3GPP TSG CN Plenary Meeting #18 **NP-020596**
4th – 6th December 2002 New Orleans, USA.

Source: TSG CN WG4

Title: Small Technical Enhancements and Improvements for Rel-5

Agenda item: 8.8

Document for: APPROVAL

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
23.003	055	1	N4-021271	Rel-5	Iur-g Introduction	F	5.4.0
23.003	056	2	N4-021283	Rel-5	Editorial clean-up	F	5.4.0
23.003	058		N4-021344	Rel-5	Addition of a reference to the ITU-T RECOMMENDATION E.212 for Mobile Country Codes	F	5.4.0
23.003	062	1	N4-021565	Rel-5	Fix miss-interworking for LMSI handling (LMSI definition)	F	5.4.0
29.010	078		N4-021394	Rel-5	Interworking between security mode procedure and relocation	F	5.1.0
23.018	112	1	N4-021500	Rel-5	Clarification of requirements for the presence of IEs in messages	F	5.4.0
23.079	020	1	N4-021297	Rel-5	Optimal routeing and CAMEL discrepancy	F	5.1.0
23.205	035	2	N4-021544	Rel-5	CAMEL4 Call Party Handling interworking with Bearer independent CS core	F	5.3.0
23.205	036	1	N4-021268	Rel-5	Clarification of the termination of the Iu interface components in the Bearer Independent Architecture	F	5.3.0
30.002	006		N4-021122	Rel-5	Alignment with use of ASN.1 (1997) standard	F	4.0.1

3GPP TSG CN WG4 Meeting #16 **N4-021271**
Miami, USA, 23rd – 27th September 2002 **Revision of N4-021143**

CR-Form-v7

CHANGE REQUEST

⌘ **23.003** **CR** **055** ⌘ **rev** **1** ⌘ Current version: **5.4.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☐

Title:	⌘	Iur-g Introduction
Source:	⌘	CN4
Work item code:	⌘	TEI5
Date:	⌘	24/09/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change:	⌘	This is an essential correction. According to discussion/study in GERAN, Iur-g interface has been introduced and CRs on TS25.423, TS25.401 and TS25.420 were approved at RAN#16 and RAN#17. For the consistency among the specifications, a clarification on RNC-id in this specification is needed.
Summary of change:	⌘	Clarification in 12.4 was made.
Consequences if not approved:	⌘	

Clauses affected:	⌘	1.1, 12.4

	Y	N		
Other specs affected: ⌘		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	

Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

****** First Modified Section ******

1.1 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 TS 21.905: "3G Vocabulary".

[2] 3GPP TS 23.008: "Organization of subscriber data".

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

[4] 3GPP TS 23.070: "Routeing of calls to/from Public Data Networks (PDN)".

[5] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".

[6] 3GPP TS 29.060: "GPRS Tunnelling protocol (GPT) across the Gn and Gp interface".

[7] GSM 03.20: "Digital cellular telecommunications system (Phase 2+); Security related network functions".

[8] GSM 09.03: "Digital cellular telecommunications system (Phase 2+); Signalling requirements on interworking between the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) and the Public Land Mobile Network (PLMN)".

[9] GSM 11.11: "Digital cellular telecommunications system (Phase 2+); Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface".

[10] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

[11] ITU-T Recommendation E.212: "The international identification plan for mobile terminals and mobile users".

[12] ITU-T Recommendation E.213: "Telephone and ISDN numbering plan for land Mobile Stations in public land mobile networks (PLMN)".

[13] ITU-T Recommendation X.121: "International numbering plan for public data networks".

[14] RFC 791: "Internet Protocol".

[15] RFC 2373: "IP Version 6 Addressing Architecture".

[16] 3GPP TS 25.401: "UTRAN Overall Description".

[17] 3GPP TS 25.413: "UTRAN Iu Interface RANAP Signalling".

[18] RFC 2181: “Clarifications to the DNS Specification”.

[19] RFC 1035: “Domain Names - Implementation and Specification”.

[20] RFC 1123: “Requirements for Internet Hosts -- Application and Support”.

[21] RFC 2462: “IPv6 Stateless Address Autoconfiguration”.

[22] RFC 3041: “Privacy Extensions for Stateless Address Autoconfiguration in IPv6”.

[23] 3GPP TS 23.236: "Intra Domain Connection of RAN Nodes to Multiple CN Nodes".

[24] 3GPP TS 23.228: "IP Multimedia (IM) Subsystem – Stage 2"

[25] RFC 2486: "The Network Access Identifier"

[26] RFC 3261: "SIP: Session Initiation Protocol"

[27] 3GPP TS 31.102: "Characteristics of the USIM Application."

[28] RFC 1035: "Domain names – implementation and specification"

[29] 3GPP TS 44.118: “Radio Resource Control (RRC) Protocol, Iu Mode”.

[30] 3GPP TS 43.130: “Iur-g interface; Stage 2”.

****** Second Modified Section ******

12.4 RNC Identifier

An RNC node is uniquely identified ~~within UTRAN~~ by its RNC Identifier (RNC-Id). The RNC-Id of an RNC is used in the UTRAN, in a GERAN which is operating in GERAN Iu mode and between them. A BSC which is part of a GERAN operating in Iu mode is uniquely identified by its RNC Identifier (RNC-Id). The RNC-Id of a BSC is used in a GERAN which is operating in GERAN Iu mode, in the UTRAN and between them. RNC-Id together with the PLMN identifier is used to globally identify the RNC. RNC-Id or the RNC-Id together with the PLMN-Id is used as RNC identifier in UTRAN Iub, Iur and Iu interfaces. SRNC-Id is the RNC-Id of the SRNC. C-RNC-Id is the RNC-Id of the controlling RNC. D-RNC-Id is the RNC Id of the drift RNC.

- **Global RNC-Id = PLMN-Id + RNC-Id**

The RNC-Id is defined by the operator, and set in the RNC via O&M

For syntax description and the usage of this identifier in RANAP signalling, see 3GPP TS 25.413.

For the usage of this identifier on Iur-g, see 3GPP TS 43.130.

3GPP TSG CN WG4 Meeting #16
Miami, USA, 23rd – 27th September 2002

N4-021283

CR-Form-v7

CHANGE REQUEST

⌘ **23.003** **CR** **056** ⌘ **rev** **2** ⌘ Current version: **5.4.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Editorial clean-up
Source:	⌘	CN4
Work item code:	⌘	TEI5
Date:	⌘	25/09/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
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R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Currently there are some minor grammatical errors in this document. Also, the references section is slightly out of date, has some omissions and the main body text does not always refer back to the References section. **Non-critical correction, agreed by consensus.**
Summary of change:	⌘	Grammar and spelling corrected. References corrected and updated. Some diagrams re-drawn. "Smart" quotes replaced by "straight" quotes as required by 21.801.
Consequences if not approved:	⌘	

Clauses affected:	⌘	All of them!

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	Changes since rev1 include: • References [19] and [28] were duplicated. Found only one reference to number [28] so removed it and in the main body of the text (section 13.2) changed it to [19]. • Section 2.3, paragraph 5, has been updated to take into account that a PLMN may be assigned more than one MNC (after off-line comment from NEC). • Annex A.2, "San Merino" has been put back to "San Marino"!

1 Scope

The present document defines the principal purpose and use of International Mobile station Equipment Identities (IMEI) within the digital cellular telecommunications system and the 3GPP system.

The present document defines:

a) an identification plan for mobile subscribers in the GSM system;

b) principles of assigning telephone and ISDN numbers to MSs in the country of registration of the MS;

c) principles of assigning Mobile Station (MS) roaming numbers to visiting MSs;

d) an identification plan for location areas, routing areas, and base stations in the GSM system;

e) an identification plan for MSCs, SGSNs, GGSNs, and location registers in the GSM system;

f) principles of assigning international mobile equipment identities;

g) principles of assigning zones for regional subscription;

h) an identification plan for groups of subscribers to the Voice Group Call Service (VGCS) and to the Voice Broadcast Service (VBS); and identification plan for voice group calls and voice broadcast calls; an identification plan for group call areas;

i) principles for assigning Packet Data Protocol (PDP) addresses to mobile stations;

j) an identification plan for point-to-multipoint data transmission groups;

k) an identification plan for CN domain, RNC and service area in the UTRAN system.

1.1 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.
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[1] 3GPP TS 21.905: "3G Vocabulary".

[2] 3GPP TS 23.008: "Organization of subscriber data".

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

[4] 3GPP TS 23.070: "Routeing of calls to/from Public Data Networks (PDN)".

[5] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".

[6] 3GPP TS 29.060: "GPRS Tunnelling protocol (GPT) across the Gn and Gp interface".

[7] ~~GSM 0~~3GPP TS 43.020: "Digital cellular telecommunications system (Phase 2+); Security related network functions".

[8] void~~GSM 09.03: "Digital cellular telecommunications system (Phase 2+); Signalling requirements on interworking between the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) and the Public Land Mobile Network (PLMN)".~~

[9] 3GPP~~GSM~~ TS ~~1~~51.011: "~~Digital cellular telecommunications system (Phase 2+);~~ Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface".

[10] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

[11] ITU-T Recommendation E.212: "The international identification plan for mobile terminals and mobile users".

[12] ITU-T Recommendation E.213: "Telephone and ISDN numbering plan for land Mobile Stations in public land mobile networks (PLMN)".

[13] ITU-T Recommendation X.121: "International numbering plan for public data networks".

[14] RFC 791: "Internet Protocol".

[15] RFC 2373: "IP Version 6 Addressing Architecture".

[16] 3GPP TS 25.401: "UTRAN Overall Description".

[17] 3GPP TS 25.413: "UTRAN Iu Interface RANAP Signalling".

[18] RFC 2181: ~~"~~"Clarifications to the DNS Specification"~~"~~.

[19] RFC 1035: ~~"~~"Domain Names - Implementation and Specification"~~"~~.

[20] RFC 1123: ~~"~~"Requirements for Internet Hosts -- Application and Support"~~"~~.

[21] RFC 2462: ~~"~~"IPv6 Stateless Address Autoconfiguration"~~"~~.

[22] RFC 3041: ~~"~~"Privacy Extensions for Stateless Address Autoconfiguration in IPv6"~~"~~.

[23] 3GPP TS 23.236: "Intra Domain Connection of RAN Nodes to Multiple CN Nodes".

[24] 3GPP TS 23.228: "IP Multimedia (IM) Subsystem – Stage 2"

[25] ~~—~~RFC 2486: "The Network Access Identifier"

[26] RFC 3261: "SIP: Session Initiation Protocol"

[27] 3GPP TS 31.102: "Characteristics of the USIM Application."

[28] void~~RFC 1035: "Domain names - implementation and specification"~~

[29] 3GPP TS 44.118: ~~"~~"Radio Resource Control (RRC) Protocol, Iu Mode"~~"~~.

[30] 3GPP TS 23.073: "Support of Localised Service Area (SoLSA); Stage 2"

[31] 3GPP TS 29.002: "Mobile Application Part (MAP) specification"

[32] 3GPP TS 22.016: "International Mobile Equipment Identities (IMEI)"

[33] 3GPP TS 43.068: "Voice Group Call Service (VGCS); Stage 2"

[34] 3GPP TS 43.069: "Voice Broadcast service (VBS); Stage 2"

[35] 3GPP TS 45.056: "CTS-FP Radio Sub-system"

[36] 3GPP TS 42.009: "Security aspects" [currently not being raised to rel-5 – Pete H. looking into it]

[37] 3GPP TS 25.423: "UTRAN Iur interface RNSAP signalling"

[38] 3GPP TS 25.419: "UTRAN Iu-BC interface: Service Area Broadcast Protocol (SABP)"

[39] 3GPP TS 25.410: "UTRAN Iu Interface: General Aspects and Principles"

[40] ISO/IEC 7812: "Identification cards - Numbering system and registration procedure for issuer identifiers"

[41] 3GPP TS 31.102 "Characteristics of the USIM Application"

[42] 3GPP TS 33.102 "3G security; Security architecture"

1.2 Abbreviations

For the purposes of the present document, the abbreviations defined in 3GPP TS 21.905 apply.

1.3 General comments to references

The identification plan for mobile subscribers defined below is that defined in ITU-T Recommendation E.212.

The ISDN numbering plan for MSs and the allocation of mobile station roaming numbers is that defined in ITU-T Recommendation E.213. Only one of the principles for allocating ISDN numbers is proposed for ~~GSM~~ PLMNs. Only the method for allocating MS roaming numbers contained in the main text of ITU-T Recommendation E.213 is recommended for use in ~~GSM~~ PLMNs. If there is any difference between the present document and the ITU-T Recommendations, the former shall prevail.

For terminology, see also ITU-T Recommendations E.164 and X.121.

1.4 Conventions on bitordering

The following conventions hold for the coding of the different identities appearing in the present document and in other GSM Technical Specifications if not indicated otherwise:

- the different parts of an identity are shown in the figures in order of significance;
- the most significant part of an identity is on the left part of the figure and the least significant on the right.

When an identity appears in other Technical Specifications, the following conventions hold if not indicated otherwise:

- digits are numbered by order of significance, with digit 1 being the most significant;
- bits are numbered by order of significance, with the lowest bit number corresponding to the least significant bit.

2 Identification of mobile subscribers

2.1 General

A unique International Mobile Subscriber Identity (IMSI) shall be allocated to each mobile subscriber in the GSM/UMTS system.

NOTE: This IMSI is the concept referred to by ITU-T as "International Mobile Station Identity".

In order to support the subscriber identity confidentiality service the VLRs and SGSNs may allocate Temporary Mobile Subscriber Identities (TMSI) to visiting mobile subscribers. The VLR and SGSNs must be capable of correlating an allocated TMSI with the IMSI of the MS to which it is allocated.

An MS may be allocated two TMSIs, one for services provided through the MSC, and the other for services provided through the SGSN (P-TMSI for short).

For addressing on resources used for GPRS, a Temporary Logical Link Identity (TLLI) is used. The TLLI to use is built by the MS either on the basis of the P-TMSI (local or foreign TLLI), or directly (random TLLI).

In order to speed up the search for subscriber data in the VLR a supplementary Local Mobile Station Identity (LMSI) is defined.

The LMSI may be allocated by the VLR at location updating and is sent to the HLR together with the IMSI. The HLR makes no use of it but includes it together with the IMSI in all messages sent to the VLR concerning that MS.

2.2 Composition of IMSI

IMSI is composed as shown in figure 1.

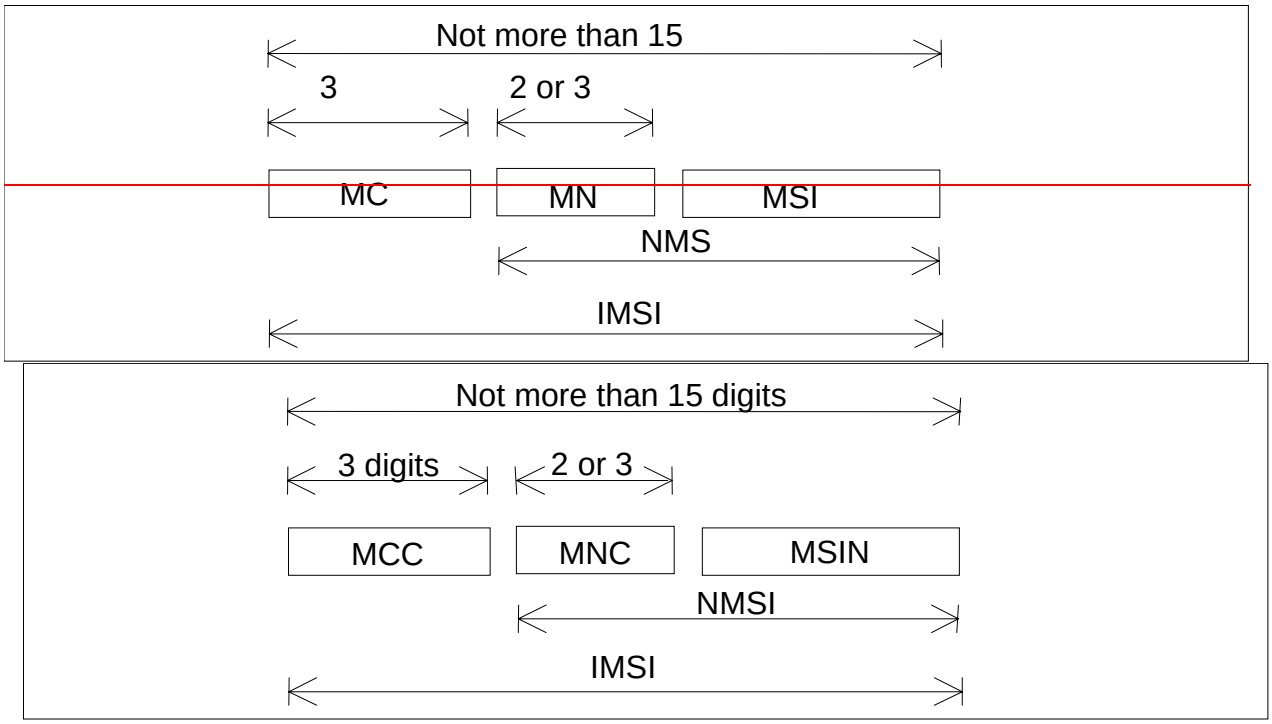


Figure 1: Structure of IMSI

IMSI is composed of three parts:

1) Mobile Country Code (MCC) consisting of three digits. The MCC identifies uniquely the country of domicile of the mobile subscriber;

2) Mobile Network Code (MNC) consisting of two or three digits for GSM/UMTS applications. The MNC identifies the home ~~GSM~~ PLMN of the mobile subscriber. The length of the MNC (two or three digits) depends on the value of the MCC. A mixture of two and three digit MNC codes within a single MCC area is not recommended and is outside the scope of this specification.

