Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Organization of subscriber data (3GPP TS 23.008 version 7.7.0 Release 7)

GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS

Reference

RTS/TSGC-0423008v770

Keywords

GSM, UMTS

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00   Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

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Contents

Foreword

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

The present document provides a mechanism giving reliable transfer of signalling messages within the 3GPP system.

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:

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x the first digit:

1 presented to TSG for information;

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

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0 Scope

The present document provides details concerning information to be stored in home subscriber servers, visitor location registers, GPRS Support Nodes and Call Session Control Function (CSCF) concerning mobile subscriber.

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.

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] 3GPP TS 22.003: "Circuit Teleservices supported by a Public Land Mobile Network (PLMN)".

[4] 3GPP TS 22.004: "General on supplementary services".

[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] 3GPP TS 23.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL); Stage 2".

[14] 3GPP TS 23.081: "Line identification supplementary services; Stage 2".

[15] 3GPP TS 23.082: "Call Forwarding (CF) Supplementary Services; Stage 2".

[16] 3GPP TS 23.083: "Call Waiting (CW) and Call Hold (HOLD) Supplementary Services; Stage 2".

[17] 3GPP TS 23.084: "Multi Party (MPTY) Supplementary Service; Stage 2".

[18] 3GPP TS 23.085: "Closed User Group (CUG) Supplementary Service; Stage 2".

[19] 3GPP TS 23.086: "Advice of Charge (AoC) Supplementary Service; Stage 2".

[20]   3GPP TS 23.088: "Call Barring (CB) Supplementary Service; Stage 2".

[21]   3GPP TS 23.060: "General Packet Radio Service (GPRS); Service Description; Stage 2".

[22]   3GPP TS 23.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL); Stage 2".

[23]   3GPP TS 23.090: "Unstructured Supplementary Service Data (USSD); Stage 2".

[24]   3GPP TS 23.116: "Super-Charger Technical Realization; Stage 2."

[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".

[52]   3GPP TS 33.102: "3G Security; Security Architecture".

[53]   3GPP TS 23.218: "IP Multimedia (IM) session handling; IM call model; Stage 2".

[54]   3GPP TS 29.328: "IP Multimedia Subsystem (IMS) Sh interface signalling flows and message contents".

[55]   3GPP TS 23.278: "Customised Applications for Mobile network Enhanced Logic (CAMEL) - IP Multimedia System (IMS) interworking; Stage 2".

[56]   3GPP TS 23.271: "Location Services (LCS); Functional description; Stage 2".

[57]   3GPP TS 23.221: "Architectural requirements ".

[58]   3GPP TS 33.220: "Generic Authentication Architecture (GAA);Generic bootstrapping architecture".

[59]   3GPP TS 29.109 "Zh and Zn Interfaces based on the Diameter protocol; Protocol details".

[60]   IETF RFC 3548: "The Base16, Base32, and Base64 Data Encodings".

[61]   3GPP TS 23.251: "Network Sharing; Architecture and Functional Description".

[62]   3GPP TS 23.234 "3GPP Systen to WLAN Interworking System Description, Stage 2".

[63]   3GPP TS 29.234 "3GPP system to Wireless Local Area Network (WLAN), Stage 3".

[64]   3GPP TS 32.422: "Subscriber and equipment trace: Trace control and configuration management".

[65]   3GPP TS 32.421: "Subscriber and equipment trace: Trace concepts and requirements".

[66]   3GPP TS 32.252: "Telecommunication management; Charging management; Wireless Local Area Network (WLAN) charging".

[67]   3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging applications".

[68]   3GPP TS 24.229: "IP Multimedia Call Control Protocol based on SIP and SDP – stage 3"

0.2   Abbreviations

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

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 in the following types of functional unit:

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

- 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.

- 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: 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].

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: 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]).

1.3   Subscriber data in functional units other than the HLR, the VLR, the SGSN, the GGSN, the GMLC, the SMLC and the LMU

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 3GPP WLAN Direct Access and 3GPP WLAN 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 3GPP WLAN 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, VLR, SGSN, GGSN 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.

2.1.1.2 Network Access Mode (NAM)

The Network Access Mode (NAM) defines if the subscriber is registered to get access to the non-GPRS network, to the GPRS network or to both networks. NAM describes the first level of the subscriber data pseudo-tree below the IMSI root. It is permanent subscriber data stored in the HLR and the SGSN with the Gs interface option.

