for each CSG-Id optionally an associated expiration date which indicates the point in time when the subscription to the CSG-Id expires and optionally corresponding APNs which can be accessed via Local IP access from this CSG identified by the CSG-Id; an absent expiration date indicates unlimited subscription; an expired expiration date may indicate that removal of the CSG-Id from the UE (e.g. by OMA DM or OTA update) is pending. The structure of CSG-Id is defined in 3GPP TS 23.003 [5].

On updating the VLR or the SGSN or MME, the HSS/HLR identifies and stores the VPLMN and the list of equivalent PLMNs provided by the VLR, SGSN or MME, and transfers the applicable CSG-Ids, expiration dates and the APNs allowed for LIPA (if present) to the VLR or SGSN or MME.

If an applicable (i.e. applicable for the current serving PLMN) CSG-Id is added to the Closed Subscriber Group Information in the subscriber data in the HLR/HSS, or an expiration date for an applicable CSG-Id is changed (added, modified or removed), or the APNs allowed for LIPA for an applicable CSG-Id is changed (added, modified or removed), then the HLR/HSS shall transfer applicable CSG-Ids, expiration dates, and APNs allowed for LIPA to the VLR or SGSN or MME.

NOTE 1: The APNs allowed for LIPA information are not applicable to the VLR.

When a CSG-Id expires, or the expiration date is changed (added or modified) to an expired date, the CSG-Id should be removed from the UE (e.g. by OMA DM or OTA update). After successful removal of the CSG-Id from the UE, the HLR/HSS should delete the CSG-Id and, if applicable, update the VLR or SGSN or MME. The two operations may not be correlated in the sense that they may be performed independently by different systems. The temporal relationship between the two operations is out scope of this specification and therefore depends on the operator policy.

If the subscription is terminated by other means than expiry, then CSG-Ids that are not expired should not be removed at the HLR/HSS; rather the expiration date may be modified to an expired date.

CSG-Ids that are expired should not be removed from the HLR/HSS before being removed from the UE.

NOTE 2: In the VLR or SGSN or MME an expired CSG-Id subscription indicates that the UE is not allowed service in the CSG. However, since the CSG-Id removal from the UE is pending, the UE may still camp on that CSG and therefore the UE may still be paged in the CSG.

Closed Subscriber Group Information is permanent subscriber data and is conditionally stored in HLR/HSS, VLR, SGSN, and MME.

2.4.23 Service Centre Address

The Service Centre Address, specified in the 3GPP TS 29.002 [27], represents the address of a Short Message Service Centre.

It is permanent subscriber data and is stored conditionally in the HLR/HSS and the IP-SM-GW (AS).

2.4.24 Subscribed Periodic LAU Timer

The Subscribed Periodic LAU Timer value (see 3GPP TS 23.012 [8]) is permanent data conditionally stored in the HLR and VLR. The use of this data is described in 3GPP TS 23.012 [8].

2.4.25 CSS number

CSS number is the international ISDN number of the CSS. It is defined in 3GPP TS 23.003 [5].

The CSS number is temporary subscriber data and is conditionally stored in the VLR and Gn/Gp-SGSN.

2.4.26 VPLMN Closed Subscriber Group Information

If the VPLMN supports VPLMN Autonomous CSG Roaming by providing CSG membership to the roaming subscriber, the CSS shall store Closed Subscriber Group Information which is a list of up to 50 CSG-Ids in the VPLMN and for each CSG-Id optionally an associated expiration date which indicates the point in time when the subscription to

the CSG-Id expires; an absent expiration date indicates unlimited subscription. The structure of CSG-Id is defined in 3GPP TS 23.003 [5].

NOTE 1: The HPLMN enables Autonomous CSG Roaming in the VPLMN via Service Level Agreement.

When a CSG-Id expires, or the expiration date is changed (added or modified) to an expired date, the CSG-Id may be removed from the CSS and the VLR or SGSN or MME based on implementation.

NOTE 2: In the VLR or SGSN or MME an expired CSG-Id subscription indicates that the UE is not allowed service in the CSG. However, since the CSG-Id removal from the UE is pending, the UE may still camp on that CSG and therefore the UE may still be paged in the CSG.

If the subscription is terminated by other means than expiry, then CSG-Ids that are not expired should not be removed at the CSS; rather the expiration date may be modified to an expired date and then be updated by the CSS to the VLR or SGSN or MME.

VPLMN Closed Subscriber Group Information as described in 3GPP TS 29.002 [27] and 3GPP TS 29.272 [81] is permanent subscriber data and is conditionally stored in CSS, VLR, SGSN, and MME.

2.4.27 IAB-Operation Allowed indication

The IAB-Operation Allowed indication defines if the subscriber is allowed for IAB node operation as specified in 3GPP TS 23.401 [74].

The IAB-Operation Allowed indication is permanent subscriber data and is conditionally stored in the HSS and the MME.

2.5 Data related to basic services

2.5.1 Provision of bearer service

Provision of bearer service is a parameter identifying whether a bearer service is provisioned to the mobile subscriber or not. This provision can be achieved through subscription of the mobile subscriber or the bearer service can be generally available. The parameter "provision of bearer service" must be set for the bearer service defined in 3GPP TS 22.002 [2] for which a subscription is required.

Provision of bearer service is permanent subscriber data and is stored in the HLR and VLR.

2.5.2 Provision of teleservice

Provision of teleservice is a parameter identifying whether a teleservice is provisioned to the mobile subscriber or not. This provision can be achieved through subscription of the mobile subscriber or the teleservice can be generally available. The parameter "provision of teleservice" must be set for the teleservices defined in GSM 02.03 [36] for which a subscription is required.

Provision of teleservice is permanent subscriber data and is stored in the HLR, Gn/Gp-SGSN and VLR.

2.5.3 Bearer capability allocation

Bearer capability allocation is a parameter stored against each ISDN number in the case when the Home PLMN allocates one directory number per teleservice and bearer service. In this case it is used to permit the establishment of the correct bearer capability on the connection to the MS. (See 3GPP TS 29.007 [28]). The bearer capability allocation is not required when the Home PLMN only allocates one directory number per subscriber for all bearer services and teleservices. It is permanent data stored conditionally in the 3GPP TS 43.020 [31].

2.5.4 Transfer of SM option

Transfer of SM option is a parameter indicating which path should be used for transfer of Terminating Short Message when GPRS is not supported by the GMSC. Two options are possible:

- transfer of SM via the MSC when GPRS is not supported in the GMSC: this option is used to indicate that SM shall always be sent via the MSC when the GMSC does not support the GPRS functionality;
- transfer of SM via the Gn/Gp-SGSN when GPRS is not supported in the GMSC: this option is used to indicate that SM shall always be sent via the Gn/Gp-SGSN when the GMSC does not support the GPRS functionality.

Transfer of SM option is permanent subscriber data stored in HLR for a GPRS subscription.

The data has an interim nature since in the final solution, the decision on SM Transfer is taken in the SMS-GMSC.

2.6 Data related to supplementary services

Subscriber data related to supplementary services are contained in the 3GPP TS 23.08x and 3GPP TS 23.09x series of Technical Specifications, that is 3GPP TS 23.081 [14] and following describing the network functionality of supplementary services. Additionally, subscriber data related to the Multicall (MC) supplementary service are contained in 3GPP TS 23.135 [25].

There is no data type which is mandatory for all supplementary services; note that the provision status is mandatory for all supplementary services except CUG, 3GPP TS 23.085 [18]. All other data are conditional depending on the provision.

2.7 Mobile station status data

2.7.1 IMSI detached flag

IMSI detached flag is a parameter indicating that the MS is in the IMSI detached state, i.e. the subscriber is no longer reachable. For definition and handling see 3GPP TS 23.012 [8] and 3GPP TS 29.002 [27]. The parameter takes the following values:

- IMSI detached;
- IMSI attached.

The parameter is temporary subscriber data and is stored conditionally in the VLR.

2.7.2 Mobile station Not Reachable for GPRS (MNRG)

In HLR, MNRG indicates whether the MS is marked as GPRS detached or GPRS not reachable in the Gn/Gp-SGSN and possibly in the GGSN. The reason why the MS is GPRS not reachable is indicated in the Mobile Not Reachable via SGSN Reason (MNR-Reason).

In Gn/Gp-SGSN, MNRG indicates whether activity from the MS shall be reported to the HLR.

In GGSN, MNRG indicates whether the MS is marked as GPRS detached in the Gn/Gp-SGSN.

MNRG is described in 3GPP TS 23.060 [21]. It is temporary subscriber data stored in the HLR, in the Gn/Gp-SGSN and in the GGSN.

2.7.3 Mobility Management State

The Mobility Management State indicates the GPRS state of the MS. It takes one of three possible values:

1. **READY**: The MS is GPRS attached and its location is known at Cell Identity level.
2. **STANDBY**: The MS is GPRS attached and its location is known at Routing Area level.
3. **IDLE**: The MS is not GPRS attached.

The parameter is described in 3GPP TS 23.060 [21]. It is temporary subscriber data stored in the SGSN.

2.7.4 Restoration flags

In the case of SGSN, MME, VLR or HLR failure, location register data have to be restored as described in 3GPP TS 23.007 [6] and 3GPP TS 29.002 [27]. The following flags are used for this purpose.

2.7.4.1 Confirmed by Radio Contact indicator

Confirmed by Radio Contact indicator is a restoration indicator defined in 3GPP TS 23.007 [6].

It is temporary subscriber data, stored in the VLR.

2.7.4.2 Subscriber Data Confirmed by HLR/HSS indicator

Subscriber Data Confirmed by HLR/HSS indicator is a restoration indicator defined in 3GPP TS 23.007 [6].

It is temporary subscriber data, stored in the VLR, in the SGSN and in the MME.

2.7.4.3 Location Information Confirmed in HLR/HSS indicator

Location Information Confirmed in HLR/HSS indicator is a restoration indicator defined in 3GPP TS 23.007 [6].

It is temporary subscriber data, stored in the VLR and in the SGSN and in the MME.

2.7.4.4 Check SS indicator

Check SS indicator is a restoration indicator defined in 3GPP TS 23.007 [6].

It is temporary subscriber data and is stored in the HLR.

2.7.4.5 VLR-Reliable indicator

VLR-Reliable indicator is a restoration indicator defined in 3GPP TS 23.007 [6].

It is temporary subscriber data and is stored in the SGSN and in the MME.

2.7.5 MS purged for non-GPRS flag

MS purged for non-GPRS flag is set in the HLR per IMSI record in order to indicate that the subscriber data for the MS concerned have been purged in the VLR. The parameter takes the following values:

- MS purged;
- MS not purged.

The default value is "MS not purged". The parameter is temporary subscriber data, stored in the HLR.

2.7.6 MS purged for GPRS/UE purged in SGSN flag

MS purged for GPRS/UE purged in SGSN flag is set in the HLR/HSS per IMSI record in order to indicate that the subscriber data for the MS/UE concerned have been purged in the SGSN. The parameter takes the following values:

- MS purged for GPRS/UE purged in SGSN;
- MS not purged for GPRS/UE not purged in SGSN.

The default value is "MS not purged for GPRS"/"UE not purged in SGSN". The parameter is temporary subscriber data, stored in the HLR/HSS for a PS subscription.

2.7.6A UE purged in MME flag

UE purged in MME flag is set in the HSS per IMSI record in order to indicate that the subscriber data for the UE concerned have been purged in the MME. The parameter shall take the following values:

- UE purged in MME;
- UE not purged in MME.

The default value is "UE not purged in MME". The parameter is temporary subscriber data, stored in the HSS for a PS subscription.

2.7.7 Mobile station Not Reachable via MSC Reason (MNRR-MSC)

Mobile station Not Reachable via MSC Reason (MNRR-MSC) for SMS is defined in 3GPP TS 23.040 [10]. The MNRR-MSC is temporary subscriber data. It is conditionally stored in the HLR.

2.7.7A Mobile station Not Reachable via SGSN Reason (MNRR-SGSN)

Mobile station Not Reachable via SGSN Reason (MNRR-SGSN) for SMS is defined in 3GPP TS 23.040 [10]. The MNRR-SGSN is temporary subscriber data. It is conditionally stored in the HLR.

2.7.8 Subscriber data dormant

Subscriber data dormant is set in the VLR per IMSI record in order to indicate that the subscriber data belong to a subscriber that has moved outside the VLR area (see 3GPP TS 23.012 [8]). The parameter takes the following values:

- Subscriber data dormant;
- Subscriber data not dormant.

The parameter is temporary subscriber data and is stored in the VLR.

2.7.8A Cancel Location received

Cancel Location received is set by a VLR supporting the MT roaming retry feature per IMSI record to indicate that a Cancel Location message has been received from the HLR. This is used to determine whether to trigger MT roaming retry upon receipt of an incoming call, see clause 7.3.2.1 of 3GPP TS 23.018 [5a]. The parameter takes the following values: true or false.

The parameter is temporary subscriber data and is stored in the VLR.

2.7.9 Data related to UE reachability procedures

2.7.9.1 URRP-MME

The UE Reachability Request Parameter for the MME (URRP-MME) indicates that UE activity notification from MME has been requested by the HSS. For definition and handling of the data see 3GPP TS 23.401 [74].

URRP-MME is temporary subscriber data conditionally stored in the MME and in the HSS.

2.7.9.2 URRP-SGSN

The UE Reachability Request Parameter for the SGSN (URRP-SGSN) indicates that UE activity notification from SGSN has been requested by the HSS. For definition and handling of the data see 3GPP TS 23.060 [21].

URRP-SGSN is temporary subscriber data conditionally stored in the SGSN and in the HSS.

2.7.9.3 Service-related Entity list

This information element is a list of service related entities (i.e. gsmSCF address list or AS Identity list, see the definition of gsmSCF address list in clause 2.14.2.4 and the definition of AS Identity list in clause 3.5.7) which have subscribed to a notification of UE reachability (e.g. IP-SM-GW)

Service-related Entity list is temporary subscriber data stored in the HSS.

2.8 Data related to Operator Determined Barring

2.8.1 Subscriber status

Subscriber status is a flag which indicates whether the subscriber is subject to operator determined barring.

It is permanent subscriber data, and is conditionally stored in the HLR/HSS, the SGSN, the MME and the VLR.

2.8.2 Operator Determined Barring general data

2.8.2.1 Barring of outgoing calls

Barring of outgoing calls indicates which one of the following categories of operator determined barring of outgoing calls applies to the subscriber:

- No barring of outgoing calls;
- Barring of all outgoing calls;
- Barring of all outgoing international calls;
- Barring of all outgoing international calls except those directed to the home PLMN country;
- Barring of all outgoing inter-zonal calls;
- Barring of all outgoing inter-zonal calls except those directed to the home PLMN country;
- Barring of all outgoing international calls except those directed to the home PLMN country AND barring of all outgoing inter-zonal calls.

It is permanent data, and is stored conditionally in the HLR/HSS, the SGSN and the VLR.

2.8.2.2 Barring of incoming calls

Barring of incoming calls indicates which one of the following categories of operator determined barring of incoming calls applies to the subscriber:

- No barring of incoming calls;
- Barring of all incoming calls;
- Barring of all incoming calls when roaming outside the home PLMN country;
- Barring of all incoming calls when roaming outside the zone of the home PLMN country.

It is permanent data, and is stored conditionally in the HLR.

2.8.2.3 Barring of roaming

Barring of roaming indicates which one of the following categories of operator determined barring of roaming applies to the subscriber:

- No barring of roaming;

- Barring of roaming outside the home PLMN;
- Barring of roaming outside the home PLMN country.

It is permanent data, and is stored conditionally in the HLR/HSS for non-GPRS, GPRS subscription and EPS subscription.

2.8.2.4 Barring of premium rate calls

Barring of premium rate calls indicates which one of the following categories of operator determined barring of premium rate calls applies to the subscriber:

- No barring of premium rate calls;
- Barring of premium rate (information) calls;
- Barring of premium rate (entertainment) calls;
- Barring of premium rate (information) calls and premium rate (entertainment) calls.

It is permanent subscriber data, and is stored conditionally in the HLR and the VLR.

2.8.2.5 Barring of supplementary services management

Barring of supplementary services management is a flag which indicates whether the subscriber is subject to operator determined barring of supplementary services management.

It is permanent subscriber data, and is stored conditionally in the HLR and the VLR.

2.8.2.6 Barring of registration of call forwarding

Barring of registration of call forwarding indicates which one of the following categories of operator determined barring of registration of call forwarding applies to the subscriber:

- Barring of registration of any forwarded-to number;
- Barring of registration of any international forwarded-to number;
- Barring of registration of any international forwarded-to number except a number within the HPLMN country;
- Barring of registration of any inter-zonal forwarded-to number;
- Barring of registration of any inter-zonal forwarded-to number except a number within the HPLMN country.

It is permanent subscriber data, and is stored conditionally in the HLR.

2.8.2.7 Barring of invocation of call transfer

Barring of invocation of call transfer indicates which of the following categories of operator determined barring of invocation of call transfer applies to the subscriber:

One of:

- Barring of invocation of any call transfer;
- Barring of invocation of call transfer where at least one of the two calls is a call charged to the served subscriber;
- Barring of invocation of call transfer where at least one of the two calls is a call charged to the served subscriber at international rates;
- Barring of invocation of call transfer where at least one of the two calls is a call charged to the served subscriber at inter-zonal rates;

and independently:

- Barring of invocation of call transfer where both calls are calls charged to the served subscriber;

and independently:

- Barring of invocation of call transfer when there is an existing transferred call for the served subscriber in the same MSC/VLR.

It is permanent subscriber data, and is stored conditionally in the HLR and the VLR.

2.8.2.8 Barring of Packet Oriented Services

Barring of Packet Oriented Services indicates which one of the following categories of operator determined barring of Packet Oriented Services applies to the subscriber:

- Barring of all Packet Oriented Services;
- Barring of Packet Oriented Services from access points that are within the HPLMN whilst the subscriber is roaming in a VPLMN;
- Barring of Packet Oriented Services from access points that are within the roamed to VPLMN.

It is permanent subscriber data, and is stored conditionally in the HLR/HSS, the SGSN and MME.

2.8.3 Operator Determined Barring PLMN-specific data

Operator determined barring PLMN-specific data indicates which of the following categories of operator specific barring, in any combination, applies to the subscriber:

- Operator specific barring (type 1);
- Operator specific barring (type 2);
- Operator specific barring (type 3);
- Operator specific barring (type 4).

It is permanent subscriber data. It is stored conditionally in the HLR/HSS, the SGSN and in the VLR when the subscriber is registered in the home PLMN.

2.8.4 Notification to CSE flag

This information element indicates whether the change of ODB data shall trigger Notification on Change of Subscriber Data or not.

2.8.5 gsmSCF address list

This information element contains the list of gsmSCF addresses to which Notification on Change of Subscriber Data is to be sent.

2.9 Data related to handover

2.9.1 Handover Number

Handover Number is defined in 3GPP TS 23.003 [5] and its use is specified in 3GPP TS 23.009 [7].

The Handover Number is short-lived subscriber data and is stored in the VLR.

2.10 Data related to short message support

2.10.1 Messages Waiting Data (MWD)

Messages Waiting Data (MWD) is defined in 3GPP TS 23.040 [10].

The MWD is temporary subscriber data, and is conditionally stored in the HLR.

2.10.2 Mobile Station Not Reachable Flag (MNRF)

Mobile Station Not Reachable Flag (MNRF) is defined in 3GPP TS 23.040 [10].

The MNRF is temporary data. It is stored in the VLR, MME and conditionally stored in the HLR.

2.10.3 Memory Capacity Exceeded Flag (MCEF)

Memory Capacity Exceeded Flag (MCEF) is defined in 3GPP TS 23.040 [10].

The MCEF is temporary subscriber data and is conditionally stored in the HLR.

2.10.4 Mobile station Not Reachable for GPRS (MNRG)

For MNRG see clause 2.7.2.

2.10.4A UE Not Reachable via IP-SM-GW Flag (UNRI)

For UNRI see clause 3.2.5.

2.10.5 Mobile station Not Reachable via MSC Reason (MNRR-MSC)

For MNRR-MSC see clause 2.7.7.

2.10.5A Mobile station Not Reachable via SGSN Reason (MNRR-SGSN)

For MNRR-SGSN see clause 2.7.7A.

2.10.5B UE Not Reachable via IP-SM-GW Reason (UNRR)

For UNRR see clause 3.2.6.

2.10.6 MME Number for MT SMS

MME number for MT SMS is the E.164 address for the MME that supports SMS in MME. It is defined in 3GPP TS 23.003 [5]. Its usage is described in 3GPP TS 29.272 [81].

The MME number for MT SMS is temporary subscriber data and is stored in the HSS when the MME was registered as an MSC for MT SMS.

2.10.7 PS and SMS Only

This parameter indicates that the subscription is for PS Only, and permits CS service access only for SMS.

This parameter is permanent subscriber data and is conditionally stored in the HSS and SGSN.

2.10.8 SMS In SGSN Allowed

This parameter indicates that the SMS in SGSN feature is allowed for the user.

This parameter is permanent subscriber data and is conditionally stored in the HSS and SGSN.

2.11 Data related to subscriber trace

2.11.1 Trace Reference

The Trace Reference is defined in 3GPP TS 52.008 [37].

The Trace Reference is permanent subscriber data and is conditionally stored in the HLR and VLR.

2.11.2 Trace Type

The Trace Type is defined in 3GPP TS 52.008 [37].

The Trace Type is permanent subscriber data and is conditionally stored in the HLR and VLR.

2.11.3 Operations Systems Identity

The Operations Systems Identity is defined in 3GPP TS 52.008 [37].

The Operations Systems Identity is permanent subscriber data and is conditionally stored in the HLR and VLR.

2.11.4 HLR Trace Type

The HLR Trace Type is defined in 3GPP TS 52.008 [37].

The HLR Trace Type is permanent subscriber data and is conditionally stored in the HLR.

2.11.5 MAP Error On Trace

The MAP Error On Trace is defined in 3GPP TS 52.008 [37].

The MAP Error On Trace is temporary subscriber data and is conditionally stored in the HLR.

2.11.6 Trace Activated in VLR

The Trace Activated in VLR flag is defined in 3GPP TS 52.008 [37].

The Trace Activated in VLR flag is temporary subscriber data and is conditionally stored in the HLR and VLR.

2.11.7 Trace Activated in SGSN

The Trace Activated in SGSN flag is defined in 3GPP TS 52.008 [37].

The Trace Activated in SGSN flag is temporary subscriber data and is conditionally stored in the HLR and SGSN.

2.11.8 Foreign Subscriber Registered in VLR

The Foreign Subscriber Registered in VLR flag is handled by operation and maintenance means in the VLR and is defined in 3GPP TS 52.008 [37].

The Foreign Subscriber Registered in VLR flag is permanent subscriber data and is conditionally stored in the VLR.

2.11.9 Trace Reference 2

Trace reference 2 is defined in 3GPP TS 32.421 [65] and in 3GPP TS 32.422 [64].

The Trace Reference 2 is permanent subscriber data and is conditionally stored in the HSS/HLR, VLR, SGSN, MME, SGW, PGW and 3GPP AAA Server.

2.11.10 Trace depth

The Trace depth is defined in 3GPP TS 32.422 [64].

The Trace depth is permanent subscriber data and is conditionally stored in the HSS/HLR, VLR, SGSN, MME, SGW, PGW and 3GPP AAA Server.

2.11.11 List of NE types to trace

The List of NE types to trace is defined in 3GPP TS 32.422 [64].

The List of NE types to trace is permanent subscriber data and is conditionally stored in the HSS/HLR, VLR, SGSN, MME and 3GPP AAA Server.

2.11.12 Triggering events

The Triggering event is defined in 3GPP TS 32.422 [64].

The Triggering event is permanent subscriber data and is conditionally stored in the HSS/HLR, VLR, SGSN, MME, SGW, PGW and 3GPP AAA Server.

2.11.13 List of interfaces to trace

The List of interfaces to trace is defined in 3GPP TS 32.422 [64].

The List of interfaces to trace is permanent subscriber data and is conditionally stored in the HSS/HLR, VLR, SGSN, MME, SGW, PGW and 3GPP AAA Server.

2.11.14 IP address of Trace Collection Entity

The IP address of Trace Collection Entity is defined in 3GPP TS 32.422 [64].

The IP address of Trace Collection Entity is permanent subscriber data and is conditionally stored in the HSS/HLR, VLR, SGSN, MME, SGW, PGW and 3GPP AAA Server.

2.11.15 MDT-Configuration

The MDT-Configuration is defined in 3GPP TS 32.422 [64]. It contains:

Job type

Area Scope

List of measurements

Reporting Trigger

Report Interval

Report Amount

Event Threshold RSRP

Event Threshold RSRQ

Logging Interval

Logging Duration

The MDT-Configuration is permanent subscriber data and is conditionally stored in the HSS/HLR, VLR, SGSN, and MME.

2.11.16 MDT User Consent

The MDT User Consent parameter indicates whether the user has given his consent for MDT activation. For details see 3GPP TS 32.422 [64].

The MDT User Consent is permanent subscriber data and is conditionally stored in the HSS/HLR, VLR, SGSN, and MME.

2.12 Data related to the support of voice group and broadcast calls

2.12.1 VGCS Group Membership List

VGCS Group Membership List and its special condition of storage in VLR is defined in 3GPP TS 43.068 [33].

The VGCS Group Membership List is permanent subscriber data. It is stored conditionally in HLR and in the VLR.

2.12.2 VBS Group Membership List

VBS Group Membership List and its special condition of storage in VLR is defined in 3GPP TS 43.069 [34].

The VBS Group Membership List is permanent subscriber data. It is stored conditionally in HLR and in the VLR.

2.12.2.1 Broadcast Call Initiation Allowed List

The Broadcast Call Initiation Allowed List and its special condition of storage in VLR is defined in 3GPP TS 43.069[34].

It is permanent subscriber data. It is stored conditionally in HLR and in the VLR.

2.13 Data related to PS NAM

The data listed in this clause pertain to the Network Access Mode "PS " and have no counterpart for CS.

2.13.1 PDP Type

PDP Type is defined in 3GPP TS 23.060 [21]. It indicates which type of protocol is used by the MS for a certain service, e.g. IP and X.25.

PDP Type is permanent subscriber data and conditionally stored in HLR, SGSN and GGSN.

2.13.2 PDP Address

PDP Address is defined in 3GPP TS 23.060 [21]. It holds the address of the MS for a certain service, e.g. an IP address. If dynamic addressing is allowed, PDP Address is empty in the HLR, and, before the PDP context is activated, empty in the SGSN.

PDP Address is permanent subscriber data and conditionally stored in HLR, SGSN and GGSN.

2.13.3 NSAPI

NSAPI is defined in 3GPP TS 23.060 [21]. It holds the index of the PDP Context.

NSAPI is temporary subscriber data and conditionally stored in SGSN and GGSN.

2.13.4 Packet Data Protocol (PDP) State

PDP State is defined in 3GPP TS 23.060 [21]. The PDP State is either ACTIVE or INACTIVE.

PDP State is temporary subscriber data and conditionally stored in SGSN.

2.13.5 New SGSN Address

New SGSN Address is defined in 3GPP TS 23.060 [21]. It is the IP-address of the new SGSN, to which N-PDUs should be forwarded from the old SGSN after an inter-SGSN routing update.

New SGSN Address is temporary subscriber data and conditionally stored in SGSN.

2.13.6 Access Point Name (APN)

Access Point Name (APN) is defined in 3GPP TS 23.003 [5] and 3GPP TS 23.060 [21] and 3GPP TS 23.401[74]. The APN field in the HLR/HSS contains either only an APN Network Identifier (i.e. an APN without APN Operator Identifier) or the wild card value (defined in 3GPP TS 23.003 [5]). APN is permanent subscriber data conditionally stored in HLR/HSS, in GGSN, SGSN, MME, S-GW, PDN and SCEF.

2.13.7 GGSN Address in Use

GGSN Address in Use is defined in 3GPP TS 23.060 [21]. It is the IP address of the GGSN currently used by a certain PDP Address of the MS.

GGSN Address is temporary subscriber data and conditionally stored in Gn/Gp-SGSN.

2.13.8 VPLMN Address Allowed

VPLMN Address Allowed is defined in 3GPP TS 23.060 [21]. It specifies per VPLMN whether the MS is allowed to use a dynamic address allocated in the VPLMN.

VPLMN Address Allowed is permanent subscriber data and conditionally stored in HLR and SGSN.

2.13.9 Dynamic Address

Dynamic Address is defined in 3GPP TS 23.060 [21]. It indicates whether the address of the MS is dynamic.

Dynamic Address is temporary subscriber data conditionally stored in GGSN.

2.13.10 SGSN Address

SGSN Address is defined in 3GPP TS 23.003 [5]. It is the IP Address of the SGSN currently serving the MS.

SGSN Address is temporary subscriber data stored in HLR and stored conditionally in GGSN. A pendant is the SGSN number, cf clause 2.4.8.

2.13.11 GGSN-list

GGSN-list is defined in 3GPP TS 23.060 [21]. It defines the GGSNs to be contacted when activity from the MS is detected and MNRG is set. It contains the GGSN number and optionally the GGSN IP address.

GGSN-list is temporary subscriber data stored in the HLR.

2.13.12 Quality of Service Subscribed

Quality of Service Subscribed is defined in 3GPP TS 23.060 [21]. It specifies the quality of service subscribed for a certain PDP context.

Quality of Service Subscribed is permanent subscriber data and conditionally stored in HLR and SGSN.

2.13.13 Quality of Service Requested

Quality of Service Requested is defined in 3GPP TS 23.060 [21]. It specifies the quality of service requested for a certain PDP context.

Quality of Service Requested is temporary subscriber data and conditionally stored in Gn/Gp-SGSN.

2.13.14 Quality of Service Negotiated

Quality of Service Negotiated is defined in 3GPP TS 23.060 [21]. It specifies the quality of service for a certain PDP context, negotiated between the MS and the SGSN, and then the GGSN.

Quality of Service Negotiated is temporary subscriber data and conditionally stored in Gn/Gp-SGSN and GGSN.

2.13.15 SND

SND is defined in 3GPP TS 23.060 [21]. It is the GPRS Tunnelling Protocol sequence number of the next downlink N-PDU.

SND is temporary subscriber data conditionally stored in Gn/Gp-SGSN and GGSN.

2.13.16 SNU

SNU is defined in 3GPP TS 23.060 [21]. It is the GPRS Tunnelling Protocol sequence number of the next uplink N-PDU.

SNU is temporary subscriber data and conditionally stored in SGSN and GGSN.

2.13.17 DRX Parameters

DRX Parameters is defined in 3GPP TS 23.060 [21].

DRX Parameters is temporary subscriber data stored in SGSN.

2.13.18 Compression

Compression is defined in 3GPP TS 23.060 [21]. There is one set of negotiated compression parameters per QoS priority level.

Compression is temporary subscriber data conditionally stored in the SGSN.

2.13.19 Non-GPRS Alert Flag (NGAF)

Non-GPRS Alert Flag (NGAF) is defined in 3GPP TS 23.060 [21]. It indicates whether activity from the MS shall be reported to the MSC/VLR.

NGAF is temporary subscriber data and is conditionally stored in the SGSN if the Gs interface is installed.

2.13.20 Classmark

MS Classmark is defined in 3GPP TS 24.008 [26].

Classmark is temporary subscriber data stored in the SGSN.

2.13.21 Tunnel Endpoint Identifier (TEID)

Tunnel Endpoint Identifier is defined in 3GPP TS 29.060 [29]. TEID is temporary subscriber data conditionally stored in SGSN and GGSN.

2.13.22 Radio Priority

Radio Priority is defined in 3GPP TS 23.060 [21]. It indicates the RLC/MAC radio priority level for uplink user data transmission for a certain PDP context.

Radio Priority is temporary subscriber data and conditionally stored in SGSN.

2.13.23 Radio Priority SMS

Radio Priority SMS is defined in 3GPP TS 23.060 [21]. It indicates the RLC/MAC radio priority level for uplink SMS transmission.

Radio Priority SMS is temporary subscriber data and conditionally stored in SGSN.

2.13.24 PDP Context Identifier

PDP Context Identifier is defined in 3GPP TS 23.060 [21]. It identifies uniquely each PDP context.

PDP Context Identifier is permanent subscriber data and conditionally stored in HLR and Gn/Gp-SGSN.

2.13.25 PDP Context Charging Characteristics

PDP Context Charging Characteristics is defined in 3GPP TS 32. 251 [41]. It indicates the charging type to be applied to the PDP context.

PDP Context Charging Characteristics is permanent subscriber data and conditionally stored in HLR, SGSN and GGSN.

2.13.26 MME name

MME name is defined in 3GPP TS 23.003 [5].

The MME name is temporary subscriber data and is stored in the HSS. Absence of the MME name in HSS indicates that the UE is not registered for EPS via 3GPP E-UTRAN access. The MME name is conditionally stored in the VLR for MMEs for which the SGs interface is supported.

The MME name is temporary subscriber data and is stored in the CSS. Absence of the MME name in the CSS indicates that no subsequent update of the CSG subscription information is needed at the MME upon CSG subscription change.

2.13.27 VLR name

The VLR name is conditionally stored in the MME for VLRs for which the SGs interface is supported. Absence of the VLR name in MME indicates that there is no association between MME and VLR.

2.13.28 Non-EPS Alert Flag (NEAF)

Non-EPS Alert Flag (NEAF) indicates whether activity from the UE shall be reported to the VLR.

NEAF is temporary subscriber data and is conditionally stored in the MME for which the SGs interface is supported.

2.13.29 UE level APN-OI-Replacement

UE level APN-OI-Replacement (see 3GPP TS 23.401 [74] and 3GPP TS 23.060 [21]) is permanent data conditionally stored in the HSS and MME/SGSN.

2.13.30 Subscribed UE-AMBR

Subscribed UE-AMBR indicates the UE-AMBR for the uplink/downlink provided by the HSS to the MME/SGSN over the S6a/S6d/Gr interface for all non-GBR Bearers according to the subscription of the user.