3) Mobile Subscriber Identification Number (MSIN) identifying the mobile subscriber within a ~~GSM~~ PLMN.

The National Mobile Subscriber Identity (NMSI) consists of the Mobile Network Code and the Mobile Subscriber Identification Number.

2.3 Allocation principles

IMSI shall consist of ~~numerical characters~~decimal digits (0 through 9) only.

The ~~overall~~ number of digits in IMSI shall not exceed 15 ~~digits~~.

The allocation of Mobile Country Codes (MCCs) is administered by the ITU-T ~~and is given in a~~Annex A ~~to ITU-T Blue Book Recommendation E.212~~.

The allocation of National Mobile Subscriber Identity (NMSI) is the responsibility of each administration.

If more than one ~~GSM~~ PLMN exists in a country, ~~a unique~~the same Mobile Network Code should not be assigned to ~~each of them~~more than one PLMN.

The allocation of IMSIs should be such that not more than the digits MCC + MNC of the IMSI have to be analysed in a foreign ~~GSM~~ PLMN for information transfer.

2.4 Structure of TMSI

Since the TMSI has only local significance (i.e. within a VLR and the area controlled by a VLR, or within an SGSN and the area controlled by an SGSN), the structure and coding of it can be chosen by agreement between operator and manufacturer in order to meet local needs.

The TMSI consists of 4 octets. It can be coded using a full hexadecimal representation.

In order to avoid double allocation of TMSIs after a restart of an allocating node, some part of the TMSI may be related to the time when it was allocated or contain a bit field which is changed when the allocating node has recovered from the restart.

In areas where both MSC-based services and SGSN-based services are provided, some discrimination is needed between the allocation of TMSIs for MSC-based services and the allocation of TMSIs for SGSN-based services. The discrimination shall be done on the 2 most significant bits, with values 00, 01, and 10 being used by the VLR, and 11 being used by the SGSN.

If intra domain connection of RAN nodes to multiple CN nodes as described in 3GPP TS 23.236 -[23] is applied in the MSC/VLR or SGSN, then the NRI shall be part of the TMSI. The NRI has a configurable length ~~between~~ of 0 to 10 bits. A configurable length of 0 bits indicates that the NRI is not used and this feature is not applied in the MSC/VLR or SGSN. The NRI ~~has to~~shall be coded ~~with~~in bits 14 to 23. The ~~M~~most significant bit of the NRI field is bit 23.

The TMSI shall ~~only~~ be allocated only in ciphered form. See also ~~GSM 03.20~~3GPP TS 43.020 [7] and 3GPP TS 33.102 [42].

The network shall not allocate a TMSI with all 32 bits equal to 1 (this is because the TMSI must be stored in the SIM, and the SIM uses 4 octets with all bits equal to 1 ~~for~~ to indicate~~ing~~ that no valid TMSI is available).

To allow for eventual modifications of the management of the TMSI code space management, MSs shall not check if an allocated TMSI belongs to the range allocated to the allocating node. MSs shall use an allocated TMSI according to the specifications, whatever its value.

2.5 Structure of LMSI

The LMSI consists of 4 octets and may be allocated by the VLR.

2.6 Structure of TLLI

A TLLI is built by the MS or by the SGSN either on the basis of the P-TMSI (local or foreign TLLI), or directly (random or auxiliary TLLI), according to the following rules.

The TLLI consists of 32 bits, numbered from 0 to 31 by order of significance, with bit 0 being the LSB.

A local TLLI is built by an MS which has a valid P-TMSI as follows:

bits 31 down to 30 are set to 1; and

bits 29 down to 0 are set equal to bits 29 to 0 of the P-TMSI.

A foreign TLLI is built by an MS which has a valid P-TMSI as follows:

bit 31 is set to 1 and bit 30 is set to 0; and

bits 29 down to 0 are set equal to bits 29 to 0 of the P-TMSI.

A random TLLI is built by an MS as follows:

bit 31 is set to 0;

bits 30 down to 27 are set to 1; and

bits 0 to 26 are chosen randomly.

An auxiliary TLLI is built by the SGSN as follows:

bit 31 is set to 0;

bits 30 down to 28 are set to 1;

bit 27 is set to 0; and

bits 0 to 26 can be assigned independently.

Other types of TLLI may be introduced in the future.

Part of the TLLI codespace is re-used in GERAN to allow for the inclusion of the GERAN Radio Network Temporary Identifier in RLC/MAC messages. The G-RNTI is defined in 3GPP TS 44.118 [29].

The structure of the TLLI is ~~then~~ summarised in table 1~~:~~.

Table 1: TLLI structure

31	30	29	28	27	26 to 0	Type of TLLI
1	1	T	T	T	T	Local TLLI
1	0	T	T	T	T	Foreign TLLI
0	1	1	1	1	R	Random TLLI
0	1	1	1	0	A	Auxiliary TLLI
0	1	1	0	X	X	Reserved
0	1	0	X	X	X	Reserved
0	0	0	0	G	G	Part of the assigned G-RNTI
0	0	0	1	R	R	Random G-RNTI

~~'~~T~~'~~, ~~'~~R~~'~~, ~~'~~A~~'~~ and ~~'~~X~~'~~ indicate bits which can take any value for the type of TLLI. More precisely, ~~'~~T~~'~~ indicates bits derived from a P-TMSI, ~~'~~R~~'~~ indicates bits chosen randomly, ~~'~~A~~'~~ indicates bits chosen by the SGSN, ~~'~~G~~'~~ indicates bits derived from the assigned G-RNTI and ~~'~~X~~'~~ indicates bits in reserved ranges.

2.7 Structure of P-TMSI Signature

The P-TMSI Signature consists of 3 octets and may be allocated by the SGSN.

The network shall not allocate a P-TMSI Signature with all 24 bits equal to 1 (this is because the P-TMSI Signature must be stored in the SIM, and the SIM uses 3 octets with all bits equal to 1 ~~for~~ to indicate~~ing~~ that no valid P-TMSI signature is available.

3 Numbering plan for mobile stations

3.1 General

~~Below t~~The structure of the following numbers is defined below:

- the number used by a subscriber of a fixed (or mobile) network ~~for~~ to call~~ing~~ a mobile station of a ~~GSM~~ PLMN~~,~~;
- ~~is defined. T~~ the network addresses used for packet data communication between a mobile station and a fixed (or mobile) station~~,~~;
- ~~and the structure of~~ mobile station roaming numbers ~~are also defined below~~.

~~Also the structure of mobile station roaming numbers is defined.~~

One or more numbers of the ISDN numbering plan shall be assigned to a mobile station to be used for all calls to that station, i.e. the assignment of at least one MSISDN to a mobile station is mandatory.

NOTE: For card operated stations the ISDN number should be assigned to the holder of the card (personal number).

3.2 Numbering plan requirements

In principle, it should be possible for any subscriber of the ISDN or PSTN to call any MS in a ~~GSM~~ PLMN. This implies that ISDN numbers for MSs should comply with the ISDN numbering plan in ~~each~~ the home country of the MS.

The ISDN numbers of MSs should be composed in such a way that standard ISDN/PSTN charging can be used for calls to MSs.

It should be possible for each administration to develop its own independent numbering/addressing plan for MSs.

The numbering/addressing plan should not limit the possibility for MSs to roam among ~~GSM~~ PLMNs.

It should be possible to change the IMSI without changing the ISDN number allocated to an MS and vice versa.

In principle, it should be possible for any subscriber of the CSPDN/PSPDN to call any MS in a ~~GSM~~ PLMN. This implies that it may be necessary for an MS to have a X.121 number.

In principle, it should be possible for any fixed or mobile terminal to communicate with a mobile terminal using an IP v4 address or IP v6 address.

3.3 Structure of MS international PSTN/ISDN number (MSISDN)

~~The~~ MS international ISDN numbers are allocated from the ITU-T Recommendation E.164 numbering plan~~;~~, see also ITU-T Recommendation E.213. The structure of the MS international ISDN number will then be as shown in figure 2.

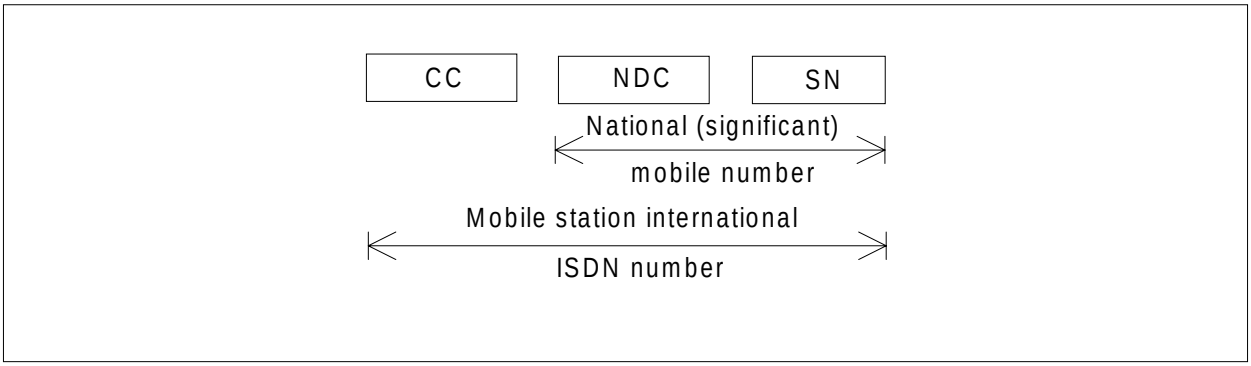


Figure 2: Number Structure of MSISDN

The number consists of:

- Country Code (CC) of the country in which the MS is registered, followed by:
- National (significant) mobile number, which consists of:
  - National Destination Code (NDC) and
  - Subscriber Number (SN).

For GSM/UMTS applications, a National Destination Code is allocated to each ~~GSM~~ PLMN. In some countries more than one NDC may be required for each ~~GSM~~ PLMN.

The composition of the MS international ISDN number should be such that it can be used as a global title address in the Signalling Connection Control Part (SCCP) for routeing messages to the home location register of the MS. The country

code (CC) and the national destination code (NDC) will provide such routeing information. If further routeing information is required, it should be contained in the first few digits of the subscriber number (SN).

A sub-address may be appended to an ISDN number for use in call setup and in supplementary service operations where an ISDN number is required (see ITU-T Recommendations E.164, clause 11.2 and X.213 annex A). The sub-address is transferred to the terminal equipment denoted by the ISDN number.

The maximum length of a sub-address is 20 octets, including one octet to identify the coding scheme for the sub-address (see ITU-T Recommendation X.213, annex A). All coding schemes described in ITU-T Recommendation X.213, annex A are supported in GSM and UMTS.

3.4 Mobile Station Roaming Number (MSRN) for PSTN/ISDN routeing

The Mobile Station Roaming Number (MSRN) is used to route calls directed to an MS. On request from the Gateway MSC via the HLR it is temporarily allocated to an MS by the VLR with which the MS is registered; it addresses the Visited MSC collocated with the assigning VLR. More than one MSRN may be assigned simultaneously to an MS.

The MSRN is passed by the HLR to the Gateway MSC ~~for~~ to routeeing calls to the MS.

The Mobile Station Roaming Number for PSTN/ISDN routing shall have the same structure as international ISDN numbers in the area in which the roaming number is allocated, i.e.:

- the country code of the country in which the visitor location register is located;
- the national destination code of the visited~~or GSM~~ PLMN or numbering area;
- a subscriber number with the appropriate structure for that numbering area.

The MSRN ~~must~~ shall not be used for subscriber dialling. It should be noted that the MSRN can be identical to the MSISDN (clause 3.3) in certain circumstances. In order to discriminate between subscriber generated access to these numbers and re-routeing performed by the network, re-routeing or redirection indicators or other signalling means should be used, if available ~~(see GSM 09.03)~~.

3.5 Structure of Mobile Station International Data Number

The structure of MS international data numbers should comply with the data numbering plan of ITU-T Recommendation X.121 as applied in the home country of the mobile subscriber. Implications ~~on~~ for numbering interworking functions which may need to be provided by the PLMN (if the use of X.121 numbers is required) are indicated in ~~GSM~~ 3GPP TS 2~~0~~3.070 [4].

3.6 Handover Number

The handover number is used for establishment of a circuit between MSCs to be used for a call being handed over. The structure of the handover number is the same as the structure of the MSRN. The handover number may be reused in the same way as the MSRN.

3.7 Structure of an IP v4 address

One or more IP address domains ~~could~~ may be allocated to each PLMN. The IP v4 address structure is defined in RFC 791 [14].

An IP v4 address may be allocated to an MS either permanently or ~~on a~~ temporarily ~~basis~~ during a connection with the network.

3.8 Structure of an IP v6 address

One or more IP address domains could be allocated to each PLMN. The IP v6 address structure is defined in RFC- 2373 [15].

An IP v6 address may be allocated to an MS either permanently or ~~on a~~ temporarily ~~basis~~ during a connection with the network

If the dynamic IPv6 stateless address autoconfiguration procedure is used, then each PDP context, or group of PDP contexts sharing the same IP address, is assigned a unique prefix as defined in 3GPP- TS- 23.060 -[3].

As described in RFC -2462- [21] and RFC- 3041- [22], the MS can change its interface identifier without the GPRS network being aware of the change.

4 Identification of location areas and base stations

4.1 Composition of the Location Area Identification (LAI)

The Location Area Identification shall be composed as shown in figure 3:

Figure 3: Structure of Location Area Identification

The LAI is composed of the following elements:

- Mobile Country Code (MCC) identifies the country in which the GSM PLMN is located. The value of the MCC is the same as the three digit MCC contained in international mobile subscriber identity (IMSI);
- Mobile Network Code (MNC) is a code identifying the GSM PLMN in that country. The MNC takes the same value as the two or three digit MNC contained in IMSI;
- Location Area Code (LAC) which is a fixed length code (of 2 octets) identifying a location area within a ~~GSM~~ PLMN. This part of the location area identification can be coded using a full hexadecimal representation except for the following reserved hexadecimal values:

  0000, and

  FFFE.

  T~~t~~hese reserved values are used in some special cases when no valid LAI exists in the MS (see ~~GSM~~ 3GPP TS 24.008 ~~04.08~~[5], 3GPP TS 31.102 [41] and 3GPP~~GSM~~ TS ~~1~~51.011 [9]).

A specific GSM PLMN code (MCC + MNC) may be broadcast for ~~non SoLSA compatible~~ mobile stations which are not compatible with SoLSA and which ~~that~~ do not understand the exclusive access indicator (see ~~GSM~~ 3GPP TS 23.073 ~~03.73~~[30]). The reserved value of the escape PLMN code is MCC = 901 and MNC = 08.

4.2 Composition of the Routing Area Identification (RAI)

The Routing Area Identification shall be composed as shown in figure 4:

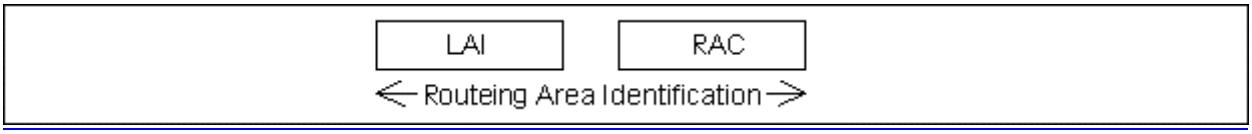


Figure 4: Structure of Routing Area Identification

The RAI is composed of the following elements:

- A valid Location Area Identity (LAI) as defined in clause 4.1. Invalid LAI values are used in some special cases when no valid RAI exists in the mobile station (see 3GPP TS 24.008 [5], 3GPP TS 31.102 [41] and 3GPP TS 51.011 [9]).
- Routeing Area Code (RAC) which is a fixed length code (of 1 octets) identifying a routeing area within a location area.

4.3 Base station identification

4.3.1 Cell Identity (CI) and Cell Global Identification (CGI)

The BSS and cell within the BSS ~~is~~ are identified within a location area or routeing area by adding a Cell Identity (CI) to the location area or routeing area identification, as shown in figure 5. The CI is of fixed length with 2 octets and it can be coded using a full hexadecimal representation.

The Cell Global Identification is the concatenation of the Location Area Identification and the Cell Identity. Cell Identity ~~must~~ shall be unique within a location area.

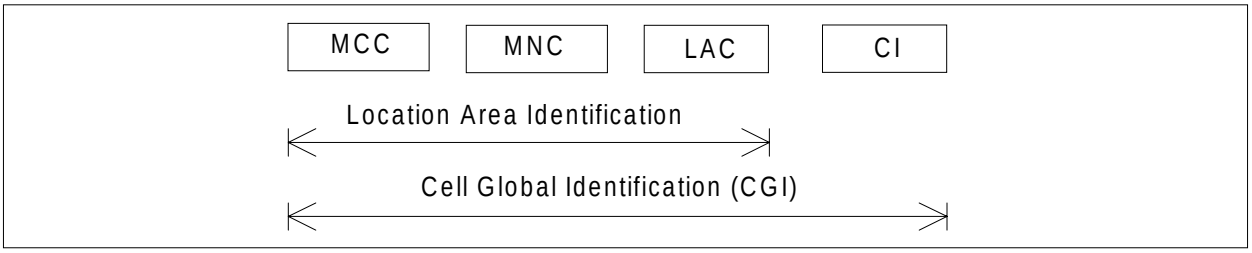


Figure 5: Structure of Cell Global Identification

4.3.2 Base Station Identify Code (BSIC)

The base station identity code is a local colour code that allows an MS to distinguish between different neighbouring base stations. BSIC is a 6 bit ~~length~~ code which is structured ~~in the following way~~as shown in Figure 6.