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 stored in HLR, VLR and SGSN.

If the multinumbering option applies, the MSISDN stored in the VLR and in the SGSN is the Basic MSISDN, see subclause 2.1.3.1.

2.1.3 MSISDNs for multinumbering 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 subclause 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 SGSN.

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 stored in the VLR, SGSN and conditionally in HLR.

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)

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].

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 (Kc) 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.

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.

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 Kc

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

Current Kc 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.

2.4   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].

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 subclause 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 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 SGSN.

2.4.8   GSN number

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 subclause 2.13.10.

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. subclause 2.13.11.

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 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 subclause 2.4.12;

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

Handling of Regionally Restricted Subscription is defined in subclause 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 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 VLR or the SGSN, the HLR identifies the VPLMN and NDC given by the VLR or SGSN number and transfers the pertaining Zone Code List to the VLR or SGSN. The VLR or SGSN derives from the Zone Code List the allowed and not allowed MSC or SGSN 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 should the MSC or SGSN 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.

2.4.11.2 Zone Code List

The VLR and the SGSN 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 (subclause 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 (subclause 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 LA 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 location area basis.

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

2.4.15   Service restriction data induced by roaming

If in the course of roaming or at updating of the VLR or SGSN the HLR is informed that the VLR or SGSN does not support certain sensitive services or features, or, the HLR is informed in data request that the VLR or the SGSN supports only specific services, features or phases which do not correspond to subscribed services, features or phases, the HLR takes appropriate measures to restrict service for the mobile station in that VLR or SGSN 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 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, and where possible as discussed below in the SGSN, 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 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 subclause 2.4.11 and 3GPP TS 29.002. A flag in the HLR and the VLR, see subclause 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 subclause 2.4.11 and 3GPP TS 29.002. A flag in the HLR and the SGSN, see subclause 2.4.15.3, collects the sources of network-induced roaming restriction which are also kept separate by the HLR.

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 subclause 2.4.13) and the "MSC area restricted flag" in the HLR (see subclause 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 subclause 2.4.14a) and the "SGSN area restricted flag" in the HLR (see subclause 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.

2.4.16 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.

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 SGSN, the HLR identifies the VPLMN given by the VLR or SGSN number and transfers the applicable LSA ID List to the VLR or SGSN. The VLR or 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 AccessRestriction_Data

The use of this data is described in 3GPP TS 23.221 [57].

The Access_Restriction_Data is permanent subscriber data stored in the HLR, and temporary subscriber data stored in the VLR and SGSN.

The parameter takes either of the following values (see also 3GPP TS 29.002 [27]):

- 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;

The use of this parameter for LA/RA update procedures is described in TS 23.012 [8] and TS 23.060 [21].

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 inerface is installed.

2.4.20 IP-SM-GW number

The IP-SM-GW number indicates the address of the external IP-SM-GW that can be used as an alternative route 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 available for MT-SM routing.

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, 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 the3GPP 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 SGSN when GPRS is not supported in the GMSC: this option is used to indicate that SM shall always be sent via the 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 in3GPP 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 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 (MNRR-SGSN).

In 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 SGSN.

MNRG is described in 3GPP TS 23.060 [21]. It is temporary subscriber data stored in the HLR, in the 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, 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 indicator

Subscriber Data Confirmed by HLR 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.

2.7.4.3 Location Information Confirmed in HLR indicator

Location Information Confirmed in HLR 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.

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.

2.7.5 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 flag

MS purged for 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 SGSN. The parameter takes the following values:

- MS purged for GPRS;

- MS not purged for GPRS.

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

2.8 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, the SGSN 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, 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 both for non-GPRS and GPRS 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.

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, 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 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 subclause 2.7.2.

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

For UNRI see subclause 3.2.5.

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

For MNRR-MSC see subclause 2.7.7.

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

For MNRR-SGSN see subclause 2.7.7A.

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

For UNRR see subclause 3.2.6.

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 HLR, VLR. And SGSN.

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 HLR, VLR and SGSN.

2.11.10 List of NE types to trace

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

The List of NE types to trace is permanent subscriber data and is conditionally stored in the HLR, VLR and SGSN.

2.11.11 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 HLR, VLR and SGSN.

2.11.12 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 HLR, VLR and SGSN.

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 GPRS NAM

The data listed in this subclause pertain to the Network Access Mode "GPRS" and have no counterpart for non-GPRS.