Subscribed UE-AMBR (see 3GPP TS 23.401[74], 3GPP TS 23.060 [21] and 3GPP TS 23.501 [112]) is permanent data stored in HSS, SGSN, MME, UDM and AMF.

2.13.30A Used UE-AMBR

Used UE-AMBR indicates the UE-AMBR that is calculated by the MME/SGSN as the sum of the Used/Authorized APN-AMBRs of all active APNs up to the value of the Subscribed UE-AMBR.

Used UE-AMBR (see 3GPP TS 23.401[74] and 3GPP TS 23.060 [21]) is temporary data stored in MME and SGSN.

2.13.31 APN-Configuration-Profile

The APN-Configuration-Profile contains a Context-Identifier identifying the default APN-Configuration, optionally an additional Context-Identifier identifying another default APN-Configuration for those subscriptions having APNs with both, IP-based and Non-IP PDN types, and a list of APN-Configurations, each identified by a Context-Identifier. For detailed content see 3GPP TS 29.272[81] and 3GPP TS 29.273 [78].

The default APN configuration (default APN) for IP-based PDN types and the default APN for Non-IP PDN type are permanent data.

The list of APN-Configuration is permanent data stored in HSS, MME, S4-SGSN, ePDG and AAA-server with the following exceptions:

- PDN GW identity for the active IP-based PDN connections; stored in HSS if the user has non-3GPP subscription and the PDN connection is applicable to both 3GPP and non-3GPP accesses. For static PDN GW allocation, the PDN GW identity is also permanent data.
- APN-Specific-Data optionally stored as part of the APN context for the wildcard APN.

2.13.32 Subscribed APN-AMBR

Subscribed APN-AMBR indicates the APN-AMBR for the uplink/downlink provided by the HSS to the MME/SGSN over the S6a/S6d/Gr interface for all non-GBR Bearers according to the subscription of the user.

Subscribed APN-AMBR is part of each APN configuration (see 3GPP TS 29.272[81] and 3GPP TS 29.273[78]) and part of each PDP-Context (see 3GPP TS 29.002 [27]) and is permanent data stored in HSS, 3GPP AAA Server, MME, SGSN, GGSN, P-GW and ePDG(for GTP-based S2b only).

2.13.32A Used APN-AMBR

Used (Authorized) APN-AMBR indicates the APN-AMBR for the uplink/downlink authorized by the PCRF/PGW for all non-GBR bearers related with the same APN.

Used APN-AMBR is temporary data stored in MME, SGSN, GGSN and P-GW for each active APN (see 3GPP TS 23.401[74], 3GPP TS 23.060 [21] and 3GPP TS 23.402 [77]).

2.13.33 Subscribed-RAT-Frequency-Selection-Priority-ID

The Subscribed-RFSP-ID (see 3GPP TS 23.401 [74] and 3GPP TS 23.060 [21]) is permanent data conditionally stored in HSS, S4-SGSN, Gn/Gp-SGSN and MME.

2.13.34 GUTI

The GUTI (see 3GPP TS 23.003 [5]) is temporary data conditionally stored in MME.

2.13.35 ME Identity

The ME Identity is temporary data and contains the IMEISV see clause 2.2.3.

2.13.36 Selected NAS Algorithm

Selected NAS security algorithm sent by MME to UE (see 3GPP TS 23.401 [74]) and is temporary data stored in MME

2.13.37 Selected AS Algorithm

Selected AS security algorithms are defined in 3GPP TS 23.401 [74] and is temporary subscriber data stored in the MME.

2.13.38 Context Identifier

Index of the PDN subscription context (see 3GPP TS 23.401 [74]) is permanent data stored in HSS and MME.

2.13.39 PDN Address

Indicates subscribed IPv4 address and/or IPv6 prefix is temporary data stored in S-GW, PDN-GW, MME, ePDG and 3GPP AAA Server, and is permanent data in HSS (static address allocation based on subscriber profile in HSS; see 3GPP TS 23.401 [74]).

2.13.40 VPLMN Address Allowed

VPLMN Address Allowed specifies per VPLMN whether for this APN the UE is allowed to use the PDN GW in the domain of the HPLMN only, or additionally the PDN GW in the domain of the VPLMN (see 3GPP TS 23.401 [74]). It is permanent data stored in HSS, and temporary data in MME, ePDG and 3GPP AAA Server.

2.13.41 PDN GW identity

PDN GW identity is the identity of the PDN GW used for this APN. The PDN GW identity may be an FQDN or an IP address. The PDN GW identity is permanent data in HSS when static assignment is used and temporary data in HSS when dynamic assignment is used. It is temporary data in MME, S4-SGSN, ePDG and 3GPP AAA Server.

2.13.42 Tracking Area List

Tracking area list contains the current list of tracking areas (see 3GPP TS 23.401 [74]) and is temporary data stored in MME.

2.13.43 APN Restriction

APN Restriction is defined in 3GPP TS 23.060 [21] for GPRS and in 3GPP TS 23.401 [74] for EPS. It is temporary data stored in MME, SGSN and S-GW and contains the maximum restriction for each PDP context/EPS Bearer Context.

2.13.44 APN in use

APN in use contains the APN (see 2.13.6) currently in use (see 3GPP TS 23.401 [74], 3GPP TS 23.060 [21] and 3GPP TS 23.402 [77]) and it is temporary data stored in S4-SGSN, MME, S-GW, ePDG and PDN-GW.

2.13.45 TAI

TAI of the TA in which the last Tracking Area Update was initiated and is temporary data stored in MME, AMF and SMF and, when received via the SGs interface, in the VLR it contains the TAI of the last received E-UTRAN Cell Global ID.

2.13.46 E-UTRAN Cell Identity Age

E-UTRAN Cell Identity Age contains time elapsed since the last E-UTRAN Cell Global Identity was acquired (see 3GPP TS 23.401 [74]) and is temporary data stored in MME and, when received via the SGs interface, in the VLR.

2.13.47 MME F-TEID for S11 (Control Plane)

F-TEID for S11 is defined in 3GPP TS 29.274 [75]. MME F-TEID for S11 is temporary data conditionally stored in MME and S-GW.

2.13.48 MME UE S1AP ID

"MME UE S1AP ID" is the Unique identity of the UE within MME (see 3GPP TS 23.401 [74]) and is temporary data stored in MME.

2.13.49 S-GW F-TEID for S11 (Control Plane)

F-TEID for S11 is defined in 3GPP TS 29.274[75]. S-GW F-TEID for S11 is temporary data conditionally stored in MME and S-GW.

2.13.50 S4-SGSN F-TEID for S4 (Control plane)

F-TEID for S4 is defined in 3GPP TS 29.274[75]. S4-SGSN F-TEID for S4 is temporary data conditionally stored in S-GW and S4-SGSN.

2.13.51 S4-SGSN F-TEID for S4 (User plane)

F-TEID for S4 is defined in 3GPP TS 29.274[75]. S4-SGSN F-TEID for S4 is temporary data conditionally stored in S-GW and S4-SGSN.

2.13.52 S-GW F-TEID for S5/S8 (control plane)

F-TEID for S5/S8(control plane) is defined in 3GPP TS 29.274[75]. S-GW F-TEID for S5/S8(control plane) is temporary data conditionally stored in PDN-GW and S-GW.

2.13.53 S-GW F-TEID for S1-U

F-TEID for S1-U is defined in 3GPP TS 29.274[75]. S-GW F-TEID for S1-U is temporary data conditionally stored in eNodeB and S-GW.

2.13.54 S-GW F-TEID for S5/S8 (user plane)

F-TEID for S5/S8 (user plane) is defined in 3GPP TS 29.274[75]. S-GW F-TEID for S5/S8 (user plane) is temporary data conditionally stored in PDN-GW and S-GW.

2.13.55 eNodeB Address

The eNodeB Address identifies the IP address of the eNodeB currently used for control plane signalling (see 3GPP TS 23.401 [74]) and is temporary data stored in MME.

2.13.56 eNodeB UE S1AP ID

The "eNodeB UE S1AP ID " is the Unique identity of the UE within eNodeB (see 3GPP TS 23.401 [74]) and is temporary data stored in MME.

2.13.57 eNodeB F-TEID for S1-U

F-TEID for S1-U is defined in 3GPP TS 29.274[75]. The eNodeB F-TEID for S1-U is temporary data conditionally stored in eNodeB, S-GW and MME.

2.13.58 E-UTRAN/UTRAN Key Set flag

The "E-UTRAN/UTRAN Key Set flag" indicates whether the UE is using security keys derived from UTRAN or E-UTRAN security association (see 3GPP TS 23.401 [74]). E-UTRAN/UTRAN Key Set flag is temporary data conditionally stored in MME.

2.13.59 Selected CN operator id

Selected CN operator id contains the selected core network operator identity (to support network sharing as defined in TS 23.251 [61]). Selected CN operator id is temporary data conditionally stored in MME.

2.13.60 UE Radio Access Capability

UE Radio Access Capability (see 3GPP TS 23.401 [74]) is temporary data conditionally stored in MME.

NOTE: The actual size of UE Radio Access Capability depends on the features and bands supported by the UE and the eNodeB as specified in 3GPP TS 36.331[96]. Its size is constrained by the message size limits on the interfaces the information is conveyed (e.g. the maximum S1-AP SCTP packet size of 65535 bytes).

The MME shall store the UE Radio Access Capability Information received from the eNodeB without any truncation.

2.13.61 UE Network Capability

UE network capabilities (see 3GPP TS 23.401 [74]) including security algorithms and key derivation functions which shall be supported by the UE. UE Network Capability is temporary data conditionally stored in MME.

2.13.62 Location Change Report

Location Change Report indicates the requirement to communicate Cell or TAI to the PDN GW with this EPS bearer Context (see 3GPP TS 23.401 [74]) and is temporary data stored in MME and S4-SGSN.

2.13.63 UE Specific DRX Parameters

UE specific DRX parameters for A/Gb mode, Iu mode and S1-mode (see 3GPP TS 23.401[74]). UE specific DRX parameters are temporary data conditionally stored in MME.

2.13.64 PDN-GW F-TEID for S5/S8 (user plane)

F-TEID for S5/S8 (user plane) is defined in 3GPP TS 29.274[75]. PDN-GW F-TEID for S5/S8 (user plane) is temporary data conditionally stored in PDN-GW, MME, S4-SGSN and S-GW for each EPS Bearer within the PDN connection see 3GPP TS 23.401[74] and 3GPP TS 23.060 [21].

2.13.65 PDN GW F-TEID for S5/S8 (control plane)

F-TEID for S5/S8 (control plane) is defined in 3GPP TS 29.274[75]. PDN-GW F-TEID for S5/S8 (control plane) is temporary data conditionally stored in PDN-GW, MME, S4-SGSN and S-GW.

2.13.66 EPS Bearer ID

An EPS bearer identity uniquely identifies an EPS bearer for one UE accessing via E-UTRAN, UTRAN, GERAN or an S2b bearer for one UE accessing via non-3GPP access with GTP on S2b. It also uniquely identifies an EPS bearer for a T6a connection to an SCEF.

EPS Bearer ID is temporary data stored in MME, S4 SGSN, S-GW, ePDG(for GTP-based S2b only) and PDN-GW for each EPS Bearer or S2b bearer within the PDN connection see 3GPP TS 23.401[74], 3GPP TS 23.060 [21] and 3GPP TS 23.402 [77].

When EPS Bearer ID identifies a T6a connection, EPS Bearer ID is temporary data stored in the MME and in the SCEF, see 3GPP TS 29.128 [106].

2.13.67 EPS Bearer QoS

EPS Bearer QoS contains QCI and ARP and optionally: GBR and MBR in case of GBR bearer. ARP contains a priority level, the preemption capability and the preemption vulnerability. EPS Bearer QoS is temporary data stored in MME, S4 SGSN, S-GW, ePDG(for GTP-based S2b only) and PDN-GW for each EPS Bearer within the PDN connection; see 3GPP TS 23.401 [74] , 3GPP TS 23.060 [21] and 3GPP TS 23.402 [77].

2.13.67A EPS Subscribed QoS Profile

EPS Subscribed QoS Profile contains QoS parameters (QCI and ARP) for the EPS default bearer of an APN, and it is permanent data stored in HSS, MME and S4-SGSN.

The QCI values allowed for the EPS Subscribed QoS Profile shall be only those associated to non-GBR bearers.

2.13.68 UL TFT

Uplink Traffic Flow Template for each EPS Bearer or S2b bearer within the PDN connection see 3GPP TS 23.401[74] and 3GPP TS 23.402 [77], and is temporary data stored in S-GW (for PMIP-based S5/S8 only), PDN-GW and ePDG (for GTP-based S2b only).

2.13.69 DL TFT

Downlink Traffic Flow Template for each EPS Bearer or S2b bearer within the PDN connection see 3GPP TS 23.401[74] and 3GPP TS 23.402 [77], and is temporary data stored in S-GW (for PMIP-based S5/S8 only) and PDN-GW.

2.13.70 Charging Id

Charging Id is defined in 3GPP TS 32.298[76] and temporary data conditionally stored in PDN-GW and S-GW for each EPS Bearer within the PDN connection see 3GPP TS 23.401[74].

2.13.71 EPS PDN Connection Charging Characteristics

EPS PDN Connection Charging Characteristics are defined in 3GPP TS 32.251[84] as permanent subscriber data conditionally stored in the HSS, 3GPP AAA Server and temporary data conditionally stored in MME, S-GW, ePDG and PDN-GW for each PDN connection see 3GPP TS 23.401[74] and 3GPP TS 23.402 [77].

2.13.72 Default bearer

Default bearer Identifies the EPS Bearer Id of the default bearer within the given PDN connection (see 3GPP TS 23.401[74] , 3GPP TS 23.060 [21] and 3GPP TS 23.402 [77]) and is temporary data stored in MME , S4 SGSN, S-GW, ePDG (for GTP-based S2b only) and PGW.

2.13.73 Void

2.13.74 Void

2.13.75 RAT Type (Access Type)

RAT Type (radio access technology, access type) contains the current RAT type of the Last known access system. RAT Type is temporary data conditionally stored in HSS, 3GPP AAA Server, S4-SGSN, MME, S-GW, PDN-GW and ePDG.

The parameter takes the values as defined for RAT-Type AVP in the 3GPP TS 29.212 [90].

2.13.76 S101 HRPD access node IP address

S101 HRPD access node IP address contains the IP address of the HRPD AN used for the S101 tunnel for a UE (see 3GPP TS 23.402) and is temporary data stored conditionally in the MME.

2.13.77 S103 Forwarding Address

S103 Forwarding Address contains the HSGW IP address used for data forwarding to the HRPD access over S103 interface (see 3GPP TS 23.402) and is temporary data stored conditionally in the MME.

2.13.78 S103 GRE key(s)

GRE Key(s) used for the data forwarding tunnel to the HSGW - one per UE-PDN connection and is Temporary data conditionally stored S-GW.

2.13.79 Permanent User Identity

Permanent user identity is defined in 3GPP TS 23.003[5] and is permanent data mandatory stored in HSS, 3GPP AAA-server, 3GPP AAA-server proxy, PDN-GW S-GW and ePDG.

2.13.80 Mobility Capabilities

Mobility Capabilities is defined in 3GPP TS 29.273 [78] and is temporary data conditionally stored in ePDG, PDN-GW and 3GPP-AAA-server.

2.13.81 MAG IP address

MAG IP address is defined in 3GPP TS 29.273 [78] and is temporary data conditionally stored in 3GPP-AAA-server.

2.13.82 Visited Network Identifier

Visited Network Identifier is defined in 3GPP TS 29.273 [78] and is temporary data conditionally stored in 3GPP-AAA-server.

2.13.83 EAP payload

EAP payload is defined in 3GPP TS 29.273 [78]. and is temporary data conditionally stored in 3GPP-AAA-server.

2.13.84 Void

2.13.85 Void

2.13.86 MIP Subscriber profile

MIP Subscriber profile is defined in 3GPP TS 29.273 [78] and is temporary data conditionally stored in AAA-server and Trusted Non-3GPP or ePDG.

2.13.87 Uplink S5 GRE Key

Uplink traffic of a given PDN connection sent over PMIP-based S5 is encapsulated with the uplink S5 GRE key (see 3GPP TS 29.275[79]) and is temporary data stored in MME, SGW and PDN-GW.

2.13.88 Downlink S5 GRE Key

Downlink traffic of a given PDN connection sent over PMIP-based S5 is encapsulated with the downlink S5 GRE key (see 3GPP TS 29.275[79]) and is temporary data stored in SGW and PDN-GW.

2.13.89 Uplink S8 GRE Key

Uplink traffic of a given PDN connection sent over PMIP-based S8 is encapsulated with the S5/S8 uplink GRE key (see 3GPP TS 29.275[79]) and is temporary data stored in MME, SGW and PDN-GW.

2.13.90 Downlink S8 GRE Key

Downlink traffic of a given PDN connection sent over PMIP-based S8 is encapsulated with the S5/S8 uplink GRE key (see 3GPP TS 29.275[79]) and is temporary data stored in SGW and PDN-GW.

2.13.91 S2a GRE Keys

Traffic of a given PDN connection sent over PMIP-based S2a is encapsulated with the per-direction (uplink or downlink) S2a GRE key (see 3GPP TS 29.275[79]) and is temporary data stored in the Trusted non-3GPP Access' MAG, and SGW (S2a chained with S8) or PDN-GW (unchained S2a).

2.13.92 S2b GRE Keys

Traffic of a given PDN connection sent over PMIP-based S2b is encapsulated with the per-direction (uplink or downlink) S2b GRE key (see 3GPP TS 29.275[79]) and is temporary data stored in the ePDG, and SGW (S2b chained with S8) or PDN-GW (unchained S2b).

2.13.93 Mobile Node Identifier

Mobile Node Identifier is defined in 3GPP TS 29.275[79] and is temporary data stored in SGW and PDN-GW.

For emergency attached UEs without IMSI (e.g. UICCless UE) or with an unauthenticated IMSI, the Mobile Node Identifier is derived from the UE IMEI to identify the UE.

2.13.94 IPv4 Default Router Address

IPv4 Default Router Address (see 3GPP TS 29.275[79]) is temporary data stored in SGW and PDN-GW.

2.13.95 Link-local address

Link-local address (see 3GPP TS 29.275[79]) is temporary data stored in SGW and PDN-GW.

2.13.96 Non 3GPP User Data

Non 3GPP User Data (see 3GPP TS 29.273 [78]) is permanent data conditionally stored in HSS. The Non 3GPP User Data (or a subset of it) is stored as temporary data also in the 3GPP AAA Server, Trusted Non-3GPP access network and ePDG. A further subset, the APN context for the served PDN connection is stored in the PDN GW as temporary data.

2.13.97 3GPP AAA Server Identity

The 3GPP AAA Server Identity is the Diameter identity of the 3GPP AAA server defined in 3GPP TS 29.273 [78] and is temporary data stored in the HSS, PDN GW, Trusted Non-3GPP access network and ePDG. Absence of the 3GPP AAA Server Identity in the HSS indicates that the UE is not registered for EPS via non 3GPP access.

2.13.98 Selected IP mobility mode

IP mobility mode is defined in 3GPP TS 24.302 [82] and is temporary data conditionally stored in the 3GPP AAA Server, Trusted Non-3GPP access network and ePDG.

2.13.99 Diameter Server Identity of HSS

The Diameter Server Identity of HSS identifies the HSS storing the EPS related data of a user. The format of the Diameter Server Identity is the Diameter Identity defined in IETF RFC 3588 [51].

The Diameter Server Identity of the HSS is temporary data and is conditionally stored in MME, S4-SGSN and 3GPP AAA Server.

2.13.100 SGSN name

SGSN name is defined in 3GPP TS 23.003 [5].

The SGSN name is temporary subscriber data and is stored in the HSS, if S6d interface is supported.

The SGSN name is temporary subscriber data and is stored in the CSS, if S7d interface is supported. Absence of the SGSN name in the CSS indicates that no subsequent update of the CSG subscription information is needed at the SGSN upon CSG subscription change.

2.13.101 S-GW F-TEID for S12

F-TEID for S12 is defined in 3GPP TS 29.274[75]. S-GW F-TEID for S12 is temporary data conditionally stored in RNC and S-GW.

2.13.102 RNC F-TEID for S12

F-TEID for S12 is defined in 3GPP TS 29.274[75]. RNC F-TEID for S12 is temporary data conditionally stored in RNC, S-GW and S4-SGSN.

2.13.103 MME F-TEID for S3

F-TEID for S3 is defined in 3GPP TS 29.274[75]. MME F-TEID for S3 is temporary data conditionally stored in S4-SGSN and MME.

2.13.104 S4-SGSN F-TEID for S3

F-TEID for S3 is defined in 3GPP TS 29.274[75]. S4-SGSN F-TEID for S3 is temporary data conditionally stored in S4-SGSN and MME.

2.13.105 PDN GW Allocation Type

PDN GW Allocation Type specifies if the PDN has been statically provisioned for a certain APN, or if it can be dynamically selected by the MME. It is permanent data stored in HSS, and temporary data stored in MME.

2.13.106 S-GW F-TEID for S4 (control plane)

F-TEID for S4 (control plane) is defined in 3GPP TS 29.274[75]. S-GW F-TEID for S4 (control plane) is temporary data conditionally stored in S4-SGSN and S-GW.

2.13.107 S-GW F-TEID for S4 (user plane)

F-TEID for S4 (user plane) is defined in 3GPP TS 29.274[75]. S-GW F-TEID for S4 (user plane) is temporary data conditionally stored in S4-SGSN and S-GW.

2.13.108 RAT-Frequency-Selection-Priority-ID in Use

The RFSP-ID in Use (see 3GPP TS 23.401 [74] and 3GPP TS 23.060 [21]) is temporary data conditionally stored in S4-SGSN, Gn/Gp-SGSN and MME.

2.13.109 APN level APN-OI-Replacement

APN level APN-OI-Replacement (see 3GPP TS 23.401 [74] and 3GPP TS 23.060 [21]) is permanent data conditionally stored in the HSS and MME/SGSN.

APN level APN-OI-Replacement has the same role as UE level APN-OI-Replacement.

If both the APN level APN-OI-Replacement and UE level APN-OI-Replacement are present, the APN level APN-OI-Replacement has a higher priority than UE level APN-OI-Replacement.

2.13.110 Unauthenticated IMSI

For an emergency attached UE with an unauthenticated IMSI, the Unauthenticated IMSI is temporary data stored in SGW and the PDN-GW. See 3GPP TS 29.275 [79].

2.13.111 PDN Connection ID

PDN Connection ID (see 3GPP TS 29.275[79]) is used to uniquely identify a PDN Connection over PMIP based interface if multiple PDN Connections to the same APN is supported. PDN Connection ID is temporary data and is conditionally stored in SGW, PDN-GW, trusted-non-3GPP access or ePDG if both MAG and LMA support multiple PDN connection to the same APN.

2.13.112 MS Network Capability

MS network capabilities (see 3GPP TS 23.060 [21]) including security algorithms and capabilities which shall be supported by the MS. MS Network Capability is temporary data conditionally stored in MME and SGSN.

2.13.113 Voice Domain Preference and UE's Usage Setting

Voice domain preference and UE's usage setting (see 3GPP TS 24.008 [26]) provides the network with the UE's usage setting and the voice domain preference. The network uses the UE's usage setting and the voice domain preference to select the RFSP index in use as specified in 3GPP TS 23.401 [74]. Voice domain preference and UE's usage setting is temporary data conditionally stored in MME and SGSN.

2.13.114 SIPTO Permission

SIPTO Permission indicates whether the traffic associated with a particular APN is allowed or not for SIPTO above RAN, as defined in 3GPP TS 23.060 [21], 3GPP TS 23.401 [74] and 3GPP TS 23.402 [77].

The SIPTO Permission for the wild card APN shall apply to any APN that is not explicitly present in the subscription data.

SIPTO Permission is permanent data and is conditionally stored in the HSS, MME, SGSN, 3GPP AAA Server and Trusted Non-3GPP access network (eHRPD).

2.13.114A SIPTO Local Network Permission

SIPTO Local Network Permission indicates whether the traffic associated with a particular APN is allowed or not for SIPTO at the Local Network, as defined in 3GPP TS 23.060 [21] and 3GPP TS 23.401 [74].

The SIPTO Local Network Permission for the wild card APN shall apply to any APN that is not explicitly present in the subscription data.

SIPTO Local Network Permission is permanent data and is conditionally stored in the HSS, MME and SGSN.

2.13.115 Subscribed Periodic RAU/TAU Timer

The Subscribed Periodic RAU/TAU Timer (see 3GPP TS 23.401 [74] and 3GPP TS 23.060 [21]) is permanent data conditionally stored in the HLR/HSS, MME and SGSN.

2.13.116 ePDG F-TEID for S2b (control plane)

F-TEID for S2b (control plane) is defined in 3GPP TS 29.274[75]. ePDG F-TEID for S2b (control plane) is temporary data conditionally stored in ePDG (for GTP-based S2b only) and PGW.

2.13.117 ePDG F-TEID for S2b (user plane)

F-TEID for S2b (user plane) is defined in 3GPP TS 29.274[75]. ePDG F-TEID for S2b (user plane) is temporary data conditionally stored in ePDG (for GTP-based S2b only) and PGW.

2.13.118 PGW F-TEID for S2b (control plane)

F-TEID for S2b (control plane) is defined in 3GPP TS 29.274[75]. PGW F-TEID for S2b (control plane) is temporary data conditionally stored in ePDG (for GTP-based S2b only) and PGW.

2.13.119 PGW F-TEID for S2b (user plane)

F-TEID for S2b (user plane) is defined in 3GPP TS 29.274[75]. PGW F-TEID for S2b (user plane) is temporary data conditionally stored in ePDG (for GTP-based S2b only) and PGW.

2.13.120 MPS CS Priority

MPS CS Priority indicates that the UE is subscribed to the eMLPP in the CS domain, as defined in 3GPP TS 23.401 [74].

MPS CS Priority is permanent data and is conditionally stored in the MME.

NOTE: The MME gets the MPS CS Priority information from the HLR/HSS, which derives this information from the eMLPP Subscription Data as defined in the 3GPP TS 29.002 [27].

2.13.121 MPS EPS Priority

MPS EPS Priority indicates that the UE is subscribed to the MPS in the EPS domain, as defined in 3GPP TS 23.401 [74].

MPS EPS Priority is permanent data and is conditionally stored in the HLR/HSS and MME.

2.13.122 LIPA Permission

LIPA Permission indicates whether the corresponding APN is allowed to be accessed via Local IP Access, as defined in 3GPP TS 23.060 [21] and 3GPP TS 23.401 [74].

The LIPA Permission for a Wildcard APN applies to any APN that is not explicitly present in the subscription data.

LIPA Permission is permanent data and is conditionally stored in the HLR/HSS, MME and SGSN.

2.13.123 LIPA Allowed VPLMN List

LIPA Allowed VPLMN List indicates the PLMNs where the UE is allowed to use LIPA, it is permanent data and is conditionally stored in the HLR/HSS.

2.13.124 VPLMN LIPA Allowed

VPLMN LIPA Allowed indicates whether the UE is allowed to use LIPA in the PLMN where the UE is attached, as defined in the 3GPP TS 23.060 [21] and the 3GPP TS 23.401 [74].

VPLMN LIPA Allowed is permanent data and is conditionally stored in the MME and the SGSN.

2.13.125 Relay Node Indicator

Relay Node Indicator indicates whether the subscriber is a Relay Node (see 3GPP TS 36.300 [88]).

Relay Node Indicator is permanent data and is conditionally stored in the HLR/HSS and MME.

2.13.126 Restricted RAT Types

Restricted RAT Types contains the RAT types that are disallowed for a user when accessing EPS service from non-3GPP accesses.

Restricted RAT Types is permanent subscriber data and is conditionally stored in the HLR/HSS, 3GPP AAA Server, UDM and AMF.

The parameter takes either of the following values:

- WLAN not allowed, the subscriber shall not be allowed to access the network using WLAN radio access. Valid for Idle and Connected mode;
- CDMA2000_1X not allowed, the subscriber shall not be allowed to access the network using CDMA2000_1X radio access. Valid for Idle and Connected mode;
- HRPD not allowed, the subscriber shall not be allowed to access the network using HRPD radio access. Valid for Idle and Connected mode;
- UMB not allowed, the subscriber shall not be allowed to access the network using UMB radio access. Valid for Idle and Connected mode;
- EHRPD not allowed, the subscriber shall not be allowed to access the network using EHRPD radio access. Valid for Idle and Connected mode.

2.13.127 Higher bitrates than 16Mbps flag

Higher bitrates than 16Mbps flag (see 3GPP TS 23.060 [21]) is temporary data conditionally stored in Gn/Gp-SGSN or S4-SGSN.

2.13.128 Void

2.13.129 UE Local IP Address

UE Local IP Address is defined in 3GPP TS 23.139 [91]. UE Local IP Address is temporary data conditionally stored in the ePDG.

2.13.130 UE UDP Port Number

UE UDP Port Number is defined in 3GPP TS 23.139 [91]. UE UDP Port Number is temporary data conditionally stored in the ePDG.

2.13.131 H(e)NB Local IP Address

H(e)NB Local IP Address is defined in 3GPP TS 23.139 [91]. H(e)NB Local IP Address is temporary data conditionally stored in the MME, S4-SGSN, and P-GW.

2.13.132 H(e)NB UDP Port Number

H(e)NB UDP Port Number is defined in 3GPP TS 23.139 [91]. H(e)NB UDP Port Number is temporary data conditionally stored in the MME, S4-SGSN, and P-GW.

2.13.133 Diameter Server Identity of CSS

The Diameter Server Identity of CSS identifies the CSS storing the VPLMN CSG Roaming subscription related data of a user. The format of the Diameter Server Identity is the Diameter Identity defined in IETF RFC 3588 [51].

The Diameter Server Identity of the CSS is temporary data and is conditionally stored in MME and S4-SGSN.

2.13.134 MME/S4 SGSN Identifier

MME/S4-SGSN Identifier is defined in 3GPP TS 29.274 [75]. MME/S4 SGSN Identifier is temporary data conditionally stored in the SGW and PGW.

2.13.135 SGW node name

SGW node name is defined in 3GPP TS 29.274 [75]. SGW node name is temporary data conditionally stored in the MME/S4 SGSN.

2.13.136 Co-located GGSN-PGW FQDN

Co-located GGSN-PGW FQDN is defined in 3GPP TS 29.060 [29]. Co-located GGSN-PGW FQDN is temporary data conditionally stored in the MME/S4 SGSN/Gn/Gp SGSN.

2.13.137 GERAN Cell Identity Age

GERAN Cell Identity Age contains time elapsed since the last GERAN Cell Global Identity was acquired (see 3GPP TS 23.060 [21]) and is temporary data stored in SGSN.

2.13.138 UTRAN Service Area Identity Age

UTRAN Service Area Identity Age contains time elapsed since the last UTRAN Service Area Identity Age was acquired (see 3GPP TS 23.060 [21]) and is temporary data stored in SGSN.

2.13.139 Default APN for Trusted WLAN

The Default APN for Trusted WLAN identifies the subscriber's default APN to be used for Trusted WLAN access to EPC over S2a in the Transparent single-connection mode. For detailed content see 3GPP TS 29.273 [78].

The Default APN for Trusted WLAN is permanent data conditionally stored in the HSS and 3GPP AAA Server.

2.13.140 Access Information for Trusted WLAN

The list of Access Information for Trusted WLAN contains information about the allowed access methods (i.e. EPC access and/or non-seamless WLAN offload) for a subscriber connecting via a trusted WLAN. For detailed content see 3GPP TS 29.273 [78].

The list of Access Information for Trusted WLAN is permanent data conditionally stored in the HSS and 3GPP AAA Server.

2.13.141 Homogeneous Support of IMS Voice over PS Sessions

Homogeneous Support of IMS Voice over PS Sessions (see 3GPP TS 23.401 [74] and 3GPP TS 23.060 [21]) is temporary data stored in the HSS/HLR, SGSN and MME.

2.13.142 Signalling Priority Indication

Signalling Priority Indication indicates that the UE signalled low access priority when the UE established the PDN connection or PDP context, as defined in 3GPP TS 23.401[74] and 3GPP TS 23.060 [21].

Signalling Priority Indication is temporary data conditionally stored in Gn/Gp-SGSN, S4-SGSN, MME, GGSN, SGW or PGW.

2.13.143 Restoration Priority

Restoration Priority is defined in 3GPP TS 23.007 [6]. It indicates the relative priority of a user's PDN connection among PDN connections to the same APN when restoring PDN connections affected by an SGW or PGW failure/restart.

Restoration Priority is permanent subscriber data conditionally stored in the HSS, MME and S4-SGSN.

2.13.144 Void

2.13.145 Presence Reporting Area Action

Presence Reporting Area Action is defined in 3GPP TS 23.060 [21] and in 3GPP TS 23.401 [74]. It denotes whether the MME/SGSN is requested to report changes of UE presence in Presence Reporting Area, and include the Presence Reporting Area Identifier, and the list of Presence Reporting Area elements if provided by the PGW.

Presence Reporting Area Action is temporary data conditionally stored in the MME, S4-SGSN and PGW.

2.13.146 WLAN offloadability

The WLAN offloadability information is a bitmask which indicates whether the traffic associated with the APN is allowed to be offloaded to WLAN from UTRAN or E-UTRAN. For detailed content see 3GPP TS 29.272 [81].

WLAN offloadability is permanent data and conditionally stored in HSS, MME, S4-SGSN.

2.13.147 CN Assistance Information

2.13.147.1 General

CN Assistance Information is a set of parameters which are calculated in the MME for the Core Network assisted eNodeB parameters tuning (see 3GPP TS 23.401 [74]); these parameters aid the eNodeB to minimize the UE state transitions and achieve optimum network behaviour.

2.13.147.2 Expected UE Activity Behaviour

The Expected UE Activity Behaviour (see 3GPP TS 36.413 [101]) indicates the expected pattern of the UE's changes between ECM-CONNECTED and ECM-IDLE states.

Expected UE Activity Behaviour is temporary subscriber data and is conditionally stored in the MME.