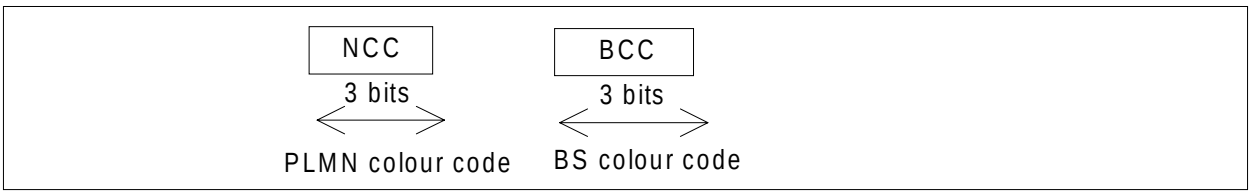


Figure 6: Structure of BSIC

In the definition of the NCC, care ~~needs to~~should be taken to ensure that the same NCC is not used in adjacent PLMNs which may use the same BCCH carrier frequencies in neighbouring areas. Therefore, to prevent potential deadlocks, a definition of the NCC appears in annex A. This annex will be reviewed in a co-ordinated manner when a PLMN is created.

4.4 Regional Subscription Zone Identity (RSZI)

A PLMN- specific regional subscription defines unambiguously for the entire PLMN the regions in which roaming is allowed. It consists of one or more regional subscription zones. The regional subscription zone is identified by a Regional Subscription Zone Identity (RSZI). A regional subscription zone identity is composed as shown in figure 7.

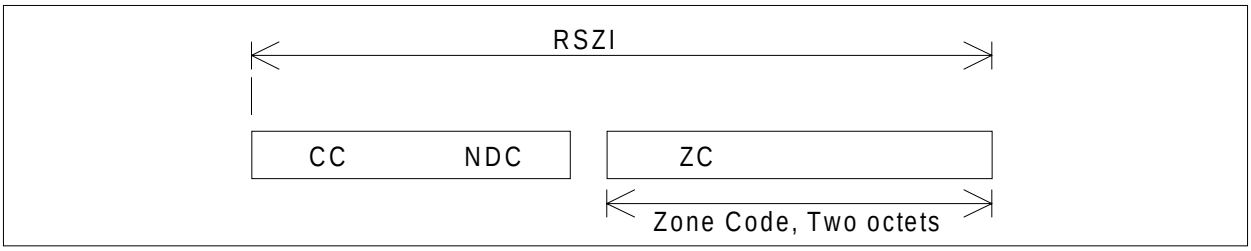


Figure 7: Structure of Regional Subscription Zone Identity (RSZI)

The elements of the regional subscription zone identity are:

1) the Country Code (CC) which identifies the country in which the GSM PLMN is located;

2) the National Destination Code (NDC) which identifies the GSM PLMN in that country;

1.3) the Zone Code (ZC) which identifies a regional subscription zone as a pattern of allowed and not allowed location areas uniquely within that PLMN.

CC and NDC are those of an ITU-T E.164 VLR or SGSN number (see clause 5.1) of the PLMN; andthey are coded with a trailing filler, if required. ZC has fixed length of two octets and is coded in full hexadecimal representation.

RSZIs, including the zone codes, are assigned by the VPLMN operator. The zone code is evaluated in the VLR or SGSN by information stored in the VLR or SGSN as a result of administrative action. If a zone code is received by a VLR or SGSN during updating by the HLR and this zone code is related to that VLR or SGSN, the VLR or SGSN shall be able to decide for all its MSC or SGSN areas and all its location areas whether they are allowed or not allowed.

For details of assignment of RSZI and of ZC as subscriber data see GSM 3GPP TS 023.008 [2].

For selection of RSZI at location updating by comparison with the leading digits of the VLR or SGSN number and for transfer of ZC from the HLR to VLR and SGSN see GSM 3GPP TS 029.002 [31].

4.5 Location Number

A location number is a number which defines a specific location within a GSM PLMN. The Llocation number is formatted according to ITU-T Recommendation E.164, as shown in figure 8. The Country Code (CC) and National Destination Code (NDC) fields of the location number are those which define the GSM PLMN of which the location is part.

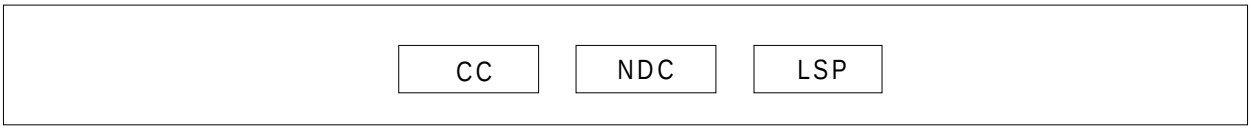


Figure 8: Location Number Structure

The structure of the locally significant part (LSP) of the location number is a matter for agreement between the PLMN operator and the national numbering authority in the PLMN's country. It is desirable that the location number can be interpreted without the need for detailed knowledge of the internal structure of the PLMN; the LSP should therefore include the national destination code in the national numbering plan for the fixed network which defines the geographic area in which the location lies.

The set of location numbers for a GSM PLMN must shall be chosen so that a location number can be distinguished from the MSISDN of a subscriber of the PLMN. This will allow the PLMN to trap attempts by users to dial a location number.

4.6 Composition of the Service Area Identification (SAI)

Void (see clause 12.54).

5 Identification of MSCs, GSNs and location registers

5.1 Identification for routeing purposes

MSCs, GSNs and location registers are identified by international PSTN/ISDN numbers and/or Signalling Point Codes ("entity number", i.e., "HLR number", "VLR number", "MSC number", "SGSN number" and "GGSN number") in each GSM PLMN.

Additionally SGSNs, and GGSNs are identified by GSN Addresses. These are the SGSN Address and the GGSN Address.

A GSN Address shall be composed as shown in figure 9.

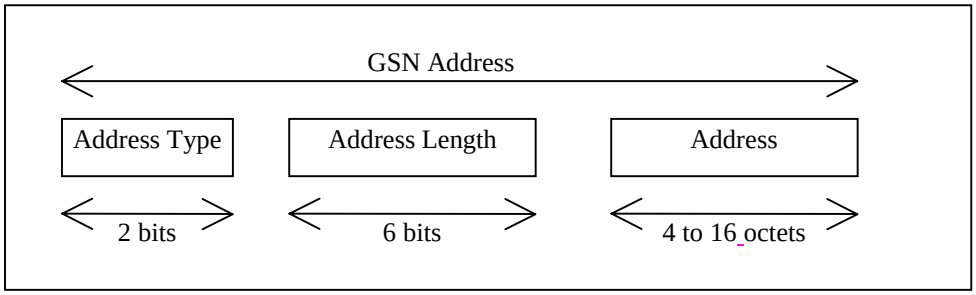


Figure 9: Structure of GSN Address

The GSN Address is composed of the following elements:

1) The Address Type, which is a fixed length code (of 2 bits) identifying the type of address that is used in the Address field.

2) The Address Length, which is a fixed length code (of 6 bits) identifying the length of the Address field.

1.3) The Address, which is a variable length field withwhich contains either an IPv4 address or an IPv6 address.

Address Type 0 and Address Length 4 are used when Address is an IPv4 address.

Address Type 1 and Address Length 16 are used when Address is an IPv6 address.

The IP v4 address structure is defined in RFC -791 -[14].

The IP v6 address structure is defined in RFC -2373 -[15].

5.2 Identification of HLR for HLR restoration application

HLR may also be identified by one or several "HLR id(s)", consisting of the leading digits of the IMSI (MCC + MNC + leading digits of MSIN).

6 International Mobile Station Equipment Identity and Software Version Number

6.1 General

~~Below t~~The structure and allocation principles of the International Mobile station Equipment Identity and Software Version ~~N~~number (IMEISV) and the International Mobile station Equipment Identity (IMEI) are defined below.

The Mobile Station Equipment is uniquely defined by the IMEI or the IMEISV.

6.2 Composition of IMEI and IMEISV

6.2.1 Composition of IMEI

The International Mobile station Equipment Identity (IMEI) is composed as shown in figure 10.

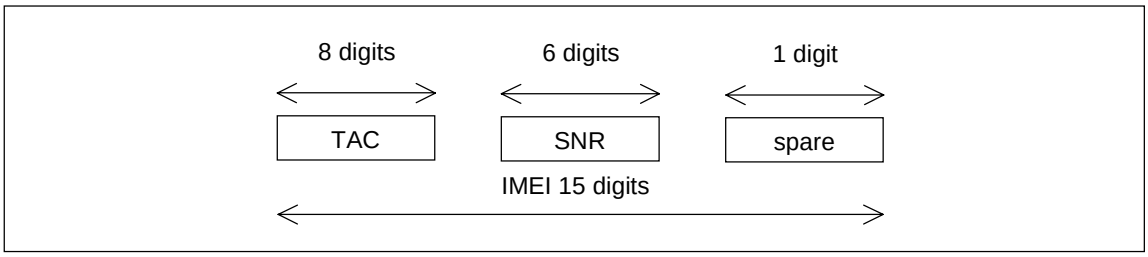


Figure 10: Structure of IMEI

The IMEI is composed of the following elements (each element shall consist of decimal digits only):

- Type Allocation Code (TAC). Its length is 8 digits;
- Serial Number (SNR) is an individual serial number uniquely identifying each equipment within ~~each~~ the TAC. Its length is 6 digits;
- Spare digit: this digit shall be zero, when transmitted by the MS.

The IMEI (14 digits) is complemented by a check digit. The check digit is not part of the digits transmitted ~~at~~ when the IMEI is checked ~~occasions~~, as described below. The Check Digit ~~shall~~ is intended to avoid manual transmission errors, e.g. when customers register stolen MEs at the operator's customer care desk. The Check Digit is defined according to the Luhn formula, as defined in annex B.

NOTE: The Check Digit is not applied to the Software Version Number.

The security requirements of the IMEI are defined in 3GPP -TS -22.016 -[32].

6.2.2 Composition of IMEISV

The International Mobile station Equipment Identity and Software Version Number (IMEISV) is composed as shown in figure 11.

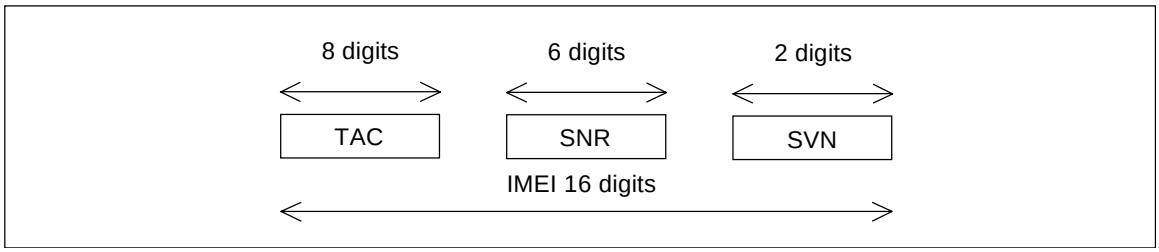


Figure 11: Structure of IMEISV

The IMEISV is composed of the following elements (each element shall consist of decimal digits only):

- Type Allocation Code (TAC). Its length is 8 digits;
- Serial Number (SNR) is an individual serial number uniquely identifying each equipment within each TAC. Its length is 6 digits;
- Software Version Number (SVN) identifies the software version number of the mobile equipment. Its length is 2 digits.

Regarding updates of the IMEISV: The security requirements of 3GPP TS 22.016 [32] apply only to the TAC and SNR, but not to the SVN part of the IMEISV.

6.3 Allocation principles

The Type Allocation Code (TAC) is issued by a central body.

Manufacturers shall allocate individual serial numbers (SNR) in a sequential order.

For a given ME, the combination of TAC and SNR used in the IMEI shall duplicate the combination of TAC and SNR used in the IMEISV.

The Software Version Number is allocated by the manufacturer. SVN value 99 is reserved for future use.

7 Identification of Voice Group Call and Voice Broadcast Call Entities

7.1 Group Identities

Logical groups of subscribers to the Voice Group Call Service or to the Voice Broadcast Service are ~~known~~ identified by a Group Identity (Group ID). Group IDs for VGCS are unique within a PLMN. Likewise, Group IDs for VBS are unique within a PLMN. However, no uniqueness is required between the sets of Group IDs. These sets may be intersecting or even identical, at the option of the network operator.

The Group ID shall be a binary number with a maximum value depending on the composition of the voice group call reference or voice broadcast call reference defined in subclause 7.3.

VGCS or VBS shall also be provided ~~in case of~~for roaming. If this applies, certain Group IDs shall be defined as supra-PLMN Group IDs which have to be co-ordinated between the network operators and which shall be known in the networks and in the SIM.

The format~~s~~ of the Group ID is identical for VBS and VGCS.

7.2 Group Call Area Identification

Groupings of cells into specific group call areas occurs in support of both the Voice Group Call Service and the Voice Broadcast Service. These service areas are known by a "Group Call Area Identity" (Group Call Area Id). No restrictions are placed on what cells may be grouped into a given group call area.

The Group Call Area ID shall be a binary number uniquely assigned to a group call area in one network and with a maximum value depending on the composition of the voice group call reference or voice broadcast reference defined under in subclause 7.3.

The formats of the Group Call Area ID is identical for VGCS and the Group Call Area ID for VBS are identical.

7.3 Voice Group Call and Voice Broadcast Call References

Specific instances of voice group calls (VGCS) and voice broadcast calls (VBS) within a given group call area are known identified by a "Voice Group Call Reference" or by a "Voice Broadcast Call Reference".

Each voice group call or voice broadcast call in one network is uniquely identified by its Voice Group Call Reference or Voice Broadcast Call Reference. The Voice Group Call Reference or Voice Broadcast Call Reference is composed of the group ID and the group call area ID. In the case wWhere the routeing of dispatcher originated calls is performed without the involvement of the HLR (see GSM 3GPP TS 043.068 [33] for VGCS and GSM 3GPP TS 043.069 [34] for VBS), the Voice Group Call Reference or Voice Broadcast Call Reference shall have a maximum length of 4 octets. The composition of the group call area ID and the group ID can be specific for each network operator.

The format is given in figure 12.

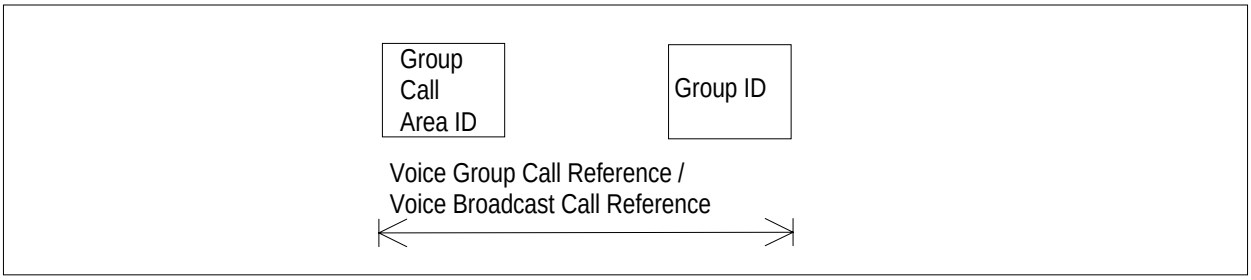


Figure 12: Voice Group Call Reference / Voice Broadcast Call Reference

8 SCCP subsystem numbers

Subsystem numbers are used to identify applications within network entities which use SCCP signalling. In GSM and UMTS, subsystem numbers may be used between PLMNs, in which case they are taken from the globally standardized range (1 - 31) or the part of the national network range (129 - 150) reserved for GSM/UMTS use between PLMNs., For use within a PLMN, in which case they are taken from the part of the national network range (32 - 128 & 151 - 254) not reserved for GSM/UMTS use between PLMNs.

8.1 Globally standardized subsystem numbers used for GSM/UMTS

The following globally standardised subsystem numbers have been allocated for use by GSM/UMTS:

0000 0110 HLR (MAP);

0000 0111 VLR (MAP);

0000 1000 MSC (MAP);

0000 1001 EIR (MAP);

0000 1010 is allocated for evolution (possible Authentication Centre).

8.2 National network subsystem numbers used for GSM/UMTS

The following national network subsystem numbers have been allocated for use within GSM/UMTS networks:

1111 1001 PCAP;

1111 1010 BSC (BSSAP-LE);

1111 1011 MSC (BSSAP-LE);

1111 1100 SMLC (BSSAP-LE);

1111 1101 BSS O&M (A interface);

1111 1110 BSSAP (A interface).

The following national network subsystem numbers have been allocated for use within and between GSM/UMTS networks:

1000 1110 RANAP;

1000 1111 RNSAP;

1001 0001 GMLC (MAP);

1001 0010 CAP;

1001 0011 gsmSCF (MAP) or IM-SSF (MAP);

1001 0100 SIWF (MAP);

1001 0101 SGSN (MAP);

1001 0110 GGSN (MAP).