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 X.121 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]. The APN field in the HLR 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, in GGSN and SGSN.

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 SGSN.

2.13.8   VPLMN Address Allowed

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

2.13.25 PDP Context Charging Characteristics

PDP Context Charging Charactertistics 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.

2.14   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 (E164 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 E164 gsmSCF address	One Default call handling
DP Route_Select_ Failure	No criterion Cause value criteria	One ServiceKey	One E164 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 E164 gsmSCF address	One Default call handling
DP T_Busy	No criterion Cause value criteria	One serviceKey	One E164 gsmSCF address	One Default call handling
DP T_No_Answer	No criterion Cause value criteria	One service Key	One E164 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 (E164 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 (E164 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 E164 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 (E164 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 Dialled service CAMEL Subscription Information (D-CSI)

This data defines the contents of the dialled 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 gsmSSF shall request gsmSCF for instructions. It is a destination number.

    2. A gsmSCF address. It is the gsmSCF address (E164 number) where this Subscribed Dialled 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 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).

- 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 reacheable 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(E164 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 (E164 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 (E164 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 (E164 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 addess is the address (E164 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 (E164 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 E164 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 Dialled service CAMEL Subscription Information (D-CSI)

This data defines the contents of the dialled 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 (E164 number) where this Subscribed Dialled 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 addess 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 (E164 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 E164 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 interworkingbetween 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 (E164 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 reacheable for paging" state (the network has not received a periodic routeing area update from the MS and assumes that the MS is unreacheable).

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.

2.17 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 [6]. 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 specifies 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 HLR, SGSN, and GGSN (see 3GPP TS 23.060 [21]).

3 Definition of data for IP Multimedia domain

This section 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 d omain (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, which is 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 wilcarded 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.

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 or Public Service 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 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 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 stored in the HSS and in the S-CSCF.

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 identities 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 Address of S-CSCF

The Diameter Client Address 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 Address is the Diameter Identity defined in IETF RFC 3588 [51].

The Diameter Client Address of the S-CSCF is temporary data and is stored in HSS.

3.2.4 Diameter Server Address of HSS

The Diameter Server Address of the HSS identifies the Diameter Server in the HSS when the IMS subscriber is registered to IP Multimedia Services or the Address of HSS holding the IMS data of a PSI user. It is used in requests send by the S-CSCF to the HSS. The format of the Diameter Server Address is the Diameter Identity defined in IETF RFC 3588 [51].

For an IMS subscriber and PSI user, the Diameter Server Address 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.

3.3 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 subclause 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.

3.4 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.

3.5 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] subclause 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] subclause 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) or Alias Public User Identities group corresponding to a Public User Identity (Aliases 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.

The Transparent Data is temporary subscriber data and is stored in the HSS and one or more ASs.

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 (E164 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 E164 gsmSCF address	One Default call handling
DP Route_Select_ Failure	No criterion Cause value criteria	One ServiceKey	One E164 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 E164 gsmSCF address	One Default call handling
DP T_Busy	No criterion Cause value criteria	One serviceKey	One E164 gsmSCF address	One Default call handling
DP T_No_Answer	No criterion Cause value criteria	One service Key	One E164 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 Dialled Services IP Multimedia CAMEL Subscription Information (D-IM-CSI)

This data defines the contents of the dialled 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 (E164 number) where this Subscribed Dialled 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 (E164 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.

3A 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 subscriptiondata in the HSS for GAA specific user identities and/or authorization controls is GAA application dependingent. 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 chapter 3.1.1.

3A.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.

3A.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.

3A.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.

3A.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 indentities 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.

3A.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.

3A.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.

3A.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 [57] the B-TID value shall be also generated in format of NAI by taking the base64 encoded RAND value [60] 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.

3A.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.

3A.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.

3A.10 NAF Group

The NAF Group contains one or more NAF Address elements (cf. subclause 3.9.12) defining the NAFs that belong to the NAF Group. The NAF Group is identified by NAF Group Identity (cf. subclause 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.

3A.11 NAF Group Identity

The NAF Group Identity is a freely defined string that the home operator can uses as a name of a group of NAFs.

The NAF Group Identity is permanent subscriber data and is stored in the HSS and BSF.

3A.12 NAF Address

The NAF Address is a freely defined string that can be used identify one or more NAFs. The NAF Address may contain a fully qualified domain identitying a single NAF. The NAF Address may also contain a domain name with wildcards "*" and it can be used to identity multiple NAFs.