2.13.147.3 Expected HO Interval

The Expected HO Interval (see 3GPP TS 36.413 [101]) indicates the expected time interval between inter-eNB handovers of the UE.

Expected HO Interval is temporary subscriber data and is conditionally stored in the MME.

2.13.148 Active Time Value for PSM

Active Time Value for PSM is defined in 3GPP TS 23.401[74] and 3GPP TS 23.060 [21]. Active Time Value for PSM is temporary data conditionally stored in MME, S4-SGSN and Gn/Gp-SGSN.

2.13.149 Origination Time Stamp

The Origination Time Stamp indicates the time at which an entity originates a request. This is used for detecting and handling requests which collide with an existing session context. See 3GPP TS 29.274 [75].

The Origination Time Stamp is temporary data conditionally stored in PGW, 3GPP AAA Server and PCRF.

2.13.150 DL Data Buffer Expiration Time

DL Data Buffer Expiration Time is defined in 3GPP TS 23.060 [21] and 3GPP TS 23.401 [74]. It indicates the time until the SGW buffers DL data, for a UE that is transiently not reachable due to power saving functions, when the MME or SGSN has requested extended buffering at the SGW.

DL Data Buffer Expiration Time is temporary data conditionally stored in the MME, SGSN and SGW.

2.13.151 DL Buffering Suggested Packet Count

DL Buffering Suggested Packet Count is defined in 3GPP TS 23.060 [21] and 3GPP TS 23.401 [74]. It indicates the number of downlink packets the MME or SGSN suggests the SGW to store, for a UE that is transiently not reachable due to power saving functions, when the MME or SGSN requests extended buffering at the SGW.

DL Buffering Suggested Packet Count is permanent data conditionally stored in the HSS/HLR, MME, and the SGSN.

NOTE: The number of downlink packets the SGW decides to buffer is an implementation choice of the SGW, which can be dependent on the DL Buffering Suggested Packet Count.

2.13.152 Notify-on-available-after-DDN-failure flag

The Notify-on-available-after-DDN-failure flag is defined in 3GPP TS 23.682 [102].

The Notify-on-available-after-DDN-failure flag is temporary data conditionally stored in the MME and S4-SGSN.

2.13.153 IMSI Group Identifier List

IMSI Group Identifier (IMSI-Group-Id) is defined in 3GPP TS 23.003 [5].

A list of IMSI Group Identifier may be stored within the subscription data for a subscriber.

The IMSI Group Identifier List is permanent subscriber data conditionally stored in HSS, SGSN, MME, UDM and AMF.

2.13.154 UE Usage Type

The UE Usage Type indicates the usage characteristics of the UE for use with Dedicated Core Networks (DCN); it is subscription information that enables the UE to be served by a specific DCN (i.e., one or more MME/SGSN and optionally one or more SGW/PGW/PCRF), as described in 3GPP TS 23.401 [74].

UE Usage Type is permanent data and conditionally stored in HSS, MME, SGSN, UDM and AMF.

2.13.155 Emergency Indication

The Emergency Indication information indicates a UE request to establish a PDN connection for emergency services. See 3GPP TS 24.302 [82] and 3GPP TS 29.273 [78].

Emergency Indication is temporary data conditionally stored in the ePDG, 3GPP AAA Server and 3GPP AAA Proxy.

2.13.156 Remote UE Contexts

Remote UE Contexts is defined in 3GPP TS 29.274 [21]. Remote UE Contexts is temporary data conditionally stored in MME, SGW and PGW.

2.13.157 Extended Idle Mode DRX parameters

The Extended Idle Mode DRX parameters is defined in 3GPP TS 23.401 [74].

The Extended Idle Mode DRX parameters is temporary data conditionally stored in the MME and SGSN.

The Extended Idle Mode DRX cycle length (a part of the Extended Idle Mode DRX parameters) is permanent data stored in HSS.

2.13.158 Delay Tolerant Connection Indication

Delay Tolerant Connection Indication is defined in the 3GPP TS 23.401 [74] and 3GPP TS 23.060 [21]. Delay Tolerant Connection Indication is permanent data conditionally stored in MME, S4-SGSN, Gn/Gp-SGSN, PGW and GGSN.

2.13.159 Pending Network Initiated PDN Connection Signalling Indication

Pending Network Initiated PDN Connection Signalling Indication is defined in the 3GPP TS 23.401 [74] and 3GPP TS 23.060 [21]. Pending Network Initiated PDN Connection Signalling Indication is temporary data conditionally stored in MME, S4-SGSN and Gn/Gp-SGSN.

2.13.160 UE Radio Capability for Paging information

UE Radio Capability for Paging information is defined in the clause 5.11.4 of 3GPP TS 23.401 [74]. UE Radio Capability for Paging information is temporary data conditionally stored in MME.

2.13.161 Information on Recommended Cells and ENBs for Paging

Information on Recommended Cells and ENBs for Paging is defined in 3GPP TS 23.401 [74].

Information on Recommended Cells and ENBs for Paging is temporary data conditionally stored in the MME.

2.13.162 Paging Attempt Count

Paging Attempt Count is defined in 3GPP TS 23.401 [74].

Paging Attempt Count is temporary data conditionally stored in the MME.

2.13.163 User Plane Integrity Protection Indicator

User Plane Integrity Protection Indicator is defined in 3GPP TS 43.020 [31].

User Plane Integrity Protection Indicator is permanent data conditionally stored in the HSS and SGSN.

2.13.164 Non-IP-PDN-Type-Indicator

Non-IP-PDN-Type-Indicator is defined in 3GPP TS 29.272 [81]. It indicates whether the PDN type of the corresponding APN is Non-IP.

Non-IP-PDN-Type-Indicator is permanent subscriber data conditionally stored in the HSS and MME.

2.13.165 Non-IP-Data-Delivery-Mechanism

Non-IP-Data-Delivery-Mechanism is defined in 3GPP TS 29.272 [81]. It indicates the mechanism to be used for Non-IP Data Delivery over a certain APN.

The parameter takes either of the following values:

- SGi-Based-Data-Delivery;
- SCEF-Based-Data-Delivery.

Non-IP-Data-Delivery-Mechanism is permanent subscriber data conditionally stored in the HSS and MME.

2.13.166 SCEF-ID

SCEF-ID is defined in 3GPP TS 29.272 [81]. It indicates the identity (FQDN) of the SCEF to be used for Non-IP Data Delivery over a certain APN, when the selected data delivery mechanism is SCEF-based.

SCEF-ID is permanent subscriber data conditionally stored in the HSS and MME.

2.13.167 PDN Type

PDN Type is defined in 3GPP TS 29.274 [81]. It indicates whether the PDN type is IPv4, IPv6, IPv4v6, Non-IP, or Ethernet.

PDN Type is permanent subscriber data conditionally stored in the HSS, S4-SGSN, MME, SGW and PGW.

NOTE: The S4-SGSN doesn't support Ethernet PDN type.

2.13.168 PDN-Connection-Restricted flag

The PDN-Connection-Restricted flag is defined in 3GPP TS 29.272 [81]. It indicates whether a registration without a PDN connection is enforced for this user when applicable.

The PDN-Connection-Restricted flag is permanent subscriber data conditionally stored in the HSS and MME.

2.13.169 Preferred-Data-Mode

Preferred-Data-Mode is defined in 3GPP TS 29.272 [81]. It indicates, for an SGi PDN connection, whether it is preferred to transmit the user's traffic associated to the APN over the User Plane or the Control Plane.

Preferred-Data-Mode is permanent subscriber data conditionally stored in the HSS and MME.

2.13.170 IOV_updates counter

IOV_updates counter is defined in the 3GPP TS 29.060 [29]. IOV_updates counter is temporary data conditionally stored in a Gn/Gp-SGSN and S4-SGSN.

2.13.171 Emergency Info

Emergency Info is defined in 3GPP TS 29.272 [81]. It contains the identity of the PGW dynamically allocated for emergency services.

Emergency Info is temporary subscriber data conditionally stored in the HSS, 3GPP AAA Server, MME and ePDG.

2.13.172 Dedicated Core Network Identifier

Dedicated Core Network Identifier is defined in the 3GPP TS 23.003 [5]. Dedicated Core Network Identifier is temporary data conditionally stored in a Gn/Gp-SGSN, S4-SGSN and MME.

2.13.173 Acknowledgements Of Downlink NAS Data PDUs flag

The Acknowledgement Of Downlink NAS Data PDUs flag is defined in 3GPP TS 29.272 [81]. It indicates whether acknowledgement of downlink NAS data PDUs for Control Plane CIoT Optimization is disabled for the UE.

The Acknowledgement Of Downlink NAS Data PDUs flag is permanent subscriber data conditionally stored in the HSS and MME.

2.13.174 Service Gap Time

The Service Gap Time is defined in 3GPP TS 29.272 [81]. It indicates the minimum number of seconds during which the UE shall stay in ECM-IDLE mode, after leaving the ECM-CONNECTED mode, before being allowed to send a subsequent connection request to enter ECM-CONNECTED mode again.

The Service Gap Time is permanent subscriber data conditionally stored in the HSS and MME.

2.13.175 Subscribed Additional RRM Policy Index

The Subscribed Additional RRM Policy Index (see 3GPP TS 23.401 [74]) is permanent data conditionally stored in HSS and MME.

2.13.176 Additional RRM Policy Index in Use

The Additional RRM Policy Index in Use (see 3GPP TS 23.401 [74]) is temporary data conditionally stored in MME.

2.13.177 Ethernet-PDN-Type-Indicator

Ethernet-PDN-Type-Indicator is defined in 3GPP TS 29.272 [81]. It indicates whether the PDN type of the corresponding APN is Ethernet.

Ethernet-PDN-Type-Indicator is permanent subscriber data conditionally stored in the HSS and MME.

2.14 Data related to CAMEL

2.14.1 Subscriber Data stored in HLR

2.14.1.1 Originating CAMEL Subscription Information (O-CSI)

This data defines the contents of the Originating CAMEL subscription information used to interwork with the gsmSCF for MO and MF call. It consists of:

- A TDP list. The TDP list is a list of TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the MO State Model where service triggering may take place. For O-CSI, the allowed DP value are *DP Collected_info*, *DP Route_Select_Failure*.
 2. A gsmSCF address. It is the gsmSCF address (E.164 number) where the CAMEL service is treated for the subscriber. A gsmSCF address is associated to each serviceKey.
 3. A serviceKey. The serviceKey identifies to the gsmSCF the service logic. A serviceKey is associated to each TDP.
 4. A default Call Handling. The default call handling indicates whether the call shall be released or continued as requested in case of error in the gsmSSF to gsmSCF dialogue. A default Call Handling is associated to each serviceKey.
 5. DP criteria. The DP criteria indicates on which criteria the gsmSSF shall access the gsmSCF. DP criteria is associated to each TDP.

TDP	Triggering Criteria (see note)	ServiceKey	gsmSCF address	Default Call Handling
DP Collected_ Info	No Criterion Number criteria Basic service code criteria Call type criteria	One ServiceKey	One E.164 gsmSCF address	One Default call handling
DP Route_Select_Failure	No criterion Cause value criteria	One ServiceKey	One E.164 gsmSCF address	One Default call handling
NOTE: One or more TDP criteria shall be applicable. All applicable triggering criteria must be satisfied before the dialogue is established with the gsmSCF.				

- CAMEL capability handling. It gives the CAMEL phase associated to the O-CSI (CAMEL phase 1, phase 2, phase 3, or phase 4).
- The CSI state. The CSI state indicates whether the O-CSI is active or not.
- The notification flag, the notification flag indicates whether changes of the O-CSI shall trigger Notification on Change of Subscriber Data.

2.14.1.2 Terminating CAMEL Subscription Information (T-CSI) and VMSC Terminating CAMEL Subscription Information (VT-CSI));

This data defines the contents of the terminating CAMEL subscription information used to interwork with the gsmSCF for MT call. It consists of:

- A TDP list. The TDP list is a list of TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the MT State Model where service triggering may take place. For T-CSI, the allowed DP value are *DP Terminating_Attempt_Authorised*, *DP T_Busy*, *DP T_No_Answer*.
 2. A gsmSCF address. It is the gsmSCF address (E.164 number) where the CAMEL service is treated for the subscriber. A gsmSCF address is associated to each serviceKey.
 3. A serviceKey. The serviceKey identifies to the gsmSCF the service logic. A serviceKey is associated to each TDP.
 4. A default Call Handling. The default call handling indicates whether the call shall be released or continued as requested in case of error in the gsmSSF to gsmSCF dialogue. A default Call Handling is associated to each serviceKey.
 5. DP criteria. The DP criteria indicates on which criteria the gsmSSF shall access the gsmSCF. DP criteria is associated to each TDP.

TDP	Triggering Criteria (see note)	ServiceKey	gsmSCF address	Default Call Handling
DP Terminating_ Attempt_Authorised	No Criterion Basic service criteria	One serviceKey	One E.164 gsmSCF address	One Default call handling
DP T_Busy	No criterion Cause value criteria	One serviceKey	One E.164 gsmSCF address	One Default call handling
DP T_No_Answer	No criterion Cause value criteria	One service Key	One E.164 gsmSCF address	One Default call handling
NOTE: One or more TDP criteria shall be applicable. All applicable triggering criteria must be satisfied before the dialogue is established with the gsmSCF.				

- CAMEL capability handling. It gives the CAMEL phase associated to the T-CSI/VT-CSI (CAMEL phase1, phase2, or phase3, or phase4).
- The CSI state indicates whether the T-CSI/VT-CSI is active or not.
- Notification flag. The notification flag indicates whether the change of the T-CSI/VT-CSI shall trigger Notification on Change of Subscriber data.

2.14.1.3 Location information/Subscriber state interrogation.

This data item indicates whether or not the HLR shall send the location information and state of the called subscriber, as available, when a GMSC requests routeing information for an MT call.

2.14.1.4 USSD CAMEL subscription information(U-CSI)

This data is used on USSD request receipt from the MS. It consists of a list of:

- a service code: the service code defines a specific application in the gsmSCF;
- a gsmSCFaddress: it is the gsmSCF address (E.164 number) where the USSD application is treated for this subscriber.

2.14.1.5 Supplementary Service invocation notification(SS-CSI)

This data is used to notify the gsmSCF about Supplementary service invocation. It consists of:

- notification criterion, which may be a list of Supplementary Service(s). The possible Supplementary Services are: ECT, CD or MPTY, CCBS;
- a gsmSCFaddress: it is the gsmSCF address (E.164 number) where the notification of the Supplementary Service invocation is treated for this subscriber;
- CSI state, indicates whether the SS-CSI is active or not;
- notification flag: it indicates whether the change of the SS-CSI shall trigger Notification on Change of Subscriber data.

2.14.1.6 Translation Information flag (TIF-CSI)

- TIF-CSI flag is used to indicate that the HLR shall not attempt to perform any actions on the FTN (translation, prohibited FTN checks, call barring checks) at the registration procedure.
- Notification flag. The notification flag indicates whether the change of TIF-CSI flag shall trigger Notification on Change of Subscriber data.

2.14.1.7 Mobility Management event notification (M-CSI)

This data indicates which Mobility Management events shall be reported to the gsmSCF. It consists of:

- gsmSCF address: this is the address of the gsmSCF where the Mobility Management event notification shall be sent to. The gsmSCF address is in E.164 format.
- ServiceKey: the serviceKey is included in the notification to the gsmSCF and indicates to the gsmSCF which Service Logic shall be applied.
- Mobility Management Triggers: these triggers define which Mobility Managements events shall be reported to the gsmSCF. The mobility managements triggers may contain one or any combination of the following elements:
 - Location update in the same VLR service area;
 - Location update to another VLR service area;
 - IMSI attach;
 - MS initiated IMSI detach (explicit detach);
 - Network initiated IMSI detach (implicit detach).
- The CSI state, indicates whether the M-CSI is active or not.
- Notification flag. The notification flag indicates whether the change of M-CSI shall trigger Notification on Change of Subscriber data.

2.14.1.8 Mobile Originated Short Message Service CAMEL Subscription Information (MO-SMS-CSI)

This data defines the contents of the MO SMS CAMEL subscription information. The MO SMS CAMEL Subscription Information is used for the following interworking:

- Interworking between gsmSCF and gsmSSF, for CAMEL control of circuit switched MO SMS;
- Interworking between gsmSCF and gprsSSF, for CAMEL control of packet switched MO SMS.

MO-SMS-CSI consists of the following data items:

- TDP List. The TDP list is a list of SMS TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the MO SMS State Model where service triggering may take place.
For MO-SMS-CSI, the only allowed DP value is *SMS_Collected_Info*.
 2. gsmSCF Address. The gsmSCF address is the address (E.164 number) of the gsmSCF where the MO SMS CAMEL Service associated with this TDP, is located for this subscriber.
 3. ServiceKey. The serviceKey identifies to the gsmSCF the service logic that shall be applied.
 4. Default SMS handling. The default SMS handling indicates whether the MO SMS submission request shall be rejected or continued in the case of error in the dialogue between the gsmSSF and gsmSCF or between the gprsSSF and gsmSCF;
- CAMEL Capability Handling. CAMEL Capability Handling indicates the CAMEL Phase that is required for the MO SMS service. The CAMEL Capability Handling for MO-SMS-CSI shall have the value CAMEL phase 3.
- CSI state: indicates whether the MO-SMS-CSI is active or not.
- Notification flag indicates whether the change of the SMS-CSI shall trigger Notification on change of subscriber Data or not.

2.14.1.9 Mobile Terminating Short Message Service CAMEL Subscription Information (MT-SMS-CSI)

This data defines the contents of the mobile terminating short message service CAMEL subscription information. The MT-SMS-CSI CAMEL Subscription Information is used for the following interworking:

- Interworking between gsmSCF and gsmSSF, for CAMEL control of circuit switched MT SMS;
- Interworking between gsmSCF and gprsSSF, for CAMEL control of packet switched MT SMS.

MT-SMS-CSI consists of the following data items:

- TDP List. The TDP list is a list of MT SMS TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the MT SMS State Model where service triggering may take place.
For MT-SMS-CSI, the only allowed DP value is DP SMS-Delivery-Request
 2. gsmSCF Address. The gsmSCF address is the address (E.164 number) of the gsmSCF where the MT SMS CAMEL Service associated with this TDP, is located for this subscriber.
 3. ServiceKey. The serviceKey identifies to the gsmSCF the service logic that shall be applied.
 4. Default SMS handling. The default SMS handling indicates whether the MT SMS delivery request shall be rejected or continued in the case of error in the dialogue between the gsmSSF and gsmSCF or between the gprsSSF and gsmSCF.
 5. DP criterion. The DP criterion indicates on which criterion the gsmSSF shall access the gsmSCF. A DP criterion is associated with each TDP. For MT-SMS the DP criterion is the TDPU type. The criterion may be absent.

TDP	Triggering Criterion	ServiceKey	gsmSCF address	Default SMS Handling
DP SMS-Delivery Request	TDPU type	One serviceKey	One E.164 gsmSCF address	One Default SMS handling

- CAMEL Capability Handling. CAMEL Capability Handling indicates the CAMEL Phase that is required for the MT SMS service. The CAMEL Capability Handling for MT-SMS-CSI shall have the value CAMEL phase 4.
- CSI state: indicates whether the MT-SMS-CSI is active or not.
- Notification flag indicates whether the change of the MT-SMS-CSI shall trigger Notification on change of subscriber Data or not.

2.14.1.10 GPRS CAMEL Subscription Information (GPRS-CSI)

This data defines the contents of the GPRS CAMEL subscription information. The GPRS CAMEL Subscription Information is used for the interworking between gsmSCF and gprsSSF, for CAMEL control of packet switch call.

GPRS-CSI consists of the following data items:

- TDP List. The TDP list is a list of GPRS TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the GPRS State Model where service triggering may take place.
 2. gsmSCF Address. The gsmSCF address is the address (E.164 number) of the gsmSCF where the GPRS CAMEL Service associated with this TDP, is located for this subscriber.
 3. Service Key. The service key identifies to the gsmSCF the service logic that shall be applied.

4. Default GPRS handling. The default GPRS handling indicates whether the GPRS submission request shall be rejected or continued in the case of error in the dialogue between the gprsSSF and gsmSCF.
- CAMEL Capability Handling. CAMEL Capability Handling indicates the CAMEL Phase that is required for the GPRS service. The CAMEL Capability Handling for GPRS-CSI shall have the value CAMEL phase 3.
 - The CSI state indicates whether the GPRS-CSI is active or not.
 - The notification flag indicates whether the change of the GPRS-CSI shall trigger Notification on change of subscriber Data or not.

2.14.1.11 Dialed service CAMEL Subscription Information (D-CSI)

This data defines the contents of the dialed service CAMEL subscription information used to interwork with the gsmSCF for MO and MF call. It is applicable at TDP Analysed Info. It consists of:

- DP Criteria list. This consists of 1 to 10 entries. Each entry shall contain the following items:
 1. DP Criterion. It indicates when the gprsSSF shall request gsmSCF for instructions. It is a destination number.
 2. A gsmSCF address. It is the gsmSCF address (E.164 number) where this Subscribed Dialed CAMEL service is treated for the subscriber. A gsmSCF address is associated to each DP Criterion.
 3. A serviceKey. The serviceKey identifies to the gsmSCF the service logic. A serviceKey is associated to each DP Criterion.
 4. A default Call Handling. It indicates whether the call shall be released or continued as requested in case of error in the gprsSSF to gsmSCF dialogue. A default Call Handling is associated to each DP Criterion.
- CAMEL capability handling. It indicates the CAMEL phase associated to the D-CSI (CAMEL phase3, or Camel phase4 shall be indicated).
- CSI state: indicates whether the D-CSI is active or not.
- Notification Flag. It indicates whether the change of the D-CSI shall trigger the Notification on Change of Subscriber Data.

2.14.1.12 Mobility Management for GPRS event notification (MG-CSI)

This data indicates which Mobility Management for GPRS subscriber events shall be reported to the gsmSCF. It consists of:

- gsmSCF address: this is the address of the gsmSCF where the Mobility Management event notification shall be sent to. The gsmSCF address is in E.164 format.
- Service Key: the service key is included in the notification to the gsmSCF and indicates to the gsmSCF which Service Logic shall be applied.
- Mobility Management Triggers: these triggers define which Mobility Managements events shall be reported to the gsmSCF. The mobility management triggers may contain one or any combination of the following elements:
 - Routeing area update of MS to a different SGSN service area;
 - Routeing area update of MS within the same SGSN service area;
 - GPRS attach (e.g. MS switched on, successful routeing area update after network initiated detach);
 - MS-initiated GPRS detach (e.g. MS switched off);
 - Network-initiated transfer to the "not reachable for paging" state (the network has not received a periodic routeing area update from the MS and assumes that the MS is unreachable).
- The CSI state indicates whether the MG-CSI is active or not.
- Notification flag. The notification flag indicates whether the change of MG-CSI shall trigger Notification on Change of Subscriber data.

2.14.2 Other Data stored in the HLR

2.14.2.1 Negotiated CAMEL Capability Handling

The HLR shall have a set of *negotiated CAMEL Capability Handling* variables. Each CSI that may be downloaded to the VLR or to the SGSN shall have a negotiated CAMEL Capability Handling (CCH) variable associated with it.

The negotiated CCH variable for a CSI indicates what CAMEL Phase is indicated in that CSI in the VLR or SGSN.

When the negotiated CCH variable has a value NULL, it indicates that the given CSI has not been downloaded to the VLR or SGSN.

The following table shows the *negotiated CAMEL Capability Handling* variables.

Variable name	Associated CSI	CSI stored in	Allowable values for negotiated CCH
O-CSI Negotiated CAMEL Capability Handling	O-CSI	VLR	NULL, 1, 2, 3, 4
D-CSI Negotiated CAMEL Capability Handling	D-CSI	VLR	NULL, 3, 4
SS-CSI Negotiated CAMEL Capability Handling	SS-CSI	VLR	NULL, 2
VT-CSI Negotiated CAMEL Capability Handling	VT-CSI	VLR	NULL, 3, 4
MO-SMS-CSI VLR Negotiated CAMEL Capability Handling	MO-SMS-CSI	VLR	NULL, 3
MT-SMS-CSI VLR Negotiated CAMEL Capability Handling	MT-SMS-CSI	VLR	NULL, 4
M-CSI Negotiated CAMEL Capability Handling	M-CSI	VLR	NULL, 3
MG-CSI Negotiated CAMEL Capability Handling	MG-CSI	SGSN	NULL, 4
MO-SMS-CSI SGSN Negotiated CAMEL Capability Handling	MO-SMS-CSI	SGSN	NULL, 3
MT-SMS-CSI SGSN Negotiated CAMEL Capability Handling	MT-SMS-CSI	SGSN	NULL, 4
GPRS-CSI Negotiated CAMEL Capability Handling	GPRS-CSI	SGSN	NULL, 3

There is no *negotiated CAMEL Capability Handling* variable associated with TIF-CSI.

The HLR does not store a *Negotiated CAMEL Capability Handling* for CSIs that are sent to the GMSC, since a subscriber is not permanently registered in a GMSC.

2.14.2.2 Supported CAMEL Phases

The HLR shall store the supported CAMEL Phases of the VLR where the subscriber is currently registered and the SGSN where the subscriber is currently attached.

The following variables are required:

- VLR Supported CAMEL Phases
- SGSN Supported CAMEL Phases

The HLR does not store the Supported CAMEL Phases of the GMSC, since a subscriber is not permanently registered at a GMSC.

2.14.2.2A Offered CAMEL4 CSIs

The HLR shall store the offered CAMEL4 CSIs of the VLR where the subscriber is currently registered and the SGSN where the subscriber is currently attached.

The following variables are required:

- VLR Offered CAMEL4 CSIs
- SGSN Offered CAMEL4 CSIs

The HLR does not store the Offered CAMEL4 CSIs of the GMSC, since a subscriber is not permanently registered at a GMSC.

2.14.2.3 UG-CSI

The USSD general CAMEL service(UG-CSI) is also stored in the HLR. This data is used on USSD request receipt from the MS. It consists of a list of:

- a service code. The service code defines a specific application in the gsmSCF;
- a gsmSCFAddress. It is the gsmSCF address (E.164 number) where the USSD application is treated for this subscriber.

2.14.2.4 gsmSCF address for CSI

This information element contains the list of gsmSCF address (E.164 address) to which Notification on Change of Subscriber Data is to be sent.

2.14.3 Subscriber data stored in VLR

2.14.3.1 Originating CAMEL Subscription Information (O-CSI)

The Originating CAMEL Subscription Information (O-CSI) are stored in the VLR.

This data defines the contents of the originating CAMEL subscription information used to interwork with the gsmSCF for MO and CF calls. It consists of:

- A TDP list: The TDP list is a list of TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the MO State Model where service triggering may take place. For O-CSI, the allowed DP value are *DP Collected_info*, *DP Route_Select_Failure*.
 2. A gsmSCF address. It is the gsmSCF address (E.164 number) where the CAMEL service is treated for the subscriber. A gsmSCF address is associated to each serviceKey.
 3. A serviceKey. The serviceKey identifies to the gsmSCF the service logic.. A serviceKey is associated to each TDP.
 4. A default Call Handling. The default call handling indicates whether the call shall be released or continued as requested in case of error in the gsmSSF to gsmSCF dialogue. A default Call Handling is associated to each serviceKey.
 5. DP criteria: The DP criteria indicates on which criteria the gsmSSF shall access the gsmSCF. DP criteria is associated to each TDP.
- CAMEL capability handling. It gives the CAMEL phase associated to the O-CSI (CAMEL phase1, or phase2, phase3, or phase4).

2.14.3.2 VMSC Terminating CAMEL Subscription Information (VT-CSI)

This data defines the contents of the visited terminating CAMEL subscription information used by the VMSC to interwork with the gsmSCF for an MT call. It consists of:

- A TDP list. The TDP list is a list of TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the MT State Model where service triggering may take place. For VT-CSI, the allowed DP value are *DP Terminating Attempt Authorised*, *DP T_Busy*, *DP T_No_Answer*.
 2. A gsmSCF address. It is the gsmSCF address (E.164 number) where the CAMEL service is treated for the subscriber. A gsmSCF address is associated to each serviceKey.
 3. A serviceKey. The serviceKey identifies to the gsmSCF the service logic. A serviceKey is associated to each TDP.

4. A default Call Handling. The default call handling indicates whether the call shall be released or continued as requested in case of error in the gsmSSF to gsmSCF dialogue. A default Call Handling is associated to each serviceKey.
 5. DP criteria: The DP criteria indicates on which criteria the gsmSSF shall access the gsmSCF.
- CAMEL capability handling. It gives the CAMEL phase associated to the VT-CSI. It is set to CAMEL phase3 or phase4.

2.14.3.3 Supplementary Service invocation notification(SS-CSI)

This data is used to notify the gsmSCF about Supplementary Service invocation. It consists of :

- a notification criterion, which may be ECT, CD or MPTY
- a gsmSCFaddress. It is the gsmSCF address (E.164 number) where the notification of the Supplementary service invocation is treated for this subscriber.

2.14.3.4 Mobility Management event notification (M-CSI)

This data indicates which Mobility Management events shall be reported to the gsmSCF. It consists of:

- gsmSCF address : This is the address of the gsmSCF where the Mobility Management event notification shall be sent to. The gsmSCF address must be in E.164 format.
- ServiceKey: The serviceKey is included in the notification to the gsmSCF and indicates to the gsmSCF which Service Logic shall be applied.
- Mobility Management Triggers. These triggers define which Mobility Managements events shall be reported to the gsmSCF. The mobility managements triggers may contain one or any combination of the following elements:
 - Location update in the same VLR service area;
 - Location update to another VLR service area;
 - IMSI attach;
 - MS initiated IMSI detach (explicit detach);
 - Network initiated IMSI detach (implicit detach).

2.14.3.5 Mobile Originating Short Message Service CAMEL Subscription Information (MO-SMS-CSI)

This data defines the contents of the MO SMS CAMEL subscription information used for the interworking between gsmSCF and gsmSSF, for CAMEL control of circuit switched MO SMS.

MO-SMS-CSI consists of the following data items:

- TDP List. The TDP list is a list of SMS TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the MO SMS State Model where service triggering may take place.
For MO-SMS-CSI, the only allowed DP value is *SMS_Collected_Info*.
 2. gsmSCF Address. The gsmSCF address is the address (E.164 number) of the gsmSCF.
 3. ServiceKey. The serviceKey identifies to the gsmSCF the service logic that shall be applied.
 4. Default SMS handling. The default SMS handling indicates whether the MO SMS submission request shall be rejected or continued in the case of error in the dialogue between the gsmSSF and gsmSCF or between the gprsSSF and gsmSCF;
- CAMEL Capability Handling. CAMEL Capability Handling indicates the CAMEL Phase that is required for the MO SMS service.
The CAMEL Capability Handling for MO-SMS-CSI shall have the value CAMEL phase 3.

2.14.3.6 Mobile Terminating Short Message Service CAMEL Subscription Information (MT-SMS-CSI)

This data defines the contents of the mobile terminating short message service CAMEL subscription information. The MT-SMS-CSI CAMEL Subscription Information is used for interworking between gsmSCF and gsmSSF, for CAMEL control of circuit switched MT SMS.

MT-SMS-CSI consists of the following data items:

- TDP List. The TDP list is a list of MT SMS TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the MT SMS State Model where service triggering may take place.
For MT-SMS-CSI, the only allowed DP value is *SMS-Delivery-Request*
 2. gsmSCF Address. The gsmSCF address is the address (E.164 number) of the gsmSCF where the MT SMS CAMEL Service associated with this TDP, is located for this subscriber.
 3. Service Key. The service key identifies to the gsmSCF the service logic that shall be applied.
 4. Default SMS handling. The default SMS handling indicates whether the MT SMS delivery request shall be rejected or continued in the case of error in the dialogue between the gsmSSF and gsmSCF or between the gprsSSF and gsmSCF
 5. DP criterion. The DP criterion indicates on which criterion the gsmSSF shall access the gsmSCF. A DP criterion is associated with each TDP. For MT-SMS the DP criterion is the TDPU type. The criterion may be absent.

TDP	Triggering Criterion	ServiceKey	gsmSCF address	Default SMS Handling
DP SMS-Delivery Request	TDPU type	One serviceKey	One E.164 gsmSCF address	One Default SMS handling

- CAMEL Capability Handling. CAMEL Capability Handling indicates the CAMEL Phase that is required for the MT SMS service. The CAMEL Capability Handling for MT-SMS-CSI shall have the value CAMEL phase 4.

2.14.3.7 Dialed service CAMEL Subscription Information (D-CSI)

This data defines the contents of the dialed service CAMEL subscription information used to interwork with the gsmSCF for MO and MF call. It is applicable at TDP Analysed Info. It consists of:

- DP Criteria list, this consists of 1 to 10 entries containing : DP Criterion: It indicates when the gsmSSF shall request gsmSCF for instructions.
 1. A gsmSCF address. It is the gsmSCF address (E.164 number) where this Subscribed Dialed CAMEL service is treated for the subscriber. A gsmSCF address is associated to each DP Criterion.
 2. A serviceKey. The serviceKey identifies to the gsmSCF the service logic. A serviceKey is associated to each DP Criterion.
 3. A default Call Handling. It indicates whether the call shall be released or continued as requested in case of error in the gsmSSF to gsmSCF dialogue. A default Call Handling is associated to each DP Criterion.
- CAMEL capability handling. It indicates the CAMEL phase associated to the D-CSI (CAMEL phase3 or CAMEL phase4 shall be indicated).

2.14.3.8 Translation Information flag (TIF-CSI)

This flag is used to indicate that the VLR shall not attempt to perform any actions on the deflected to number (DTN).

2.14.4 Data stored in SGSN

2.14.4.1 Mobile Originating Short Message Service CAMEL Subscription Information (MO-SMS-CSI)

This data defines the contents of the MO SMS CAMEL subscription information. The MO-SMS-CSI in SGSN is used for the Interworking between SGSN and gsmSCF, for CAMEL control of packet switched MO SMS.