9 Definition of Access Point Name

In the GPRS backbone, an Access Point Name (APN) is a reference to a GGSN. To support inter-PLMN roaming, the internal GPRS DNS functionality is used to translate the APN into the IP address of the GGSN.

9.1 Structure of APN

The APN is composed of two parts as follows:

- The APN Network Identifier; ~~which~~ this defines to which external network the GGSN is connected ~~to~~ and optionally a requested service by the MS. This part of the APN is mandatory.
- The APN Operator Identifier; ~~which~~this defines in which PLMN GPRS backbone the GGSN is located. This part of the APN is optional.

The APN Operator Identifier is placed after the APN Network Identifier. An APN consisting of both the Network Identifier and Operator Identifier corresponds to a DNS name of a GGSN; ~~and~~it has a maximum length of 100 octets.

The syntax of the APN shall follow the Name Syntax defined in RFC 2181 [18], RFC 1035 [19] and RFC 1123 [20]. The APN consists of one or more labels. Each label is coded as a one octet length field followed by that number of octets coded as 8 bit ASCII characters. Following RFC 1035 [19] the labels shall consist only of the alphabetic characters (A-Z and a-z), digits (0-9) and the hyphen (-). Following RFC 1123 [20], the label shall begin and end with either an alphabetic character or a digit. The case of alphabetic characters is not significant. The APN is not terminated by a length byte of zero.

NOTE: A length byte of zero is added by the SGSN at the end of the APN before interrogating a DNS server.

For the purpose of presentation, an APN is usually displayed as a string in which the labels are separated by dots (e.g. "Label1.Label2.Label3").

9.1.1 Format of APN Network Identifier

The APN Network Identifier shall contain at least one label and shall have a maximum length of 63 octets. An APN Network Identifier shall not start with any of the strings "rac", "lac", "sgsn" or "rnc", and it shall not end in ".gprs". Further, ~~I~~it shall ~~also~~ not take the value "*".

In order to guarantee uniqueness of APN Network Identifiers within ~~the~~ GPRS PLMN(s), an APN Network Identifier containing more than one label corresponds to an Internet domain name. This name should only be allocated by the PLMN to an organisation ~~that~~ which has officially reserved this name in the Internet domain. Other types of APN Network Identifiers are not guaranteed to be unique within ~~the~~ GPRS PLMN(s).

An APN Network Identifier may be used to access a service associated with a GGSN. This may be achieved by defining:~~;~~

- an APN ~~that~~ which corresponds to a DNS name of a GGSN, and which is locally interpreted by the GGSN as a request for a specific service, or~~;~~
- an APN Network Identifier consisting of 3 or more labels and starting with a Reserved Service Label, or an APN Network Identifier consisting of a Reserved Service Label alone, ~~that~~ which indicates a GGSN by the nature of the requested service. Reserved Service Labels and the corresponding services they stand for ~~are to~~shall be agreed among operators.

9.1.2 Format of APN Operator Identifier

The APN Operator Identifier is composed of three labels. The last label shall be "gprs". The first and second labels together shall uniquely identify the GPRS PLMN (e.g. "<operator-name>.<operator-group>.gprs").

For each operator, there is a default APN Operator Identifier (i.e. domain name). This default APN Operator Identifier is derived from the IMSI as follows:

"mnc<MNC>.mcc<MCC>.gprs"

where:

"mnc" and "mcc" serve as invariable identifiers for the following digits.

<MNC> and <MCC> are derived from the components of the IMSI defined in subclause 2.2.

This default APN Operator Identifier is used in inter-PLMN roaming situations when attempting to translate an APN consisting only of a Network Identifier ~~only~~ into the IP address of the GGSN ~~residing~~ in the HPLMN. The PLMN may provide DNS translations for other, more human-readable, APN Operator Identifiers in addition to the default Operator Identifier described above.

In order to guarantee inter-PLMN DNS translation possibility, the <MNC> and <MCC> coding ~~to be~~ used in the "mnc<MNC>.mcc<MCC>.gprs" format of the APN OI shall be:

- <MNC> = 3 digits
- <MCC> = 3 digits
- If there are ~~less than 3~~only 2 significant digits in the MNC, one ~~or more~~ "0" digit~~(s)~~ is~~/are~~ inserted at the left side to fill the 3 digits coding of MNC in the APN OI.

As an example, the APN OI for MCC 345 and MNC 12 shall be coded in the DNS as mnc012.mcc345.gprs.

9.2 Definition of the Wild Card APN

The APN field in the HLR may contain a wild card APN if the HPLMN operator allows the subscriber to access any network of a given PDP Type. If an SGSN has received such a wild card APN, it may either choose the APN Network Identifier received from the Mobile Station or a default APN Network Identifier for addressing the GGSN when activating a PDP context.

9.2.1 Coding of the Wild Card APN

The wild card APN is coded as an APN with "*" as its single label, (i.e. a length octet with value one, followed by the ASCII code for the asterisk~~s~~).

10 Identification of the Cordless Telephony System entities

10.1 General description of CTS-MS and CTS-FP Identities

Every CTS-FP broadcasts a local identity - the Fixed Part Beacon Identity (FPBI) - which contains an Access Rights Identity. Every CTS-MS has both an Access Rights Key and a CTS Mobile Subscriber Identity (CTSMSI). These operate as a pair. A CTS-MS is allowed to access any CTS-FP which broadcasts an FPBI ~~that~~ which can be identified by any of the CTS-MS Access Rights Keys of that CTS-MS. The CTS-MS Access Rights Key contains the FPBI and the FPBI Length Indicator (FLI) indicating the relevant part of the FPBI used ~~for~~ to control~~ling~~ access.

10.2 CTS Mobile Subscriber Identities

10.2.1 General

Each CTS-MS has one or more temporary identities ~~that~~ which are used for paging and to request access ~~requesting~~. ~~Below the~~ The structure and allocation principles of the CTS Mobile Subscriber Identities (CTSMSI) are defined below.

10.2.2 Composition of the CTSMSI

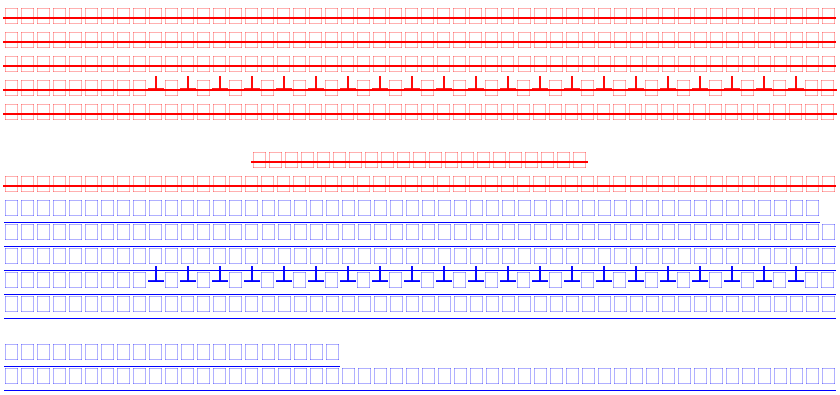


Figure 13: Structure of CTSMSI

The CTSMSI is composed of the following elements:

- CTSMSI Type. Its length is 2 bits;
- Significant Part. Its length is 20 bits.

The following CTSMSI Type values have been allocated for use by CTS:

00 Default Individual CTSMSI;

01 Reserved;

10 Assigned Individual CTSMSI;

11 Assigned Connectionless Group CTSMSI.

10.2.3 Allocation principles

The Default Individual CTSMSI contains the least significant portion of the IMSI. This is the default CTS-MS identity.

Assigned CTSMSIs are allocated by the CTS-FP during enrolment, registration and other access procedures. Significant Part of the assigned CTSMSI shall be allocated in the range 00001-FFFFE. CTS-FP shall not allocate Significant Part equal to 00000 or to FFFFF and shall not allocate Assigned CTSMSI using Reserved Type value. Such assignments shall be ignored by the CTS-MS.

Assigned CTSMSIs are allocated in ciphered mode.

NOTE: The assigned individual CTSMSI should be updated whenever it is sent in clear text on the CTS radio interface during RR connection establishment.

The value FFFFF from the set of Assigned Connectionless Group CTSMSI shall be considered in all CTS-MS as the value of the Connectionless Broadcast Identifier.

10.2.4 CTSMSI hexadecimal representation

The 22 bits of CTSMSI are padded with 2 leading zeroes ~~for having~~to give a 6 digit~~s~~ hexadecimal value.

EXAMPLE: binary CTSMSI value: 11 1001 0010 0000 1011 1100

hexadecimal CTSMSI value: 39 20 BC.

10.3 Fixed Part Beacon Identity

10.3.1 General

Each CTS-FP has one Fixed Part Beacon Identity known by the enrolled CTS-MSs. The FPBI is periodically broadcast on the BCH logical channel so that the CTS-MSs are able to recognise the identity of the CTS-FP. The FPBI contains an Access Rights Identity.

Enrolled CTS-MSs shall store the FPBI to which their assigned CTSMSIs are related.

Below the structure and allocation principles of the Fixed Part Beacon Identity (FPBI) are defined.

10.3.2 Composition of the FPBI

10.3.2.1 FPBI general structure

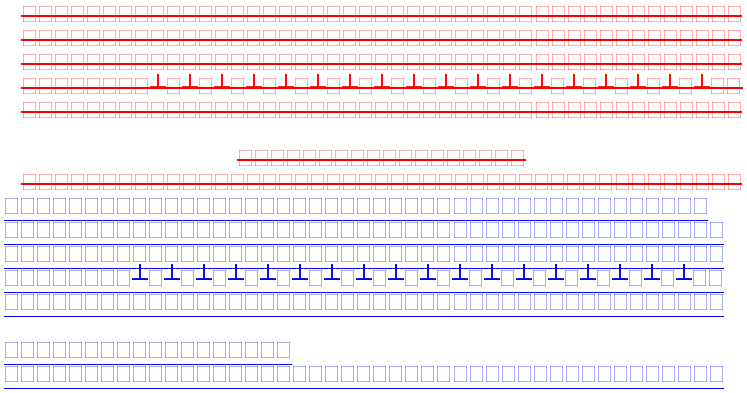


Figure 14: General structure of FPBI

The FPBI is composed of the following elements:

- FPBI Type. Its length is 2 bits;
- FPBI Significant Part. Its length is 17 bits.

NOTE: The three LSBs bits of the FPBI form the 3-bit training sequence code (TSC). See ~~GSM~~3GPP TS ~~0~~45.056 [35].

The following FPBI Type values have been allocated for use by CTS:

00 FPBI class A: residential and single-cell systems;

01 FPBI class B: multi-cell PABXs.~~;~~

~~a~~All other values are reserved and CTS-MSs shall treat these values as FPBI class A.

10.3.2.2 FPBI class A

This class is intended to be used for small residential and private (PBX) single cell CTS-FP.

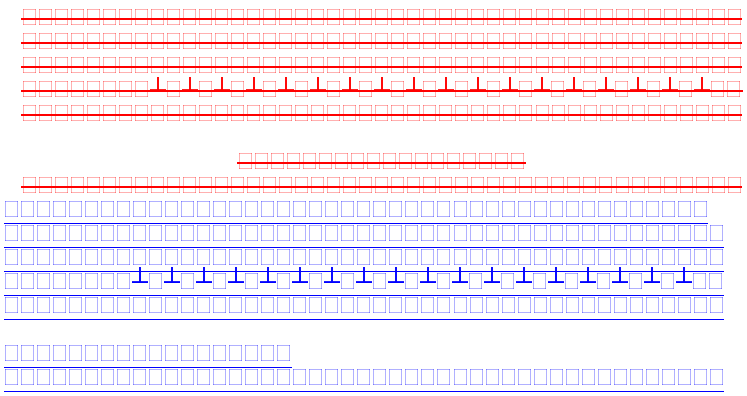


Figure 15: Structure of FPBI class A

The FPBI class A is composed of the following elements:

- FPBI Class A Type. Its length is 2 bits and its value is 00;
- Fixed Part Number (FPN). Its length is 17 bits. The FPN contains the least significant bits of the Serial Number part of the IFPEI.

~~NOTE: The~~ The FPBI Length Indicator sh~~ould~~all be set to 19 for a class A FPBI.

10.3.2.3 FPBI class B

This class is reserved for more complex private installation such as multi-cell PABXs.

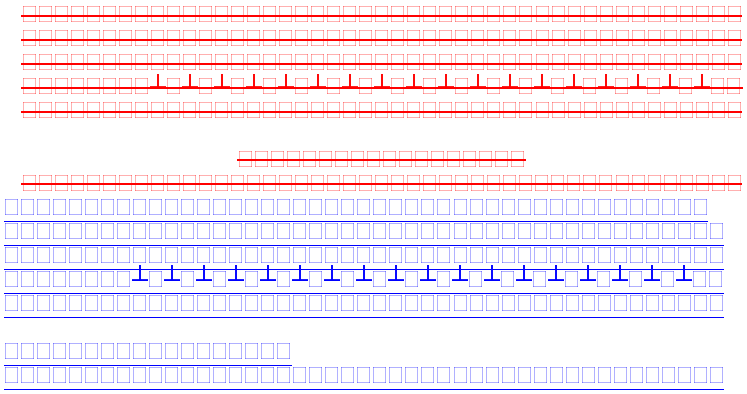


Figure 16: Structure of FPBI class B

The FPBI class B is composed of the following elements:

- FPBI Class B Type. Its length is 2 bits and its value is 01;
- CTS Network Number (CNN). Its length is defined by the manufacturer or the system installer;
- Fixed Part Number (FPN). Its length is defined by the manufacturer or the system installer;
- Radio Part Number (RPN) assigned by the CTS manufacturer or system installer. Its length is defined by the manufacturer or the system installer.

NOTE ~~1~~: RPN is used to separate a maximum of $2^{\text{RPN length}}$ different cells from each other. This define~~s~~ a cluster of cells supporting intercell handover. RPN length is submitted to a CTS-MS as a result of a successful attachment.

~~NOTE 2: The~~ The FPBI Length Indicator sh~~ould~~all be set to (2 + CNN Length) for a class B FPBI.

10.3.3 Allocation principles

The FPBI shall be allocated during the CTS-FP initialisation procedure. Any change to the value of the FPBI of a given CTS-FP shall be considered as a CTS-FP re-initialisation; i.e. each enrolled CTS-MS needs to be enrolled again.

FPBI are not ~~requested~~ required to be unique (i.e. several CTS-FP can have the same FPBI in different areas). Care should be taken ~~for~~ to limit~~ing~~ CTS-MS registration attempts to a ~~homonymous~~ fixed part with the same FPBI as another fixed part.

10.4 International Fixed Part Equipment Identity

10.4.1 General

~~Below t~~The structure and allocation principles of the International Fixed Part Equipment Identity (IFPEI) are defined below.

10.4.2 Composition of the IFPEI

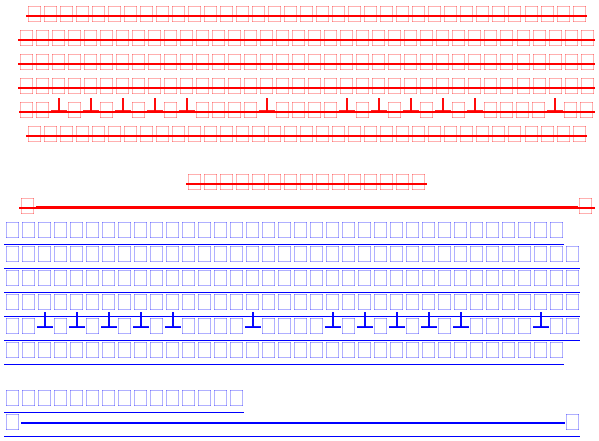


Figure 17: Structure of IFPEI

The IFPEI is composed of the following elements (each element shall consist of decimal digits only):

- Type Approval Code (TAC). Its length is 6 decimal digits;
- Final Assembly Code (FAC). Its length is 2 decimal digits;
- Serial NumbeR (SNR). Its length is 6 decimal digits;
- Software Version Number (SVN) identifies the software version number of the fixed part equipment. Its length is 2 digits.

Regarding updates of the IFPEI: the TAC, FAC and SNR shall be physically protected against unauthorised change (see ~~GSM~~ 3GPP TS ~~0~~4<u>2</u>.0<u>0</u>9 [36]); i.e. only the SVN part of the IFPEI can be modified.

10.4.3 Allocation principles

The Type Approval Code (TAC) is issued by a central body.

The place of final assembly (FAC) is encoded by the manufacturer.

Manufacturers shall allocate unique serial numbers (SNR) in a sequential order.

The Software Version Number (SVN) is allocated by the manufacturer after authorisation by the type approval authority. SVN value 99 is reserved for future use.

10.5 International Fixed Part Subscription Identity

10.5.1 General

~~Below t~~The structure and allocation principles of the International Fixed Part Subscription Identity (IFPSI) are defined below.