The NAF Address is permanent subscriber data and is stored in the BSF.

3A.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.

3A.14 Boostrapping Info Creation Time

Boostrapping Info Creation Time is an integer which defines the point of time when the corresponding boostrapping information is created in BSF in seconds according

3B Definition of subscriber data I-WLAN domain

3B.1 Data related to subscription, identification and numbering

3B.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.

3B.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 section 2.1.3 for more information on MSISDNs for multinumbering option).

3B.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).

3B.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.

3B.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.

3B.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.

3B.1.7   Serving PDG List

The Serving PDG List field contains the addresses of the PDGs to which the WLAN UE is connected.

3B.1.8   Serving WAG

The Serving WAG field contains the WAG address information obtained through the successful user authentication procedure.

3B.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.

3B.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 section 3B.5.4.4.

3B.2   Data related to registration

3B.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.

3B.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 Direct IP access is indicated to be for emergency purposes.

3B.3   Data related to authentication and ciphering

3B.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.

3B.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.

3B.3.3   Master Key (MK)

The Master Key (MK) field is defined in 3GPP TS 33.234 [18]. It enables keys to be derived.

3B.3.4   Transient EAP Keys (TEKs)

The Transient EAP Keys (TEKs) field is defined in 3GPP TS 33.234 [18] and are used to protect the EAP packets.

3B.3.5　Master Session Key (MSK)

The Master Session Key (MSK) field is defined in 3GPP TS 33.234 [18] and is used to obtain the key material required for the link layer confidentiality mechanism and IPsec confidentiality mechanism.

3B.4　Data related to session

3B.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.

3B.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.

3B.4.3　Void

3B.5　Operator Determined Barring general data

3B.5.1　Void

3B.5.2　Void

3B.5.3　Void

3B.5.4　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.

3B.5.4.1　W-APN Identifier List

See subclause 3B.1.3.

3B.5.4.2　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.

3B.5.4.3 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 subclause 3B.7.

3B.5.4.4 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 subclause 3B.1.10.

3B.5.4.5 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.

3B.5.4.6 Access Number List

Access Number is an integer counter kept at the 3GPP AAA Server per W-APN.

3B.5.5 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 3GPP Direct WLAN Access. The parameter takes either of the following values:

- Allow access to WLAN 3GPP IP Access independently of a previous WLAN 3GPP Direct Access.

- Prohibit access to WLAN 3GPP IP Access independently of a previous WLAN 3GPP Direct Access.

3B.5.6 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 IWLAN. The parameter takes either of the following values:

- WLAN 3GPP IP Access;

- WLAN 3GPP Direct Access.

3B.6 QoS general data

3B.6.1 Max Subscribed Bandwidth

The Max Subscribed Bandwidth field, specified in 3GPP TS 29.234 [63], indicates the Max subscribed bandwidth.

3B.6.2 Routing Policy

The Routing Policy field, specified in 3GPP TS 29.234 [63], defines a packet filter for an IP flow.

3B.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.

3B.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.

3B.7   Data related to Charging

3B.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.

3B.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.

3B.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].

3B.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].

3B.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].

3B.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].

3B.7.6   WLAN Session Identifier

The WLAN Session Identifier is the identifier generated by 3GPP AAA Server and sent to PDG. Togther 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].

3B.7.7   PDG Charging Identifier

The PDG Charging Identifier is the identifier generated by PDG and sent to 3GPP AAA Server. Togther 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].

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), whereas table 5.2 shows the data stored in the location registers, in the SGSN and in the GGSN for GPRS Network Access Mode. 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 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).

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).

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).

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).

NOTE: See clause 4 for explanation of M, C, T and P in table 1, table 2 and table 3.