MO-SMS-CSI consists of the following data items:

- TDP List. The TDP list is a list of SMS TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the MO SMS State Model where service triggering may take place.
For MO-SMS-CSI, the only allowed DP value is *SMS_Collected_Info*.
 2. gsmSCF Address. The gsmSCF address is the address (E.164 number) of the gsmSCF where the MO SMS CAMEL Service associated with this TDP, is located for this subscriber.
 3. ServiceKey. The serviceKey identifies to the gsmSCF the service logic that shall be applied.
 4. Default SMS handling. The default SMS handling indicates whether the MO SMS submission request shall be rejected or continued in the case of error in the dialogue between the gprsSSF and gsmSCF.
- CAMEL Capability Handling. CAMEL Capability Handling indicates the CAMEL Phase that is required for the MO SMS service.
The CAMEL Capability Handling for MO-SMS-CSI in SGSN shall have the value CAMEL phase 3.

2.14.4.2 Mobile Terminating Short Message Service CAMEL Subscription Information (MT-SMS-CSI)

This data defines the contents of the mobile terminating short message service CAMEL subscription information. The MT-SMS-CSI CAMEL Subscription Information is used for the Interworking between gsmSCF and gprsSSF, for CAMEL control of packet switched MT SMS.

MT-SMS-CSI consists of the following data items:

- TDP List. The TDP list is a list of MT SMS TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the MT SMS State Model where service triggering may take place.
For MT-SMS-CSI, the only allowed DP value is SMS-Delivery-Request
 2. gsmSCF Address. The gsmSCF address is the address (E.164 number) of the gsmSCF where the MT SMS CAMEL Service associated with this TDP, is located for this subscriber.
 3. ServiceKey. The serviceKey identifies to the gsmSCF the service logic that shall be applied.
 4. Default SMS handling. The default SMS handling indicates whether the MT SMS delivery request shall be rejected or continued in the case of error in the dialogue between the gprsSSF and gsmSCF.
 5. DP criterion. The DP criterion indicates on which criterion the gsmSSF shall access the gsmSCF. A DP criterion is associated with each TDP. For MT-SMS the DP criterion is the TDPU type. The criterion may be absent.

TDP	Triggering Criterion	ServiceKey	gsmSCF address	Default SMS Handling
DP SMS-Delivery Request	TDPU type	One serviceKey	One E.164 gsmSCF address	One Default SMS handling

- CAMEL Capability Handling. CAMEL Capability Handling indicates the CAMEL Phase that is required for the MT SMS service. The CAMEL Capability Handling for MT-SMS-CSI shall have the value CAMEL phase 4.

2.14.4.3 GPRS CAMEL Subscription Information (GPRS-CSI)

This data defines the contents of the GPRS CAMEL subscription information. The GPRS CAMEL Subscription Information is used for the interworking between gsmSCF and gprsSSF, for CAMEL control of packet switch call.

The GPRS-CSI consists of the following data items:

- TDP List. The TDP list is a list of GPRS TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the GPRS State Model where service triggering may take place.
 2. gsmSCF Address. The gsmSCF address is the address (E.164 number) of the gsmSCF where the GPRS CAMEL Service associated with this TDP, is located for this subscriber.
 3. Service Key. The service key identifies to the gsmSCF the service logic that shall be applied.
 4. Default GPRS handling. The default GPRS handling indicates whether the GPRS submission request shall be rejected or continued in the case of error in the dialogue between the gprsSSF and gsmSCF.
- CAMEL Capability Handling. CAMEL Capability Handling indicates the CAMEL Phase that is required for the GPRS service. The CAMEL Capability Handling for GPRS-CSI in SGSN shall have the value CAMEL phase 3.

2.14.4.4 Mobility Management for GPRS event notification (MG-CSI)

This data indicates which Mobility Management for GPRS events shall be reported to the gsmSCF. It consists of:

- gsmSCF address : This is the address of the gsmSCF where the Mobility Management for GPRS event notification shall be sent to. The gsmSCF address must be in E.164 format.
- Service Key: The service key is included in the notification to the gsmSCF and indicates to the gsmSCF which Service Logic shall be applied.

- Mobility Management Triggers. These triggers define which Mobility Management events shall be reported to the gsmSCF. The mobility management triggers may contain one or any combination of the following elements:
 - Routeing area update of MS to a different SGSN service area;
 - Routeing area update of MS within the same SGSN service area;
 - GPRS attach (e.g. MS switched on, successful routeing area update after network initiated detach);
 - MS-initiated GPRS detach (e.g. MS switched off);
 - Network-initiated transfer to the "not reachable for paging" state (the network has not received a periodic routeing area update from the MS and assumes that the MS is unreachable).

2.15 Data related to IST

2.15.1 IST Alert Timer

The IST Alert Timer indicates the timer value that the VMSC and the GMSC shall use to inform the HLR about each of the call activities that an IST non-CAMEL subscriber performs.

This parameter is only sent to the VLRs which support the non-CAMEL IST functionality.

2.16 Data related to Location Services

2.16.1 Subscriber Data stored in HLR

2.16.1.1 Privacy Exception List

This data contains the privacy classes for any target MS that identify the LCS clients permitted to locate the MS. For a detailed definition of this data, refer to 3GPP TS 23.271 [56].

2.16.1.2 GMLC Numbers

This data contains the GMLC addresses for an MS subscriber. These addresses may be used to verify that a location request from specific LCS clients is authorized for the target MS.

2.16.1.3 MO-LR List

This data contains the classes of MO-LR that are permitted for the MS subscriber. For a detailed definition of this data, refer to 3GPP TS 23.271 [56].

2.16.1.4 Service Types

This data contains the privacy settings for any target MS that identify the permitted service types for LCS clients requesting positioning of the MS. For a detailed definition of this data, refer to 3GPP TS 23.271 [56].

2.16.2 Data stored in GMLC

The GMLC stores data related to LCS clients. Refer to 3GPP TS 23.271 [56] for a detailed description.

2.16.3 Data stored in SMLC (GSM only)

The SMLC stores data related to associated Type A and Type B LMUs from which location measurements may be received. Refer to GSM 23.271 [56] for a detailed description.

2.16.4 Data stored in LMU (GSM only)

The LMU stores data related to its LCS measurement and O&M capabilities and may store data related to LCS measurements and O&M reports that it is required to provide to its controlling SMLC. The nature and content of this data is not defined in GSM.

2.16.5 Data stored in the MSC (GSM only)

In order to support routing of connectionless LCS messages to an SMLC or a Type B LMU, the MSC may store permanent routing data for an SMLC or a Type B LMU in association with a specific location area identifier or location area identifier plus cell identifier.

2.16.6 Data stored in the BSC (GSM only)

In order to support routing of connectionless LCS messages to an SMLC or a Type B LMU, the BSC may store permanent routing data for an SMLC or a Type B LMU in association with a specific location area identifier or location area identifier plus cell identifier.

2.16.7 Subscriber Data stored in HSS

2.16.7.1 List of Broadcast Location Assistance Data Types

This data contains information used to determine which ciphering key data should be provided to the UE if requested by the UE, when location assistance data is broadcast in E-UTRAN using ciphering. For a detailed definition of this data, refer to 3GPP TS 23.271 [56].

2.17 Data related to Super-Charger

2.17.1 Age Indicator

This data indicates the age of the subscription data provided by the HLR, e.g. the date and time at which the subscriber data was last modified in the HLR.

2.18 Data related to bearer service priority

2.18.1 CS Allocation/Retention priority

The Circuit Switched (CS) Allocation/Retention priority corresponds to the allocation/retention priority which is defined in 3GPP TS 23.107 [93]. It specifies the relative importance compared to other UMTS bearers for allocation and retention of the UMTS bearer in the CS domain.

The parameter is permanent subscriber data and is conditionally stored in the HLR and VLR.

2.19 Data related to charging

2.19.1 Subscribed Charging Characteristics

Subscribed Charging Characteristics are specified in 3GPP TS 32.251[84], for example whether the subscriber is a normal, prepaid, flat rate and/or hot billing subscriber.

Subscribed Charging Characteristics is permanent subscriber data and conditionally stored in HSS/HLR, SGSN, MME and ePDG (for GTP-based S2b only) (see 3GPP TS 23.060 [21], 3GPP TS 23.401 [74] and 3GPP TS 29.273[78]).

2.20 Data related to IMS Centralized Service

2.20.1 ICS Indicator

The ICS Indicator specifies whether or not the subscriber is an ICS user (see 3GPP TS 23.292 [71]).

The ICS Indicator is permanent subscriber data and is conditionally stored in the HSS, MME, VLR and SGSN.

NOTE: The value of ICS Indicator is unique for a given subscriber, for both CS and PS, so its value is the same when sent by the HSS/HLR to the MME/SGSN/VLR over the different interfaces.

2.21 Data related to SRVCC

2.21.1 STN-SR

2.21.1.1 General

The STN-SR identifies the Session Transfer Number for SRVCC or 5G-SRVCC (see 3GPP TS 23.003 [5]).

The STN-SR is temporary data and is conditionally stored in the UDM, HSS, AMF, MME and SGSN (see 3GPP TS 23.216 [80]).

2.21.1.2 STN-SR in EPS or GPRS

The existence or absence of a STN-SR data in the HSS indicates that the user is SRVCC subscribed or not SRVCC subscribed. This information on SRVCC subscription is independent of the STN-SR value. The creation or deletion of the STN-SR data in the HSS is ensured by provisioning.

NOTE: Backward compatibility cases (e.g. Pre-Release 10 AS) can still require provisioning of the STN-SR.

2.21.1.3 STN-SR in 5GS

The existence or absence of a STN-SR data in the UDM indicates that the user is 5G-SRVCC subscribed or not 5G-SRVCC subscribed. This information on SRVCC subscription is independent of the STN-SR value. The creation or deletion of the STN-SR data in the UDM is ensured by provisioning.

2.21.2 UE SRVCC Capability

2.21.2.1 General

This information element indicates the SRVCC capability of the UE and is described in 3GPP TS 23.237 [87].

2.21.2.2 UE SRVCC Capability in EPS

The UE SRVCC Capability is temporary data conditionally stored in the HSS, MME and SGSN.

2.21.2.3 UE SRVCC Capability in 5GS

The UE 5G SRVCC Capability is temporary data conditionally stored in the UDM and AMF.

2.21.3 Subscribed vSRVCC

The Subscribed vSRVCC is permanent data and is conditionally stored in the HSS and MME (see 3GPP TS 23.216 [80]). The Subscribed vSRVCC indicates that the user is subscribed to the Single Radio Video Call Continuity (vSRVCC) or not.

2.21.4 CS to PS SRVCC Allowed

The CS to PS SRVCC Allowed indicator is permanent data and is conditionally stored in the HSS and VLR (see 3GPP TS 23.216 [80]). The CS to PS SRVCC Allowed indicator indicates per PLMN whether the user is allowed to have CS to PS Single Radio Voice Call Continuity or not.

2.22 Data related to MBMS

2.22.1 MBMS GW F-TEID for Sm (Control Plane)

The MBMS GW F-TEID for Sm (Control Plane) is defined in 3GPP TS 29.274 [75]. MBMS GW F-TEID for Sm (control plane) is temporary data conditionally stored in MBMS GW and MME.

2.22.2 MBMS GW F-TEID for Sn (Control Plane)

The MBMS GW F-TEID for Sn (Control Plane) is defined in 3GPP TS 29.274 [75]. MBMS GW F-TEID for Sn (control plane) is temporary data conditionally stored in MBMS GW and SGSN.

2.22.3 Temporary Mobile Group Identity

Temporary Mobile Group Identity (TMGI) (see 3GPP TS 23.246 [85]) is permanent data stored in MBMS GW, MME, SGSN and BM-SC.

2.22.4 MBMS Flow Identifier

The MBMS Flow Identifier is defined in 3GPP TS 23.246 [85]. MBMS Flow Identifier is permanent data conditionally stored in MBMS GW, MME, SGSN and BM-SC.

2.22.5 MBMS IP Multicast Distribution

The MBMS IP Multicast Distribution is defined in 3GPP TS 29.274 [75]. MBMS IP Multicast Distribution is temporary data conditionally stored in MBMS GW, MME and SGSN.

2.22.6 MBMS Service Area

The MBMS Service Area is defined in 3GPP TS 23.246 [85]. MBMS Service Area is permanent data conditionally stored in MBMS GW, MME, SGSN and BM-SC.

2.22.7 MME F-TEID for Sm (Control Plane)

The MME F-TEID for Sm (Control Plane) is defined in 3GPP TS 29.274 [75]. This is temporary data conditionally stored in MBMS GW and MME.

2.22.8 SGSN F-TEID for Sn (Control Plane)

The SGSN F-TEID for Sn (Control Plane) is defined in 3GPP TS 29.274 [75]. This is temporary data conditionally stored in MBMS GW and S4-SGSN.

2.22.9 SGSN F-TEID for Sn (User Plane)

The SGSN F-TEID for Sn (User Plane) is defined in 3GPP TS 23.246 [85]. This is temporary data stored in MBMS GW and S4-SGSN.

2.22.10 MBMS session identifier

The MBMS Session identifier is defined in 3GPP TS 23.246 [85]. This is permanent data conditionally stored in MBMS GW, MME, SGSN and BM-SC.

2.22.11 MBMS session duration

MBMS session duration is defined in 3GPP TS 23.246 [85]. This is permanent data conditionally stored in MBMS GW, MME, SGSN and BM-SC.

2.22.12 QoS parameters

QoS parameters is defined in 3GPP TS 23.246 [85]. QoS is permanent data conditionally stored in MBMS GW, MME, SGSN and BM-SC.

2.22.13 MBMS Time to Data Transfer

The MBMS Time to Data Transfer is defined in 3GPP TS 23.246 [85]. This is permanent data conditionally stored in MBMS GW, MME, SGSN and BM-SC.

2.22.14 MBMS Data Transfer Start

The MBMS Data Transfer Start is defined in 3GPP TS 23.246 [85]. This is permanent data conditionally stored in MBMS GW, MME and BM-SC.

2.22.15 List of downstream nodes

The List of downstream nodes is defined in 3GPP TS 23.246 [85]. This is temporary data stored in MBMS GW, MME, SGSN and BM-SC.

2.22.16 MBMS Session Re-establishment Indication

The MBMS Session Re-establishment Indication is defined in 3GPP TS 23.007 [6]. This is temporary data conditionally stored in MME, SGSN, MBMS GW and BM-SC.

2.22.17 GCS AS Address

The GCS AS Address is defined in 3GPP TS 23.468 [95]. It is used to address the AS over the MB2-C reference point. This is temporary data stored in BM-SC.

2.22.18 MB2-U Port Number

The MB2-U Port Number is defined in 3GPP TS 23.468 [95]. It is used by the BM-SC to receive data related to one MBMS bearer from a GCS AS over the MB2-U reference point. This is temporary data stored in BM-SC.

2.22.19 MBMS Start Time

The MBMS Start Time is defined in 3GPP TS 23.468 [95]. This is temporary data stored in BM-SC.

2.22.20 TMGI Expiration Time

The TMGI Expiration Time is defined in 3GPP TS 23.468 [95]. This is temporary data stored in BM-SC.

2.22.21 MBMS Alternative IP Multicast Distribution

The MBMS Alternative IP Multicast Distribution is defined in 3GPP TS 29.274 [75]. The MBMS Alternative IP Multicast Distribution is temporary data conditionally stored in MBMS GW and MME.

2.22.22 MBMS Cell List

The MBMS Cell List is defined in 3GPP TS 23.246 [85]. The MBMS Cell List is permanent data conditionally stored in the BM-SC, MBMS GW and MME.

2.23 Data related to Cellular IoT Control Plane Optimizations

2.23.1 Robust Header Compression Context

The Robust Header Compression Configuration and Context contains the ROHC configuration and context used between the UE and the MME for the small data transferred over control plane. It is defined in IETF RFC 4995 [104]. The contents of the ROHC configuration and the ROHC context are specified in 3GPP TS 24.301 [105]. It is a temporary data conditionally stored in the MME.

2.23.2 Void

2.23.3 MME F-TEID for S11 (User Plane)

F-TEID for S11 is defined in 3GPP TS 29.274 [75].

MME F-TEID for S11 is temporary data conditionally stored in MME and S-GW.

2.23.4 S-GW F-TEID for S11(User Plane)

F-TEID for S11 is defined in 3GPP TS 29.274 [75].

S-GW F-TEID for S11 is temporary data conditionally stored in MME and S-GW.

2.23.5 Serving-PLMN-Rate-Control

The Serving-PLMN-Rate-Control contains the rate control information requested for CIoT in the serving PLMN. It is defined in 3GPP TS 23.682 [102] and 3GPP TS 29.128 [106]. It is permanent data conditionally stored in the MME, SGW, PGW and SCEF.

2.23.6 APN-Rate-Control

The APN-Rate-Control contains the rate control information per APN allowed for CIoT from the home operator. It is defined in 3GPP TS 23.682 [102] and 3GPP TS 29.128 [106]. It is permanent data conditionally stored in the SCEF and PGW.

2.23.7 Not Reachable for NIDD Flag

The Not Reachable for NIDD Flag is defined in 3GPP TS 29.128 [106]. It indicates that Non-IP Data has been attempted to be delivered by one or more SCEF(s) to a UE that is temporarily not reachable due to a power saving function (e.g. extended idle mode DRX or UE Power Saving Mode) and that the corresponding SCEF(s) need to be notified when the UE is reachable or about to become reachable.

The Not Reachable for NIDD Flag (together with the list of SCEF(s)) is temporary data conditionally stored in the MME.

2.23.8 NIDD Authorization

The NIDD Authorization contains whether the UE is authorized for MT/MO NIDD for a given APN, and the time period when this authorization is valid. It is permanent data conditionally stored in the HSS and SCEF.

2.24 Data related to ERP

2.24.1 General

Following clauses describe the data that are defined on a per user basis and are related to EAP-Reauthentication Protocol (ERP).

2.24.2 ERP-Authorization

ERP-Authorization is defined in 3GPP TS 29.273 [78].

ERP-Authorization is used to indicate if a user is authorized to use ERP.

ERP-Authorization is permanent data conditionally stored in the HSS and the 3GPP AAA Server.

2.24.3 ERP Keying Material

ERP Keying Material is composed of rMSK and eventually rMSK Lifetime.

rMSK and rMSK Lifetime are defined in IETF RFC 6696 [110].

ERP Keying Material is temporary data conditionnaly stored in the 3GPP AAA Server or the 3GPP AAA Proxy.

2.24.4 ERP Realm

ERP-Realm is defined in 3GPP TS 29.273 [78].

ERP-Realm is used to identify the realm in which is located the ER server that will serve the user.

ERP-Realm is permanent data conditionnaly stored in the 3GPP AAA Server or the 3GPP AAA Proxy.

2.25 Data related to the support of 5GS

2.25.1 SUPI

The Subscription Permanent Identifier (SUPI) is defined in clause 2.2A of 3GPP TS 23.003 [5]).

SUPI is permanent data conditionally stored in the UDM, AMF, SMF, SMSF and NEF.

2.25.2 GPSI

The Generic Public Subscription Identifier (GPSI) shall contain either an External Id (see clause 19.7.2 of 3GPP TS 23.003 [5]) or an MSISDN (see clause 3.3 of 3GPP TS 23.003 [5]). Multiple identifiers may be assigned to a user.

GPSI is permanent data conditionally stored in the UDM, AMF, SMF and NEF.

2.25.3 Internal Group ID-list

Internal Group ID-list is a list of the subscribed internal group(s) that the UE belongs to.

Internal Group ID is permanent data conditionally stored in the UDM, AMF and SMF.

2.25.4 Subscribed NSSAI

The Subscribed NSSAI (Network Slice Selection Assistance Information) represents the set of S-NSSAI(s) for a SUPI.

The NSSAI is permanent data conditionally stored in UDM, AMF and SMF.

2.25.5 Default S-NSSAI

The default S-NSSAI (Network Slice Selection Assistance Information) represents the default S-Nssai for a SUPI.

The default S-NSSAI is permanent data conditionally stored in UDM and AMF.

2.25.6 5G QoS Parameters

5G QoS Parameters (see 3GPP TS 23.501 [112]) are permanent data conditionally stored in UDM and SMF.

2.25.7 Forbidden area

Forbidden area defines areas in which the subscriber is not permitted to initiate any communication with the network (see 3GPP TS 23.501 [112] and 3GPP TS 23.316 [120]).

Forbidden area is permanent data conditionally stored in UDM and AMF.

2.25.8 Service Area Restriction

Service Area Restriction indicates either Allowed areas in which the UE is permitted to initiate communication with the network, or Non-allowed areas in which the UE and the network are not allowed to initiate Service Request or SM signalling to obtain user services. (see 3GPP TS 23.501 [112]) and 3GPP TS 23.316 [120]).

Service Area Restriction is permanent data conditionally stored in UDM and AMF.

2.25.9 RFSP Index

RAT/Frequency Selection Priority Index (RFSP Index), an index to a specific RRM configuration as defined in 3GPP TS 23.501 [112].

RFSP Index is permanent data and is conditionally stored in the UDM and AMF.

2.25.10 Priority Service

Priority indicates that the UE is subscribed to the MPS or MCX in the 5GS domain, as defined in 3GPP TS 23.501 [112] and 3GPP TS 23.379 [115].

Priority service is permanent data and is conditionally stored in the UDM and AMF.

2.25.11 DNN Info

Data Network Name Information (DNN Info) contains the DNN and optionally the default DNN indicator and LBO roaming allowed for the DNN see 3GPP TS 29.503 [114].

DNN Info is permanent data and is conditionally stored in the UDM and SMF.

2.25.12 DNN Configuration

Data Network Name Configuration (DNN Configuration) contains the DNN, pduSessionTypes, SSC modes, 5G QoS parameters, sessionAMBR, 3gppChargingCharacteristics, static IP Address and acsInfo see 3GPP TS 29.503 [114].

DNN Configuration is permanent data and is conditionally stored in the UDM and SMF.

2.25.13 Steering of Roaming Information

Steering of roaming information (see 3GPP TS 29.503 [114]) contains e.g. the preferred PLMN/AccessTechnologies.

Steering of roaming information is temporary data and is conditionally stored in the UDM, AMF and AUSF.

2.25.14 SMS supported Data

SMS supported Data (see 3GPP TS 29.503 [114]) contains the supported SMS service delivery options of the UE.

SMS supported Data is temporary data and is conditionally stored in the UDM, AMF and SMSF.

2.25.15 SMSF Registrations

SMSF Registrations (see 3GPP TS 29.503 [114]) contains the SMSF address registered for SMS service.

SMSF Registration is temporary data and is conditionally stored in the UDM, AMF and SMSF.

2.25.16 SMS subscribed

SMS subscribed (see 3GPP TS 29.503 [114]) indicates if the subscriber has subscription for:

- MT SMS service
- MO SMS service.

SMS subscribed is permanent data and is mandatory stored in the UDM and SMSF.

2.25.17 SMS barring

SMS barring indicates if the subscriber has barrings for:

- Barring of all incoming calls for MT-SMS
- Barring of incoming calls for MT-SMS when roaming outside the Home Public Land Mobile Network (PLMN) country
- Barring of all outgoing calls for MO-SMS
- Barring of outgoing calls for MO-SMS when roaming outside the Home Public Land Mobile Network (PLMN) country.

SMS barring is permanent data and is conditionally stored in the UDM and SMSF.

2.25.18 SMS Roaming

The SMS Roaming (see 3GPP TS 29.503 [114]) if the subscriber is restriction for MT and MO SMS services when roaming.

The SMS Roaming is permanent data and is conditionally stored in the UDM, AMF and SMSF.

2.25.19 Core Network Type Restriction

Core Network Type Restriction defines the types of Core Networks that are disallowed for a UE.

Core Network Type Restriction is permanent data and is conditionally stored in the UDM and AMF.

2.25.20 LADN Information

LADN (Local Area Data Network) information (i.e. LADN service area information and LADN DNN) list of DNNs with LADN indication.

LADN Information is permanent data and is conditionally stored in the UDM and AMF.

2.25.21 Subscribed Periodic Registration Timer

Subscribed periodic registration timer (see 3GPP TS 23.502 [113]) is permanent data conditionally stored in UDM and AMF.

2.25.22 PEI

The PEI (see 3GPP TS 23.502 [113] and 3GPP TS 23.316 [120]) is temporary data conditionally stored in UDM, AMF and SMF.

2.25.23 5G GUTI

The 5G GUTI (see 3GPP TS 23.003 [5]) is temporary data conditionally stored in AMF.

2.25.24 PLMN Identifier

The PLMN Identifier identifies the VPLMN in which the subscriber is serving or allowed to serve. The PLMN identifier is permanent subscriber data stored conditionally in the UDM, AMF, SMF and SMSF.

2.25.25 PDU Session

The PDU session (see 3GPP TS 29.503 [114]) is the association between the UE and a Data Network that provides a PDU connectivity service.

The PDU session is temporary data conditionally stored in the UDM, AMF and SMF.

2.25.26 Trace Data

The Trace Data (see 3GPP TS 32.422 [64]) is the association between the UE and a Data Network that provides a PDU connectivity service.

The Trace Data is permanent data conditionally stored in the UDM, AMF and SMF.

2.25.27 Mobile Initiated Connection Only (MICO) mode

The Mobile Initiated Connection Only (MICO) mode (see 3GPP TS 23.501 [112]) provides the information if MICO mode is allowed.

The Mobile Initiated Connection Only (MICO) mode is permanent data conditionally stored in the UDM and AMF.

2.25.28 UE purged in AMF flag

UE purged in AMF flag is set in the UDM per IMSI record in order to indicate that the subscriber data for the UE concerned have been purged in the AMF. The parameter shall take the following values:

- UE purged in AMF;
- UE not purged in AM.

The default value is "UE not purged in AMF". The parameter is temporary subscriber data, stored in the UDM.

2.25.29 GUAMI

The GUAMI (Globally Unique AMF Identifier) (see 3GPP TS 23.501 [112]) of the serving AMF.

The GUAMI is temporary data conditionally stored in the UDM, SMF and AMF.

2.25.30 RAND, AUTN, XRES, CK', IK'

Random Challenge (RAND), Authentication Token (AUTN), Expected Response (XRES), Cipher Key prime (CK') and (IK') form a quintuplet vector for user authentication based on EAP-AKA' as defined in clause 6.1.3.1 of 3GPP TS 33.501 [116].

This quintuplet is provided by the UDM to the AUSF.

2.25.31 RAND, AUTN, XRES*

Random Challenge (RAND), Authentication Token (AUTN) and Expected Response prime (XRES*) form a triplet for user authentication based on 5G AKA as defined in clause 6.1.3.2.0 of 3GPP TS 33.501 [116].

This triplet is provided by the UDM to the AUSF. The Expected Response prime (XRES*) is used in particular during the confirmation phase by the AUSF.

2.25.32 RAND, AUTN, HXRES*

Random Challenge (RAND), Authentication Token (AUTN) and H-Expected Response prime (HXRES*) form a triplet for user authentication based on 5G AKA as defined in clause 6.1.3.2.0 of 3GPP TS 33.501 [116].

This triplet is provided by the AUSF to the AMF.

2.25.33 Kausf

The Kausf is defined in 3GPP TS 33.501 [116]. It is a key either provided by the UDM if 5G-AKA is selected as authentication method or derived at the AUSF if EAP-AKA' is selected.

NOTE: For 5G-AKA, the Kausf is provided along with RAND, AUTN and XRES*.

The Kausf is temporary data conditionnaly stored at the AUSF.

2.25.34 Kseaf

The Kseaf is defined in 3GPP TS 33.501 [116]. It is a key provided by the AUSF to the AMF acting as an SEAF.

NOTE: For 5G-AKA, the Kseaf is provided if confirmation from AUSF is successful.

2.25.35 AuthenticationMethod

The AuthenticationMethod is described in 3GPP TS 33.501 [116].

The AuthenticationMethod is permanent data mandatory stored at the UDM.

2.25.36 PermanentKey

The PermanentKey is described in 3GPP TS 33.501 [116]. The permanent key shall be stored encrypted.

The PermanentKey is permanent data contitionally stored at the UDM.

2.25.37 SequenceNumber

The SequenceNumber is described in 3GPP TS 33.102 [52].

The SequenceNumber is temporary data conditionally stored at the UDM.

2.25.38 AuthenticationManagementField

The AuthenticationManagementField is described in 3GPP TS 33.501 [116].

The AuthenticationManagementField is permanent data conditionally stored at the UDM.

2.25.39 VectorAlgorithm

The VectorAlgorithm the algorithm used for the generation of authentication vectors see 3GPP TS 29.505 [119].

The VectorAlgorithm is permanent data conditionally stored at the UDM.

2.25.40 Milenage

The Milenage described in 3GPP TS 35.206 [117].

The Milenage is permanent data conditionally stored at the UDM.

2.25.41 Tuak

The Tuak described in 3GPP TS 35.231 [118].

The Tuak is permanent data conditionally stored at the UDM.

2.25.42 Opc

The Opc described in 3GPP TS 35.205 [117].

The Opc is permanent data conditionally stored at the UDM.

2.25.43 Topc

The Topc described in 3GPP TS 35.231 [118].

The Topc is permanent data conditionally stored at the UDM.

2.25.44 Authentication Status

The authentication status of the UE contains authentication result, timestamp, and the serving network name.

The Authentication Status is temporary data conditionally stored at the UDM.

2.25.45 SoR-XMAC-I_{UE}

The SoR-XMAC-I_{UE} of the UE contains the expected SoR-XMAC-I_{UE} as specified in 3GPP TS 33.501 [116].

The SoR-XMAC-I_{UE} is temporary data conditionally stored at the UDM.

2.25.46 Shared Data Ids

The Shared Data Id is defined in 3GPP TS 29.503 [114].

Shared Data Ids are permanent data and are conditionally stored in the UDM, AMF, SMSF and SMF.

2.25.47 Access Restriction Data

The use of this data is described in 3GPP TS 23.501 [112] clause 5.3.4.1.1.

The Access Restriction Data is permanent subscriber data and is conditionally stored per PLMN in the UDM and the AMF.

The parameter takes either of the following values:

- NR not allowed as primary RAT, the subscriber shall not be allowed to access the network in TAs using NR radio access. Valid for Idle and Connected mode;
- NR not allowed as secondary RAT, the subscriber shall not be allowed to access the network using NR radio access as secondary RAT. Valid for Connected mode;

NOTE: As specified in clause 4.11.1.2.1 of 3GPP TS 23.502 [113], this restriction can also be applied when attached to EPC depending on operator policy, and in this case AMF will send this information to MME during handover from 5GC to EPC in order to allow MME to make appropriate handling, e.g. SGW selection based on access restriction, or whether or not to allocate resources for secondary RAT during inter RAT handover.

- NR in unlicensed bands not allowed as primary RAT, the subscriber shall not be allowed to access the network in TAs using NR radio access in unlicensed bands. Valid for Idle and Connected mode;
- NR in unlicensed bands not allowed as secondary RAT, the subscriber shall not be allowed to access the network using NR radio access in unlicensed bands as secondary RAT. Valid for Connected mode;
- E-UTRA not allowed as primary RAT, the subscriber shall not be allowed to access the network in TAs using E-UTRA radio access. Valid for Idle and Connected mode;
- E-UTRA not allowed as secondary RAT, the subscriber shall not be allowed to access the network using E-UTRA radio access as secondary RAT. Valid for Connected mode;
- E-UTRA in unlicensed bands not allowed as secondary RAT, the subscriber shall not be allowed to access the network using E-UTRA radio access in unlicensed bands as secondary RAT. Valid for Connected mode;
- NB-IoT not allowed, the subscriber shall not be allowed to access the network in TAs using NB-IoT radio access. Valid for Idle and Connected mode;
- LTE-M not allowed, the subscriber shall not be allowed to access the network in TAs using LTE-M radio access. Valid for Idle and Connected mode;
- NR(LEO) satellite access not allowed as primary RAT, the subscriber shall not be allowed to access the network in TAs using NR(LEO) satellite access. Valid for Idle and Connected mode;
- NR(MEO) satellite access not allowed as primary RAT, the subscriber shall not be allowed to access the network in TAs using NR(MEO) satellite access. Valid for Idle and Connected mode;
- NR(GEO) satellite access not allowed as primary RAT, the subscriber shall not be allowed to access the network in TAs using NR(GEO) satellite access. Valid for Idle and Connected mode;
- NR(OTHERSAT) satellite access not allowed as primary RAT, the subscriber shall not be allowed to access the network in TAs using NR(OTHERSAT) satellite access. Valid for Idle and Connected mode;
- NR RedCap not allowed as primary RAT, the subscriber shall not be allowed to access the network in TAs using NR radio access with reduced radio capability. Valid for Idle and Connected mode.

Only the access restriction for WB-E-UTRA and NB-IoT may include a different value per PLMN.

The use of this parameter for TA update procedures is described in 3GPP TS 23.501 [112].

2.25.48 IAB-Operation Allowed indication

The IAB-Operation Allowed indication defines if the subscriber is allowed for IAB node operation as specified in 3GPP TS 23.501 [112].

The IAB-Operation Allowed indication is permanent subscriber data and is conditionally stored in the UDM and the AMF.

2.25.49 UE radio capability ID

The UE radio capability ID is defined in 3GPP TS 23.003 [5]. Its usage is described in 3GPP TS 23.501 [112].

The UE radio capability ID is temporary subscriber data and is conditionally stored in the AMF.

2.25.50 RG Level Wireline Access Characteristics

RG Level Wireline Access Characteristics (see 3GPP TS 23.316 [120]) are permanent data conditionally stored in UDM and AMF.

2.25.51 RG-TMBR

RG-TMBR (see 3GPP TS 23.316 [120]) are permanent data conditionally stored in UDM and AMF.

2.25.52 List of 5GS Broadcast Location Assistance Data Types

This data contains information used to determine which ciphering key data should be provided to the UE if requested by the UE, when location assistance data is broadcast in NG-RAN using ciphering. For a detailed definition of this data, refer to 3GPP TS 23.273 [121].

The list of 5GS Broadcast Location Assistance Data Types is permanent subscriber data and is conditionally stored in the UDM and the AMF.

3 Definition of data for IP Multimedia domain

This clause describes the IMS data for IMS subscribers and PSI users.