10.5.2 Composition of the IFPSI

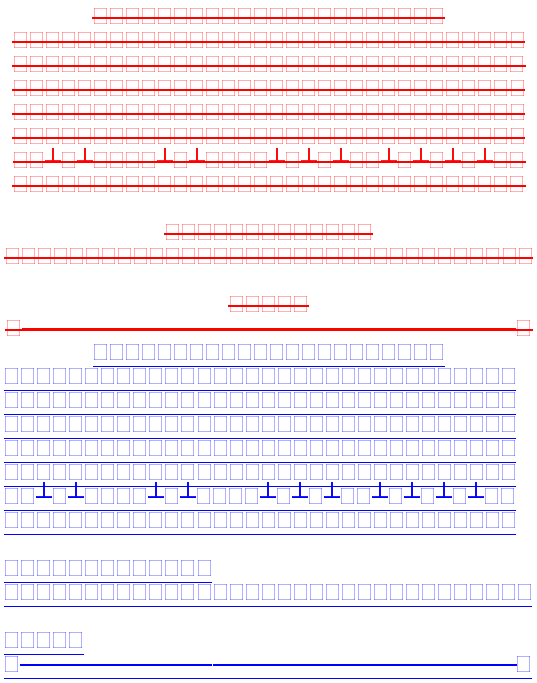


Figure 18: Structure of IFPSI

The IFPSI is composed of the following elements (each element shall consist of decimal digits only):

- Mobile Country Code (MCC) consisting of three digits. The MCC identifies the country of the CTS-FP subscriber (e.g. 208 for France);
- CTS Operator Number (CON). Its length is three digits;
- Fixed Part Identification Number (FPIN) identifying the CTS-FP subscriber.

The National Fixed Part Subscriber Identity (NFPSI) consists of the CTS Operator Number and the Fixed Part Identification Number.

10.5.3 Allocation principles

IFPSI shall consist of ~~numerical~~ decimal characters (0 ~~through~~ to 9) only.

The allocation of Mobile Country Codes (MCCs) is administered by the ITU-T ~~and is given in annex A to ITU-T Blue Book Recommendation E.212~~.

The allocation of CTS Operator Number (CON) and the structure of National Fixed Part Subscriber Identity (NFPSI) are the responsibility of each National Regulation Authority.

CTS Operators shall allocate unique Fixed Part Identification Numbers.

11 Identification of Localised Service Area

Cells may be grouped into specific localised service areas. ~~These~~ Each localised service area is ~~are~~ identified by a localised service area identity (LSA ID). No restrictions are placed on what cells may be grouped into a given localised service area.

The LSA ID can either be a PLMN significant number or a universal identity. This shall be known both in the networks and in the SIM.

The LSA ID consists of 24 bits, numbered from 0 to 23 by order of significance, with bit 0 being the LSB. Bit 0 indicates if whether the LSA is a PLMN significant number or a universal LSA. If the bit is set to 0 the LSA is a PLMN significant number; and if it is set to 1 it is a universal LSA.

The LSA ID shall be composed as shown in figure 19:

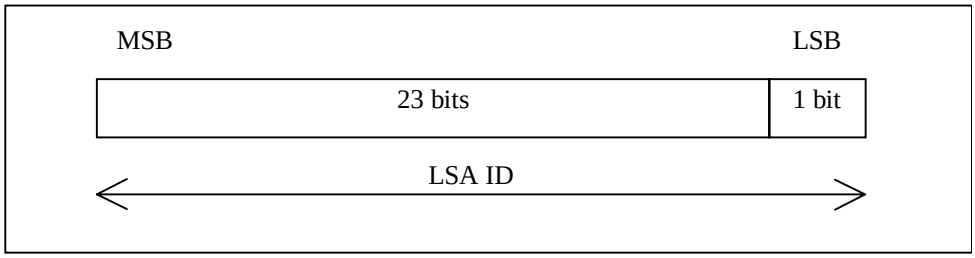


Figure 19: Structure of LSA ID

12 Identification of PLMN, RNC, Service Area, CN domain, and Shared Network Area

The following clauses describe identifiers that which are used by both the CN and the UTRAN across the Iu interface. For identifiers that which are solely used within the UTRAN, see 3GPP TS 25.401 [16].

NOTE: in the following sub-clauses, the double vertical bar notation || indicates the concatenation operator.

12.1 PLMN Identifier

A Public Land Mobile Network is uniquely identified by its PLMN identifier. PLMN-Id is madeconsists of Mobile Country Code (MCC) and Mobile Network Code (MNC).

- **PLMN-Id = MCC ||+ MNC**

The MCC and MNC are predefined within a UTRAN, and set in the RNC via O&M.

12.2 CN Domain Identifier

A CN Domain Edge Node is identified within the UTRAN by its CN Domain Identifier. The CN Domain identifier is used over UTRAN interfaces to identify a particular CN Domain Edge Node for relocation purposes. The CN Domain identifier for Circuit Switching (CS) is made upconsists of the PLMN-Id and the LAC, whereas for Packet Switching (PS) it is made upconsists of the PLMN-Id, the LAC, and the RAC of the first accessed cell in the target RNS.

The two following CN Domains Identifiers are defined:

- **CN CS Domain-Id = PLMN-Id ||+ LAC**
- **CN PS Domain-Id = PLMN-Id ||+ LAC ||+ RAC**

The LAC and RAC are defined by the operator, and set in the RNC via O&M.

For the syntax description and the usage of this identifier in RANAP signalling, see 3GPP TS 25.413 [17].

12.3 CN Identifier

A CN node is uniquely identified within a PLMN by its CN Identifier (CN-Id). The CN-Id together with the PLMN identifier is used to globally identifiesy the CN node. The CN-Id together with the PLMN-Id is used as the CN node identifier in RANAP signalling over the Iu interface.

Global CN-Id = PLMN-Id ||+ CN-Id

The CN-Id is defined by the operator, and set in the nodes via O&M.

For the syntax description and the usage of this identifier in RANAP signalling, see 3GPP- TS- 25.413 [17].

12.4 RNC Identifier

An RNC node is uniquely identified within the UTRAN by its RNC Identifier (RNC-Id). RNC-Id together with the PLMN identifier is used to globally identifies the RNC. The RNC-Id on its own or the RNC-Id together with the PLMN-Id is used as the RNC identifier in the UTRAN Iub, Iur and Iu interfaces. The SRNC-Id is the RNC-Id of the SRNC. The C-RNC-Id is the RNC-Id of the controlling RNC. The D-RNC-Id is the RNC Id of the drift RNC.

- **Global RNC-Id = PLMN-Id || RNC-Id**

The RNC-Id is defined by the operator, and set in the RNC via O&M

For the syntax description and the usage of this identifier in RANAP signalling, see 3GPP- TS- 25.413- [17].

12.5 Service Area Identifier

The Service Area Identifier (SAI) is used to identify an area consisting of one or more cells belonging to the same Location Area. Such an area is called a Service Area and can be used for indicating the location of a UE to the CN.

The Service Area Code (SAC) together with the PLMN-Id and the LAC will constitute the Service Area Identifier.

- **SAI = PLMN-Id || LAC || SAC**

The SAC is defined by the operator, and set in the RNC via O&M.

For the syntax description and the usage of this identifier in RANAP signalling, see 3GPP- TS- 25.413- [17]. 3GPP- TS 25.423- [37] and 3GPP- TS- 25.419- [38] define the usage of this identifier in RNSAP and SABP signalling.

A cell may belong to one or two Service Areas. In the case thatIf it belongs to two Service Areas, one is applicable in the Broadcast (BC) domain and the other is applicable in both the CS and PS domains.

The bBroadcast (BC) domain requires that it's Service Areas each consist of only one cell. This does not limit the usage of Service Areas for other domains. Refer to 3GPP- TS- 25.410- [39] for a definition of the BC domain.

12.6 Shared Network Area Identifier

The Shared Network Area Identifier (SNA-Id) is used to identify an area consisting of one or more Location Areas. Such an area is called a Shared Network Area and can be used to grant access rights to parts of a Shared Network to a UE in connected mode (see 3GPP- TS- 25.401- [39]).

The Shared Network Area Identifier consists of the PLMN-Id followed by the Shared Network Area Code (SNAC).

- **SNA-Id = PLMN-Id || SNAC**

The SNAC is defined by the operator.

For the syntax description and the usage of this identifier in RANAP signalling, see 3GPP- TS- 25.413- [17].

13 Numbering, addressing and identification within the IP multimedia core network subsystem

13.1 Introduction

This clause describes the format of the parameters needed to access the IP multimedia core network subsystem. For further information on the use of the parameters see 3GPP- TS- 23.228- [24].

13.2 Home network domain name

The home network domain name shall be in the form of an Internet domain name, e.g. operator.com, as specified in RFC 1035 [1928].

If there is no ISIM application, the UE shall derive the home network domain name from the IMSI as described in the following steps:

1. take the first 5 or 6 digits, depending on whether a 2 or 3 digit MNC is used (see 3GPP TS 31.102 [27]) and separate them into MCC and MNC with ".";
2. reverse the order of the MCC and MNC. Append to the result: ".IMSI.3gppnetwork.org"

An example of a home network domain name is:

EXAMPLE: IMSI in use: 234150999999999;

where;

MCC: 234;

MNC: 15;

MSIN: 0999999999, which gives

home domain name: 15.234.IMSI.3gppnetwork.org.

13.3 Private user identity

The private user identity shall take the form of an NAI, and shall have the form user@realm as specified in clause 3 of RFC 2486 [25].

NOTE: It is possible for a representation of the IMSI to be contained within the NAI for the private identity.

If there is no ISIM application, the private user identity is not known. In this case, the private user identity is derived from the IMSI.

The following steps show how to build the private user identity out of the IMSI:

1. use the whole string of digits as the user part of the private user identity;
2. convert the leading digits of the IMSI, i.e. MNC and MCC, into a domain name, as described in subclause 13.2.

The result will be a private user identity of the form imsi@mnc.mcc."IMSI.3gppnetwork.org". For example: If the IMSI is 234150999999999 (MCC = 234, MNC = 15), the private user identity then takes the form 234150999999999@15.234.IMSI.3gppnetwork.org

13.4 Public user identity

The public user identity shall take the form of either a SIP URI (see RFC 3261 [26]) or an E.164 number. A SIP URI shall take the form "sip:user@domain".

If there is no ISIM application to host the public user identity, a temporary public user identity shall be derived, based on the IMSI. The temporary public user identity shall be of the form "user@domain" and shall therefore be equal to the private user identity. The private user identity is derived as described in subclause 13.2. That is, the private user identity will be appended to the string "sip:"

EXAMPLE: "sip:234150999999999@15.234.IMSI.3gppnetwork.org".

Annex A (informative): Colour Codes

A.1 Utilization of the BSIC

A BSIC is allocated ~~T~~to each cell. ~~is allocated a BSIC, within~~A BSIC can take one of 64 values. In each cell ~~its~~ the BSIC is broadcast in each burst sent on the SCH, and is then known by all MSs which ~~get the~~ synchronis~~z~~e~~ation~~ with this cell. The BSIC is used by the MS for several purposes, all aiming at avoiding ambiguity or interference which can arise when a MS in a given position can receive signals from two cells *using the same BCCH frequency*.

Some of the ~~utilizations~~ uses of the BSIC relate to cases where the MS is attached to one of the cells. Other ~~utilizations~~ uses relate to cases where the MS is attached to a third cell, usually somewhere between the two cells in question.

The first category of ~~utilizations~~ uses includes:

- The three least significant bits of the BSIC indicate which of the 8 training sequences is used in the bursts sent on the downlink common channels of the cell. Different training sequences allow for a better transmission ~~in case of~~if there is interference. The group of the three least significant bits of the BSIC is called the BCC (Base station Colour Code).

- The BSIC is used to modify the bursts sent by the MSs on the access bursts. This aims to avoid ~~that~~ one cell correctly decoding~~es correctly~~ access bursts sent to another cell.

The second category of ~~utilizations~~ uses includes:

- When in connected mode, the MSs measure and report the level they receive on a number of frequencies, corresponding to the BCCH frequencies of neighbouring cells in the same network as the used cell. Along with the measurement result, the MS ~~provides~~ sends to the network ~~with~~ the BSIC which it has received on ~~the~~ that frequency. This enables the network to discriminate between several cells which happen~~ing~~ to use the same BCCH frequency. ~~Bad~~ Poor discrimination might result in faulty handovers.

- The content~~s~~ of the measurement report messages is limited to information for 6 neighbour cells. It is therefore~~n~~ useful to limit the reported cells to those to which handovers are accepted. ~~To~~ For this ~~avail~~purpose, each cell provides a list of the values of the three most significant bits of the BSICs ~~that~~ which are allocated to the cells ~~that~~ which are useful to consider for handovers (usually excluding cells in other PLMNs). This information enables the MS to ~~put aside~~discard information for cells with non-conformant BSICs and not to report ~~about~~ them. The group of the three most significant bits of the BSIC is called the NCC (Network Colour Code).

It should be noted that when in idle mode, the MS identifies a cell (for cell selection purposes) according to the cell identity broadcast on the BCCH and *not* by the BSIC.

A.2 Guidance for planning

From these ~~utilizations~~uses, the following planning rule can be derived:

> *If there exist places where MSs can receive signals from two cells, whether in the same PLMN or in different ~~one~~PLMNs, ~~that~~ which use the same BCCH frequency, it is highly preferable that these two cells have different BSICs.*

Where the coverage areas of two PLMNs overlap, the rule above is respected if:

1) The PLMNs use~~s~~ different sets of BCCH frequencies~~. This is i~~(In particular, this is the case if no frequency is common to the two PLMNs. This usually holds for PLMNs in the same country)~~.~~, or

2) The PLMNS use different sets of NCCs~~.~~, or

3) BSIC and BCCH frequency planning is co-ordinated.

Recognizing that method 3) is more cumbersome than method 2), and that method 1) is too constraining, it is suggested that overlapping PLMNs which use~~ing~~ a common part of the spectrum~~,~~ agree on different NCCs to be used in any overlapping areas. As an example, a preliminary NCC allocation for countries in the European region can be found in clause A.3 of this annex.

This example can be used as a basis for bilateral agreements. However, the us~~ag~~e of the NCCs allocated in clause A.3 is not compulsory. PLMN operators can agree on different BSIC allocation rules in border areas. The us~~ag~~e of BSICs is not constrained in non~~-~~-overlapping areas, or if ambiguities are resolved by using different sets of BCCH frequencies.

A.3 Example of PLMN Colour Codes (NCCs) for the European region

Austria	:	0
Belgium	:	1
Cyprus	:	3
Denmark	:	1
Finland	:	0
France	:	0
Germany	:	3
Greece	:	0
Iceland	:	0
Ireland	:	3
Italy	:	2
Liechtenstein	:	2
Luxembourg	:	2
Malta	:	1
Monaco	:	3 (possibly 0(=France))
Netherlands	:	0
Norway	:	3
Portugal	:	3
San Marino	:	0 (possibly 2(= Italy))
Spain	:	1
Sweden	:	2
Switzerland	:	1
Turkey	:	2
UK	:	2
Vatican	:	1 (possibly 2(=Italy)
Yugoslavia	:	3

This allows ~~for each country~~ a second operator for each country by allocating the colour codes n (in the table) and n + 4. More than 2 colour codes per country may be used provided that in border areas only the values n and/or n+4 are used.

Annex B (normative): IMEI Check Digit computation

B.1 Representation of IMEI

The International Mobile station Equipment Identity and Software Version nNumber (IMEISV), as defined in clause 6TS 23.003, is a 16 digit decimal number composed of three distinct elements:

- an 8 digit Type Allocation Code (TAC);
- a 6 digit Serial Number (SNR); and
- a 2 digit Software Version Number (SVN).

The IMEISV is formed by concatenating these four three elements as illustrated below:

Figure A.1: Composition of the IMEISV

The IMEI is complemented by a check digit as defined in clause 3. The Luhn Check Digit (CD) is computed on the 14 most significant digits of the IMEISV, that is on the value obtained by ignoring the SVN digits.

The method for computing the Luhn check is defined in Annex B of the International Standard "Identification cards - Numbering system and registration procedure for issuer identifiers" (ISO/IEC 7812) [3]).

In order to specify precisely how the CD is computed for the IMEI, it is necessary to label the individual digits of the IMEISV, excluding the SVN. This is done as follows:

The (14 most significant) digits of the IMEISV are labelled D14, D13 ... D1, where:

- TAC = D14, D13 ... D79 (with D79 the least significant digit of TAC);
- SNR = D6, D5 ... D1 (with D1 the least significant digit of SNR).

B.2 Computation of CD for an IMEI

Computation of CD from the IMEI proceeds as follows:

Step 1: Double the values of the odd labelled digits D1, D3, D5 ... D13 of the IMEI.

Step 2: Add together the individual digits of all the seven numbers obtained in Step 1, and then add this sum to the sum of all the even labelled digits D2, D4, D6 ... D14 of the IMEI.

Step 3: If the number obtained in Step 2 ends in 0, then set CD to be 0. If the number obtained in Step 2 does not end in 0, then set CD to be that number subtracted from the next higher number which does end in 0.

B.3 Example of computation

IMEI (14 most significant digits):

TAC								SNR					
D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1
2	6	0	5	3	1	7	9	3	1	1	3	8	3

Step 1:

2	6	0	5	3	1	7	9	3	1	1	3	8	3
	x2		x2		x2		x2		x2		x2		x2
	12		10		2		18		2		6		6

Step 2:

2 + 1 + 2 + 0 + 1 + 0 + 3 + 2 + 7 + 1 + 8 + 3 + 2 + 1 + 6 + 8 + 6 = 53

Step 3:

CD = 60 - 53 = 7

Annex C (normative): Naming convention

A naming convention ~~that~~ which will make it possible for DNS servers to translate logical names for GSNs and RAs to physical IP addresses is described in this normative annex. The use of logical names is optional, but if the option is used, it shall comply with the naming convention described in this annex.

C.1 Routing Area Identities

A possible way to support inter-PLMN roaming is discussed very briefly in this clause.