5.1 Non-GPRS Network Access Mode Data Storage

Table 5.1: Overview of data stored for non-GPRS Network Access Mode (CS)

PARAMETER	SUBCLAUSE	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	M	M	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
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
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-MSC	2.7.7	C	-	T
Subscriber data dormant	2.7.8	-	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
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

PARAMETER	SUBCLAUSE	HLR	VLR	TYPE
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
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

5.2 GPRS Network Access Mode Storage

Table 5.2: Overview of data used for GPRS Network Access Mode

PARAMETER	Subclause	HLR	VLR	SGSN	GGSN	TYPE
IMSI	2.1.1.1	M	M	M	M	P
Network Access Mode	2.1.1.2	M	-	C note1	-	P
International MS ISDN number	2.1.2	M	M	M	M	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
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	-	T
IMEISV	2.2.3	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
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	-	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
Selected CN operator ID	2.4.19	-	C note2	C	-	T
IP-SM-GW number	2.4.20	C	-	-	-	T
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
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	-	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
PDP Type	2.13.1	C	-	C	M	P
PDP Address	2.13.2	C	-	C	M	P

PARAMETER	Subclause	HLR	VLR	SGSN	GGSN	TYPE
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
GPRS CAMEL Subscription Information (GPRS-CSI)	2.14.1.10/2.14.4.4	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
Subscribed Charging Characteristics	2.19.1	C	-	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

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 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.

5.3 IP Multimedia Service Data Storage

Table 5.3: Overview of IMS subscriber data used for IP Multimedia services

PARAMETER	Subclause	HSS	S-CSCF	IM-SSF	AS	TYPE
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
Registration Status	3.2.1	M	-		-	T
S-CSCF Name	3.2.2	M	-		-	T
Diameter Client Address of S-CSCF	3.2.3	M	-		-	T
Diameter Server Address of HSS	3.2.4	-	M	-	C	T
RAND, XRES, CK, IK and AUTN	3.3.1	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
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
UNRI	3.2.5	C	-	-	C	T
UNRR	3.2.6	C	-	-	-	T
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	Subclause	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 Address of S-CSCF	3.2.3	M	-		-	T
Diameter Server Address 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	Subclause	HSS	BSF	NAF	TYPE
Private User Identity	3.1.1	M	M	C	P
GAA Service Type	3A.1	M	M	M	P
GAA Service Identifier	3A.2	M	M	M	P
GBA User Security Settings	3A.3	M	M		P
User Security Setting	3A.4	M	M	M	P
User Public Identity	3A.5	M	M	M	P
GAA Authorization flag	3A.6	C	C	C	P
Bootstrapping Transaction Identifier	3A.7		M	M	T
Key Lifetime	3A.8	C	M		P
UICC Security Setting	3A.9	C	C		P
NAF Group	3A.10		M		P
NAF Group Identity	3A.11	C	M		P
NAF Address	3A.12		M		P
Key Expirytime	3A.13		M	M	T
Boostrapping Info Creation Time	3A.14		M	M	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

Table 5.5: Overview of data used for I-WLAN services

PARAMETER	Subclause	HSS	3GPP AAA Server	3GPP AAA Proxy	PDG	WAG	TYPE
IMSI	3B.1.1	M	M		C		P
MSISDN	3B.1.2	M	M	M	M	M	P
W-APN	3B.1.3	C	C	C	C		T
List of authorized visited network identifiers	3B.1.4	M					P
3GPP AAA Proxy Name	3B.1.5	C	C	C	C	C	T
3GPP AAA Server Name	3B.1.6	C		C	C	C	T
Serving PDG List	3B.1.7		C	C			T
Serving WAG	3B.1.8		C	C			T
WLAN UE Local IP address	3B.1.9				C	C	T
WLAN UE Remote IP address	3B.1.10	C	C		C		P
User Status	3B.2.1	M	M				T
Emergency Access	3B.2.2		M				T
RAND, SRES, Kc	3B.3.1		C				T
RAND, XRES CK, IK, AUTN	3B.3.2	M	C				T
Master Key (MK)	3B.3.3		M				T
Transient EAP Keys (TEKs)	3B.3.4		M				T
Master Session Key (MSK)	3B.3. 5				C		T
Session Identifier	3B.4.1		M	C	C		T
Session-Timeout	3B.4.2		C				P
W APN Identifier List	3B.5.4.1	C	C		C		P
W-APN Barring Type List	3B.5.4.2	C	C				P
W-APN Charging Data List	3B.5.4.3	C	C		C		P
Static WLAN UE Remote IP Address List	3B.5.4.4	C	C		C		P
Maximum-Number-Accesses List	3B.5.4.5	C	C				P
Access-Number List	3B.5.4.6		M				T
Access Dependence Flag	3B.5.5	M	M				P
I-WLAN Access Type	3B.5.6	M	M				T
Max Subscribed Bandwidth	3B.6.1	C	C		C		P
Routing Policy	3B.6.2		C	C	C	C	T
Subscribed 3GPP WLAN QoS Profile	3B.6.4	C	C				P
Authorized 3GPP WLAN QoS Profile	3B.6.4		C		C		T
Charging Characteristics	3B.7.1.1	M	M		C		P
Primary OCS Charging Function Name	3B.7.2	C Note 1	C		C		P
Secondary OCS Charging Function Name	3B.7.3	C	C		C		P
Primary Charging Collection Function Name	3B.7.4	C Note 1	C		C		P
Secondary Charging Collection Function Name	3B.7.5	C	C		C		P
WLAN Session Identifier	3B.7.6		M	C	C		T
PDG Session Identifier	3B.7.7		C	C	M		T
Note 1: At least one of these Primary Charging Function Names shall be mandatorily provisioned in the HSS.							