3.1 Data related to subscription, identification and numbering

3.1.1 Private User Identity

The Private User Identity is applicable to IMS subscribers only. The Private User Identity is in the form of a Network Access Identifier (NAI), which is defined in IETF RFC 4282 [48].

If the GAA bootstrapping is based on authentication data from the IM domain, the corresponding Private User Identity from the IM domain (IMPI) is used as it is. If the GAA bootstrapping is based on the authentication data from the CS/PS domain, a Private User Identity is derived from user's IMSI according 3GPP TS 23.003 [5] is used.

The Private User Identity is permanent subscriber data and is stored in HSS and in S-CSCF.

3.1.2 Public User Identities

The Public User Identities of an IMS subscriber contain one or several instances of Public User Identity or Wildcarded Public User Identity, which are defined in 3GPP TS 23.003 [5].

The Public User Identities are permanent subscriber data and are stored in HSS, S-CSCF and BSF.

3.1.2A Private Service Identity

The Private Service Identity is applicable to a PSI user and is similar to a private user identity in the form of a Network Access Identifier (NAI), which is defined in IETF RFC 4282 [48]. The Private Service Identity is operator defined.

The Private Service Identity is permanent data and is stored in HSS and S-CSCF.

3.1.2B Public Service Identity

The Public Service Identity hosted by an application server may match either to a distinct PSI or a wildcarded PSI that is stored in the HSS. The PSI is defined in 3GPP TS 23.003 [5].

The relationship between Wildcarded Public Service Identities and Private Service Identities is one-to-one.

A Public Service Identity (distinct PSI or Wildcarded PSI) cannot be shared by more than one Private Service Identity.

The Public Service Identity is permanent data and is stored in HSS and S-CSCF.

3.1.3 Barring indication

Flag associated to each Public User Identity to indicate that the identity is barred from any IMS communication. A Public User Identity that is barred is allowed to register with the IMS.

The Barring indication is permanent subscriber data and is stored in the HSS and in the S-CSCF.

3.1.4 List of authorized visited network identifiers

The list of authorized visited network identifiers is associated with the Public User Identity to indicate which visited network identifiers are allowed for roaming. If the Public User Identity is part of a set of implicitly registered Public User Identities, the list of authorized visited network identifiers shall be the same for the whole set.

The list of authorized visited network identifiers is permanent subscriber data and is stored in the HSS. This list can be a linear list of visited network identifiers or a compound list of network identifier types e.g. home PLMN or home country; however the exact structure of the list is an implementation option.

3.1.5 Services related to Unregistered State

The Services related to Unregistered State is a parameter associated to each Public User Identity and Public Service Identity and it indicates whether the identity has services related to unregistered state or not. For a Public Service Identity the parameter shall always be set to value indicating that the identity has services related to unregistered state.

The Services related to Unregistered State is permanent subscriber data stored in the HSS.

3.1.6 Implicitly Registered Public User Identity Sets

The Implicitly Registered Public User Identity Set contains one or several instances of Public User Identity of an IMS subscriber, and is defined in 3GPP TS 29.228 [43] following the described concept in 3GPP TS 23.228 [42]. Several Implicitly Registered Public User Identity Sets can be configured for a given user. Each Public User Identity shall be included in no more than one Implicitly Registered Public User Identity Set.

The Implicitly Registered Public User Identity Sets are permanent subscriber data and are conditionally stored in HSS and in S-CSCF.

3.1.7 Default Public User Identity indicator

The Default Public User Identity indicator marks the Public User Identity to be used as default Public User Identity in each Implicitly Registered Public User Identity Set, and is defined in 3GPP TS 29.228 [43]. There shall be one Default Public User Identity per Implicitly Registered Public User Identity Set.

The Default Public User Identity indicator is permanent subscriber data and is conditionally stored in the HSS.

3.1.8 PSI Activation State

The PSI Activation State is specific for Public Service Identities and is defined in 3GPP TS 29.328 [54].

The PSI Activation State indicator for distinct PSIs is temporary subscriber data and is stored in the HSS. The PSI Activation State indicator for wildcarded PSIs is permanent subscriber data and is stored in the HSS. A wildcarded PSI or a distinct PSI that matches a wildcarded PSI shall not be activated/deactivated via the Sh interface.

3.1.9 Display Name

The Display Name is a string associated with a Public Identity

The Display Name is permanent subscriber data and is conditionally stored in the HSS and in the S-CSCF.

3.1.10 Alias Public User Identity Sets

The Alias Public User Identity Set contains two or more Public User Identities of an IMS subscriber, and these Public User Identities in the set are aliases of each other and their treatment is identical. Several Alias Public User Identity Sets can be configured for a given user. Each Public User Identity shall be included in no more than one Alias Public User Identity Set. All the Public User Identities in every Alias Public User Identity Set shall be included in the same Implicitly Registered Public User Identity Set, and shall be linked to the same Service Profile and share the same service data for each and every service, but there can be more than one Alias Public User Identity Set per Implicitly Registered Public User Identity Set and Service Profile.

The Alias Public User Identity Sets are permanent subscriber data and are conditionally stored in the HSS and in the S-CSCF.

3.1.11 Loose-Route Indication

The Loose-Route Indication indicates if the loose-route mechanism is required for all the Public User Identities belonging to a Private User Identity. It is defined in 3GPP TS 29.228 [43] following the described concept in 3GPP TS 24.229 [68].

The Loose-Route Indication shall have the same value for all the Private Identities of the IMS subscription if at least one Public User Identity is shared by the multiple Private Identities; otherwise, each Private User Identity may have a different Loose-Route Indication value.

The Loose-Route Indication is permanent subscriber data and is conditionally stored in the HSS and in the S-CSCF.

3.1.12 Service Priority Level

The Service Priority Level indicates the Priority Level allowed for the Public Identity. It is defined in 3GPP TS 29.228 [43] following the described concept in 3GPP TS 24.229 [68].

The Service Priority Level is permanent subscriber data and is conditionally stored in the HSS and the S-CSCF.

3.1.13 Extended Priority

The Extended Priority provides priority information for the Public Identity. It provides support for more than one subscribed namespaces in an operator's network, as included in priority mechanisms described in 3GPP TS 24.229 [68] and it is defined in 3GPP TS 29.228 [43].

The Extended Priority is permanent subscriber data and is conditionally stored in the HSS and the S-CSCF.

3.1.14 Reference Location Information

The Reference Location Information contains the reference location for the Private User Identity (e.g. line identification in the case of fixed line access). It is defined in 3GPP TS 29.228 [43] following the described concept in 3GPP TS 23.167 [89].

The Reference Location Information is permanent subscriber data and is conditionally stored in the HSS and the S-CSCF.

3.1.15 Privileged-Sender Indication

The Privileged-Sender Indication indicates if the corresponding Private User Identity shall be considered a privileged sender. It is defined in 3GPP TS 29.228 [43] following the described concept in 3GPP TS 24.229 [68].

If for an IMS subscription at least one Public User Identity is shared by more than one Private Identity, then all these Private Identities shall have the same value for the Privileged-Sender Indication; otherwise, each Private User Identity may have a different Privileged-Sender Indication value.

The Privileged-Sender Indication is permanent subscriber data and is conditionally stored in the HSS and in the S-CSCF.

3.1.16 Additional MSISDN (A-MSISDN)

An Additional MSISDN (A-MSISDN) is an MSISDN optionally assigned in addition to the already assigned MSISDN(s) to a user with PS subscription. For the definition of A-MSISDN see 3GPP TS 23.003 [5].

It is a permanent subscriber data stored in the HSS/HLR. It is temporarily stored in the MME, SGSN and AS.

3.2 Data related to registration

3.2.1 Registration Status

The Registration Status, specified in 3GPP TS 29.228 [43], contains the status of registration of a Public User Identity or a Public Service Identity (i.e. registered, not registered, unregistered). A Public Service Identity shall have only the registration status not registered or unregistered.

The Registration Status is temporary subscriber data and is stored in HSS.

3.2.2 S-CSCF Name

For an IMS subscriber, the S-CSCF Name identifies the S-CSCF allocated to the IMS subscriber when the subscriber is registered to IP Multimedia Services. It is used during mobile terminated sessions set-up and re-registrations.

For a Public Service Identity the S-CSCF Name identifies the S-CSCF allocated to the PSI for basic IMS routing. It is used during terminated call set-up for a PSI user.

The S-CSCF Name shall be in the form of a SIP URL as defined in IETF RFC 3261 [45] and RFC 2396 [46].

For an IMS subscriber and PSI user, the S-CSCF Name is temporary data and is stored in HSS.

3.2.2A AS Name

For a PSI user the AS Name identifies the application server hosting the Public Service Identity and is used for direct routing of a Public Service Identity.

The AS Name shall be in the form of a SIP URL as defined in IETF RFC 3261 [45] and RFC 2396 [46].

The AS Name is permanent data and is stored in the HSS.

3.2.3 Diameter Client Identity of S-CSCF

The Diameter Client Identity of the S-CSCF identifies the Diameter client in the S-CSCF when the IMS subscriber is registered to IP Multimedia Services or a PSI user has an assigned S-CSCF. It is used in requests sent by the HSS to the S-CSCF. The format of the Diameter Client Identity is the Diameter Identity defined in IETF RFC 3588 [51].

The Diameter Client Identity of the S-CSCF is temporary data and is stored in HSS.

3.2.4 Diameter Server Identity of HSS

The Diameter Server Identity of HSS identifies the Diameter Server in the HSS when the IMS subscriber is registered to IP Multimedia Services or the identity of HSS holding the IMS data of a PSI user. It is used in requests sent by the S-CSCF to the HSS. The format of the Diameter Server Identity is the Diameter Identity defined in IETF RFC 3588 [51].

For an IMS subscriber and PSI user, the Diameter Server Identity of the HSS is temporary data and is stored in S-CSCF.

3.2.5 UE Not Reachable via IP-SM-GW Flag (UNRI)

The UNRI is temporary subscriber data stored in the HLR/HSS and in the IP-SM-GW (AS). It indicates whether the UE is marked not reachable for short message delivery via the IMS.

3.2.6 UE Not Reachable via IP-SM-GW Reason (UNRR)

The UNRR is temporary subscriber data stored in the HLR/HSS. It indicates the reason why MT short message delivery failed at the IP-SM-GW.

3.2.7 S-CSCF Restoration Information

The S-CSCF Restoration Information, specified in 3GPP TS 29.228 [43], contains information for the S-CSCF to restore services for the user, including the list of SIP Proxies in the Path header, the Contact information and the UE's subscription information.

The S-CSCF Restoration Information is temporary subscriber data and is stored in the HSS and S-CSCF.

3.2.8 Maximum Number Of Allowed Simultaneous Registrations

The Maximum Number Of Allowed Simultaneous Registrations per public user identity is specified in 3GPP TS 29.228 [43].

It is permanent subscriber data and is stored in the HSS and S-CSCF.

3.3 Data related to authentication and ciphering

The Data related to authentication and ciphering are applicable to IMS subscribers only.

3.3.1 Random Challenge (RAND), Expected Response (XRES), Cipher Key (CK), Integrity Key (IK) and Authentication Token (AUTN)

For contents of Random Challenge (RAND), Expected Response (XRES), Cipher Key (CK), Integrity Key (IK) and Authentication Token (AUTN) see clause 2.3.2.

A set of quintuplet vectors are calculated in the HSS, and sent from the HSS to the S-CSCF (see 3GPP TS 29.228 [43]).

These data are temporary subscriber data conditionally stored in the HSS and in the S-CSCF.

3.3.2 Data related to SIP Digest Authentication

3.3.2.1 Digest Nonce

The Digest Nonce is a random (non-predictable) value selected by the S-CSCF (see 3GPP TS 29.228 [43]) and used by the client to calculate the authentication response (see IETF RFC 7616 [122]).

The Digest Nonce is temporary subscriber data and is stored in the S-CSCF.

3.3.2.2 Digest HA1

Digest HA1 is the value calculated as defined in IETF RFC 7616 [122]. It is calculated by the HSS and used by the S-CSCF to create the Expected Response (see 3.3.2.14). It is also used to create the Response-Auth (see 3.3.2.15) after a successful authentication verification has occurred.

HA1 is permanent subscriber data and is stored in the HSS and the S-CSCF.

3.3.2.3 Digest Nextnonce

Nextnonce is the nonce the server wishes the client to use for a future authentication response (see IETF RFC 7616 [122]).

Digest Nextnonce is temporary subscriber data and is stored in the S-CSCF.

3.3.2.4 Void

3.3.2.5 Authentication Pending Flag

The Authentication Pending flag, described in 3GPP TS 29.228 [43], indicates that the authentication of a Public User Identity - Private User Identity pair is pending and waiting for confirmation.

The Authentication Pending Flag is temporary data and is stored in the HSS.

3.3.1 Data related to NASS Bundled Authentication

3.3.3.1 Line Identifier List

Line Identifier List contains a list of fixed broadband access line identifiers associated to the user and used by the S-CSCF to authenticate the user.

Line Identifier List is permanent subscriber data and is stored in HSS and the S-CSCF.

3.4 Data related S-CSCF selection information

3.4.1 Server Capabilities

The Server Capabilities contains information to assist the I-CSCF in the selection of a S-CSCF for an IMS subscriber or a PSI user. For definition and handling of the data see 3GPP TS 29.228 [43] and 3GPP TS 29.229 [44].

The Server Capabilities information is permanent data and is stored in HSS.

3.4.2 S-CSCF Reassignment Pending Flag

The S-CSCF Reassignment Pending Flag, described in 3GPP TS 29.228 [43] indicates that the subscription can be reassigned to a new S-CSCF (i.e. the current S-CSCF is not responding).

The S-CSCF Reassignment Pending Flag is temporary data and is stored in the HSS.

3.5 Data related to Application and service triggers

For definition and handling of these data see 3GPP TS 23.218 [53].

3.5.1 Void

3.5.2 Initial Filter Criteria

A set of Initial Filter Criteria are stored for each user, for each application or service that the user request may invoke. The relevant service points of interest are defined in 3GPP TS 23.218 [53] clause 5.2.

Each set of filter criteria includes the Application Server Address, AS priority, Default Handling, Subscribed Media, Trigger Points and Optional Service Information.

For a PSI that is routed according to the basic IMS routing principles, Initial Filter criteria is mandatory in order to route towards the AS hosting the PSI.

3.5.3 Application Server Information

The HSS may store Application Server specific information for each user. This information may include Service Key, Trigger Points, and Service Scripts etc. (see 3GPP TS 23.218 [53] clause 9.3.1)

3.5.4 Service Indication

The Service Indication, associated with a public user identity, identifies exactly one set of service related transparent data (see 3GPP TS 29.328 [54]), which is stored in an HSS in an operator network. It is defined in 3GPP TS 29.328 [54].

The Service Indication is permanent subscriber data and is stored in the HSS and one or more ASs.

3.5.5 Shared iFC Set Identifier

Shared iFC Set Identifier identify sets of Initial Filter Criteria that may be shared by more than one IMS subscriber or PSI user. The translation from a Shared iFC Set Identifier to the set of initial Filter Criteria is performed in the S-CSCF based on operator configuration.

The Shared iFC Set Identifier are permanent data stored in the HSS and in the S-CSCF.

3.5.6 Transparent Data

The Transparent Data is information stored in the HSS by the AS per Service Indication and Public User Identity or Public Service Identity (Repository Data). It is defined in 3GPP TS 29.328 [54]. If the Public Service Identity matches a Wildcarded Public Service Identity, the transparent data shall be stored per Wildcarded PSI, and not for each specific Public Service Identity matching that Wildcarded PSI. Transparent Data for Wildcarded Public User Identities shall also be stored per Wildcarded Public User Identity, and not for each identity matching that Wildcarded Public User Identity. Transparent data for an Alias Public User Identity Set shall be stored and shared by each and every Public User Identity within the same Public User Identity Set.

The Transparent Data is temporary subscriber data and is stored in the HSS and one or more ASs.

3.5.7 Application Server Identity List

The Application Server Identity List is stored in the HSS per Public User Identity or Public Service Identity and per requested user data (data-reference) for a given expiration time. It identifies the application servers which subscribed to notifications of the user data updates and need to be notified when the data subscribed changes.

Application Server Identity List is temporary data and is stored in the HSS.

3.6 Data related to Core Network Services Authorization

3.6.1 Subscribed Media Profile Identifier

The Subscribed Media Profile Identifier identifies a set of session description parameters that the IMS subscriber or PSI user is authorized to request. The translation from the Profile Identifier to the set of subscribed media is performed in the S-CSCF based on operator configuration.

The Subscribed Media Profile Identifier is permanent data stored in the HSS and in the S-CSCF.

3.6.2 List of Subscribed IMS Communication Service Identifiers

The list of subscribed IMS Communication Service Identifiers is associated with the IMS Public Identity and identifies the list of IMS communication services that the subscriber is authorized to use as specified in 3GPP TS 23.228 [42]. The syntax of the IMS Communication Service Identifier is defined in 3GPP TS 24.229 [68]. The usage of IMS Communication Service Identifier for policing the allowed IMS communication service is performed in the S-CSCF and in the AS based on operator configuration.

The List of Subscribed IMS Communication Service Identifiers is permanent data stored in the HSS and conditionally in the S-CSCF and AS.

3.7 Data related to Charging

The following charging function names shall be common to the entire IMS Subscription i.e. the same set of charging function names shall be returned for all the identities inside the same IMS Subscription.

3.7.1 Primary Event Charging Function Name

The Primary Event Charging Function Name identifies the primary Online Charging Function, which performs on-line charging. The format is specified in 3GPP TS 29.229 [44].

The Primary Event Charging Function Name is permanent data stored in the HSS and in the S-CSCF.

3.7.2 Secondary Event Charging Function Name

The Secondary Event Charging Function Name identifies the secondary Online Charging Function, which performs on-line charging. The format is specified in 3GPP TS 29.229 [44].

The Secondary Event Charging Function Name is permanent data stored in the HSS and in the S-CSCF.

3.7.3 Primary Charging Collection Function Name

The Primary Charging Collection Function Name identifies the primary Charging Data Function, which provides off-line charging support for IMS subscribers and PSIs. The format is specified in 3GPP TS 29.229 [44].

The Primary Charging Collection Function Name is permanent data stored in the HSS and in the S-CSCF.

3.7.4 Secondary Charging Collection Function Name

The Secondary Charging Collection Function Name identifies the secondary Charging Data Function, which provides off-line charging support for IMS subscribers and PSIs. The format is specified in 3GPP TS 29.229 [44].

The Secondary Charging Collection Function Name is permanent data stored in the HSS and in the S-CSCF.

3.8 Data related to CAMEL Support of IMS Services

The Data related to CAMEL Support of IMS Services are applicable to IMS subscribers only.

3.8.1 Originating IP Multimedia CAMEL Subscription Information (O-IM-CSI)

This data defines the contents of the Originating IP Multimedia CAMEL subscription information used to interwork with the gsmSCF for originating IP multimedia sessions. It consists of:

- A TDP list. The TDP list is a list of TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the O-IM-BCSM where service triggering may take place. For O-IM-CSI, the allowed DP values are *DP Collected_info*, *DP Route_Select_Failure*.
 2. A gsmSCF address. It is the gsmSCF address (E.164 number) where the CAMEL service is treated for the subscriber. A gsmSCF address is associated to each serviceKey.
 3. A serviceKey. The serviceKey identifies to the gsmSCF the service logic. A serviceKey is associated to each TDP.
 4. A default Call Handling. The default call handling indicates whether the IP Multimedia session shall be released or continued as requested in case of error in the IM-SSF to gsmSCF dialogue. A default Call Handling is associated to each serviceKey.
 5. DP criteria. The DP criteria indicates on which criteria the IM-SSF shall access the gsmSCF. DP criteria is associated to each TDP.

TDP	Triggering Criteria (*)	ServiceKey	gsmSCF address	Default Call Handling
DP Collected_ Info	No Criterion Number criteria	One ServiceKey	One E.164 gsmSCF address	One Default call handling
DP Route_Select_Failure	No criterion Cause value criteria	One ServiceKey	One E.164 gsmSCF address	One Default call handling
NOTE: One or more TDP criteria shall be applicable. All applicable triggering criteria must be satisfied before the dialogue is established with the gsmSCF.				

- CAMEL capability handling. It gives the CAMEL phase associated to the O-IM-CSI (phase 4).
- The CSI state. The CSI state indicates whether the O-IM-CSI is active or not. The CSI state is not sent to the IM-SSF.
- The notification flag, the notification flag indicates whether changes of the O-IM-CSI shall trigger Notification on Change of Subscriber Data towards the gsmSCF and IM-SSF. The notification flag is not sent to the IM-SSF.

3.8.2 Terminating IP Multimedia CAMEL Subscription Information (VT-IM-CSI)

This data defines the contents of the terminating IP Multimedia CAMEL subscription information used to interwork with the gsmSCF for terminating IP multimedia sessions. It consists of:

- A TDP list. The TDP list is a list of TDP descriptions. Each TDP description contains the following elements:
 1. DP Value. The DP value identifies the DP in the T-IM-BCSM where service triggering may take place. For VT-IM-CSI, the allowed DP values are *DP Terminating_Attempt_Authorised*, *DP T_Busy*, *DP T_No_Answer*.
 2. A gsmSCF address. It is the gsmSCF address (E.164 number) where the CAMEL service is treated for the subscriber. A gsmSCF address is associated to each serviceKey.
 3. A serviceKey. The serviceKey identifies to the gsmSCF the service logic. A serviceKey is associated to each TDP.
 4. A default Call Handling. The default call handling indicates whether the IP Multimedia session shall be released or continued as requested in case of error in the IM-SFF to gsmSCF dialogue. A default Call Handling is associated to each serviceKey.
 5. DP criteria. The DP criteria indicates on which criteria the IM-SSF shall access the gsmSCF. DP criteria is associated to each TDP.

TDP	Triggering Criteria (*)	ServiceKey	gsmSCF address	Default Call Handling
DP Terminating_Attempt_Authorised	No Criterion	One serviceKey	One E.164 gsmSCF address	One Default call handling
DP T_Busy	No criterion Cause value criteria	One serviceKey	One E.164 gsmSCF address	One Default call handling
DP T_No_Answer	No criterion Cause value criteria	One service Key	One E.164 gsmSCF address	One Default call handling
NOTE: One or more TDP criteria shall be applicable. All applicable triggering criteria must be satisfied before the dialogue is established with the gsmSCF.				

- CAMEL capability handling. It gives the CAMEL phase associated to the VT-IM-CSI (CAMEL phase 4).
- The CSI state indicates whether the VT-IM-CSI is active or not. The CSI state is not sent to the IM-SSF.
- Notification flag. The notification flag indicates whether the change of the VT-IM-CSI shall trigger Notification on Change of Subscriber data towards the gsmSCF and IM-SSF. The notification flag is not sent to the IM-SSF.

3.8.3 Dialed Services IP Multimedia CAMEL Subscription Information (D-IM-CSI)

This data defines the contents of the dialed service CAMEL subscription information used to interwork with the gsmSCF for originating and forwarded IP Multimedia sessions. It is applicable at TDP Analysed Info. It consists of:

- DP Criteria list. This consists of 1 to 10 entries. Each entry shall contain the following items:
 1. DP Criterion. It indicates when the IM-SSF shall request gsmSCF for instructions. It is a destination number.
 2. A gsmSCF address. It is the gsmSCF address (E.164 number) where this Subscribed Dialed CAMEL service is treated for the subscriber. A gsmSCF address is associated to each DP Criterion.
 3. A serviceKey. The serviceKey identifies to the gsmSCF the service logic. A serviceKey is associated to each DP Criterion.
 4. A default Call Handling. It indicates whether the IP Multimedia session shall be released or continued as requested in case of error in the IM-SSF to gsmSCF dialogue. A default Call Handling is associated to each DP Criterion.
- CAMEL capability handling. It indicates the CAMEL phase associated to the D-IM-CSI (CAMEL phase 4).
- CSI state: indicates whether the D-IM-CSI is active or not. The CSI state is not sent to the IM-SSF.
- Notification Flag. It indicates whether the change of the D-IM-CSI shall trigger the Notification on Change of Subscriber Data towards the gsmSCF and IM-SSF. The notification flag is not sent to the IM-SSF.

3.8.4 gsmSCF address for IM CSI

This information element contains the list of gsmSCF address (E.164 address) to which Notification on Change of Subscriber Data is to be sent.

3.8.5 IM-SSF address for IM CSI

This information element contains the IM-SSF address to which Notification on Change of Subscriber Data is to be sent. The IM-SSF address is entered in the HSS/HLR at UE registration and is deleted when the HSS/HLR initiates or is notified of the UE deregistration.

3.9 Data related to IMS Service Level Trace

3.9.1 IMS Service Level Trace Information

The IMS Service Level Trace Information is utilised by the S-CSCF and the Application Server to enable service level tracing within the IMS Core Network. The content of the IMS Service Level Trace Information is defined in the management object specified in 3GPP TS 24.323 [111].

The IMS Service Level Trace Information is temporary subscriber data and is stored in the HSS, S-CSCF and Application Server.

3.10 Data related to Generic Authentication Architecture

The Generic Authentication Architecture (GAA) is independent from CS/PS and IM domains, but it requires a subscription in the HSS for every its users at least in one of the domains for generation of authentication vectors. The need for a GAA specific subscription data in the HSS for GAA specific user identities and/or authorization controls is GAA application dependent. At the same time, GAA shall not be considered as a separate domain in the same sense as the notion of a "domain" is considered for CS and PS.

The Generic Authentication Architecture is defined in 3GPP TS 33.220 [58] and 3GPP TS 29.109 [59]. For data related to GAA, see also the definition of Private User Identity in clause 3.1.1.

3.10.1 GAA Service Type

The GAA Service Type is an enumerated integer, which is defined in 3GPP TS 29.109 [58].

The GAA Service Type is permanent subscriber data and is stored in the HSS, BSF and NAF.

3.10.2 GAA Service Identifier

The GAA Service Identifier (GSID) is an integer, which uniquely identifies a GAA Service. For example a set of NAFs belonging to a certain GAA Service Type and owned or managed by a certain operator may provide the same operator specific service and they may use the same GAA Service Identifier to identify their services to BSF. The owner of the user's home HSS may define different GAA Authorization flags and allowed Private User Identities for each GAA Service Identifiers separately.

The GAA Service Identifier is permanent subscriber data and is stored in the HSS, BSF and NAF.

3.10.3 GBA User Security Settings

The GBA User Security Settings (GUSS) is identified by a Private User Identity. The GBA User Security Settings contains optional BSF control information (i.e., UICC Security Type and optional Key Lifetime) and a set of User Security Setting (USS).

The GBA User Security Settings is permanent subscriber data and is stored in the HSS, and the BSF.

3.10.4 User Security Setting

The User Security Setting (USS) is unique identified by a combination of Private User Identifiers (IMPI) and GAA Service Identifiers (GSID). The User Security Setting contains a list of allowed public identities for the service and possible authorization flags. No duplicates are allowed.

The User Security Setting is permanent subscriber data and is stored in the HSS, BSF and NAF.

3.10.5 User Public Identity

The User Public Identity (UID) is a freely defined string that can be used as user's public identity in a GAA application. A list of allowed User Public Identities is stored for each GAA Service Subscription. A User Public Identity may be connected to several GAA Service Subscription.

The User Public Identity is permanent subscriber data and is stored in the HSS, BSF and NAF.

3.10.6 GAA Authorization flag

The GAA Authorization flag is a GAA Service type specific integer code, which authorizes a defined security operation in the GAA service. A list of allowed operations is stored for each GAA Service Subscription.

The values of the authorization flags for each application type using them are listed in TS 29.109 [59]

The Authorization Flag is permanent subscriber data and is stored in the HSS, BSF and NAF.

3.10.7 Bootstrapping Transaction Identifier

The Bootstrapping Transaction Identifier (B-TID) identifies the security association between a BSF and a UE after a bootstrapping procedure in GAA. According to 3GPP TS 33.220 [58], the B-TID value shall be also generated in format of NAI by taking the base64 encoded RAND value (see IETF RFC 4648 [123] for description of the base64 encoding scheme) and the BSF server name, i.e. base64 encoded (RAND)@BSF_servers_domain_name.

The Bootstrapping Transaction Identifier is temporary subscriber data and is stored in the BSF and NAF.

3.10.8 Key Lifetime

Key Lifetime is an integer which defines the length of the validity period of bootstrapping information in BSF in seconds.

The Key Lifetime is permanent subscriber data and is stored in the HSS, and the BSF.

3.10.9 UICC Security Type

The UICC Security Type indicates the allocation of security procedure inside a User Equipment i.e. are security applications executed entirely inside mobile equipment or also in UICC .

The values of UICC Security Type are defined in TS 29.109 [59]

The UICC Security Type is permanent subscriber data and is stored in the HSS and BSF.

3.10.10 NAF Group

The NAF Group contains one or more NAF Address elements (cf. clause 3.9.12) defining the NAFs that belong to the NAF Group. The NAF Group is identified by NAF Group Identity (cf. clause 3.9.11).

NOTE: The grouping of NAFs is done in each home network separately, i.e. one NAF contacting BSFs in different home networks belongs to different groups in every home network.

The NAF Group Setting is permanent subscriber data and is stored in the BSF.

3.10.11 NAF Group Identity

The NAF Group Identity is a freely defined string that the home operator can use as a name of a group of NAFs.

The NAF Group Identity is permanent subscriber data and is stored in the HSS and BSF.

3.10.12 NAF Address

The NAF Address is a freely defined string that can be used to identify one or more NAFs. The NAF Address may contain a fully qualified domain identifying a single NAF. The NAF Address may also contain a domain name with wildcards "*" and it can be used to identify multiple NAFs.

The NAF Address is permanent subscriber data and is stored in the BSF.

3.10.13 Key Expirytime

Key Expirytime is an integer which defines the expiry time of bootstrapping information in BSF in seconds according to Diameter Time format as specified in IETF RFC 3588[51].

The Key Expirytime is temporary subscriber data and is stored in the BSF and NAF.

3.10.14 Bootstrapping Info Creation Time

Bootstrapping Info Creation Time is an integer which defines the point of time when the corresponding bootstrapping information is created in BSF in seconds according.

3.10.15 Diameter Server Identity of HSS

The Diameter Server Identity of HSS identifies the HSS storing the GAA specific subscription data for a subscriber. It is used in requests sent by the BSF to the HSS. The format of the Diameter Server Identity is the Diameter Identity defined in IETF RFC 3588 [51].

The Diameter Server Identity of the HSS is temporary data and is stored in BSF.

3.11 Definition of subscriber data I-WLAN domain

NOTE: The WLAN Network Selection and WLAN/3GPP Radio Interworking features supersede the I-WLAN feature from Rel-12 onwards, therefore all I-WLAN subscriber data specified in the present Clause are no longer maintained.

3.11.1 Data related to subscription, identification and numbering

3.11.1.1 IMSI

The International Mobile Subscriber Identity (IMSI) is defined in 3GPP TS 23.003 [5]. The IMSI serves as the root of the subscriber data pseudo-tree.

3.11.1.2 Mobile Subscriber ISDN Number (MSISDN)

Mobile Subscriber ISDN Number (MSISDN) is defined in 3GPP TS 23.003 [5]. One MSISDN is used for WLAN-IW subscription. If the multinumbering option applies, the MSISDN used is the Basic MSISDN (see clause 2.1.3 for more information on MSISDNs for multinumbering option).

3.11.1.3 W-APN

The WLAN Access Point Name (W-APN) is defined in 3GPP TS 23.003 [5]. This parameter identifies a data network and a point of interconnection to that network (Packet Data Gateway).

3.11.1.4 List of authorized visited network identifiers

The list of authorized visited network identifiers field indicates which 3GPP visited network identifiers are allowed for roaming.

This list can be a linear list of visited network identifiers or a compound list of network identifier types e.g. home PLMN or home country; however the exact structure of the list is an implementation option.

3.11.1.5 3GPP AAA Proxy Name

The 3GPP AAA Proxy Name, specified in 3GPP TS 29.234 [63], defines the Diameter or RADIUS Identity of the 3GPP AAA Proxy node.

3.11.1.6 3GPP AAA Server Name

The 3GPP AAA Server Name, specified in 3GPP TS 29.234 [63], defines the Diameter or RADIUS Identity of the 3GPP AAA Server node.

3.11.1.7 Serving PDG List

The Serving PDG List field contains the addresses of the PDGs to which the WLAN UE is connected.

3.11.1.8 Serving WAG

The Serving WAG field contains the WAG address information obtained through the successful user authentication procedure.

3.11.1.9 WLAN UE Local IP Address

The WLAN UE Local IP Address field, specified in 3GPP TS 23.234 [62], represents the IPv4/IPv6 address of the WLAN UE in the WLAN AN. It is an address used to deliver the packet to a WLAN UE in a WLAN AN.

3.11.1.10 WLAN UE Remote IP Address

The WLAN UE Remote IP Address field, specified in 3GPP TS 23.234 [62], represents the IPv4/IPv6 address of the WLAN UE in the network which the WLAN UE is accessing. It is an address used in the data packet encapsulated by the WLAN UE-initiated tunnel and is the source address used by applications in the WLAN UE. The WLAN UE Remote IP address is per W-APN, see clause 3.11.5.1.4.

3.11.2 Data related to registration

3.11.2.1 User Status

The User Status field identifies the registration status of the I-WLAN User. The User Status shall be either REGISTERED, in which case there is an associated Serving 3GPP AAA Server Name stored at the HSS, or NOT_REGISTERED, in which case there may or may not be a 3GPP AAA Server Name stored.

3.11.2.2 Emergency Access Flag

The Emergency Access flag is specified in 3GPP TS 29.234 [63]. It enables operators to control the access to I-WLAN for emergency purposes. The parameter takes either of the following values:

- Access is for emergency purposes.
- Access is not for emergency purposes.

The flag is set in the 3GPP AAA Server if the WLAN Direct IP access is indicated to be for emergency purposes.

3.11.2.3 Diameter Server Identity of HSS

The Diameter Server Identity of HSS identifies the identity of HSS storing the I-WLAN specific subscription data for a subscriber. It is used in requests sent by the 3GPP AAA Server to the HSS. The format of the Diameter Server Identity is the Diameter Identity defined in IETF RFC 3588 [51].