When an MS roams between two SGSNs within the same PLMN, the new SGSN finds the address ~~to~~ of the old SGSN by the association old RA - old SGSN. Thus, each SGSN knows the address ~~to~~ of every other SGSN in the PLMN.

When an MS roams from an SGSN to an SGSN in another PLMN, the new SGSN may not itself have access to the address ~~to~~ of the old SGSN. Instead, the SGSN transforms the old RA information to a logical name of the form:

RACxxxx.LACyyyy.MNCzzzz.MCCwwww.GPRS~~;~~

~~———~~x and y~~-~~ shall be Hex coded digits; z and w shall be encoded as single digits (in the range ~~of~~ 0-9)..

If there are less than 4 significant digits in xxxx, yyyy, zzzz or~~,~~ wwww, one or more "0" digit(s) is/are inserted at the left side to fill the 4 digit~~s~~ coding.

> As an example, the logical name for RAC 123A, LAC 234B, MCC 167 and MNC 92 shall be coded in the DNS as *RAC123A.LAC234B.MNC0092.MCC0167.GPRS*.

The SGSN may then acquire the IP address of the old SGSN from a DNS server, using the logical address. ~~Every~~ Each PLMN should include at least one DNS server ~~each~~. Note that these DNS servers are GPRS internal entities, unknown outside the GPRS system.

The above implies that at least MCC + MNC + RAC + LAC (= RAI) is sent as RA parameter over the radio when an MS roams to another RA.

If for any reason the new SGSN ~~for any reason~~ fails to obtain the address of the old SGSN, the same actions are taken as when the corresponding event occurs within one PLMN ~~are taken~~.

Introducing the DNS concept in GPRS gives a general possibility to use logical names instead of IP addresses when referring to (e.g.) GSNs, thus providing flexibility in addressing ~~of~~ PLMN nodes.

Another way to support seamless inter-PLMN roaming is to store the SGSN IP addresses in the HLR and request them when necessary.

If Intra Domain Connection of RAN Nodes to Multiple CN Nodes (see 3GPP TS 23.236 [23]) is applied then the Network Resource Identifier (NRI) identifies uniquely a given SGSN node out of all the SGSNs serving the same pool area.

~~-~~If the new SGSN is not able to extract the NRI from the old P-TMSI, it shall retrieve the address of the default SGSN (see 3GPP TS 23.236 [23]) serving the old RA, using the logical name described earlier in this section. The default SGSN in the old RA relays the GTP signalling to the old SGSN identified by the NRI in the old P-~~-~~TMSI unless the default SGSN itself is the old SGSN.

If the new SGSN is able to extract the NRI from the old P-TMSI, then it shall attempt to derive the address of the old SGSN from the NRI and the old RAI. NRI-to-SGSN assignments may be either configured (by O&M) in the new SGSN, or retrieved from DNS. If DNS is used, it shall be queried using the following logical name, derived from the old RAI and NRI information:

NRIxxxx.RACyyyy.LACzzzz.MNCvvvv.MCCwwww.GPRS

x, y and z shall be Hex coded digits, v and w shall be encoded as single digits (in the range ~~of~~ 0-9). If there are less than 4 significant digits in xxxx, yyyy, zzzz, vvvv~~,~~ or wwww, one or more "0" digit(s) is/are inserted at the left side to fill the 4 digit~~s~~ coding.

As an example, the logical name for NRI 3A, RAC 123A, LAC 234B, MCC 167 and MNC 92 shall be coded in the DNS as *NRI003A.RAC123A.LAC234B.MNC0092.MCC0167.GPRS*.

If for any reason the new SGSN ~~for any reason~~ fails to obtain the address of the old SGSN using this method, then as a fallback method it shall retrieve the address of the default SGSN serving the old RA.

C.2 GPRS Support Nodes

In this clause a naming convention for GSNs is described.

It shall be possible to refer to a GSN by a logical name ~~that~~ which shall then be translated into a physical IP address. ~~Here~~ This clause proposes a GSN naming convention ~~is proposed~~ which would make it possible for an internal GPRS DNS server to make the translation.

An example of how a logical name of an SGSN could ~~look like~~appear is:

SGSNxxxx.MNCyyyy.MCCzzzz.GPRS

~~;~~ ~~————~~x, y and z shall be Hex coded digits, y and z shall be encoded as single digits (in the range of 0-9)..

If there are less than 4 significant digits in xxxx, yyyy, zzzz, one or more "0" digit(s) is/are inserted at the left side to fill the 4 digits coding.

As an example, the logical name for SGSN 1B34, MCC 167 and MNC 92 shall be coded in the DNS as *SGSN1B34. MNC0092.MCC0167.GPRS*.

C.3 Target ID

In this clause a possible way to support SRNS relocation is described.

In UMTS, when an SRNS relocation is executed, a target ID ~~that~~ which consists of MCC, MNC and RNC ID is used as ~~a~~ routeing information to route to the target RNC via the new SGSN. An old SGSN shall resolve a new SGSN IP address by a target ID to send the Forward Relocation Request message to the new SGSN.

It shall be possible to refer to a target ID by a logical name ~~that~~ which shall be translated into an SGSN IP address ~~for~~ to take~~ing the~~ inter-PLMN handover into account. The old SGSN transforms the target ID information to a logical name of the form:

RNCxxxx.MNCyyyy.MCCzzzz.GPRS

~~;~~ x, y and z shall be Hex coded digits. Then, for example a DNS server is used to translate the logical name into an SGSN IP address.

3GPP TSG CN WG4 Meeting #17 **N4-021344**
Bangkok, THAILAND, 11th – 15th November 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.003** **CR** **058** ⌘ **rev** **-** ⌘ Current version: **5.4.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Addition of a reference to the ITU-T RECOMMENDATION E.212 for Mobile Country Codes
Source:	⌘	CN4
Work item code:	⌘	TEI5
Date:	⌘	24/10/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	A new reference is required to the COMPLEMENT TO ITU-T RECOMMENDATION E.212 (11/98) for Mobile Country Codes as this is now obtained via ITU Bulletins.
Summary of change:	⌘	A new section for informative references is added together with the new reference and the associated URL.
Consequences if not approved:	⌘	Loss of reference to the source of Mobile Country Codes.

Clauses affected:	⌘	1.1, 2.3

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	The inclusion of this reference is additional to the editorial clean up in CR 23.003-056r2.

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

First Modified Section

1.1 References

1.1.1 Normative 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 TS 21.905: "3G Vocabulary".

[2] 3GPP TS 23.008: "Organization of subscriber data".

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

[4] 3GPP TS 23.070: "Routeing of calls to/from Public Data Networks (PDN)".

[5] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".

[6] 3GPP TS 29.060: "GPRS Tunnelling protocol (GPT) across the Gn and Gp interface".

[7] GSM 03.20: "Digital cellular telecommunications system (Phase 2+); Security related network functions".

[8] GSM 09.03: "Digital cellular telecommunications system (Phase 2+); Signalling requirements on interworking between the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) and the Public Land Mobile Network (PLMN)".

[9] GSM 11.11: "Digital cellular telecommunications system (Phase 2+); Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface".

[10] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

[11] ITU-T Recommendation E.212: "The international identification plan for mobile terminals and mobile users".

[12] ITU-T Recommendation E.213: "Telephone and ISDN numbering plan for land Mobile Stations in public land mobile networks (PLMN)".

[13] ITU-T Recommendation X.121: "International numbering plan for public data networks".

[14] RFC 791: "Internet Protocol".

[15] RFC 2373: "IP Version 6 Addressing Architecture".

[16] 3GPP TS 25.401: "UTRAN Overall Description".

[17] 3GPP TS 25.413: "UTRAN Iu Interface RANAP Signalling".

[18] RFC 2181: “Clarifications to the DNS Specification”.

[19] RFC 1035: “Domain Names - Implementation and Specification”.

[20] RFC 1123: “Requirements for Internet Hosts -- Application and Support”.

[21] RFC 2462: “IPv6 Stateless Address Autoconfiguration”.

[22] RFC 3041: “Privacy Extensions for Stateless Address Autoconfiguration in IPv6”.

[23] 3GPP TS 23.236: "Intra Domain Connection of RAN Nodes to Multiple CN Nodes".

[24] 3GPP TS 23.228: "IP Multimedia (IM) Subsystem – Stage 2"

[25] RFC 2486: "The Network Access Identifier"

[26] RFC 3261: "SIP: Session Initiation Protocol"

[27] 3GPP TS 31.102: "Characteristics of the USIM Application."

[28] RFC 1035: "Domain names – implementation and specification"

[29] 3GPP TS 44.118: “Radio Resource Control (RRC) Protocol, Iu Mode”.

1.1.2 Informative references

[xx] "COMPLEMENT TO ITU-T RECOMMENDATION E.212 (11/98)", Annex to ITU Operational Bulletin No. 741 – 1.VI.200; This is published on the ITU-T website, whose home page is at http://www.itu.int/ITU-T/~~ http://www.itu.int/ITU-T/inr/codes.html~~
~~http://www.itu.int/itudoc/itu-t/ob-lists/icc/e212_685.html~~

Next Modified Section

2.3 Allocation principles

IMSI shall consist of numerical characters (0 through 9) only.

The overall number of digits in IMSI shall not exceed 15 digits.

The allocation of Mobile Country Codes (MCCs) is administered by the ITU-T. ~~and~~The current allocation is given in the COMPLEMENT TO ITU-T RECOMMENDATION E.212 [xx]~~annex A to ITU-T Blue Book Recommendation E.212~~.

The allocation of National Mobile Subscriber Identity (NMSI) is the responsibility of each administration.

If more than one GSM PLMN exist in a country, a unique Mobile Network Code should be assigned to each of them.

The allocation of IMSIs should be such that not more than the digits MCC + MNC of the IMSI have to be analysed in a foreign GSM PLMN for information transfer.

3GPP TSG CN WG4 Meeting #17 **N4-021565**
Bangkok, THAILAND, 11th – 15th November 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.003** **CR** **062** ⌘ **rev** **1** ⌘ Current version: **5.4.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Fix miss-interworking for LMSI handling (LMSI definition)
Source:	⌘	CN4
Work item code:	⌘	TEI5
Date:	⌘	31/10/2002
Category:	⌘	**F**
Release:	⌘	REL5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	The definition of LMSI is ambiguous in 23.003. According to the current 29.002, the value zero for LMSI is used by HLR to indicate to VLR that HLR does not know LMSI. Unless the value zero is defined properly in 23.003, VLR may assign the value zero as an ordinary LMSI.
Summary of change:	⌘	The value zero is declared as the reserved value in order not to be used by VLR.
Consequences if not approved:	⌘	• If the value zero is assigned by the VLR as the ordinary LMSI, the Cancel Location request message comes to VLR with the IMSI-WithLMSI (LMSI is set to zeroes.) cannot delete the subscriber data since VLR detects the mismatch information between IMSI carried with LMSI and IMSI stored in VLR. As the result subscriber data remains in the VLR.

Clauses affected:	⌘	2.5

Other specs affected: ⌘	Y	N		⌘
		X	Other core specifications	
		X	Test specifications	
		X	O&M Specifications	

Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

2.5 Structure of LMSI

The LMSI consists of 4 octets and may be allocated by the VLR. The VLR ~~cannot~~ shall not allocate the value zero. The value zero is ~~the~~ reserved ~~value~~to indicate that a LMSI parameter sent from the HLR to the VLR shall not be interpreted.

3GPP TSG CN WG4 Meeting #17 ***N4-021343***
Bangkok, THAILAND, 11th – 15th November 2002 **(Revision of N4-021343)**

CR-Form-v7

CHANGE REQUEST

⌘ **23.018** **CR** **112** ⌘ **rev** **1** ⌘ Current version: **5.4.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Clarification of requirements for the presence of IEs in messages
Source:	⌘	CN4
Work item code:	⌘	TEI5
Date:	⌘	11/11/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	There is confusion over the requirements for the presence of information elements which are specified for messages defined in TS 23.018, but for which different requirements are defined in "derived" specifications such as 23.078, 23.079, … If 23.018 specifies that under certain conditions an IE shall be absent, this may be overriden by a requirement in a "derived" specification that the IE shall be present. An example of the confusion is the submission of two CRs (N4-021191 & N4-021250) against 23.079 This is a non-critical correction, for agreement by consensus
Summary of change:	⌘	Add clarifying statement to clause 8
Consequences if not approved:	⌘	Continued confusion over requirements for presence or absence of information elements

Clauses affected:	⌘	8			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

8 Contents of messages

This clause specifies the content of each message shown in clauses 5 and 7, except for the following messages, which are not specific to call handling:

On the D interface (VLR-HLR):

- Abort;
- Activate Trace Mode;
- Authentication Failure Report;
- Insert Subscriber Data;
- Send Authentication Info;
- Send Authentication Info ack;
- Send Authentication Info negative response;

In the tables which follow, information elements are shown as mandatory (M), conditional (C) or optional (O). A mandatory information element shall always be present. A conditional information element shall be present if certain conditions are fulfilled; if those conditions are not fulfilled it shall be absent. An optional element may be present or absent, at the discretion of the application at the sending entity.

Some messages which are defined in this clause are used for other services or features. The specifications (referred to below as "derived specifications") for those services or features may simply refer to the present document for the definition of the message; in this case the requirements for the presence of each information element are as defined in this clause. If the specification for a service or feature requires information elements in a message additional to those specified in this clause, the requirements for the presence of the additional information elements are specified in the relevant specification. If the specification for a service or feature has different requirements for the presence of an information element in a message which is specified in this clause, then the following principles apply:

- If the information element is shown as mandatory in this clause, it shall always be present;
- If the information element is shown as conditional or optional in this clause, but mandatory in the derived specification, it shall always be present in the context of the service or feature defined in the derived specification;
- If the information element is shown as conditional or optional in this clause, and the conditions in the derived specification require the information element to be present, it shall be present even if the conditions in this clause do not require it to be present.

3GPP TSG CN WG4 Meeting #16 ***N4-021297***
Miami, USA, 23rd – 27th September 2002 **(Revision of *N4-021191*)**

CR-Form-v7

CHANGE REQUEST

⌘ **23.079** **CR** **020** ⌘ **rev** **1** ⌘ Current version: **5.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Optimal routeing and CAMEL discrepancy
Source:	⌘	CN4
Work item code:	⌘	TEI5
Date:	⌘	12/09/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	In 23.079 where "late call forwarding on unsuccessful outcome" is described in the case where the HLR does not support OR, 23.079 indicates that GMSC address and call reference number are sent in the ProvideRoamingNumber message. However, 23.078 indicates that both call reference number and GMSC address are mandatory parameters. The handling of call reference number and GMSC address is conflicting in 23.079 and 23.078.
Summary of change:	⌘	Add clarification at the beginning of clauses 5 & 6 to indicate that these clauses are descriptive rather than normative
Consequences if not approved:	⌘	Misunderstanding of the OR specification

Clauses affected:	⌘	5; 6

Other specs affected: ⌘	Y	N	
		X	Other core specifications
		X	Test specifications
		X	O&M Specifications

⌘

Other comments: ⌘

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

****** First modified section ******

5 Optimal routeing for basic mobile-to-mobile calls: message flows

It is a network operator option whether to implement optimal routeing for basic mobile-to-mobile calls.

This clause does not consider the handling of calls to a fixed network B subscriber.

The description in this clause of the handling of optimal routeing for basic mobile-to-mobile calls is informative, not normative. Further, the description does not consider the effects of other services or features, except where these are specifically mentioned.

The message flow for an optimally routed call from one mobile subscriber to another mobile subscriber is shown in figure 3. For simplicity of description, it is assumed that forwarding of calls from the B subscriber is not required. Solid lines indicate circuit-associated signalling; dashed lines indicate connectionless signalling.

****** Next modified section ******

6 Optimal routeing for conditional call forwarding: message flows

The description in this clause of the handling of optimal routeing for conditional call forwarding is informative, not normative. Further, the description does not consider the effects of other services or features, except where these are specifically mentioned.

Two cases of conditional call forwarding are described in this clause:

- early call forwarding to a fixed destination;
- late call forwarding to a fixed destination.

For phase 1 of SOR, no attempt is made to route a call directly from the GMSC to a forwarded-to mobile subscriber; if the forwarded-to subscriber is mobile, the call is routed from the GMSC to a GMSC in the HPLMN of the forwarded-to subscriber.

****** End of document ******

3GPP TSG CN WG2 Meeting #27 ***N2-021070***
Bangkok, Thailand, 11th – 15th November 2002

3GPP TSG CN WG4 Meeting #17 ***N4-021544***
Bangkok, Thailand, 11th – 15th November 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.205** **CR** **035** ⌘ **rev** **2** ⌘ Current version: **5.3.0** ⌘

For HELP *on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	CAMEL4 Call Party Handling interworking with Bearer independent CS core
Source:	⌘	CN4
Work item code:	⌘	TEI5
Date:	⌘	13/11/2002
Category:	⌘	**B**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	3GPP TS 23.205 needs to be enhanced according to 3GPP TS 23.078 (Rel-5) to support Call party handling of CAMEL phase 4.
Summary of change:	⌘	CAMEL4 Call Party Handling (CPH) is added to the CAMEL chapter.
Consequences if not approved:	⌘	Call party handling does not work as specified in 3GPP 23.078, and Inter-operability between MSC Servers and Media Gateways from different vendors would not exist.