Annex A (informative):
Change history

Change history						
TSG CN#	Spec	Version	CR	<Phase>	New Version	Subject/Comment
Apr 1999	GSM 03.08	7.0.0				Transferred to 3GPP CN1
CN#03	23.008			R99	3.0.0	Approved at CN#03
CN#05	23.008	3.0.0	002r1	R99	3.1.0	Approved at CN#05
CN#06	23.008	3.1.0	003r1	R99	3.2.0	Introduction of the Super-Charger Concept in TS 23.008
CN#06	23.008	3.1.0	004r3	R99	3.2.0	Authentication Enhancements
CN#06	23.008	3.1.0	009	R99	3.2.0	Authentication Enhancements
CN#06	23.008	3.1.0	010r2	R99	3.2.0	Combined CR on 23.008
CN#06	23.008	3.1.0	011	R99	3.2.0	Organization of Subscriber Data for LCS
CN#07	23.008	3.2.0	012r2	R99	3.3.0	Introduction of 'Notification to CSE flag' to the operator determined barring data
CN#07	23.008	3.2.0	013	R99	3.3.0	Correction of LSA Information
CN#07	23.008	3.2.0	014r2	R99	3.3.0	The addition of priority information to subscriber data
CN#07	23.008	3.2.0	015r1	R99	3.3.0	Introduction of Multicall
CN#07	23.008	3.2.0	016r1	R99	3.3.0	Parallel handling of multiple PDP contexts
CN#07	23.008	3.2.0	019r1	R99	3.3.0	Introduction of Service Area Identification
CN#07	23.008	3.2.0	020r1	R99	3.3.0	Addition of gsmSCF address list to CSI
CN#07	23.008	3.2.0	023r1	R99	3.3.0	Combined CR on 23.008
CN#07	23.008	3.2.0	024	R99	3.3.0	Adding D-CSI to table with Negotiated CAMEL Capability Handling variables
CN#07	23.008	3.2.0	025	R99	3.3.0	Addition of PDP Context Identifier
CN#08	23.008	3.3.0	017	R99	3.4.0	Addition of subscribed charging characteristics information
CN#08	23.008	3.3.0	026r2	R99	3.4.0	Editorial changes on 23.008 draft version 3.2.0
CN#08	23.008	3.3.0	027	R99	3.4.0	Clarifications on GSM vs. UMTS specific parts
CN#08	23.008	3.3.0	029	R99	3.4.0	Addition of charging characteristics per PDP context
CN#09	23.008	3.4.0	030	R99	3.5.0	Deletion of "Barring of roaming" stored in SGSN
CN#09	23.008	3.4.0	031	R99	3.5.0	Corrections of the description of BC allocation for VLR (Release 99)
CN#11	23.008	3.5.0		Rel-4	4.0.0	Version updated from R99 to Rel-4 after CN#11
CN#11	23.008	3.5.0	032r1	Rel-4	4.0.0	Declare barring data for ODB PS
CN#11	23.008	3.5.0	033r2	Rel-4	4.0.0	Addition of LCS related subscriber data for PS domain
CN#12	23.008	4.0.0	035r3	Rel-4	4.1.0	Correction of references
CN#12	23.008	4.0.0	037	Rel-4	4.1.0	Supported CAMEL Phases in VLR is temporary
CN#15	23.008	4.1.0	038r5	Rel-5	5.0.0	Addition of multimedia information elements
CN#15	23.008	4.1.0	039r1	Rel-5	5.0.0	Collective CRs against 23.008 for CAMEL phase4
CN#16	23.008	5.0.0	041r2	Rel-5	5.1.0	Filter Criteria Modifications
CN#16	23.008	5.0.0	043	Rel-5	5.1.0	Correction to TS 23.008
CN#16	23.008	5.0.0	044	Rel-5	5.1.0	Correction of the DP criteria table for T-CSI and VT-CSI on the Rel05 collective CR
CN#16	23.008	5.0.0	045r1	Rel-5	5.1.0	Splitting of CAMEL phase 4
CN#16	23.008	5.0.0	047r1	Rel-5	5.1.0	Addition of Service Indication
CN#16	23.008	5.0.0	048r1	Rel-5	5.1.0	CR on the charging function address format
CN#16	23.008	5.0.0	051	Rel-5	5.1.0	Correction of errors introduced with the taken into account CAMEL phase 4
CN#16	23.008	5.0.0	052r1	Rel-5	5.1.0	LCS: Service Type and Codeword