The Diameter Server Identity of the HSS is temporary data and is stored in 3GPP AAA Server.

3.11.3 Data related to authentication and ciphering

3.11.3.1 Random Number (RAND), Signed Response (SRES) and Ciphering Key (Kc)

Random Number (RAND), Signed Response (SRES) and Ciphering Key (Kc) fields form a triplet vector used for authentication and encryption as defined in 3GPP TS 43.020 [31].

In I-WLAN for SIM based users, triplet vectors are calculated in the 2G AuC and provided to the 2G HLR/HSS (see GSM 12.03 [36]). For USIM based users, triplet vectors are derived from quintuplet vectors in the 3G HLR/HSS if needed (see 3GPP TS 33.102 [52]).

A set of up to 5 triplet values are sent from the 2G HLR/HSS to the 3GPP AAA Server upon request. These data are temporary subscriber data stored in the 3GPP AAA Server.

3.11.3.2 Random Challenge (RAND), Expected Response (XRES), Cipher Key (CK), Integrity Key (IK) and Authentication Token (AUTN)

Random Challenge (RAND), Expected Response (XRES), Cipher Key (CK), Integrity Key (IK) and Authentication Token (AUTN) fields form a quintuplet vector used for user authentication, data confidentiality and data integrity as defined in 3GPP TS 33.102 [52].

In I-WLAN, a set of quintuplet vectors are calculated in the AuC, and up to 5 quintuplets are sent from the HLR/HSS to the 3GPP AAA Server upon request (see 3GPP TS 29.002 [27]).

These data are temporary subscriber data stored in the HSS and 3GPP AAA Server.

3.11.3.3 Master Key (MK)

The Master Key (MK) field is defined in 3GPP TS 33.234 [92]. It enables keys to be derived.

3.11.3.4 Transient EAP Keys (TEKs)

The Transient EAP Keys (TEKs) field is defined in 3GPP TS 33.234 [92] and are used to protect the EAP packets.

3.11.3.5 Master Session Key (MSK)

The Master Session Key (MSK) field is defined in 3GPP TS 33.234 [92] and is used to obtain the key material required for the link layer confidentiality mechanism and IPsec confidentiality mechanism.

3.11.4 Data related to session

3.11.4.1 Session Identifier

The Session Identifier field, specified in 3GPP TS 29.234 [63], indicates a unique Diameter signalling session specific to the user.

3.11.4.2 Session-Timeout

The Session-Timeout field, specified in 3GPP TS 29.234 [63], indicates the maximum period for a session measured in seconds. It is used for re-authentication purposes. If this field does not appear, the WLAN AN shall apply default time intervals.

3.11.5 Operator Determined Barring general data

3.11.5.1 W-APN Authorised List

The W-APN Authorised field is specified in 3GPP TS 29.234 [63]. It contains authorization information for each W-APN. This parameter indicates the list of allowed W-APNs, the environment where the access is allowed and optionally the charging data specific for that W-APN and the Static IP address.

3.11.5.1.1 W-APN Identifier List

See clause 3.11.1.3.

3.11.5.1.2 W-APN Barring Type List

The W-APN Barring Type field is specified in 3GPP TS 29.234 [63]. It indicates the subscriber access type to the home and visited network's services. The parameter takes either of the following values:

- Allow access to this W-APN regardless of whether the subscriber is located in a VPLMN or in the HPLMN;
- Prohibit access to this W-APN within the HPLMN when the subscriber is located in a VPLMN;
- Prohibit access to this W-APN within the VPLMN when the subscriber is located in a VPLMN;
- Prohibit access to this W-APN within the HPLMN when the subscriber is located in the HPLMN;
- Prohibit access to public Internet through any W-APN regardless of whether the subscriber is located in a VPLMN or in the HPLMN.

3.11.5.1.3 W-APN Charging Data List

The W-APN Charging Data field is specified in 3GPP TS 29.234 [63]. When this parameter is present, it supersedes the general charging information to be applied for the subscriber. See clause 3.11.7.

3.11.5.1.4 Static WLAN UE Remote IP Address List

WLAN UE IP Address field identifies the IPv4/IPv6 address that the operator has statically assigned to the WLAN UE. See clause 3.11.1.10.

3.11.5.1.5 Maximum Number of Accesses List

The Maximum Number of Accesses is specified in 3GPP TS 29.234[63]. It enables operators to specify the maximum number of concurrent accesses per W-APN.

3.11.5.1.6 Access Number List

Access Number is an integer counter kept at the 3GPP AAA Server per W-APN.

3.11.5.2 Access Dependence Flag

The Access Dependence Flag is specified in 3GPP TS 29.234 [63]. It enables operators to authenticate a subscriber accessing the I-WLAN by WLAN 3GPP IP Access independently of a previous WLAN Direct IP Access. The parameter takes either of the following values:

- Allow access to WLAN 3GPP IP Access independently of a previous WLAN Direct IP Access.
- Prohibit access to WLAN 3GPP IP Access independently of a previous WLAN Direct IP Access.

3.11.5.3 I-WLAN Access Type

The I-WLAN Access Type field is specified in 3GPP TS 29.234 [63]. It indicates the types of access the subscriber has used to access to the I-WLAN. The parameter takes either of the following values:

- WLAN 3GPP IP Access;
- WLAN Direct IP Access.

3.11.5.4 WLAN Direct IP Access

WLAN Direct IP Access (see 3GPP TS 29.234 [63]) is permanent data conditionally stored in HSS. It indicates whether the user is allowed to have WLAN direct IP access to external IP networks from the WLAN Access Network. The WLAN Direct IP Access is stored as temporary data also in the 3GPP AAA Server.

3.11.6 QoS general data

3.11.6.1 Max Subscribed Bandwidth

The Max Subscribed Bandwidth field, specified in 3GPP TS 29.234 [63], indicates the Max subscribed bandwidth.

3.11.6.2 Routing Policy

The Routing Policy field, specified in 3GPP TS 29.234 [63], defines a packet filter for an IP flow.

3.11.6.3 Subscribed 3GPP WLAN QoS Profile

The Subscribed 3GPP WLAN QoS Profile field, specified in 3GPP TS 29.234 [63], defines a subscribed 3GPP WLAN QoS profile per W-APN.

3.11.6.4 Authorized 3GPP WLAN QoS Profile

The Authorized 3GPP WLAN QoS Profile field, specified in 3GPP TS 29.234 [63], defines the authorized 3GPP WLAN QoS profile per W-APN for a user.

3.11.7 Data related to Charging

3.11.7.1 Charging Data

The Charging Data field identifies the Charging Characteristics plus the Charging Nodes to be applied per user for all W-APNs or per user for individual W-APNs.

3.11.7.1.1 Charging Characteristics

Charging Characteristics field is defined in 3GPP TS 32.252 [66]. It indicates the charging type to be applied to the user tunnel.

3.11.7.2 Primary OCS Charging Function Name

The Primary OCS Charging Function Name field identifies the Primary OCS Function node that performs on-line based charging. The format is specified in 3GPP TS 29.234 [63].

3.11.7.3 Secondary OCS Charging Function Name

The Secondary OCS Charging Function Name field identifies the Secondary OCS Charging Function node that performs on-line based charging. The format is specified in 3GPP TS 29.234 [63].

3.11.7.4 Primary Charging Collection Function Name

The Primary Charging Collection Function Name field identifies the primary Charging Collection Function node that provides off-line charging support for the IMS subscribers. The format is specified in 3GPP TS 29.234 [63].

3.11.7.5 Secondary Charging Collection Function Name

The Secondary Charging Collection Function Name field identifies the secondary Charging Collection Function node that provides off-line charging support for the IMS subscribers. The format is specified in 3GPP TS 29.234 [63].

3.11.7.6 WLAN Session Identifier

The WLAN Session Identifier is the identifier generated by 3GPP AAA Server and sent to PDG. Together with PDG Charging Identifier, it is used for correlating WLAN AN and PDG charging data. The format is specified in 3GPP TS 32.299 [67].

3.11.7.7 PDG Charging Identifier

The PDG Charging Identifier is the identifier generated by PDG and sent to 3GPP AAA Server. Together with WLAN Session Identifier, it is used for correlating WLAN AN and PDG charging data. The format is specified in 3GPP TS 32.299 [67].

3.12 Data related to Access Network Discovery and Selection Function (ANDSF)

3.12.1 General

Following clauses describe the Data that is defined on per user basis and is related to Access Network Discovery and Selection Function (ANDSF).

3.12.2 Policy Information

This set and contains a list of inter-system mobility policies. Each policy contains the following information while the corresponding coding is defined in 3GPP TS 24.312 [86]:

- Rule Priority: indicates the priority of the correspondent intersystem mobility policy;
- Prioritized Access: a set of information providing lists of possible technologies the UE can access. The technologies are prioritized based on operator preferences. It is also possible to indicate an access technology as forbidden or as restricted;
- Validity Area and Time of the Day: these two sets of information indicate where and when the policy can be applied by the UE. Different ways to describe the area of validity of the policy are provided and described in 3GPP TS 24.312 [86]. There can be multiple policies valid (e.g. overlapping validity areas): in this case, the value of Rule Priority is used as discriminator;
- Roaming: it indicates if the policy is also valid if the UE is roaming.

This set is permanent data conditionally stored in the ANDSF.

3.12.3 Discovery Information

This set contains the information regarding the access networks the UE can discover.

It contains the following information while the corresponding coding is defined in 3GPP TS 24.312 [86]:

- Access Network Type: indicates the type of the network for which discovery assistance information is provided;
- Access Network Area: describes the location where the access network indicated in the correspondent Access Network Type is expected to be available. Different ways to describe the area of validity of the policy are provided in 3GPP TS 24.312 [86];
- Access Network Information Reference: is a pointer to a set containing the relevant information for the networks the UE can discover (e.g. SSIDs and correspondent channels in case of WLAN access).

This set is permanent data conditionally stored in the ANDSF.

3.12.4 UE Location

This set provides information about the UE location, i.e. it is a way to indicate the position of the UE. This information can be used by ANDSF to limit the number of information sent to the UE. Different ways to describe the UE location are provided in 3GPP TS 24.312 [86].

This set is temporary data conditionally stored in the ANDSF.

3.13 Proximity Services (ProSe)

3.13.1 General

Following clauses describe the data that are defined on per user basis and are related to Proximity Services (ProSe).

3.13.2 ProSe Subscription data

3.13.2.1 ProSe-Permission

The ProSe-permission is part of the ProSe Subscription data information and is specified in 3GPP TS 29.344 [99].

ProSe-permission is permanent data conditionally stored in HSS, MME and ProSe Function.

3.13.2.2 PLMN-Allowed-ProSe

The PLMN-Allowed-ProSe is part of the ProSe Subscription data and is specified in 3GPP TS 29.344 [99].

PLMN-Allowed-ProSe is permanent data conditionally stored in HSS, MME and ProSe Function.

3.13.3 Application layer user ID

The Application layer user ID is specified in 3GPP TS 23.303 [98].

Application layer user ID is permanent data conditionally stored in ProSe Function and ProSe Application Server.

3.13.4 EPC ProSe User ID

The EPC ProSe User user ID is specified in 3GPP TS 23.003 [5].

EPC ProSe User ID is temporary data conditionally stored in ProSe Function, ProSe Application Server

3.13.5 ProSe Application ID

The ProSe Application ID is specified in 3GPP TS 23.003 [5].

ProSe Application ID is permanent data conditionally stored in ProSe Function.

3.13.6 ProSe Application Code

The ProSe Application Code is specified in 3GPP TS 23.003 [5].

ProSe Application Code is temporary data conditionally stored in ProSe Function.

3.13.7 Discovery Filter

3.13.7.1 Filter ID

The Filter ID part of the Discovery Filter is specified in 3GPP TS 24.334 [100].

Filter ID is permanent data conditionally stored in ProSe Function.

3.13.7.2 ProSe Application Code

The ProSe Application Code as part of the Discovery Filter is specified in 3GPP TS 23.003 [5].

ProSe Application Code is permanent data conditionally stored in ProSe Function.

3.13.7.3 ProSe Application Mask

The ProSe Application Mask as part of the Discovery Filter is specified in 3GPP TS 24.334 [100].

ProSe Application Mask as part of the discovery filter is permanent data conditionally stored in ProSe Function.

3.13.7.4 TTLTimer T4002

The TTLTimer T4002 as part of the Discovery Filter is specified in 3GPP TS 24.334 [100].

The TTLTimer T4002 as part of the discovery filter is permanent data conditionally stored in ProSe Function.

3.13.8 ProSe Function Identity

ProSe Function Identity is specified in 3GPP TS 29.344 [99].

The ProSe Function Identity is temporary subscriber data and is conditionally stored in the HSS and in the ProSe Application Server.

3.13.9 ProSe Metadata Index Mask

The ProSe Metadata Index Mask indicates which part of the ProSe Application Code contains the metadata index. It is specified in 3GPP TS 24.334 [100].

ProSe Metadata Index Mask is permanent data conditionally stored in ProSe Function.

3.13.10 PC5-tech

The PC5-tech indicates the PC5 radio technology in order to enable co-ordination between the announcing and monitoring side. It is specified in 3GPP TS 24.334 [100].

PC5-tech is temporary data conditionally stored in ProSe Function.

3.14 Architecture Enhancements for Service Exposure (AESE)

3.14.1 General

Following clauses describe the data that are defined on a per user basis and are related to Architecture Enhancements for Service Exposure (AESE).

3.14.2 SCEF-Reference-ID

SCEF-Reference-ID is defined in 3GPP TS 29.336 [103].

SCEF-Reference-ID is used to uniquely identify an event created by an SCEF.

SCEF-Reference-ID is temporary data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.3 SCEF-ID

SCEF-ID is defined in 3GPP TS 29.336 [103].

SCEF-ID is used to uniquely identify an SCEF.

SCEF-ID is permanent data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.4 Monitoring-Type

Monitoring-Type is defined in 3GPP TS 29.336 [103].

Monitoring-Type is used to identify type the event to be monitored.

Monitoring-Type is permanent data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.5 Maximum-Number-of-Reports

Maximum-Number-of-Reports is defined in 3GPP TS 29.336 [103].

Maximum-Number-of-Reports is used to indicate the number of reports to be delivered to the SCEF.

Maximum-Number-of-Reports is permanent data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.6 UE-Reachability-Configuration

UE-Reachability-Configuration number is defined in 3GPP TS 29.336 [103].

UE-Reachability-Configuration contain details for configuration for UE reachability.

UE-Reachability-Configuration is permanent data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.7 Monitoring-Duration

Monitoring-Duration is defined in 3GPP TS 29.336 [103].

Monitoring-Duration indicates the time for which the SCEF request to perform the monitoring.

Monitoring-Duration is permanent data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.8 Maximum-Detection-Time

Maximum-Detection-Time is defined in 3GPP TS 29.336 [103].

Maximum-Detection-Time contains the maximum number of time without any communication with the UE after which the SCEF is to be informed that the UE is considered to be unreachable.

Maximum-Detection-Time is permanent data conditionally stored in the SCEF and HSS.

3.14.9 Reachability-Type

Reachability-Type is defined in 3GPP TS 29.336 [103].

Reachability-Type indicates for which kind of reachability of the subscriber needs to be reported i.e. reachable for SMS or data.

Reachability-Type is permanent data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.10 Maximum-Latency

Maximum Latency is defined in 3GPP TS 29.336 [103].

Maximum Latency contains the maximum acceptable delay time for downlink data transfer.

Maximum Latency is permanent data conditionally stored in the SCEF and HSS.

3.14.11 Maximum-Response-Time

Maximum Response Time is defined in 3GPP TS 29.336 [103].

Maximum Response Time contains the maximum time for which the UE stays reachable.

Maximum Response Time is permanent data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.12 MONTE-Location-Type

MONTE-Location-Type is defined in 3GPP TS 29.336 [103].

MONTE-Location-Type indicates how actual the location information should be.

Location-Type is permanent data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.13 Accuracy

Accuracy is defined in 3GPP TS 29.336 [103].

Accuracy is used to indicate in which form geographic location information has to be provided in the report. Accuracy is permanent data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.14 Association-Type

Association-Type is defined in 3GPP TS 29.336 [103].

Association-Type indicates which kind (IMEI or SV) of change of the IMEI has to be reported. Association-Type is permanent data conditionally stored in the SCEF and HSS.

3.14.15 Charged-Party

Charged-Party is defined in 3GPP TS 32.299 [67].

Charged-Party holds the address (Public User ID: SIP URI, Tel URI, etc.) of the party to be charged.

Charged-Party is permanent data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.16 Remaining-number-of-reports

Remaining number of reports is defined in 3GPP TS 29.336 [103].

Remaining number of reports holds the number of reports which are outstanding to be sent to the SCEF. Remaining number of reports is temporary data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.17 Communication Pattern set

3.14.17.1 Periodic-Communication-Indicator

Periodic-Communication-Indicator is defined in 3GPP TS 29.336 [103].

Periodic-Communication-Indicator provides information if the CP occurs periodically or on demand.

Periodic-Communication-Indicator is permanent data conditionally stored in the SCEF, HSS and MME.

3.14.17.2 Communication-Duration-Time

Communication-duration-time is defined in 3GPP TS 29.336 [103].

Communication-duration-time contains the time in seconds of the duration of the periodic communication.

Communication-duration-time is permanent data conditionally stored in the SCEF, HSS and MME.

3.14.17.3 Periodic-Time

Periodic-Time is defined in 3GPP TS 29.336 [103].

Periodic-Time contains the time in seconds of the interval for periodic communication.

Periodic-Time is permanent data conditionally stored in the SCEF, HSS and MME.

3.14.17.4 Scheduled-Communication-Time

Scheduled-Communication-Time is defined in 3GPP TS 29.336 [103].

Scheduled-Communication-Time contains start and end times and repetition during a week for periodic communication.

Scheduled-Communication-Time is permanent data conditionally stored in the SCEF, HSS and MME.

3.14.17.5 Stationary-Indication

Stationary-Indication is defined in 3GPP TS 29.336 [103].

Stationary-Indication contains the information if the subscriber is stationary or mobile.

Stationary-Indication is permanent data conditionally stored in the SCEF, HSS and MME.

3.14.17.6 Validity-Time

Validity-Time is defined in 3GPP TS 29.336 [103].

Validity-Time provides the expiration time at which the CP sets shall be deleted.

Validity-Time is permanent data conditionally stored in the SCEF, HSS and MME.

3.14.18 AESE-Subscription-Data

AESE-Subscription-Data contains details on subscription information of the allowed services such as:

- allowed service (e.g. monitoring, CP set);

- allowed service types (e.g. allowed Monitoring events).

AESE-Subscription-Data is permanent data conditionally stored in the HSS.

3.14.19 SCEF-Realm

SCEF-Realm is defined in 3GPP TS 29.272 [81].

SCEF-Realm is used to identify the realm of the SCEF.

SCEF-Realm is permanent data conditionally stored in the SCEF, HSS, MME and SGSN.

3.14.20 External Identifier for Monitoring Event Configuration

The External Identifier for Monitoring Event Configuration contains an External Identifier as defined in 3GPP TS 23.003 [5] and identifies the External Identifier in the subscription that is associated to each Monitoring Event Configuration (MONTE) data instance.

The External Identifier for each Monitoring Event Configuration is permanent subscriber data and is stored in the HSS and conditionally in the SCEF, MME and SGSN.

3.14.21 External Group Identifier

The External Group Identifier contains an External Group Identifier as defined in 3GPP TS 23.003 [5].

The External Group Identifier for Monitoring Event Configuration is permanent subscriber data and is stored in the HSS and conditionally in the SCEF.

3.15 Data related to WebRTC

3.15.1 Allowed WAF and/or WWSF Identity List

An Allowed WAF or WWSF Identity identifies a WebRTC Authentication Function or WebRTC Web Server Function the subscription is allowed to use. See 3GPP TS 33.203 [49]. Multiple WAF or WWSF identities may be stored within the Allowed WAF and/or WWSF Identity List.

The Allowed WAF and/or WWSF Identity List is permanent data stored in the HSS and in the S-CSCF.

3.16 V2X Service (V2X)

3.16.1 General

Following clauses describe the data that are defined on per user basis and are related to V2X Service (V2X).

3.16.2 V2X Subscription data for the network scheduled LTE sidelink communication

3.16.2.1 V2X-Permission

The V2X-Permission is part of the V2X Subscription data information for the network scheduled LTE sidelink communication and is specified in 3GPP TS 29.272 [81].

V2X-Permission is permanent data conditionally stored in HSS and MME.

3.16.2.2 UE-PC5-AMBR

The UE-PC5-AMBR is part of the V2X Subscription data information for the network scheduled LTE sidelink communication and is specified in 3GPP TS 29.272 [81].

UE-PC5-AMBR is permanent data conditionally stored in HSS and MME.

3.16.2.3 V2X-PC5-Allowed-PLMN

The V2X-PC5-Allowed-PLMN is part of the V2X Subscription data and is specified in 3GPP TS 29.388 [108].

V2X-PC5-Allowed-PLMN is permanent data conditionally stored in HSS and V2X Control Function.

3.16.3 V2X Authorization data

3.16.3.1 V2X-Permission-in-VPLMN

The V2X-Permission-VPLMN is part of the V2X authorization data and is specified in 3GPP TS 29.389 [109].

V2X-Permission-in-VPLMN is permanent data conditionally stored in V2X Control Function.

3.16.3.2 V2X-Application-Server

The V2X-Application-Server is part of the V2X authorization data and is specified in 3GPP TS 29.389 [109].

V2X-Application-Server is permanent data conditionally stored in V2X Control Function.

3.16.3.3 PC5-RAT-Type

The PC5-RAT-Type is part of the V2X authorization data and is specified in 3GPP TS 29.389 [109].

PC5-RAT-Type is permanent data conditionally stored in HSS and V2X Control Function.

3.16.4 V2X Control Function Identity

V2X Function Identity is specified in 3GPP TS 29.388 [108].

The V2X Control Function Identity is temporary subscriber data and is conditionally stored in the HSS.

3.16.5 V2X Subscription data for the network scheduled NR sidelink communication

3.16.5.1 V2X-Permission

The V2X-Permission is part of the V2X Subscription data information for the network scheduled NR sidelink communication and is specified in 3GPP TS 29.272 [81].

V2X-Permission is permanent data conditionally stored in HSS and MME.

3.16.5.2 UE-PC5-AMBR

The UE-PC5-AMBR is part of the V2X Subscription data information for the network scheduled NR sidelink communication and is specified in 3GPP TS 29.272 [81].

UE-PC5-AMBR is permanent data conditionally stored in HSS and MME.

3.16.5.3 V2X-PC5-Allowed-PLMN

The V2X-PC5-Allowed-PLMN is part of the V2X Subscription data and is specified in 3GPP TS 29.388 [108].

V2X-PC5-Allowed-PLMN is permanent data conditionally stored in HSS and V2X Control Function.

3.16.5.4 UE-PC5-QoS

The UE-PC5-QoS is part of the V2X Subscription data information for the network scheduled NR sidelink communication and is specified in 3GPP TS 29.272 [81].

UE-PC5-AMBR is permanent data conditionally stored in HSS and MME.

4 Summary of data stored in location registers

Table 5.1 gives an overview of data stored in location registers for non-GPRS Network Access Mode (CS).

Table 5.2 shows the data stored in the location registers, in the Gn/Gp-SGSN and in the GGSN for GPRS Network Access Mode.

Tables 5.2A-1 show the data stored in the location registers, in the SGSN, S4-SGSN, MME, S-GW, P-GW, ePDG, 3GPP AAA server and 3GPP AAA server Proxy for EPS Network Access Mode.

Table 5.2B-1 show the data stored by the UDM, AMF, SMF, SMSF, AUSF and NEF in the 5G System.

Table 5.3 gives an overview of data stored for IP Multimedia services.

In the tables, M = mandatory means that this parameter is stored for all subscribers with subscription of the Network Access Mode as shown in the table heading and defining the table; and C = conditional means that the parameter is subject to some condition (e.g. subscription of teleservice or other services, reception of optional message or short-lived data). The type indication indicates whether the subscriber data is temporary (T) or permanent (P) data, where permanent data can be set and modified but by the operator, whereas the temporary data are set and changed automatically by network functions.

5 Accessing subscriber or PSI data

It shall be possible to retrieve or store subscriber data concerning a specific MS from the HSS by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);

- Mobile Station ISDN Number (MSISDN).

It shall be possible to retrieve CSG subscriber data concerning a specific roaming MS from the CSS by use of each of the following references:

- International Mobile Subscriber Identity (IMSI).

It may be possible to retrieve subscriber data concerning a specific roaming MS from the CSS by use of each of the following references:

- Mobile Station ISDN Number (MSISDN).

It shall be possible to retrieve or store subscriber IP Multimedia service data concerning a specific IMS subscription from the HSS by use of each of the following references:

- Private User Identity;
- Public User Identity.

It shall be possible to retrieve or store PSI IP Multimedia service data from the HSS by use of each of the following references:

- Public Service Identity.

It shall be possible to retrieve or store subscriber data concerning a specific MS from the VLR by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);
- Temporary Mobile Subscriber Identity (TMSI).

It shall be possible to retrieve or store subscriber data concerning a specific MS from the SGSN by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);
- Packet Temporary Mobile Subscriber identity (P-TMSI);
- International Mobile Equipment Identity (IMEI) for emergency attached UEs without IMSI (e.g; UICCless UE) or with an unauthenticated IMSI.

It shall be possible to retrieve or store subscriber data concerning a specific MS from the GGSN by use of the following reference:

- International Mobile Subscriber Identity (IMSI);
- International Mobile Equipment Identity (IMEI) for emergency attached UEs without IMSI (e.g; UICCless UE) or with an unauthenticated IMSI.

It shall be possible to retrieve or store subscriber data concerning a specific MS from the MME by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);
- Globally Unique Temporary Identity (GUTI);
- International Mobile Equipment Identity (IMEI) for emergency attached UEs without IMSI (e.g; UICCless UE) or with an unauthenticated IMSI.

It shall be possible to retrieve or store subscriber data concerning a specific MS from the S-GW and P-GW by use of the following reference:

- International Mobile Subscriber Identity (IMSI);
- International Mobile Equipment Identity (IMEI) for emergency attached UEs without IMSI (e.g; UICCless UE) or with an unauthenticated IMSI.

It shall be possible to retrieve or store subscriber data concerning a specific MS from the 3GPP AAA Server by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);
- Mobile Subscriber ISDN Number (MSISDN).
- International Mobile Equipment Identity (IMEI) for emergency attached UEs without IMSI (e.g; UICCless UE) or with an unauthenticated IMSI.

It shall be possible to retrieve or store subscriber data concerning a specific MS from the 3GPP AAA Proxy by use of the following reference:

- Mobile Subscriber ISDN Number (MSISDN).

It shall be possible to retrieve or store subscriber data concerning a specific MS from the WAG by use of the following reference:

- Mobile Subscriber ISDN Number (MSISDN).

It shall be possible to retrieve or store subscriber data concerning a specific MS from the PDG by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);
- Mobile Subscriber ISDN Number (MSISDN).
- International Mobile Equipment Identity (IMEI) for emergency attached UEs without IMSI (e.g; UICCless UE) or with an unauthenticated IMSI.

NOTE: See clause 4 for explanation of M, C, T and P in table 5.1, table 5.2, table 5.2A-1, table 5.2A-2, table 5.2A-3, table 5.2B-1 and table 5.3.

5.1 CS Network Access Mode Data Storage

Table 5.1: Overview of data stored for CS Network Access Mode

PARAMETER	CLAUSE	HLR	VLR	TYPE
IMSI	2.1.1.1	M	M	P
Network Access Mode	2.1.1.2	M	-	P
International MS ISDN number	2.1.2	C	C	P
multinumbering MSISDNs	2.1.3	C	-	P
Basic MSISDN indicator	2.1.3.1	C	-	P
MSISDN-Alert indicator	2.1.3.2	C	-	P
TMSI	2.1.4	-	C	T
LMSI	2.1.8	C	C	T
Mobile Station Category	2.2.1	M	M	P
LMU Identifier	2.2.2	C	C	P
IMEISV	2.2.3	C	C	T
RAND, SRES and Kc	2.3.1		C	T
RAND, XRES, CK, IK and AUTN	2.3.2	M	C	T
Ciphering Key Sequence Number	2.3.3	-	M	T
Key Set Identifier (KSI)	2.3.4	-	M	T
Key Status	2.3.9	-	C	T
MSRN	2.4.1	-	C	T
Location Area Identity	2.4.2	-	M	T
VLR number	2.4.5	M	-	T
MSC number	2.4.6	M	C	T
HLR number	2.4.7	-	C	T
Subscription restriction	2.4.10	C	-	P
RSZI lists	2.4.11.1	C	-	P
Zone Code List	2.4.11.2	-	C	P
MSC area restricted flag	2.4.12	M	-	T
LA not allowed flag	2.4.13	-	M	T
ODB-induced barring data	2.4.15.1	C	-	T
Roaming restriction due to unsupported feature	2.4.15.2	M	M	T
Cell Global ID or Service Area ID	2.4.16	-	C	T
LSA Identity	2.4.17.1	C	C	P
LSA Priority	2.4.17.2	C	C	P
LSA Preferential Access Indicator	2.4.17.2A	C	C	P
LSA Active Mode Support Indicator	2.4.17.2B	C	C	P
LSA Only Access Indicator	2.4.17.3	C	C	P
LSA Active Mode Indicator	2.4.17.4	C	C	P
VPLMN Identifier	2.4.17.5	C	-	P
Access Restriction Data	2.4.18	C	C	P
Selected CN operator ID	2.4.19	-	C	T
IP-SM-GW number	2.4.20	C	-	T
IP-SM-GW Diameter Identity	2.4.20A	C	-	T
Paging area	2.4.21	C	C	T
Closed Subscriber Group Information	2.4.22	C	C	P
Service Centre Address	2.4.23	C	-	P
Subscribed Periodic LAU Timer	2.4.24	C	C	P
Provision of bearer service	2.5.1	M	M	P
Provision of teleservice	2.5.2	M	M	P
BC allocation	2.5.3	C	C	P
IMSI detached flag	2.7.1	-	C	T
Confirmed by Radio Contact indicator	2.7.4.1	-	M	T
Subscriber Data Confirmed by HLR indicator	2.7.4.2	-	M	T
Location Information Confirmed in HLR indicator	2.7.4.3	-	M	T
Check SS indicator	2.7.4.4	M	-	T
MS purged for non-GPRS flag	2.7.5	M	-	T
MNRR-MS	2.7.7	C	-	T
Subscriber data dormant	2.7.8	-	C	T
Cancel Location received	2.7.8A	-	C	T
Subscriber status	2.8.1	C	C	P
Barring of outgoing calls	2.8.2.1	C	C	P
Barring of incoming calls	2.8.2.2	C	-	P
Barring of roaming	2.8.2.3	C	-	P
Barring of premium rate calls	2.8.2.4	C	C	P
Barring of supplementary service management	2.8.2.5	C	C	P
Barring of registration of call forwarding	2.8.2.6	C	-	P
Barring of invocation of call transfer	2.8.2.7	C	C	P

PARAMETER	CLAUSE	HLR	VLR	TYPE
Operator determined barring PLMN-specific data	2.8.3	C	C	P
Notification to CSE flag for ODB	2.8.4	C	-	T
gsmSCF address list for ODB	2.8.5	C	-	P
Handover Number	2.9.1	-	C	T
Messages Waiting Data	2.10.1	C	-	T
Mobile Station Not Reachable Flag	2.10.2	C	M	T
Memory Capacity Exceeded Flag	2.10.3	C	-	T
Trace Reference	2.11.1	C	C	P
Trace Type	2.11.2	C	C	P
Operations Systems Identity	2.11.3	C	C	P
HLR Trace Type	2.11.4	C	-	P
MAP Error On Trace	2.11.5	C	-	T
Trace Activated in VLR	2.11.6	C	C	T
Foreign Subscriber Registered in VLR	2.11.7	-	C	P
Trace Reference 2	2.11.9	C	C	P
Trace depth	2.11.10	C	C	P
List of NE types to trace	2.11.11	C	C	P
Triggering events	2.11.12	C	C	P
List of interfaces to trace	2.11.13	C	C	P
IP address of Trace Collection Entity	2.11.14	C	C	P
MDT-Configuration	2.11.15	C	C	P
MDT User Consent	2.11.16	C	C	P
VGCS Group Membership List	2.12.1	C	C	P
VBS Group Membership List	2.12.2	C	C	P
Broadcast Call Initiation Allowed List	2.12.2.1	C	C	P
Originating CAMEL Subscription Information (O-CSI)	2.14.1.1/3.1	C	C	P
Terminating CAMEL Subscription Information (T-CSI)	2.14.1.2	C	-	P
VMSC Terminating CAMEL Subscription Information (VT-CSI)	2.14.1.2/3.2	C	C	P
Location Information/Subscriber state Information	2.14.1.3	C	-	P
USSD CAMEL subscription information(U-CSI)	2.14.1.4	C	-	P
SS invocation notification (SS-CSI)	2.14.1.5/3.2	C	C	P
Translation information flag(TIF-CSI)	2.14.1.6/3.6	C	C	P
Dialled service CAMEL Subscription Information (D-CSI)	2.14.1.11/3.7	C	C	P
USSD General CAMEL service information (UG-CSI)	2.14.2.4	C	-	P
O-CSI Negotiated CAMEL Capability Handling	2.14.2.1	C	-	T
SS-CSI Negotiated CAMEL Capability Handling	2.14.2.1	C	-	T
VT-CSI Negotiated CAMEL Capability Handling	2.14.2.1	C	-	T
Short Message Service CAMEL Subscription Information(MO-SMS-CSI)	2.14.1.8/2.14.3.5	C	C	P
Short Message Service CAMEL Subscription Information(MT-SMS-CSI)	2.14.1.9/2.14.3.6	C	C	P
MO-SMS-CSI VLR Negotiated CAMEL Capability Handling	2.14.2.1	C	-	T
MT-SMS-CSI VLR Negotiated CAMEL Capability Handling	2.14.2.1	C	-	P
M-CSI Negotiated CAMEL Capability Handling	2.14.2.1	C	-	T
VLR Supported CAMEL Phases	2.14.2.3	C	-	T
GsmSCF address for CSI	2.14.2.4	C	-	P
VLR Offered CAMEL4 CSIs	2.14.2.2A	C	-	T
IST Alert Timer	2.15.1	C	C	P
Privacy Exception List	2.16.1.1	C	C	P
GMLC Numbers	2.16.1.2	C	C	P
MO-LR List	2.16.1.3	C	C	P
Service Types	2.16.1.4	C	C	P
Age Indicator	2.17.1	C	C	T
CS Allocation/Retention priority	2.18.1	C	C	P
ICS Indicator	2.20.1	C	C	P
CS to PS SRVCC Allowed	2.21.4	C	C	P