Clauses affected:	⌘	14.1.3

Other specs affected: ⌘

Y	N	
	X	Other core specifications
	X	Test specifications
	X	O&M Specifications

⌘

Other comments: ⌘

1. CPH cannot re-use existing figures for HOLD or MPTY. In HOLD the new party is connected to the served party, whereas in the Split and ICA (NP) cases the new party is “isolated” from the CAMEL served party/others.
2. This CR tries to re-use existing user interaction figures by referring to them.
3. 22.078 states that CPH *should not* be used together with the MPTY service. Given that MPTY has many options in the figures in 23.205, it may be useful to put stronger wording in the CAMEL Stage 1; alternatively, we need to specify all the options. In this CR, the interworking between CPH and MPTY is not described.

	4. 23.078 subclause 4.5.1 uses the wording "*The active legs in the same Call Segment have a voice connection. They hear each other and the same in-band tones and announcements, unless explicitly indicated otherwise by the gsmSCF*" 5. It is not required to use the same MGW for all parties. One reason is that some MGWs may not have a conference bridge. The figures show the principle, not the actual configuration. If multiple MGWs are used, then there is a bearer between MGWs.

— For information —

14 Interactions with Other Network Features and Services

NOTE: All message sequence charts in this clause are informative examples.

14.1 Customised Applications for Mobile network Enhanced Logic (CAMEL)

If the gsmSRF is co-located with the (G)MSC server, the gsmSRF is divided into a gsmSRF server and an MGW. The gsmSRF server terminates the CAP protocol and signals over the Mc interface to instruct its MGW to provide the required resource. All the logic of the gsmSRF is located in the gsmSRF server. The MGW provides only simple resources for playing a single announcement or tone, or detection of single DTMF tone pair. If one single resource in the MGW does not fulfil the requirement of the gsmSCF, the gsmSRF server has to use different resources in sequence to fulfil the whole requirement.

The gsmSSF uses the capabilities of the (G)MSC server and the MGW to play announcements or send tones to the server.

NOTE 1: In the subsequent Figures within clause 14.1, the "Connect To Resource" scenario is used. However the other CAMEL Intelligent Peripheral (IP) scenarios are not intended to be excluded. No impacts are identified when applying these other CAMEL scenarios.

NOTE 2: The gsmSRF functionality may be deployed within the MSC server, and either the current serving MGW or any MGW resource under the control of the current MSC server.

14.1.1 Play Announcement/Send Tone

The playing of an announcement or sending of a tone shall be performed in accordance with 3GPP TS 23.078 [10]. It is assumed that the MGW selected for the call has the capabilities to provide announcements and tones.

When the gsmSCF requests the gsmSRF to play a specified announcement or tone, the gsmSRF orders the MGW to play the announcement or tone as described in clause 14.6.

After the gsmSRF has received the announcement or tone completed notification from its MGW, it reports the announcement or tone completion to the gsmSCF.

If the gsmSCF requests the gsmSRF to cancel the earlier started announcement or tone, the gsmSRF orders the MGW to stop playing the announcement or tone as described in clause 14.6.

Example of playing announcement by the gsmSRF

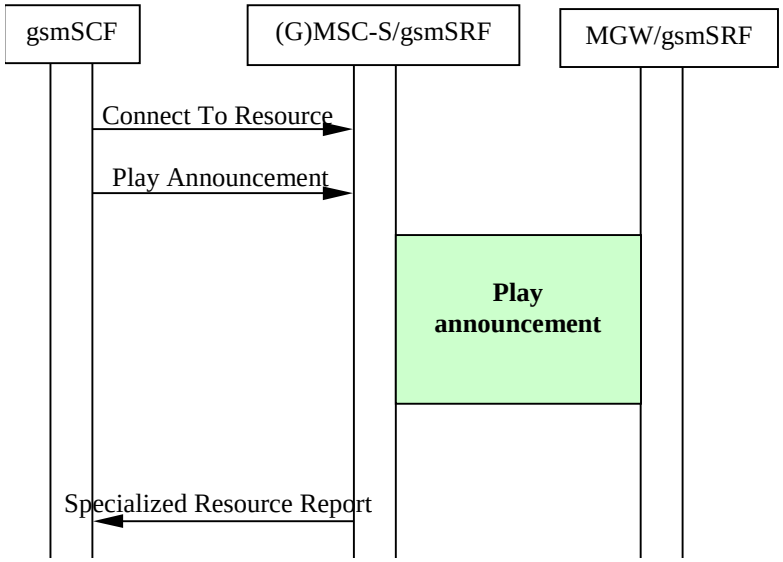


Figure 14.1 CAMEL Announcement Playing (message sequence chart)

14.1.2 User Interaction

The user interaction shall be performed in accordance with 3GPP TS 23.078 [10]. It shall be assumed that the MGW selected for the call has the capabilities to provide announcements. In bearer independent CS core network the DTMF digits can be propagated inband or out-of-band.

Play announcement

When the gsmSCF requests the gsmSRF/SSF to play a specified announcement and to collect digits that are sent by the user the gsmSRF/SSF requests the MGW to play the announcement as described in clause 14.6.

Detect DTMF tones

The gsmSRF/gsmSSF starts detecting DTMF tones, as describes in clause 14.4.2, before it receives the announcement or tone completed notification (see clause 14.6).

Report DTMF tones

The DTMF tones are reported to the gsmSRF/SSF as described in clause 14.4.2. After all requested digits are received the gsmSRF/SSF reports the digits to the gsmSCF.

Cancel prompt and collect user information

If the gsmSCF requests the gsmSRF to cancel the prompt and collect user information procedure, which had been started earlier, the gsmSRF orders the MGW to stop playing the announcement or sending tone, if they are still in progress , using the Stop Announcement or the Stop Tone procedure. The gsmSRF shall also order the MGW to stop detecting DTMF tones using the Stop DTMF Detection procedure.

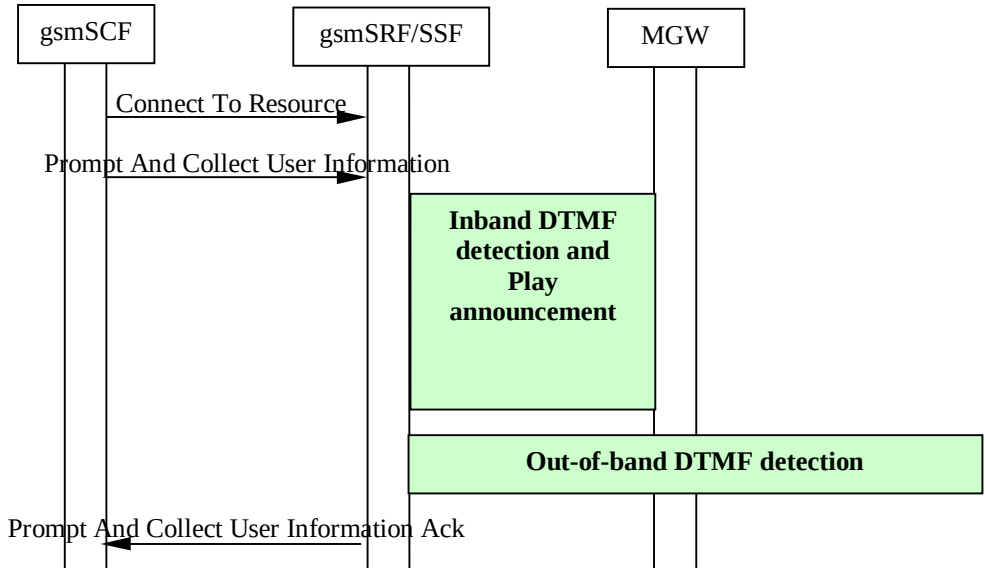


Figure 14.2 CAMEL User Interaction (message sequence chart)

NOTE: Since gsmSRF don not know whether DTMF digits are provided inband or out-of-band the gsmSRF has to be able to collect DTMF tones both inband and out-of-band.

—First modified section —

14.1.3 Call Party Handling (CPH)

The procedures specified in 3GPP TS 23.078 [10] for Call Party Handling (CPH) shall be followed. The following paragraphs describe the additional requirements for the bearer independent CS core network.

In contrast with HOLD and MPTY, the call parties created on instruction from the gsmSCF are not seen as separate calls in the Mobile Station, i.e. all call parties in a CPH configuration use the same *transaction id* towards the MS. In addition, CPH may take place in an MSC-S different from the one where the CAMEL served subscriber is registered. Furthermore, in CPH it is possible to have multiple call parties in separate *call segments* whereas the call hold supplementary service has a limit of one held call party and one active call.

The gsmSCF always triggers the elementary procedures which are described in this subclause. CPH elementary procedures can be used in more complex procedures to provide useful services, but the more complex procedures are out of scope of this specification.

NOTE: For simplicity, the figures below which show network models do not show the gsmSCF. The gsmSCF is in the HPLMN of the served (CAMEL) party. The GMSC-S is in the interrogating network (IPLMN). The MSC-S is in the VPLMN of the served party.

Use of a multi-party (conference) bridge

When the gsmSCF invokes a CPH procedure which requires the connection of three or more legs in a multi-party configuration, the MSC server selects an MGW which provides multi-party bridge capabilities. The timing of the selection of the MGW with the multi-party bridge capabilities is vendor specific. If the selected MGW is not the MGW which is used for the active call, the MSC server requests the MGW(s) to connect the bearer terminations of the participants to the selected MGW. The bearer terminations are connected together.

14.1.3.1 Call Party Handling concepts

The relationship between Call Segments and voice connections is explained in 3GPP TS 23.078 [10] subclause 4.5.1.

14.1.3.2 Initiate Call Attempt procedure

The Initiate Call Attempt (ICA) procedure is used either:

- To create a new call (out-of-the-blue), in which case the gsmSCF makes the initial contact with the MSC-S, or
- To create an additional call party in an existing call. The new call party is always created in a new call segment. The existing call may have triggered contact with the gsmSCF based on CAMEL subscription information (MO or MT in VMSC, MT in GMSC, call forwarding etc), or the gsmSCF may have initiated the contact using the ICA procedure (out-of-the-blue).

The gsmSCF may create additional call parties before it establishes the bearer to the calling party. The MSC-S/GMSC-S shall establish bearers to the additional call parties independently of the other parties, including the calling party.

The leg which is created by the Initiate Call Attempt procedure is initially in the held state.

Example

Figure 14.x1 shows an example network model for the Initiate Call Attempt procedure with an establishment of a new call leg. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling and the bearer. The MSC-S seizes a new context with one bearer termination in the MGW which is used for the new call leg.

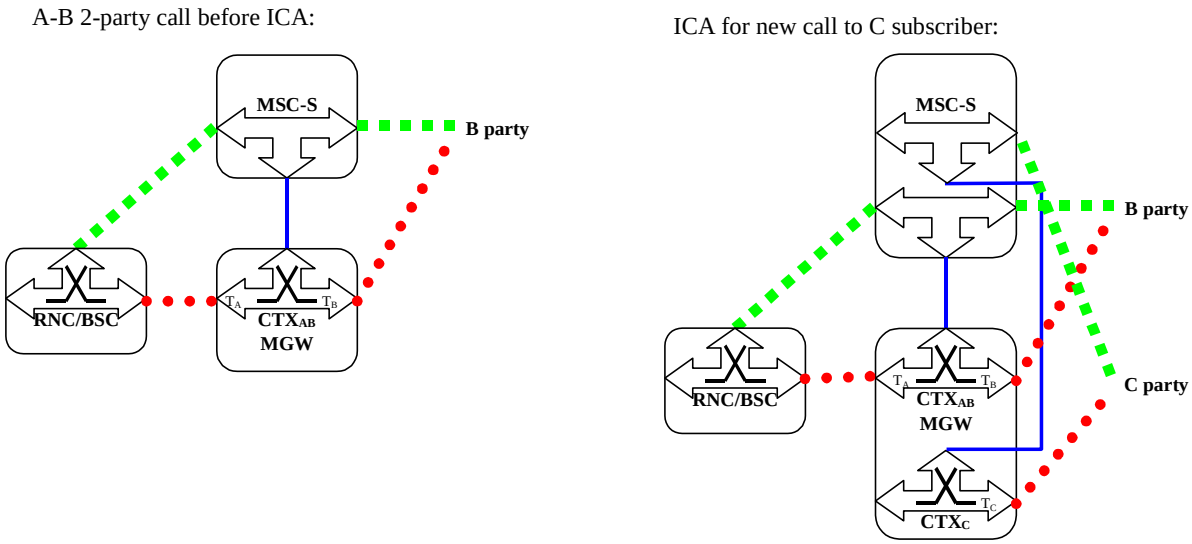


Figure 14.x1 Initiate Call Attempt procedure (Network model)

Figure 14.x2 shows an example message sequence for the Initiate Call Attempt procedure.

In this example a new call leg to the C-party is established.

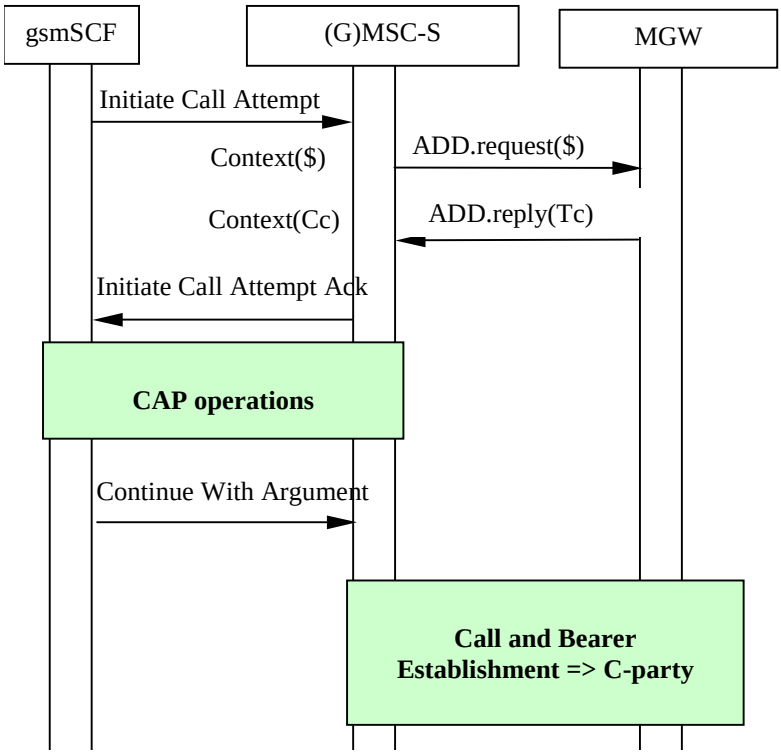


Figure 14.x2 Information flow for Initiate Call Attempt (message sequence chart)

14.1.3.3 Move Leg procedure

The Move Leg procedure is used to move a leg from its current call segment to the (existing) target call segment.

Using Move Leg to add a leg to a call segment which already includes 2 call legs requires the establishment of a multiparty call (if it does not already exist for the served CAMEL subscriber) as described in clause 13.7. Other call parties may be involved in independent Multiparty calls due to MPTY SS or CPH. If the call segment to which the

specified leg is added is already using a multi-party bridge, the MSC server requests the MGW to establish the connection between the specified leg and the multi-party bridge.

Example

Figure 14.x3 shows an example network model for the Move Leg procedure. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling and the bearer

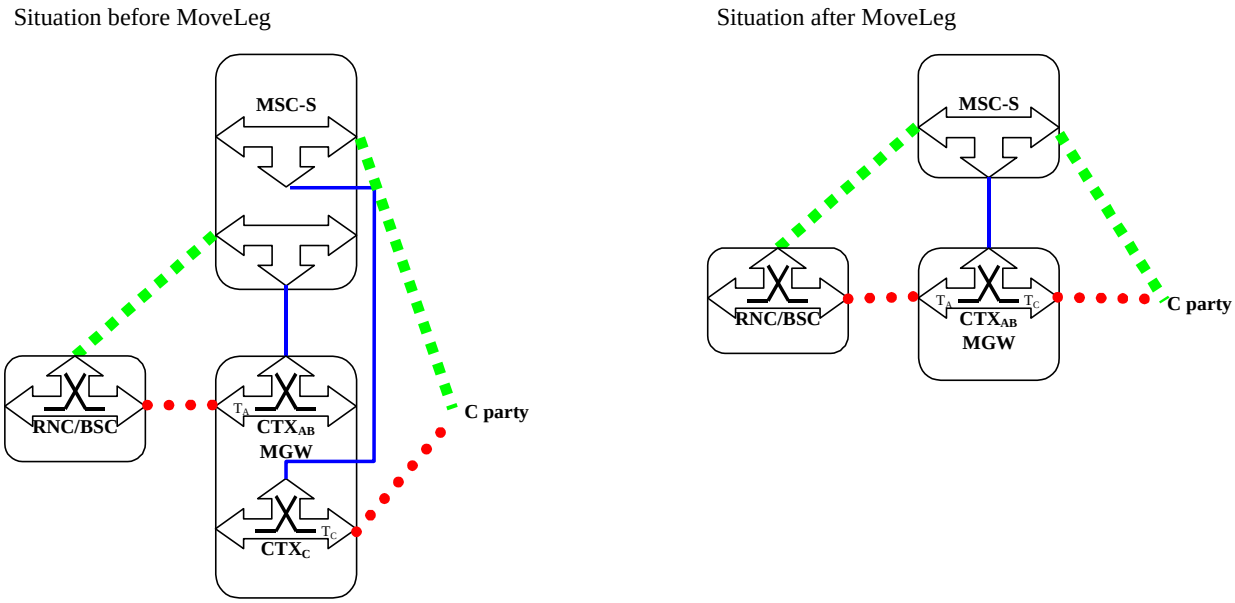


Figure 14.x3 Move Leg procedure (Network model)

Figure 14.x4 shows an example message sequence for the Move Leg procedure.