Change history						
TSG CN#	**Spec**	**Version**	**CR**	**<Phase>**	**New Version**	**Subject/Comment**
CN#16	23.008	5.0.0	053	Rel-5	5.1.0	Alignment of 23.008
CN#17	23.008	5.1.0	054r1	Rel-5	5.2.0	The Organisation of CAMEL IMS Data
CN#17	23.008	5.1.0	056r1	Rel-5	5.2.0	Handling of partial implementations of CAMEL phase 4
CN#17	23.008	5.1.0	057	Rel-5	5.2.0	Wrong Camel capability handling for the O-CSI, T-CSI, VT-CSI and D-CSI
CN#18	23.008	5.2.0	058	Rel-5	5.3.0	Addition of Barring Indication of multimedia public identities
CN#18	23.008	5.2.0	060	Rel-5	5.3.0	Deleting codeword related information
CN#18	23.008	5.2.0	061r1	Rel-5	5.3.0	Correction to the form of public user identity
CN#19	23.008	5.3.0	065r1	Rel-5	5.4.0	Clarification of IMPU barring handling
CN#19	23.008	5.3.0	067r1	Rel-5	5.4.0	Definition of the Subscribed Media Profile Identifier
CN#20	23.008	5.4.0	068	Rel-5	5.5.0	Storage of UESBI in the VLR and SGSN
CN#20	23.008	5.4.0	121	Rel-5	5.5.0	Distinction between Roaming Restriction Due To Unsupported Feature and Roaming Restricted in the SGSN Due To Unsupported Feature
CN#21	23.008	5.5.0	122r2	Rel-5	5.6.0	Addition of a list of authorized visited network identifiers
CN#22	23.008	5.6.0	126	Rel-5	5.7.0	Registration status
CN#22	23.008	5.6.0	128r1	Rel-5	5.7.0	Correct table of IMS elements
CN#22	23.008	5.7.0	127r4	Rel-6	6.0.0	Services related to unregistered state
CN#23	23.008	6.0.0	129	Rel-6	6.1.0	Inclusion of Access_Restriction_Data parameter
CN#24	23.008	6.1.0	130r4	Rel-6	6.2.0	Add IMEISV to 'data stored in the HLR' due to ADD function
CN#25	23.008	6.2.0	133r3	Rel-6	6.3.0	GAA Domain Data Structure
CN#26	23.008	6.3.0	135r1	Rel-6	6.4.0	Inclusion of selected CN operator ID parameter
CN#26	23.008	6.3.0	136	Rel-6	6.4.0	Optimization of User Profile Download
CN#26	23.008	6.3.0	137	Rel-6	6.4.0	Subscribed Media Profile Identifier
CN#26	23.008	6.3.0	138r1	Rel-6	6.4.0	Domain independent GAA
CN#26	23.008	6.3.0	140	Rel-6	6.4.0	Correction to authorization flag definition
CN#26	23.008	6.3.0	141	Rel-6	6.4.0	Introduction of NAF groups
CN#26	23.008	6.3.0	142r1	Rel-6	6.4.0	WLAN-IW data handling: additions to 23.008
CN#27	23.008	6.4.0	134r4	Rel-6	6.5.0	Adding trace control and configuration parameters to subscriber data in HSS
CN#27	23.008	6.4.0	143r1	Rel-6	6.5.0	Add reference to Implicitly registered Public User Identities set definition
CT#28	23.008	6.5.0	148	Rel-6	6.6.0	Change the temporary flag of the MSISDN for GPRS
CT#28	23.008	6.5.0	0150	Rel-6	6.6.0	Removal of implied link between MS and IMS subscription
CT#28	23.008	6.5.0	0146r2	Rel-6	6.6.0	Corrections on WLAN UE Remote IP Address
CT#28	23.008	6.5.0	0147r1	Rel-6	6.6.0	Default Public User Identity per Implicit Registration Set
CT#28	23.008	6.5.0	0145r2	Rel-6	6.6.0	Corrections on Serving WAG
CT#28	23.008	6.5.0	0151r1	Rel-6	6.6.0	Addition of Maximum-Number-Accesses AVP and Number-Accesses Data types
CT#28	23.008	6.5.0	0144r4	Rel-6	6.6.0	Public Service Identity
CT#28	23.008	6.6.0	152r2	Rel-6	6.7.0	Correction on I-WLAN Service Data Storage table
CT#28	23.008	6.6.0	153	Rel-6	6.7.0	Correction to handling of Maximum-Number-Accesses description
CT#28	23.008	6.6.0	154R2	Rel-6	6.7.0	PSI routing
CT#28	23.008	6.6.0	155r1	Rel-6	6.7.0	Update to GAA time data items
CT#28	23.008	6.6.0	156r1	Rel-6	6.7.0	PSI Activation
CT#28	23.008	6.6.0	157r1	Rel-6	6.7.0	Removing references to Diameter draft
CT#28	23.008	6.6.0	159r1	Rel-6	6.7.0	IMSI handling at the PDG
CT#28	23.008	6.6.0	160	Rel-6	6.7.0	Change of reference from Release 5 to Release 6