5.2 PS Network Access Mode Storage (GPRS)

Table 5.2: Overview of data used for PS Network Access Mode (GPRS)

PARAMETER	Clause	HLR	VLR	Gn/Gp-SGSN	GGSN	TYPE
IMSI	2.1.1.1	M	M	C	C	P
Network Access Mode	2.1.1.2	M	-	C note1	-	P
IMSI Unauthenticated indicator	2.1.1.3	-	-	C	C	T
International MS ISDN number	2.1.2	C	C	C	C	P
multinumering MSISDNs	2.1.3	C	-	-	-	P
Basic MSISDN indicator	2.1.3.1	C	-	-	-	P
MSISDN-Alert indicator	2.1.3.2	C	-	-	-	P
P-TMSI	2.1.5	-	-	C	-	T
TLLI	2.1.6	-	-	C	-	T
Random TLLI	2.1.7	-	-	C	-	T
IMEI	2.1.9	-	-	C	C	T
External Identifier Set	2.1.10	C	-	-	-	P
IMEISV	2.2.3	C	-	C	C	T
RAND/SRES and Kc	2.3.1	-	-	C	-	T
RAND, XRES, CK, IK, AUTN	2.3.2	M	-	C	-	T
Ciphering Key Sequence Number	2.3.3	-	-	M	-	T
Key Set Identifier (KSI)	2.3.4	-	-	M	-	T
Selected Ciphering Algorithm	2.3.5	-	-	M	-	T
Current Kc	2.3.6	-	-	M	-	T
P-TMSI Signature	2.3.7	-	-	C	-	T
Key Status	2.3.9	-	-	C	-	T
Routing Area Identity	2.4.3	-	-	M	-	T
VLR Number	2.4.5	M	-	C note2	-	T
SGSN Number	2.4.8.1	M	C note2	-	-	T
GGSN Number	2.4.8.2	M	-	-	-	P
RSZI Lists	2.4.11.1	C	-	-	-	P
Zone Code List	2.4.11.2	-	-	C	-	P
RA not allowed flag	2.4.14a	-	-	M	-	T
SGSN area restricted flag	2.4.14	M	-	-	-	T
Roaming Restricted in the SGSN due to unsupported feature	2.4.15.3	M	-	M	-	T
Cell Global ID or Service Area ID	2.4.16	-	-	C	C	T
LSA Identity	2.4.17.1	C	C	C	-	P
LSA Priority	2.4.17.2	C	C	C	-	P
LSA Preferential Access Indicator	2.4.17.2A	C	C	C	-	P
LSA Active Mode Support Indicator	2.4.17.2B	C	C	C	-	P
LSA Only Access Indicator	2.4.17.3	C	C	C	-	P
LSA Active Mode Indicator	2.4.17.4	C	C	C	-	P
VPLMN Identifier	2.4.17.5	C	-	-	-	P
Access Restriction Data	2.4.18	C	-	C	-	P
IP-SM-GW number	2.4.20	C	-	-	-	T
IP-SM-GW Diameter Identity	2.4.20A	C	-	-	-	T
Closed Subscriber Group Information	2.4.22	C	C	C	-	P
Service Centre Address	2.4.23	C	-	-	-	P
Provision of teleservice	2.5.2	C	-	C	-	P
Transfer of SM option	2.5.4	M	-	-	-	P
MNRG	2.7.2	M	-	M	M	T
MM State	2.7.3	-	-	M	-	T
Subscriber Data Confirmed by HLR Indicator	2.7.4.2	-	-	M	-	T
Location Info Confirmed by HLR Indicator	2.7.4.3	-	-	M	-	T
VLR-Reliable Indicator	2.7.4.5	-	-	C note1	-	T
MS purged for GPRS flag	2.7.6	M	-	-	-	T
MNRR-SGSN	2.7.7A	C	-	-	-	T
Subscriber Status	2.8.1	C	-	C	-	P
Barring of outgoing calls	2.8.2.1	C	-	-	-	P
Barring of roaming	2.8.2.3	C	-	-	-	P
Barring of Packet Oriented Services	2.8.2.8	C	-	C	-	P
ODB PLMN-specific data	2.8.3	C	-	C	-	P
Notification to CSE flag for ODB	2.8.4	C	-	-	-	T
gsmSCF address list for ODB	2.8.5	C	-	-	-	P
Trace Activated in SGSN	2.11.7	C	-	C	-	P
Trace Reference 2	2.11.9	C	-	C	C	P
Trace depth	2.11.10	C	-	C	C	P

List of NE types to trace	2.11.11	C	-	C	C	P
Triggering events	2.11.12	C	-	C	C	P
List of interfaces to trace	2.11.13	C	-	C	C	P
MDT-Configuration	2.11.15	C	C	C	-	P
PDP Type	2.13.1	C	-	C	M	P
PDP Address	2.13.2	C	-	C	M	P
NSAPI	2.13.3	-	-	C	C	T
PDP State	2.13.4	-	-	C	-	T
New SGSN Address	2.13.5	-	-	C	-	T
Access Point Name	2.13.6	C	-	C	C	P/T
GGSN Address in Use	2.13.7	-	-	C	-	T
VPLMN Address Allowed	2.13.8	C	-	C	-	P
Dynamic Address	2.13.9	-	-	-	C	T
SGSN Address	2.13.10	-	-	-	M	T
GGSN-list	2.13.11	M	-	-	-	T
Quality of Service Subscribed	2.13.12	C	-	C	-	P
Quality of Service Requested	2.13.13	-	-	C	-	T
Quality of Service Negotiated	2.13.14	-	-	C	M	T
SND	2.13.15	-	-	C	C	T
SNU	2.13.16	-	-	C	C	T
DRX Parameters	2.13.17	-	-	M	-	T
Compression	2.13.18	-	-	C	-	T
NGAF	2.13.19	-	-	C note2	-	T
Classmark	2.13.20	-	-	M	-	T
TEID	2.13.21	-	-	C	C	T
Radio Priority	2.13.22	-	-	C	-	T
Radio Priority SMS	2.13.23	-	-	C	-	T
PDP Context Identifier	2.13.24	C	-	C	-	T
PDP Context Charging Characteristics	2.13.25	C	-	C	C	P
UE level APN-OI-Replacement	2.13.29	C	-	C	-	P
Subscribed UE-AMBR	2.13.30	C	-	C	-	P
Used UE-AMBR	2.13.30A	-	-	C	-	T
Subscribed APN-AMBR	2.13.32	C	-	C	C	P
Used APN-AMBR	2.13.32A	-	-	C	C	T
Subscribed-RFSP-ID	2.13.33	C	-	C	-	P
APN Restriction	2.13.43	-	-	C	C	P
RFSP-ID in Use	2.13.108	-	-	C	-	T
APN level APN-OI-Replacement	2.13.109	C	-	C	-	P
SIPTO Permission	2.13.114	C	-	C	-	P
SIPTO Local Network Permission	2.13.114A	C	-	C	-	P
Subscribed Periodic RAU/TAU Timer	2.13.115	C	-	C	-	P
LIPA Permission	2.13.122	C	-	C	-	P
LIPA Allowed VPLMN List	2.13.123	C	-	-	-	P
VPLMN LIPA Allowed	2.13.124	-	-	C	-	P
Higher bitrates than 16Mbps flag	2.13.127	-	-	C	-	T
Co-located GGSN-PGW FQDN	2.13.136	-	-	C	-	T
GERAN Cell Identity Age	2.13.137	-	-	C	-	T
UTRAN Service Area Identity Age	2.13.138	-	-	C	-	T
Homogeneous Support of IMS Voice over PS Sessions	2.13.141	C	-	C	-	T
Signalling Priority Indication	2.13.142	-	-	C	C	T
Active Time Value for PSM	2.13.148	-	-	C	-	T
DL Data Buffer Expiration Time	2.13.150	-	-	C	-	T
DL Buffering Suggested Packet Count	2.13.151	C	-	C	-	P
IMSI-Group Identifier List	2.13.153	C	-	C	-	P
UE Usage Type	2.13.154	C	-	C	-	P
Extended idle mode DRX parameters	2.13.157	-	-	C	-	T
Delay Tolerant Connection Indication	2.13.158	-	-	C	C	P
Pending Network Initiated PDN Connection Signalling Indication	2.13.159	-	-	C	-	T
User Plane Integrity Protection Indicator	2.13.163	C	-	C	-	P
IOV_updates counter	2.13.170	-	-	C	-	T
Dedicated Core Network Identifier	2.13.172	-	-	C	-	T
GPRS CAMEL Subscription Information (GPRS-CSI)	2.14.1.10/2.1 4.4.4	C	-	C	-	C

MO Short Message Service CAMEL Subscription Information(MO-SMS-CSI)	2.14.1.8/2.14.4.1	C	-	C	-	C
MT Short Message Service CAMEL Subscription Information(MT-SMS-CSI)	2.14.1.9/2.14.4.2	C	-	C	-	C
MO-SMS-CSI SGSN Negotiated CAMEL Capability Handling	2.14.2.1	C	-	-	-	P
MT-SMS-CSI SGSN Negotiated CAMEL Capability Handling	2.14.2.1	C	-	-	-	P
Mobility Management for GPRS event notification (MG-CSI)	2.14.1.12/2.14.4.4	C	-	C	-	C
MG-CSI Negotiated CAMEL Capability Handling	2.14.2.1	C	-	-	-	P
GPRS-CSI Negotiated CAMEL Capability Handling	2.14.2.1	C	-	-	-	T
SGSN Supported CAMEL Phases	2.14.2.3	C	-	-	-	T
SGSN Offered CAMEL4 CSIs	2.14.2.2A	C	-	-	-	T
GsmSCF address for CSI	2.14.2.4	C	-	-	-	P
Age Indicator	2.16.1	C	-	C	-	T
Privacy Exception List	2.16.1.1	C	-	C	-	P
GMLC Numbers	2.16.1.2	C	-	C	-	P
MO-LR List	2.16.1.3	C	-	C	-	P
Service Types	2.16.1.4	C	-	C	-	P
Subscribed Charging Characteristics	2.19.1	C	-	C	C	P
ICS Indicator	2.20.1	C	C	C	-	P
STN-SR	2.21.1	C	-	C	-	T
Additional MSISDN	3.1.16	C	-	C	-	P

The HLR column indicates only GPRS related use, i.e. if the HLR uses a parameter in non-GPRS Network Access Mode but not in GPRS Network Access Mode, it is not mentioned in this table 5.2.

NOTE 1: This parameter is relevant in the SGSN only when the Gs interface is installed.

NOTE 2: The VLR column is applicable if Gs interface is installed. It only indicates GPRS related data to be stored and is only relevant to GPRS subscribers registered in VLR.

For special condition of storage see in clause 2. See clause 4 for explanation of M, C, T and P in table 5.2.

5.2A PS Network Access Mode Storage (EPS)

Table 5.2A-1: Overview of data used for PS Network Access Mode (EPS 3GPP access)

PARAMETER	Clause	HSS	VLR (see note3)	S4- SGSN	MME	S-GW	PDN- GW	TYPE
IMSI	2.1.1.1	M	C	C	C	C	C	P
Network Access Mode	2.1.1.2	M	-	-	C (see note 1)	-	-	P
IMSI Unauthenticated indicator	2.1.1.3	-	-	C	C	C	C	T
International MS ISDN number	2.1.2	C	-	C	C	C	C	P
P-TMSI	2.1.5	-	-	C	-	-	-	T
TLLI	2.1.6	-	-	C	-	-	-	T
Random TLLI	2.1.7	-	-	C	-	-	-	T
IMEI	2.1.9	C	-	C	C	C	C	T
External Identifier Set	2.1.10	C	-	-	-	-	-	P
UE radio capability ID	2.1.11	-	-	-	C	-	-	T
IMEISV	2.2.3	C	-	C	C	C	C	T
RAND/SRES and Kc	2.3.1	-	-	C	-	-	-	T
RAND, XRES, CK, IK, AUTN	2.3.2	M	-	C	C	-	-	T
RAND, XRES, KASME, AUTN	2.3.2	M	-	-	C	-	-	T
Ciphering Key Sequence Number	2.3.3	C	-	M	-	-	-	T
Key Set Identifier (KSI)	2.3.4	-	-	M	-	-	-	T
KSI _{ASME}	2.3.4	-	-	-	M	-	-	T
Selected Ciphering Algorithm	2.3.5	-	-	M	-	-	-	T
Current Kc	2.3.6	-	-	M	-	-	-	T
P-TMSI Signature	2.3.7	-	-	C	-	-	-	T
Key Status	2.3.9	-	-	C	-	-	-	T
Routing Area Identity	2.4.3	-	-	M	-	-	-	T
IWF number	2.4.8.3	C	-	-	-	-	-	T
RSZI Lists	2.4.11.1	C	-	-	-	-	-	P
Zone Code List	2.4.11.2	-	-	C	C	-	-	P
SGSN area restricted Flag	2.4.14	M	-	-	-	-	-	T
RA not allowed flag	2.4.14a	-	-	M	-	-	-	T
TA not allowed flag	2.4.14b	-	-	-	M	-	-	T
Roaming Restricted in the SGSN due to unsupported feature	2.4.15.3	M	-	M	-	-	-	T
Roaming Restricted in the MME due to unsupported feature	2.4.15.3a	M	-	-	M	-	-	T
Cell Global Identity or Service Area ID	2.4.16	-	-	C	C	-	C	T
E-UTRAN Cell Global ID	2.4.16A	-	C (see note 2)	-	C	-	C	T
Access Restriction Data	2.4.18	C	-	C	C	-	-	P
Closed Subscriber Group Information	2.4.22	C	C	C	C	-	-	P
IAB-Operation Allowed	2.4.27	C	-	-	C	-	-	P
Confirmed by Radio Contact indicator	2.7.4.1	-	C	-	-	-	-	T
Subscriber Data Confirmed by HLR/HSS Indicator	2.7.4.2	-	-	M	M	-	-	T
Location Info Confirmed by HLR/HSS Indicator	2.7.4.3	-	-	M	M	-	-	T
VLR-Reliable Indicator	2.7.4.5	-	-	C(see note 5)	C (see note 2)	-	-	T
UE purged in SGSN flag	2.7.6	M	-	-	-	-	-	T
UE purged in MME flag	2.7.6A	M	-	-	-	-	-	T
URRP-MME	2.7.9.1	C	-	-	C	-	-	T
URRP-SGSN	2.7.9.2	C	-	C	-	-	-	T
Subscriber Status	2.8.1	C	-	C	C	-	-	P
Barring of outgoing calls	2.8.2.1	C	-	C	-	-	-	P
Barring of roaming	2.8.2.3	C	-	-	-	-	-	P
Barring of Packet Oriented Services	2.8.2.8	C	-	C	C	-	-	P
ODB PLMN-specific data	2.8.3	C	-	C	-	-	-	P

PARAMETER	Clause	HSS	VLR (see note3)	S4- SGSN	MME	S-GW	PDN- GW	TYPE
PS and SMS Only	2.10.7	C	-	C	-	-	-	P
SMS in SGSN Allowed	2.10.8	C	-	C	-	-	-	P
Trace Activated in SGSN	2.11.7	C	-	C	-	-	-	P
Trace Reference 2	2.11.9	C	C	C	C	C	C	P
Trace depth	2.11.10	C	C	C	C	C	C	P
List of NE types to trace	2.11.11	C	C	C	C	-	-	P
Triggering events	2.11.12	C	C	C	C	C	C	P
List of interfaces to trace	2.11.13	C	C	C	C	C	C	P
IP address of trace collection entity	2.11.14	C	C	C	C	C	C	P
MDT-Configuration	2.11.15	C	C	C	C	-	-	P
MDT User Consent	2.11.16	C	C	C	C	-	-	P
Access Point Name (APN).	2.13.6	M	-	M	M	M	M	P
MME name	2.13.26	M	C	-	-	-	-	T
VLR name	2.13.27	-	-	-	C (see note 2)	-	-	T
NEAF	2.13.28	-	-	-	C (see note 2)	-	-	T
UE level APN-OI-Replacement	2.13.29	C	-	-	C	-	-	P
Subscribed UE-AMBR	2.13.30	M	-	M	M	-	-	P
Used UE-AMBR	2.13.30A	-	-	C	C	-	-	T
APN-Configuration-Profile	2.13.31	M	-	M	M	-	-	P
Subscribed APN-AMBR	2.13.32	M	-	M	M	M	-	P
Used APN-AMBR	2.13.32A	-	-	C	C	-	C	T
Subscribed-RFSP-ID	2.13.33	C	-	-	C	-	-	P
GUTI	2.13.34	-	-	-	C	-	-	T
ME identity (IMEISV)	2.13.35	C	-	C	C	C	C	T
Selected NAS Algorithm	2.13.36	-	-	-	M	-	-	T
Selected AS Algorithm	2.13.37	-	-	-	M	-	-	T
Context Identifier	2.13.38	M	-	M	M	M	M	P
PDN Address	2.13.39	C	-	C	C	C	C	P/T (see note4)
VPLMN Address Allowed	2.13.40	M	-	M	M	-	-	P
PDN GW identity	2.13.41	C	-	C (see note 6)	C (see note 6)	-	-	P/T (see note4)
Tracking Area List	2.13.42	-	-	-	M	-	-	T
APN Restriction	2.13.43	-	-	C	C	C	C	P
APN in use	2.13.44	-	-	M	M	M	M	T
TAI	2.13.45	-	C (see note 2)	-	M	-	-	T
E-UTRAN Cell Identity Age	2.13.46	-	C (see note 2)	-	C	-	-	T
MME F-TEID for S11 (control plane)	2.13.47	-	-	-	C	C	-	T
MME UE S1AP ID	2.13.48	-	-	-	C	-	-	T
S-GW F-TEID for S11 (control plane)	2.13.49	-	-	-	C	C	-	T
S4-SGSN F-TEID for S4 (control plane)	2.13.50	-	-	C	-	-	-	T
S4-SGSN F-TEID for S4 (User plane)	2.13.51	-	-	C	-	-	-	T
S-GW F-TEID for S5/S8 (control plane)	2.13.52	-	-	-	C	C	C	T
S-GW F-TEID for S1-U	2.13.53	-	-	-	C	C	-	T
S-GW F-TEID for S5/S8 (user plane)	2.13.54	-	-	-	-	C	C	T

PARAMETER	Clause	HSS	VLR (see note3)	S4- SGSN	MME	S-GW	PDN- GW	TYPE
eNodeB Address	2.13.55	-	-	-	C	-	-	T
eNodeB UE S1AP ID	2.13.56	-	-	-	C	-	-	T
eNodeB F-TEID for S1-U	2.13.57	-	-	-	C	C	-	T
E-UTRAN/UTRAN Key Set flag	2.13.58	-	-	-	C	-	-	T
Selected CN operator id	2.13.59	-	-	-	C	-	-	T
UE Radio Access Capability	2.13.60	-	-	-	C	-	-	T
Location Change Report Required	2.13.62	-	-	C	C	-	-	T
UE specific DRX parameters	2.13.63	-	-	-	C	-	-	T
PDN GW F-TEID for S5/S8 (user plane)	2.13.64	-	-	C	C	C	C	T
PDN GW F-TEID for S5/S8 (control plane)	2.13.65	-	-	C	C	C	C	T
EPS Bearer ID	2.13.66	-	-	C	C	C	C	T
EPS Bearer QoS	2.13.67	-	-	C	C	C	C	T
EPS Subscribed QoS Profile	2.13.67A	M	-	M	M	-	-	P
UL TFT	2.13.68	-	-	-	C	C	C	T
DL TFT	2.13.69	-	-	-	C	C	C	T
Charging Id	2.13.70	-	-	C	-	C	C	T
EPS PDN Connection Charging Characteristics	2.13.71	C	-	C	C	C	C	P
Default bearer	2.13.72	-	-	-	C	C	C	T
URRP-MME	2.13.73	C	-	-	C	-	-	T
RAT Type (Access Type)	2.13.75	C	-	C	C	C	C	T
Diameter Server Identity of the HSS	2.13.99	-	-	C	C	-	-	T
SGSN name	2.13.100	M	-	-	-	-	-	T
S-GW F-TEID for S12	2.13.101	-	-	-	-	C	-	T
RNC F-TEID for S12	2.13.102	-	-	C	-	C	-	T
MME F-TEID for S3	2.13.103	-	-	C	C	-	-	T
S4-SGSN F-TEID for S3	2.13.104	-	-	C	C	-	-	T
PDN GW Allocation Type	2.13.105	M	-	-	M	-	-	P
S-GW F-TEID for S4 (control plane)	2.13.106	-	-	C	-	C	-	T
S-GW F-TEID for S4 (user plane)	2.13.107	-	-	C	-	C	-	T
RFSP-ID in Use	2.13.108	-	-	C	C	-	-	T
APN level APN-OI-Replacement	2.13.109	C	-	C	C	-	-	P
PDN Connection ID	2.13.111	-	-	-	-	C	C	T
MS Network Capability	2.13.112	-	-	C	C	-	-	T
Voice Domain Preference and UE's Usage Setting	2.13.113	-	-	C	C	-	-	T
SIPTO Permission	2.13.114	C	-	C	C	-	-	P
SIPTO Local Network Permission	2.13.114A	C	-	C	C	-	-	P
Subscribed Periodic RAU/TAU Timer	2.13.115	C	-	C	C	-	-	P
MPS CS Priority	2.13.120	-	-	-	C	-	-	P
MPS EPS Priority	2.13.121	C	-	-	C	-	-	P
LIPA Permission	2.13.122	C	-	C	C	-	-	P
LIPA Allowed VPLMN List	2.13.123	C	-	-	-	-	-	P
VPLMN LIPA Allowed	2.13.124	-	-	C	C	-	-	P
Relay Node Indicator	2.13.125	C	-	-	C	-	-	P
Higher bitrates than 16Mbps flag	2.13.127	-	-	C	-	-	-	T
H(e)NB Local IP Address	2.13.131	-	-	C	C	-	C	T
H(e)NB UDP Port Number	2.13.132	-	-	C	C	-	C	T
MME/S4 SGSN Identifier	2.13.134	-	-	-	-	C	C	T
SGW node name	2.13.135	-	-	C	C	-	-	T
Co-located GGSN-PGW FQDN	2.13.136	-	-	C (see note 6)	C (see note 6)	-	-	T
GERAN Cell Identity Age	2.13.137	-	-	C	-	-	-	T
UTRAN Service Area Identity Age	2.13.138	-	-	C	-	-	-	T
Homogeneous Support of IMS Voice over PS Sessions	2.13.141	C	-	C	C	-	-	T

PARAMETER	Clause	HSS	VLR (see note3)	S4- SGSN	MME	S-GW	PDN- GW	TYPE
Signalling Priority Indication	2.13.142	-	-	C	C	C	C	T
Restoration Priority	2.13.143	C	-	C	C	-	-	P
Presence Reporting Area Action	2.13.145	-	-	C	C	-	C	T
WLAN offloadability	2.13.146	C	-	C	C	-	-	P
Expected UE Activity Behaviour	2.13.147.2	-	-	-	C	-	-	T
Expected HO Interval	2.13.147.3	-	-	-	C	-	-	T
Active Time Value for PSM	2.13.148	-	-	C	C	-	-	T
Origination Time Stamp	2.13.149	-	-	-	-	-	C	T
DL Data Buffer Expiration Time	2.13.150	-	-	C	C	C	-	T
DL Buffering Suggested Packet Count	2.13.151	C	-	C	C	-	-	P
Notify-on-available-after-DDN-failure flag	2.13.152	-	-	C	C	-	-	T
IMSI-Group Identifier List	2.13.153	C	-	C	C	-	-	P
UE Usage Type	2.13.154	C	-	C	C	-	-	P
Remote UE Contexts	2.13.156	-	-	-	C	C	C	T
Extended idle mode DRX parameters	2.13.157	C	-	C	C	-	-	P/T (see note 7)
Delay Tolerant Connection Indication	2.13.158	-	-	C	C	-	C	P
Pending Network Initiated PDN Connection Signalling Indication	2.13.159	-	-	C	C	.	-	T
UE Radio Capability for Paging information	2.13.160	-	-	-	C	-	-	T
Information on Recommended Cells and ENBs for Paging	2.13.161	-	-	-	C	-	-	T
Paging Attempt Count	2.13.162	-	-	-	C	-	-	T
User Plane Integrity Protection Indicator	2.13.163	C	-	C	-	-	-	P
Non-IP-PDN-Type-Indicator	2.13.164	C	-	-	C	-	-	P
Non-IP-Data-Delivery-Mechanism	2.13.165	C	-	-	C	-	-	P
SCEF-ID	2.13.166	C	-	-	C	-	-	P
PDN Type	2.13.167	C	-	C	C	C	C	P
PDN-Connection-Restricted flag	2.13.168	C	-	-	C	-	-	P
Preferred-Data-Mode	2.13.169	C	-	-	C	-	-	P
IOV_updates counter	2.13.170	-	-	C	-	-	-	T
Dedicated Core Network Identifier	2.13.172	-	-	C	C	-	-	T
Service Gap Time	2.13.174	C	-	-	C	-	-	P
Subscribed Additional RRM Policy Index	2.13.175	C	-	-	C	-	-	P
Additional RRM Policy Index in use	2.13.176	-	-	-	C	-	-	T
Ethernet-PDN-Type-Indicator	2.13.177	C	-	-	C	-	-	P
Privacy Exception List	2.16.1.1	C	-	C	-	-	-	P
GMLC Numbers	2.16.1.2	C	-	C	-	-	-	P
MO-LR List	2.16.1.3	C	-	C	-	-	-	P
Service Types	2.16.1.4	C	-	C	-	-	-	P
Broadcast Location Assistance Data Types	2.16.7.1	C	-	-	C	-	-	P
Subscribed Charging Characteristics	2.19.1	C	-	C	C	-	-	P
ICS Indicator	2.20.1	C	C	C	C	-	-	P
STN-SR	2.21.1	C	-	C	C	-	-	T
UE SRVCC Capability	2.21.2	C	-	C	C	-	-	T
Subscribed vSRVCC	2.21.3	C	-	-	C	-	-	P
Additional MSISDN	3.1.16	C	-	C	C	-	-	P

PARAMETER	Clause	HSS	VLR (see note3)	S4- SGSN	MME	S-GW	PDN- GW	TYPE
<p>NOTE 1: This parameter is relevant in the MME only when the SGs interface is installed.</p> <p>NOTE 2: Only is applicable if SGs interface is installed. It only indicates EPS related data to be stored and is only relevant to EPS subscribers registered in VLR.</p> <p>NOTE 3: The VLR column is applicable if SGs/Sv interface is installed. It only indicates EPS related data to be stored and is only relevant to EPS subscribers registered in VLR.</p> <p>NOTE 4: If Static IP address allocation provisioned in the subscriber profile in the HSS is chosen, PDN address is permanent data.</p> <p>NOTE 5: Only is applicable if Gs interface is installed. It only indicates EPS related data to be stored and is only relevant to EPS subscribers registered in VLR.</p> <p>NOTE 6: The MME/S4 SGSN stores either the PDN GW identity or the Co-located GGSN-PGW FQDN since they are identical information.</p> <p>NOTE 7: The eDRX cycle length may be stored in HSS as a subscribed parameter, and in that case, it is permanent data.</p>								

For special condition of storage see in clause 2. See clause 4 for explanation of M, C, T and P in table 5.2A-1.

Table 5.2A-2: Overview of data used for PS Network Access Mode (EPS non 3GPP access)

PARAMETER	Clause	HSS	MME	S-GW	PDN-GW	ePDG	3GPP AAA server	3GPP AAA server Proxy	TYPE
IMSI	2.1.1.1	M	C	C	C	C	-	-	P
IMSI Unauthenticated indicator	2.1.1.3	-	C	C	C	C	-	-	T
International MS ISDN number	2.1.2	C	C	C	C	C	C	-	P
IMEI	2.1.9	C	-	-	C	C	C	-	T
RAND, XRES, CK, IK, AUTN	2.3.2	M	-	-	-	-	M	-	T
RAND, XRES, KASME, AUTN	2.3.2	M	-	-	-	-	M	-	T
Access Network Identity	2.3.8	C	-	-	-	-	C	-	T
Trace Reference 2	2.11.9	C	-	-	C	-	C	-	P
Trace depth	2.11.10	C	-	-	C	-	C	-	P
List of NE types to trace	2.11.11	C	-	-	-	-	C	-	P
Triggering events	2.11.12	C	-	-	C	-	C	-	P
List of interfaces to trace	2.11.13	C	-	-	C	-	C	-	P
IP address of Trace Collection Entity	2.11.14	C	-	-	C	-	C	-	P
APN-Configuration-Profile	2.13.31	M	-	-	C	C	C	-	T
Subscribed APN-AMBR	2.13.32	M	-	-	C	C	C	-	P
Used APN-AMBR	2.13.32A	-	-	-	C	-	-	-	T
ME Identity (IMEISV)	2.13.35	C	-	-	C	C	C	-	T
PDN Address	2.13.39	C	-	C	C	C	C	-	T/P (see Note)
VPLMN Address Allowed	2.13.40	M	C	-	-	C	C	-	P
PDN GW identity	2.13.41	M	C	-	-	C	C	-	P
APN in use	2.13.44	-	-	-	C	C	-	-	T
EPS Bearer ID	2.13.66	-	-	-	C	C	-	-	T
EPS Bearer QoS	2.13.67	-	-	-	C	C	-	-	T
EPS PDN Connection Charging Characteristics	2.13.71	C	-	-	C	C	C	-	P
RAT Type (Access Type)	2.13.75	C	-	C	C	C	C	-	T
Permanent User Identity	2.13.79	M	-	M	M	M	M	-	P
Mobility Capabilities	2.13.80	-	-	-	M	C	C	-	T
MAG IP address	2.13.81	-	-	-	-	-	C	-	T
Visited Network Identifier	2.13.82	C	-	-	C	C	C	-	T
EAP payload	2.13.83	-	-	-	-	-	C	-	P
MIP Subscriber profile	2.13.86	M	-	-	M	-	-	-	P
Uplink S5 GRE Key	2.13.87	-	C	C	C	-	-	-	T
Downlink S5 GRE Key	2.13.88	-	-	C	C	-	-	-	T
Uplink S8 GRE Key	2.13.89	-	C	C	C	-	-	-	T
Downlink S8 GRE Key	2.13.90	-	-	C	C	-	-	-	T
S2a GRE Keys	2.13.91	-	-	C	C	-	-	-	T
S2b GRE Keys	2.13.92	-	-	C	C	C	-	-	T
Mobile Node Identifier	2.13.93	-	-	C	C	-	-	-	T
IPv4 Default Router Address	2.13.94	-	-	C	C	-	-	-	T
Link-local address	2.13.95	-	-	C	C	-	-	-	T
Non 3GPP User Data	2.13.96	C	-	-	-	C	C	-	
3GPP AAA Server Identity	2.13.97	C	-	-	C	C	-	-	T
Selected IP mobility mode	2.13.98	-	-	-	C	C	C	-	T
Diameter Server Identity of HSS	2.13.99	-	C	-	-	-	C	-	T
Unauthenticated IMSI	2.13.110	-	-	C	C	-	-	-	T
PDN Connection ID	2.13.111	-	-	C	C	C	-	-	T
SIPTO Permission	2.13.114	C	-	-	-	-	C	-	P
ePDG F-TEID for S2b (control plane)	2.13.116	-	-	-	C	C	-	-	T
ePDG F-TEID for S2b (user plane)	2.13.117	-	-	-	C	C	-	-	T
PGW F-TEID for S2b (control plane)	2.13.118	-	-	-	C	C	-	-	T
PGW F-TEID for S2b (user plane)	2.13.119	-	-	-	C	C	-	-	T
Restricted RAT Types	2.13.126	C	-	-	-	-	C	-	P
UE Local IP Address	2.13.129	-	-	-	-	C	-	-	T
UE UDP Port Number	2.13.130	-	-	-	-	C	-	-	T
Default APN for Trusted WLAN	2.13.139	C	-	-	-	-	C	-	P

PARAMETER	Clause	HSS	MME	S-GW	PDN-GW	ePDG	3GPP AAA server	3GPP AAA server Proxy	TYPE
Access Information for Trusted WLAN	2.13.140	C	-	-	-	-	C	-	P
Origination Time Stamp	2.13.149	-	-	-	C	-	C	-	T
Emergency Indication	2.13.155	-	-	-	-	C	C	C	T
Emergency Info	2.13.171	C	C	-	-	C	C	-	T
Subscribed Charging Characteristics	2.19.1	M	-	-	-	C	C	-	P
ERP-Authorization	2.24.2	C	-	-	-	-	C	-	P
ERP Keying Material	2.24.3	-	-	-	-	-	C	C	T
ERP-Realm	2.24.4	-	-	-	-	-	C	C	P
Master session Key	3.11.3. 5	-	-	-	C	C	C	-	T
NOTE: If Static IP address allocation provisioned in the subscriber profile in the HSS is chosen, PDN address is permanent data.									

For special condition of storage see in clause 2. See clause 4 for explanation of M, C, T and P in table 5.2A-2.

Table 5.2.A-3 contains additional parameter to be hold when optimised handover to 3GPP2 is supported.