Change history						
TSG CN#	Spec	Version	CR	<Phase>	New Version	Subject/Comment
CT#28	23.008	6.6.0	161	Rel-6	6.7.0	Association of the Charging Information with the IMS Subscription
CT#28	23.008	6.6.0	162	Rel-6	6.7.0	Charging-Information Correction
CT#30	23.008	6.7.0	0163r1	Rel-6	6.8.0	Incorrect References
CT#30	23.008	6.7.0	0164r1	Rel-6	6.8.0	Correction on I-WLAN Sevice Data Storage table
CT#30	23.008	6.7.0	0165r2	Rel-6	6.8.0	Updating the table of I-WLAN Data Storage
CT#30	23.008	6.8.0		Rel-7	7.0.0	Rel-7 version was created because of ETSI TISPAN references.
CT#31	23.008	7.0.0	0169r1	Rel-7	7.1.0	Correction to the Max Requested Bandwidth in I-WLAN data storage
CT#32	23.008	7.1.0	0172r2	Rel-7	7.2.0	Roaming handling with implicilty registered Public User IDs
CT#33	23.008	7.2.0	0179r1	Rel-7	7.3.0	Correction of the handling of transparent data
CT#33	23.008	7.2.0	0176r2	Rel-7	7.3.0	Storage of the Display Name in the IM Core Network Subsystem
CT#34	23.008	7.3.0	0170r4 0181r1 0183r1 0187r1 0190r1 0194 0195r1	Rel-7	7.4.0	Support of SMS over IP networks Activation Status of a PSI Charging identifier storage User Status valid values Definition of Wildcarded PSIs Clarification of the definition of the Service Indication Addition of Emergency Access Flag to I-WLAN User data
CT#35	23.008	7.4.0	0196r1 0198r2 0199r2 0201 0205r1		7.5.0	Subscriber data for Operator Determined Barring Correction of user data QoS parameter storage in I-WLAN entities MNRR correction Netwok Access Identifier Update
CT#36	23.008	7.5.0	0200r1 0206 0207r2 0209		7.6.0	Addition of UNRI Mobile Termination whilst the MS is moving to another MSC Definition of the List of Subscribed IMS Communication Service Identifiers Negotiated CAMEL Capability Handling for M-CSI and SS-CSI
CT#37	23.008	7.6.0	0210 0211r1 0213r1		7.7.0	Mandatory Charging Data in the HSS Repository Data for Alias Public User Identities Repository Data for Wildcarded PSIs

History

Document history		
V7.0.0	December 2005	Publication
V7.1.0	March 2006	Publication
V7.2.0	June 2006	Publication
V7.3.0	September 2006	Publication
V7.4.0	December 2006	Publication
V7.5.0	March 2007	Publication
V7.6.0	June 2007	Publication
V7.7.0	October 2007	Publication