Table 5.2A-3: Overview of data used for PS Network Access Mode (optimized handover to 3GPP2)

PARAMETER	Clause	HSS	MME	S-GW	PDN-GW	ePDG	3GPP AAA server	3GPP AAA server Proxy	TYPE
Access Restriction Data	2.4.18	C	C	-	-	-	-	-	P
Barring of Packet Oriented Services	2.8.2.8	C	C	-	-	-	-	-	P
RAT Type	2.13.75	C	-	-	-	-	-	-	T
S101 HRPD access node IP address	2.13.76	-	C	-	-	-	-	-	T
S103 Forwarding Address	2.13.77	-	C	C	-	-	-	-	T
S103 GRE key(s)	2.13.78	-	C	C	-	-	-	-	T

NOTE: A UE may be simultaneously attached to EPS and have simultaneously active PDN connections or IP flows via different access systems (3GPP access and a non 3GPP access).

5.2B PS Network Access Mode Data (5GS)

Table 5.2B-1: Overview of data used for PS Network Access Mode (5GS)

PARAMETER	Clause	UDM	AMF	SMF	SMSF	AUSF	NEF		TYPE
Subscribed UE-AMBR	2.13.30	C	C	-	-	-	-	-	P
TAI	2.13.45	-	C	C	-	-	-	-	T
Restricted RAT Types	2.13.126	C	C	-	-	-	-	-	P
IMSI Group Identifier List	2.13.153	C	C	-	-	-	-	-	P
UE Usage Type	2.13.154	C	C	-	-	-	-	-	P
STN-SR	2.21.1	C	C	-	-	-	-	-	T
UE 5G SRVCC Capability	2.21.2	C	C	-	-	-	-	-	T
SUPI	2.25.1	M	C	C	C	-	C	-	P
GPSI	2.25.2	M	C	C	-	-	C	-	P
Internal Group ID-list	2.25.3	C	C	C	-	-	-	-	P
Subscribed S-NSSAI	2.25.4	C	C	C	-	-	-	-	P
Default S-NSSAI	2.25.5	C	C	-	-	-	-	-	P
5G QOS Parameter	2.25.6	C	-	C	-	-	-	-	P
Forbidden Area	2.25.7	C	C	-	-	-	-	-	P
Service Area Restriction	2.25.8	C	C	-	-	-	-	-	P
RFSP Index	2.25.9	C	C	-	-	-	-	-	P
Priority Service	2.25.10	C	C	-	-	-	-	-	P
DNN Info	2.25.11	C	-	C	-	-	-	-	P
DNN Configuration	2.25.12	C	-	C	-	-	-	-	P
Steering of Roaming Information	2.25.13	C	C	-	-	C	-	-	T
SMS supported Data	2.25.14	C	C	-	C	-	-	-	T
SMSF Registrations	2.25.15	C	C	-	M	-	-	-	P
SMS subscribed	2.25.16	M	-	-	C	-	-	-	P
SMS barring	2.25.17	M	-	-	C	-	-	-	P
SMS Roaming	2.25.18	C	C	-	C	-	-	-	P
Core Network Type Restriction	2.25.19	C	C	-	-	-	-	-	P
LADN Information	2.25.20	C	C	-	-	-	-	-	P
Subscribed periodic Registration timer	2.25.21	C	C	-	-	-	-	-	P
PEI	2.25.22	C	C	C	-	-	-	-	T
5G GUTI	2.25.23	-	C	-	-	-	-	-	T
PLMN ID	2.25.24	C	C	C	C	-	-	-	P
PDU session	2.25.25	C	C	C	-	-	-	-	T
Trace Data	2.25.26	C	C	C	-	-	-	-	P
Mobile Initiated Connection Only (MICO) mode	2.25.27	C	C	-	-	-	-	-	P
UE purged in AMF flag	2.25.28	M	-	-	-	-	-	-	T
GUAMI	2.25.29	C	C	C	-	-	-	-	T
RAND, AUTN, XRES, CK', IK'	2.25.30	-	-	-	-	-	-	-	T
RAND, AUTN, XRES*	2.25.31	-	-	-	-	-	-	-	T
RAND, AUTN, HXRES*	2.25.32	-	-	-	-	-	-	-	T
Kausf	2.25.33	-	-	-	-	C	-	-	T
Kseaf	2.25.34	-	M	-	-	-	-	-	T
AuthenticationMethod	2.25.35	M	-	-	-	-	-	-	P
PermanentKey	2.25.36	C	-	-	-	-	-	-	P
SequenceNumber	2.25.37	C	-	-	-	-	-	-	T
AuthenticationManagementField	2.25.38	C	-	-	-	-	-	-	P
VectorAlgorithm	2.25.39	C	-	-	-	-	-	-	P
Milenage	2.25.40	C	-	-	-	-	-	-	P
Tuak	2.25.41	C	-	-	-	-	-	-	P
Opc	2.25.42	C	-	-	-	-	-	-	P
Topc	2.25.43	C	-	-	-	-	-	-	P
Authentication Status	2.25.44	C	-	-	-	-	-	-	T
SoR-XMAC-I _{UE}	2.25.45	C	-	-	-	-	-	-	T
Shared Data Ids	2.25.46	C	C	C	C	-	-	-	P
Access Restriction Data	2.25.47	C	C	-	-	-	-	-	P
IAB-Operation Allowed	2.25.48	C	C	-	-	-	-	-	P
UE radio capability ID	2.25.49	-	C	-	-	-	-	-	T
RG Level Wireline Access Characteristics	2.25.50	C	C	-	-	-	-	-	P
RG-TMBR	2.25.51	C	C	-	-	-	-	-	P
List of 5GS Broadcast Location Assistance Data Types	2.25.52	C	C	-	-	-	-	-	P

NOTE: Where the node physically stores data and/or from where it retrieves data for usage (e.g. interactions with the UDR) are not reflected in this table.

5.3 IP Multimedia Service Data Storage

Table 5.3: Overview of IMS subscriber data used for IP Multimedia services

PARAMETER	Clause	HSS	S-CSCF	IM-SSF	AS	TYPE
Service Centre Address	2.4.23	C	-	-	C	P
Private User Identity	3.1.1	M	M	-	-	P
Public User Identity	3.1.2	M	M	-	-	P
Barring Indication	3.1.3	M	M	-	-	P
List of authorized visited network identifiers	3.1.4	M	-	-	-	P
Services related to Unregistered State	3.1.5	M	-	-	-	P
Implicitly registered Public User Identity sets	3.1.6	C	C	-	-	P
Default Public User Identity indicator	3.1.7	C	-	-	-	P
Display Name	3.1.9	C	C	-	-	P
Alias Public User Identities Set	3.1.10	C	C	-	-	P
Loose-Route Indication	3.1.11	C	C	-	-	P
Service Priority Level	3.1.12	C	C	-	-	P
Extended Priority	3.1.13	C	C	-	-	P
Reference Location Information	3.1.14	C	C	-	-	P
Privileged-Sender Indication	3.1.15	C	C	-	-	P
Additional MSISDN	3.1.16	C	-	-	C	P
Registration Status	3.2.1	M	-	-	-	T
S-CSCF Name	3.2.2	M	-	-	-	T
Diameter Client Identity of S-CSCF	3.2.3	M	-	-	-	T
Diameter Server Identity of HSS	3.2.4	-	M	-	C	T
UNRI	3.2.5	C	-	-	C	T
UNRR	3.2.6	C	-	-	-	T
S-CSCF Restoration Information	3.2.7	C	C	-	-	T
Maximum Number Of Allowed Simultaneous Registrations	3.2.8	C	C	-	-	P
RAND, XRES, CK, IK and AUTN	3.3.1	M	C	-	-	T
Digest Nonce	3.3.2.1	-	C	-	-	T
Digest HA1	3.3.2.2	C	C	-	-	P
Digest Nextnonce	3.3.2.3	-	C	-	-	T
Authentication Pending Flag	3.3.2.5	C	-	-	-	T
Line Identifier List	3.3.3.1	C	C	-	-	P
Server Capabilities	3.4.1	C	-	-	-	P
S-CSCF Reassignment Pending Flag	3.4.2	C	-	-	-	T
Initial Filter Criteria	3.5.2	C	C	-	-	P
Application Server Information	3.5.3	C	C	-	-	P
Service Indication	3.5.4	M	-	-	M	P
Shared iFC Set Identifier	3.5.5	C	C	-	-	P
Transparent Data	3.5.6	C	-	-	C	T
Application Server Identity List	3.5.7	C	-	-	-	T
Subscribed Media Profile Identifier	3.6.1	C	C	-	-	P
List of Subscribed Communication Service Identifiers	3.6.2	M	C	-	C	P
Primary Event Charging Function Name	3.7.1	C Note 1	C	-	-	P
Secondary Event Charging Function Name	3.7.2	C	C	-	-	P
Primary Charging Collection Function Name	3.7.3	C Note 1	C	-	-	P
Secondary Charging Collection Function Name	3.7.4	C	C	-	-	P
O-IM-CSI	3.8.1	C	-	C	-	P
VT-IM-CSI	3.8.2	C	-	C	-	P
D-IM-CSI	3.8.3	C	-	C	-	P
GsmSCF address for IM CSI	3.8.4	C	-	-	-	P
IM-SSF address for IM CSI	3.8.5	C	-	-	-	T
IMS Service Level Trace Information	3.9.1	C	C	-	C	T
Allowed WAF and/or WWSF Identity List	3.15.1	C	C	-	-	P

Note 1: At least one of these Primary Charging Function Names shall be mandatorily provisioned in the HSS.

Table 5.3A: Overview of PSI user data used for IP Multimedia services

PARAMETER	Clause	HSS	S-CSCF	IM-SSF	AS	TYPE
Private Service Identity	3.1.2A	M	M	-	-	P
Public Service Identity	3.1.2B	M	M	-	M	P
Services related to Unregistered State	3.1.5	M	-	-	-	P
PSI Activation State	3.1.8	M	-	-	M	T
Display Name	3.1.9	C	C	-	-	P
Registration Status	3.2.1	M	-	-	-	T
S-CSCF Name	3.2.2	C	-	-	-	T
AS Name	3.2.2A	C	-	-	-	P
Diameter Client Identity of S-CSCF	3.2.3	M	-	-	-	T
Diameter Server Identity of HSS	3.2.4	-	M	-	C	T
Server Capabilities	3.4.1	C	-	-	-	P
Initial Filter Criteria	3.5.2	C	C	-	-	P
Application Server Information	3.5.3	C	C	-	-	P
Service Indication	3.5.4	M	-	-	M	P
Shared iFC Set Identifier	3.5.5	C	C	-	-	P
Transparent Data	3.5.6	C	-	-	C	T
Subscribed Media Profile Identifier	3.6.1	C	C	-	-	P
Primary Event Charging Function Name	3.7.1	C Note 1	C	-	-	P
Secondary Event Charging Function Name	3.7.2	C	C	-	-	P
Primary Charging Collection Function Name	3.7.3	C Note 1	C	-	-	P
Secondary Charging Collection Function Name	3.7.4	C	C	-	-	P

Note 1: At least one of these Primary Charging Function Names shall be mandatorily provisioned in the HSS.

5.4 Generic Authentication Architecture Service Data Storage

Table 5.4: Overview of data used for GAA services

PARAMETER	Clause	HSS	BSF	NAF	TYPE
Private User Identity	3.1.1	M	M	C	P
GAA Service Type	3.10.1	M	M	M	P
GAA Service Identifier	3.10.2	M	M	M	P
GBA User Security Settings	3.10.3	M	M	-	P
User Security Setting	3.10.4	M	M	M	P
User Public Identity	3.10.5	M	M	M	P
GAA Authorization flag	3.10.6	C	C	C	P
Bootstrapping Transaction Identifier	3.10.7	-	M	M	T
Key Lifetime	3.10.8	C	M	-	P
UICC Security Setting	3.10.9	C	C	-	P
NAF Group	3.10.10	-	M	-	P
NAF Group Identity	3.10.11	C	M	-	P
NAF Address	3.10.12	-	M	-	P
Key Expirytime	3.10.13	-	M	M	T
Bootstrapping Info Creation Time	3.10.14	-	M	M	T
Diameter Server Identity of HSS	3.10.15	-	C	-	T

The possible user's GBA User Security Settings (GUSS) are stored in HSS with User Private Identifier (IMPI) as retrieval key.

The bootstrapping procedure creates a bootstrapping information entity to the BSF with B-TID as retrieval key.

5.5 I-WLAN Service Data Storage

NOTE: The WLAN Network Selection and WLAN/3GPP Radio Interworking features supersede the I-WLAN feature from Rel-12 onwards, therefore all I-WLAN subscriber data specified in the present Clause are no longer maintained.

Table 5.5: Overview of data used for I-WLAN services

PARAMETER	Clause	HSS	3GPP AAA Server	3GPP AAA Proxy	PDG	WAG	TYPE
IMSI	3.11.1.1	M	M	-	C	-	P
MSISDN	3.11.1.2	M	M	M	M	M	P
W-APN	3.11.1.3	C	C	C	C	-	T
List of authorized visited network identifiers	3.11.1.4	M	-	-	-	-	P
3GPP AAA Proxy Name	3.11.1.5	C	C	C	C	C	T
3GPP AAA Server Name	3.11.1.6	C	-	C	C	C	T
Serving PDG List	3.11.1.7	-	C	C	-	-	T
Serving WAG	3.11.1.8	-	C	C	-	-	T
WLAN UE Local IP address	3.11.1.9	-	-	-	C	C	T
WLAN UE Remote IP address	3.11.1.10	C	C	-	C	-	P
User Status	3.11.2.1	M	M	-	-	-	T
Emergency Access	3.11.2.2	-	M	-	-	-	T
Diameter Server Identity of HSS	3.11.2.3	-	C	-	-	-	T
RAND, SRES, Kc	3.11.3.1	-	C	-	-	-	T
RAND, XRES CK, IK, AUTN	3.11.3.2	M	C	-	-	-	T
Master Key (MK)	3.11.3.3	-	M	-	-	-	T
Transient EAP Keys (TEKs)	3.11.3.4	-	M	-	-	-	T
Master Session Key (MSK)	3.11.3.5	-	-	-	C	-	T
Session Identifier	3.11.4.1	-	M	C	C	-	T
Session-Timeout	3.11.4.2	-	C	-	-	-	P
W APN Identifier List	3.11.5.1.1	C	C	-	C	-	P
W-APN Barring Type List	3.11.5.1.2	C	C	-	-	-	P
W-APN Charging Data List	3.11.5.1.3	C	C	-	C	-	P
Static WLAN UE Remote IP Address List	3.11.5.1.4	C	C	-	C	-	P
Maximum-Number-Accesses List	3.11.5.1.5	C	C	-	-	-	P
Access-Number List	3.11.5.1.6	-	M	-	-	-	T
Access Dependence Flag	3.11.5.2	M	M	-	-	-	P
I-WLAN Access Type	3.11.5.3	M	M	-	-	-	T
WLAN Direct IP Access	3.11.5.4	C	C	-	-	-	P
Max Subscribed Bandwidth	3.11.6.1	C	C	-	C	-	P
Routing Policy	3.11.6.2	-	C	C	C	C	T
Subscribed 3GPP WLAN QoS Profile	3.11.6.3	C	C	-	-	-	P
Authorized 3GPP WLAN QoS Profile	3.11.6.4	-	C	-	C	-	T
Charging Characteristics	3.11.7.1.1	M	M	-	C	-	P
Primary OCS Charging Function Name	3.11.7.2	C Note 1	C	-	C	-	P
Secondary OCS Charging Function Name	3.11.7.3	C	C	-	C	-	P
Primary Charging Collection Function Name	3.11.7.4	C Note 1	C	-	C	-	P
Secondary Charging Collection Function Name	3.11.7.5	C	C	-	C	-	P
WLAN Session Identifier	3.11.7.6	-	M	C	C	-	T
PDG Session Identifier	3.11.7.7	-	C	C	M	-	T

Note 1: At least one of these Primary Charging Function Names shall be mandatorily provisioned in the HSS.

5.6 MBMS Storage (EPS)

Table 5.6-1: Overview of data used for MBMS (EPS)

PARAMETER	Clause	SGSN	MME	MBMS GW	BM-SC	TYPE
MBMS GW F-TEID for Sm(Control Plane)	2.22.1	-	C	C	-	T
MBMS GW F-TEID for Sn(Control Plane)	2.22.2	C	-	C	-	T
Temporary Mobile Group Identity	2.22.3	C	C	C	C	P
MBMS Flow Identifier	2.22.4	C	C	C	C	P
MBMS IP Multicast Distribution	2.22.5	C	C	C	-	T
MBMS Service Area	2.22.6	C	C	C	C	P
MME F-TEID for Sm (Control Plane)	2.22.7	-	C	C	-	T
SGSN F-TEID for Sn (Control Plane)	2.22.8	C	-	C	-	T
SGSN F-TEID for Sn (User Plane)	2.22.9	C	-	C	-	T
MBMS session identifier	2.22.10	C	C	C	C	P
MBMS session duration	2.22.11	C	C	C	C	P
QoS parameters	2.22.12	C	C	C	C	P
MBMS Time to Data Transfer	2.22.13	C	C	C	C	P
MBMS Data Transfer Start	2.22.14	-	C	C	C	P
List of downstream nodes	2.22.15	C	C	C	C	T
MBMS Session Re-establishment Indication	2.22.16	C	C	C	C	T
GCS AS Address	2.22.17	-	-	-	C	T
MB2-U Port Number	2.22.18	-	-	-	C	T
MBMS Start Time	2.22.19	-	-	-	C	T
TMGI Expiration Time	2.22.20	-	-	-	C	T
MBMS Alternative IP Multicast Distribution	2.22.21	-	C	C	-	T
MBMS Cell List	2.22.22	-	C	C	C	P

5.7 VPLMN Autonomous CSG Roaming Service Data Storage

Table 5.7-1: Overview of data used for VPLMN Autonomous CSG Roaming Service

PARAMETER	Clause	CSS	MME	S4-SGSN	Gn/Gp-SGSN	VLR	TYPE
IMSI	2.1.1.1	M	C	C	M	M	P
International MS ISDN number	2.1.2	C	C	C	C	C	P
VLR Number	2.4.5	M	-	-	-	-	T
SGSN Number	2.4.8.1	M	-	-	-	-	T
CSS Number	2.4.25	-	-	-	C	C	T
VPLMN Closed Subscriber Group Information	2.4.26	C	C	C	C	C	P
MME Name	2.13.26	M	-	-	-	-	T
SGSN Name	2.13.100	M	-	-	-	-	T
Diameter Server Identity of CSS	2.13.133	-	C	C	-	-	T

5.8 Proximity Services (ProSe) Data Storage

Table 5.8-1: Overview of data for Proximity Services

PARAMETER	Clause	HSS	SLP	MME	ProSe Function	ProSe Application Server	TYPE
IMSI	2.1.1.1	M	C	C	C	-	P
MSISDN	2.1.2	C	C	C	C	-	P
ProSe-Permission	3.13.2.1	C	-	C	C	-	P
PLMN-Allowed-ProSe	3.13.2.2	C	-	C	C	-	P
Application layer user ID	3.13.3	-	-	-	C	C	P
EPC ProSe User ID	3.13.4	-	-	-	C	C	T
ProSe Application ID	3.13.5	-	-	-	C	-	P
ProSe Application Code	3.13.6	-	-	-	C	-	T
Filter ID	3.13.7.1	-	-	-	C	-	P
ProSe Application Code	3.13.7.2	-	-	-	C	-	P
ProSe Application Mask	3.13.7.3	-	-	-	C	-	P
TTLTimer T4002	3.13.7.4	-	-	-	C	-	P
ProSe Function Identity	3.13.8	C	-	-	-	C	T
ProSe Metadata Index Mask	3.13.9	-	-	-	C	-	P
PC5-tech	3.13.10	-	-	-	C	-	T

5.9 Architecture Enhancements for Service Exposure storage (AESE)

Table 5.9-1: Overview of data used for AESE

PARAMETER	Clause	HSS	MME	SGSN	SCEF	TYPE
International MS ISDN number	2.1.2	C	C	C	C	P
External Identifier Set	2.1.10	C	-	-	C	P
SCEF-Reference-ID	3.14.2	C	C	C	C	T
SCEF-ID	3.14.3	C	C	C	C	P
Monitoring-Type	3.14.4	C	C	C	C	P
Maximum-Number-of-Reports	3.14.5	C	C	C	C	P
UE-Reachability-Configuration	3.14.6	C	C	C	C	P
Monitoring-Duration	3.14.7	C	C	C	C	P
Maximum-Detection-Time	3.14.8	C	-	-	C	P
Reachability-Type	3.14.9	C	-	-	C	P
Maximum Latency	3.14.10	C	-	-	C	P
Maximum Response Time	3.14.11	C	C	C	C	P
MONTE-Location-Type	3.14.12	C	C	C	C	P
Accuracy	3.14.13	C	C	C	C	P
Association-Type	3.14.14	C	-	-	C	P
Charged-Party	3.14.15	C	C	C	C	P
Remaining number of reports	3.14.16	C	C	C	C	T
Periodic-Communication-Indicator	3.14.17.1	C	C	-	C	P
Communication-Duration-Time	3.14.17.2	C	C	-	C	P
Periodic-Time	3.14.17.3	C	C	-	C	P
Scheduled-Communication-Time	3.14.17.4	C	C	-	C	P
Stationary-Indication	3.14.17.5	C	C	-	C	P
Validity-Time	3.14.17.6	C	C	-	C	P
AESE-Subscription-Data	3.14.18	C	-	-	-	P
SCEF-Realm	3.14.19	C	C	C	C	P
External-Identifier for Monitoring Event Configuration	3.14.20	C	C	C	C	P
External Group Identifier	3.14.21	C	-	-	C	P

5.10 Data related to Cellular IoT Control Plane Optimizations

Table 5.10-1: Overview of data used for Clot

PARAMETER	Clause	HSS	MME	SGSN	SGW	PGW	SCEF	TYPE
IMSI	2.1.1.1	C	C	C	-	-	C	P
MSISDN	2.1.2	C	C	C	-	-	C	P
External Identifier set	2.1.10	C	-	-	-	-	C	P
Access Point Name	2.13.6	C	C	C	-	-	C	P
EPS Bearer Id	2.13.66	-	C	C	-	-	C	T
Acknowledgement-Of-Downlink-NAS-Data-PDUs flag	2.13.173	C	C	-	-	-	-	P
Robust Header Compression Context	2.23.1	-	C	-	-	-	-	T
MME F-TEID for S11 (user plane)	2.23.3	-	C	-	C	-	-	T
S-GW F-TEID for S11 (userplane)	2.23.4	-	C	-	C	-	-	T
Serving-PLMN-Rate-Control	2.23.5	-	C	-	C	C	C	P
APN-Rate-Control	2.23.6	-	-	-	-	C	C	P
Not Reachable for NIDD Flag	2.23.7	-	C	C	-	-	-	T
NIDD Authorization	2.23.8	C	-	-	-	-	C	P
SCEF-ID	3.14.3	C	C	C	-	-	C	P
SCEF-Realm	3.14.19	C	C	C	-	-	C	P

5.11 V2X Service (V2X) Data Storage

Table 5.11-1: Overview of data for V2X Service

PARAMETER	Clause	HSS	SLP	MME	V2X Control Function	TYPE
IMSI	2.1.1.1	M	C	C	C	P
MSISDN	2.1.2	C	C	C	C	P
V2X-Permission	3.16.2.1	C	-	C	-	P
UE-PC5-AMBR	3.16.2.2	C	-	C	-	P
V2X-PC5-Allowed-PLMN	3.16.2.3	C	-	-	C	P
V2X-Permission-in-VPLMN	3.16.3.1	-	-	-	C	P
V2X-Application-Server	3.16.3.2	-	-	-	C	P
PC5-RAT-Type	3.16.3.3	C	-	-	C	P
V2X Control Function Identity	3.16.4	C	-	-	-	T
V2X-Permission	3.16.5.1	C	-	C	-	P
UE-PC5-AMBR	3.16.5.2	C	-	C	-	P
V2X-PC5-Allowed-PLMN	3.16.5.3	C	-	-	C	P
UE-PC5-QoS	3.16.5.4	C	-	C	-	P

Annex A (informative): Change history

Date	TSG #	TSG Doc.	CR	Rev	Cat	Subject/Comment	New
	Apr 1999					Transferred to 3GPP CN1	0.0.0
	CN#03					Approved at CN#03	3.0.0
	CN#05		002r1			Approved at CN#05	3.1.0
	CN#06		003r1			Introduction of the Super-Charger Concept in TS 23.008	3.2.0
	CN#06		004r3			Authentication Enhancements	3.2.0
	CN#06		009			Authentication Enhancements	3.2.0
	CN#06		010r2			Combined CR on 23.008	3.2.0
	CN#06		011			Organization of Subscriber Data for LCS	3.2.0
	CN#07		012r2			Introduction of 'Notification to CSE flag' to the operator determined barring data	3.3.0
	CN#07		013			Correction of LSA Information	3.3.0
	CN#07		014r2			The addition of priority information to subscriber data	3.3.0
	CN#07		015r1			Introduction of Multicall	3.3.0
	CN#07		016r1			Parallel handling of multiple PDP contexts	3.3.0
	CN#07		019r1			Introduction of Service Area Identification	3.3.0
	CN#07		020r1			Addition of gsmSCF address list to CSI	3.3.0
	CN#07		023r1			Combined CR on 23.008	3.3.0
	CN#07		024			Adding D-CSI to table with Negotiated CAMEL Capability Handling variables	3.3.0
	CN#07		025			Addition of PDP Context Identifier	3.3.0
	CN#08		017			Addition of subscribed charging characteristics information	3.4.0
	CN#08		026r2			Editorial changes on 23.008 draft version 3.2.0	3.4.0
	CN#08		027			Clarifications on GSM vs. UMTS specific parts	3.4.0
	CN#08		029			Addition of charging characteristics per PDP context	3.4.0
	CN#09		030			Deletion of "Barring of roaming" stored in SGSN	3.5.0
	CN#09		031			Corrections of the description of BC allocation for VLR (Release 99)	3.5.0
	CN#11					Version updated from R99 to Rel-4 after CN#11	4.0.0
	CN#11		032r1			Declare barring data for ODB PS	4.0.0
	CN#11		033r2			Addition of LCS related subscriber data for PS domain	4.0.0
	CN#12		035r3			Correction of references	4.1.0
	CN#12		037			Supported CAMEL Phases in VLR is temporary	4.1.0
	CN#15		038r5			Addition of multimedia information elements	5.0.0
	CN#15		039r1			Collective CRs against 23.008 for CAMEL phase4	5.0.0
	CN#16		041r2			Filter Criteria Modifications	5.1.0
	CN#16		043			Correction to TS 23.008	5.1.0
	CN#16		044			Correction of the DP criteria table for T-CSI and VT-CSI on the Rel05 collective CR	5.1.0
	CN#16		045r1			Splitting of CAMEL phase 4	5.1.0
	CN#16		047r1			Addition of Service Indication	5.1.0
	CN#16		048r1			CR on the charging function address format	5.1.0
	CN#16		051			Correction of errors introduced with the taken into account CAMEL phase 4	5.1.0
	CN#16		052r1			LCS: Service Type and Codeword	5.1.0
	CN#16		053			Alignment of 23.008	5.1.0
	CN#17		054r1			The Organisation of CAMEL IMS Data	5.2.0
	CN#17		056r1			Handling of partial implementations of CAMEL phase 4	5.2.0
	CN#17		057			Wrong Camel capability handling for the O-CSI, T-CSI, VT-CSI and D-CSI	5.2.0
	CN#18		058			Addition of Barring Indication of multimedia public identities	5.3.0
	CN#18		060			Deleting codeword related information	5.3.0
	CN#18		061r1			Correction to the form of public user identity	5.3.0
	CN#19		065r1			Clarification of IMPU barring handling	5.4.0
	CN#19		067r1			Definition of the Subscribed Media Profile Identifier	5.4.0
	CN#20		068			Storage of UESBI in the VLR and SGSN	5.5.0
	CN#20		121			Distinction between Roaming Restriction Due To Unsupported Feature and Roaming Restricted in the SGSN Due To Unsupported Feature	5.5.0
	CN#21		122r2			Addition of a list of authorized visited network identifiers	5.6.0
	CN#22		126			Registration status	5.7.0
	CN#22		128r1			Correct table of IMS elements	5.7.0
	CN#22		127r4			Services related to unregistered state	6.0.0
	CN#23		129			Inclusion of Access_Restriction_Data parameter	6.1.0

	CN#24		130r4		Add IMEISV to 'data stored in the HLR' due to ADD function	6.2.0
	CN#25		133r3		GAA Domain Data Structure	6.3.0
	CN#26		135r1		Inclusion of selected CN operator ID parameter	6.4.0
	CN#26		136		Optimization of User Profile Download	6.4.0
	CN#26		137		Subscribed Media Profile Identifier	6.4.0
	CN#26		138r1		Domain independent GAA	6.4.0
	CN#26		140		Correction to authorization flag definition	6.4.0
	CN#26		141		Introduction of NAF groups	6.4.0
	CN#26		142r1		WLAN-IW data handling: additions to 23.008	6.4.0
	CN#27		134r4		Adding trace control and configuration parameters to subscriber data in HSS	6.5.0
	CN#27		143r1		Add reference to Implicitly registered Public User Identities set definition	6.5.0
	CT#28		148		Change the temporary flag of the MSISDN for GPRS	6.6.0
	CT#28		0150		Removal of implied link between MS and IMS subscription	6.6.0
	CT#28		0146r2		Corrections on WLAN UE Remote IP Address	6.6.0
	CT#28		0147r1		Default Public User Identity per Implicit Registration Set	6.6.0
	CT#28		0145r2		Corrections on Serving WAG	6.6.0
	CT#28		0151r1		Addition of Maximum-Number-Accesses AVP and Number-Accesses Data types	6.6.0
	CT#28		0144r4		Public Service Identity	6.6.0
	CT#28		152r2		Correction on I-WLAN Service Data Storage table	6.7.0
	CT#28		153		Correction to handling of Maximum-Number-Accesses description	6.7.0
	CT#28		154R2		PSI routing	6.7.0
	CT#28		155r1		Update to GAA time data items	6.7.0
	CT#28		156r1		PSI Activation	6.7.0
	CT#28		157r1		Removing references to Diameter draft	6.7.0
	CT#28		159r1		IMSI handling at the PDG	6.7.0
	CT#28		160		Change of reference from Release 5 to Release 6	6.7.0
	CT#28		161		Association of the Charging Information with the IMS Subscription	6.7.0
	CT#28		162		Charging-Information Correction	6.7.0
	CT#30		0163r1		Incorrect References	6.8.0
	CT#30		0164r1		Correction on I-WLAN Service Data Storage table	6.8.0
	CT#30		0165r2		Updating the table of I-WLAN Data Storage	6.8.0
	CT#30				Rel-7 version was created because of ETSI TISPAN references.	7.0.0
	CT#31		0169r1		Correction to the Max Requested Bandwidth in I-WLAN data storage	7.1.0
	CT#32		0172r2		Roaming handling with implicitly registered Public User IDs	7.2.0
	CT#33		0179r1		Correction of the handling of transparent data	7.3.0
	CT#33		0176r2		Storage of the Display Name in the IM Core Network Subsystem	7.3.0
	CT#34		0170r4		Support of SMS over IP networks	7.4.0
			0181r1		Activation Status of a PSI	7.4.0
			0183r1		Charging identifier storage	7.4.0
			0187r1		User Status valid values	7.4.0
			0190r1		Definition of Wildcarded PSIs	7.4.0

		0194		Clarification of the definition of the Service Indication	7.4.0
		0195r 1		Addition of Emergency Access Flag to I-WLAN User data	7.4.0
CT#35		0196r 1		Subscriber data for Operator Determined Barring	7.5.0
		0198r 2		Correction of user data	7.5.0
		0199r 2		QoS parameter storage in I-WLAN entities	7.5.0
		0201		MNRR correction	7.5.0
		0205r 1		Network Access Identifier Update	7.5.0
CT#36		0200r 1		Addition of UNRI	7.6.0
		0206		Mobile Termination whilst the MS is moving to another MSC	7.6.0
		0207r 2		Definition of the List of Subscribed IMS Communication Service Identifiers	7.6.0
		0209		Negotiated CAMEL Capability Handling for M-CSI and SS-CSI	7.6.0
CT#37		0210		Mandatory Charging Data in the HSS	7.7.0
		0211r 1		Repository Data for Alias Public User Identities	7.7.0
		0213r 1		Repository Data for Wildcarded PSIs	7.7.0
CT#38		0220		Addition of Alias Public User Identities	7.8.0
CT#38		0214r 5		Updates to 23.008 for Digest	8.0.0
CT#39		0222r 2		Update for Supporting NASS-Bundled-Authentication	8.1.0
		0223r 1		PSI clarification	8.1.0
		0226		Wildcarded Public User Identities	8.1.0
CT#40		0221r 1		Paging optimization with A/lu flex	8.2.0
CT#41		0229		Addition of IMS Centralized Service subscription information	8.3.0
		0230r 1		Support of "Loose-Route" indication from HSS	8.3.0
		0232		Add S-CSCF Restoration Information as One Subscriber Data	8.3.0
CT#42		0234r 1		Introduction of new subscriber related data for CS fallback	8.4.0
		0233r 4		Closed Subscriber Group	8.4.0
		0236		Support for IMS Service Level Trace	8.4.0
		0238r 2		EPS related Subscriber Data	8.4.0
CT#43		0245r 1		AliasesRepositoryData removal	8.5.0
		0239r 3		Correction and alignments with interface specifications	8.5.0
		0244		EPS Subscription Data	8.5.0
Ct#44		0248r 2		Loose Route Indication	8.6.0
		0249		Parameters storage related to ISR	8.6.0
		0251r 3		User data related to UE reachability notification procedure	8.6.0
CT#45		0252r 1		Subscribed and EPS PDN Connection Charging Characteristics	8.7.0
		0254r 1		HSS Data Corrections	8.7.0
		0256r 1		SA2 alignment in 23.008	8.7.0
		0258r 1		Correction on some ODB parameters description	8.7.0

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