In this example the leg of the C-party is moved to an existing call segment. The MSC-S requests the MGW to move the bearer termination for the C-party to the same Context which contains the bearer termination for the A-party

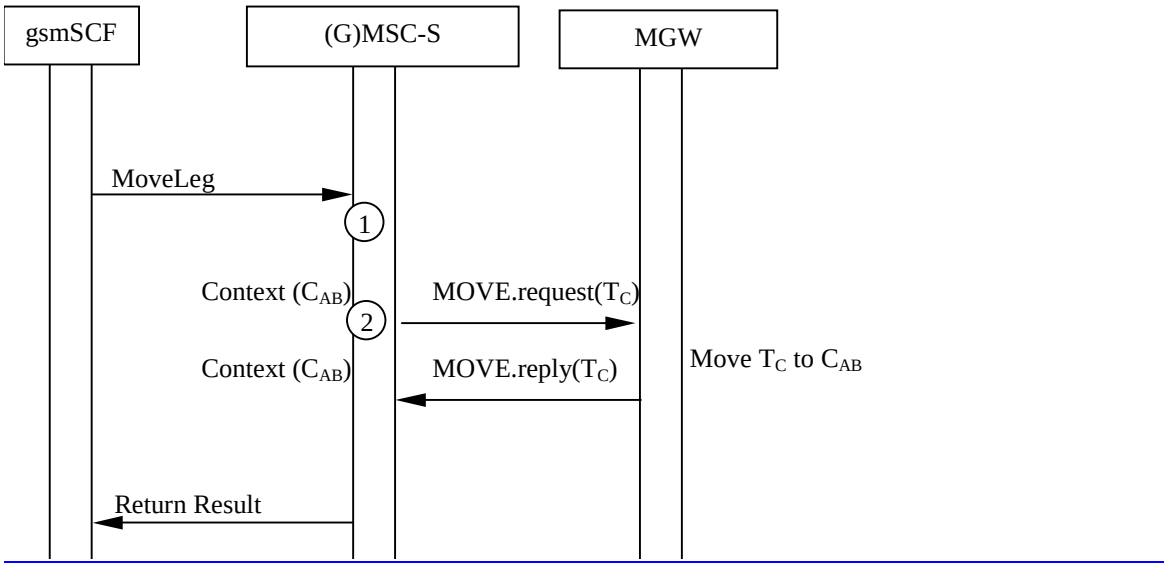


Figure 14.x4 Information flow for Move Leg (message sequence chart)

14.1.3.4 Split Leg procedure

The Split Leg procedure is used to separate a call leg from a source call segment and place it in a (new) target call segment.

When the gsmSCF uses the Split Leg procedure to put a call leg on hold, the MSC server instructs the MGW to interrupt the connection between the specified call leg and the other party/parties in the call segment. If the call segment is using a multi-party bridge, the connection from the specified call leg to the multi-party bridge is interrupted.

Example

Figure 14.x5 shows an example network model for Split Leg procedure. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling and the bearer.

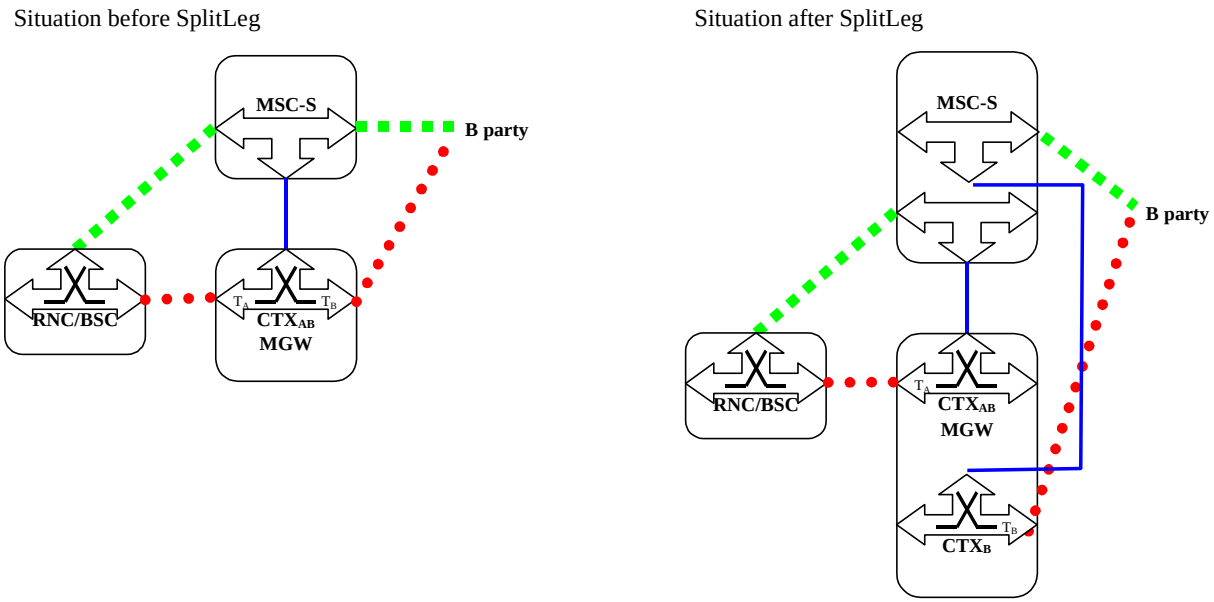


Figure 14.x5 Split Leg procedure (Network model)

Figure 14.x6 shows an example message sequence for ~~a~~the Split Leg procedure.

In this example the leg of the B-party is moved to a new call segment. The MSC-S requests the MGW to move the bearer termination for the B-party in the active call to a new context.

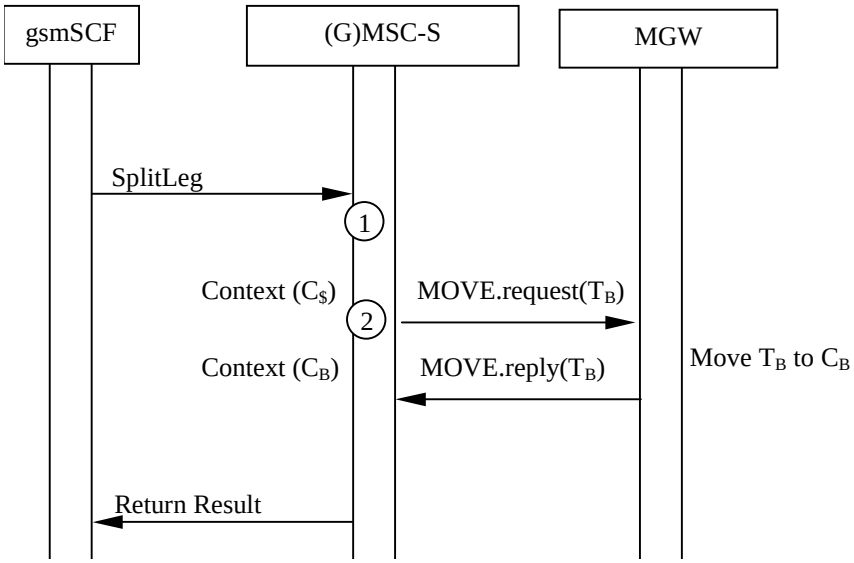


Figure 14.x6 Information flow for Split Leg (message sequence chart)

14.1.3.5 CAMEL User interaction procedure

In accordance with 3GPP TS 23.078 [10] the gsmSCF may order the MSC-S/gsmSSF to play an announcement or control user interaction as specified in subclauses 14.1.1 and 14.1.2 respectively. The tones are provided in accordance with subclause 14.6 of the present document. As part of Call Party Handling, announcements or tones can be played to an individual party or to all the parties connected in the call segment.

The gsmSCF may also instruct the MSC-S to establish a temporary connection to an external device which provides the user interaction.

14.1.3.6 Failure handling in the MSC-S

If resources for Call Party Handling cannot be allocated in any of the MGWs assigned to the MSC-S, then the MSC-S shall reject the request for the Call Party Handling procedure.

— Next modified section —

14.6 Providing tones or announcements

It shall be assumed that the MGW selected for the call has the capabilities to provide announcements and tones.

Preconditions when providing in-band information to the calling subscriber

For a mobile terminating/forwarded call, announcements/tones may be provided to the calling subscriber only when both of the following conditions are satisfied:

1. Either:
   a. The incoming IAM indicated that the Continuity message will follow, and a Continuity message has been received, or
   b. The incoming IAM did not indicate that the Continuity message will follow;
2. Notification indicating successful completion of the incoming side bearer set-up has been received from the MGW using the Bearer Established procedure.

~~If~~ For a mobile originating call, the traffic channel assignment shall be completed before providing the in-band information to the calling subscriber.

Preconditions when providing in-band information to the called subscriber

The called party is selected by the calling party, or a supplementary service (call forwarding, call deflection, CAMEL redirection etc), or a call is initiated by the gsmSCF using the Initiate Call Attempt procedure. The called party may also be in the PSTN.

Announcements/tones may be provided to the called subscriber only when both of the following conditions are satisfied:

1. The called party has answered and is still active in the call.
2. Notification indicating successful completion of the outgoing side bearer set-up has been received from the MGW using the Bearer Established procedure.

Preconditions when providing in-band information to multiple subscribers

The gsmSCF may instruct the MSC-S/gsmSSF to provide announcements or tones for multiple subscribers. For each calling and called subscriber the precondition for calling and called subscriber (respectively) shall be fulfilled. If the preconditions are not fulfilled for all subscribers (e.g. one of the called parties is in the alerting phase), then the announcements/tones shall not be played to the subscribers who do not meet the preconditions, but the announcements/tones shall be played to the subscribers (if any) who meet the preconditions.

Request to play an announcement/tone

The (G)MSC server/gsmSSF/gsmSRF provides the MGW with the announcement/tone identification and optionally requests the MGW to notify the announcement/tone completion using the Play Announcement or Send Tone procedure (bullet 1 in figure 14.13).

Stopping an announcement/tone

The (G)MSC server/gsmSSF/gsmSRF can order the MGW to stop the current announcement/tone using the Stop Announcement or Stop Tone procedure (bullet 2 in figure 14.13).

Announcement/tone completed

If notification of the announcement/tone completion was requested in the Play Announcement or Send Tone procedure, the MGW notifies the (G)MSC server/gsmSSF/gsmSRF when the announcement/tone has been completed using the Announcement Completed or Tone Completed procedure (bullet 3 in figure 14.13).

Example

Figure 14.12 shows the network model for providing in-band information to the calling subscriber. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling and the bearer. The bearer termination Tx is used for the bearer towards the preceding MGW (calling subscriber).

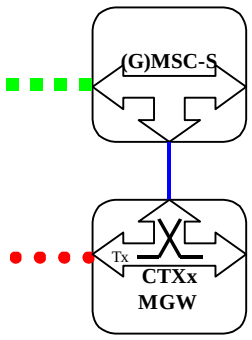
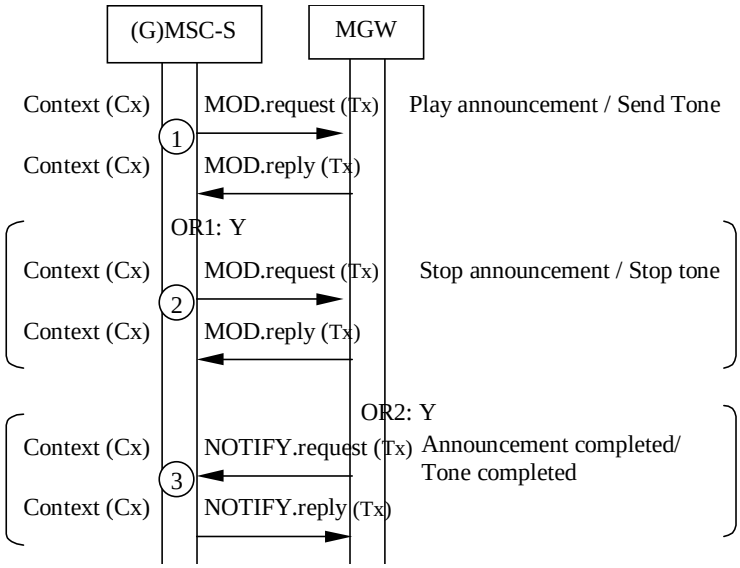


Figure 14.12: Proving in-band information (Network model)

Figure 14.13 shows the message sequence example for providing the calling party with an announcement/tone. In the example the (G)MSC server requests the MGW to play an announcement/tone and to notify the announcement/tone completion. The (G)MSC server may stop the announcement while the current announcement/tone is ongoing.



NOTE: OR1: Stop the announcement/tone (Y: yes N:no)
OR2: Notification of completion required (Y: yes N:no)

Figure 14.13: Playing an announcement/tone (message sequence chart)

— End of document —

3GPP TSG CN WG4 Meeting #16 ***N4-021268***
Miami, USA, 23rd – 27th September 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.205** **CR** **036** ⌘ **rev** **1** ⌘ Current version: **5.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Clarification of the termination of the Iu interface components in the Bearer Independent Architecture
Source:	⌘	Lucent Technologies
Work item code:	⌘	TEI5
Date:	⌘	24/9/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Currently the termination of the Iu interface signalling components is not clearly specified in the Bearer Independent Circuit Switched Core Network Architecture.
Summary of change:	⌘	To clarify the Logical Architecture CS Core Nodes to clearly indicate the termination of the Iu interface components.
Consequences if not approved:	⌘	Possible mis-understandings and interoperability problems could occur.

Clauses affected:	⌘	Sections 2 and 5

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

***** First Modified Section *****

2 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 23.002: "Network Architecture".

[3] 3GPP TS 23.153: "Out of Band Transcoder Control; Stage 2".

[4] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".

[5] ITU-T Recommendation H.248: "Gateway Control Protocol".

[6] 3GPP TS 29.232: "Media Gateway Controller (MGC); Media Gateway (MGW) interface; Stage 3".

[7] 3GPP TS 29.415: "Core Network Nb User Plane Protocols; Stage 3".

[8] 3GPP TS 23.009: "Handover procedures".

[9] 3GPP TS 23.072: "Call Deflection (CD) supplementary service; Stage2".

[10] 3GPP TS 23.078: "Customized Applications for Mobile network Enhanced Logic (CAMEL) - Phase 3; Stage 2".

[11] 3GPP TS 23.079: "Support of Optimal Routeing (SOR); Technical Realisation".

[12] 3GPP TS 23.082: "Call Forwarding (CF) Supplementary Services; Stage 2".

[13] 3GPP TS 23.083: "Call Waiting (CW) and Call Hold (HOLD) Supplementary Services; Stage 2".

[14] 3GPP TS 23.084: "Digital cellular telecommunications system (Phase 2+); Multi Party (MPTY) Supplementary Service; Stage 2".

[15] 3GPP TS 23.091: "Explicit Call Transfer (ECT) Supplementary Service; Stage 2".

[16] 3GPP TS 23.093: "Technical realisation of Completion of Calls to Busy Subscriber (CCBS); Stage 2".

[17] 3GPP TS 23.135: "Multicall supplementary service; Stage 2".

[18] 3GPP TS 23.108: "Mobile radio interface layer 3 specification; Core Network Protocols; Stage 2".

[19] 3GPP TS 42.032: "Immediate Service Termination (IST); Service Description; Stage 1".

[20] 3GPP TS 25.415: "UTRAN Iu Interface User Plane Protocols".

[21] 3GPP TS 29.414: "Core Network Nb Data Transport and Transport Signalling".

[22] 3GPP TS 29.205: "Application of Q.1900 Series to Bearer Independent circuit-switched core network architecture; Stage 3".

[23] 3GPP TS 29.010: "Information element mapping between Mobile Station - Base Station System (MS - BSS) and Base Station System - Mobile-services Switching Centre (BSS - MSC); Signalling procedures and the Mobile Application Part (MAP)".

[24] 3GPP TS 43.045: "Technical realization of facsimile group 3 transparent".

[25] 3GPP TS 23.146: "Technical realization of facsimile group 3 non-transparent".

[26] 3GPP TS 25.413: "UTRAN Iu Interface RANAP Signalling"

[27] 3GPP TS 48.008: "Mobile-services Switching Centre – Base Station System (MSC – BSS) interface; layer 3 specification"

[28] 3GPP TS 23.226: "Global Text Telephony (GTT)"

[29] 3GPP TS 43.051: “Technical Specification Group GSM/EDGE; Radio Access Network; Overall description - Stage 2;”.

[30] 3GPP TS 25.412: "UTRAN Iu interface signalling transport".

[31] 3GPP TS 25.410: "UTRAN Iu Interface: general aspects and principles".

[32] 3GPP TS 25.414: "UTRAN Iu interface data transport and transport signalling".

***** Next Modified Section *****

5 General Circuit Switched Core Network Domain Architecture

5.1 Logical Architecture

The overall CS core network logical architecture is shown in figure 1.

5.1.1 CS Core Network Nodes

5.1.1.1 MSC Server

The MSC server mainly comprises the call control and mobility control parts of a GSM/UMTS MSC as described in 3GPP TS 23.002 [2]. It is also integrated with a VLR to hold the mobile subscriber's service data and CAMEL related data.

The MSC server terminates the user-network signalling (see 3GPP TS 24.008 [4]) and translates it into the signalling over the Nc interface. The MSC Server terminates the Iu control plane signalling and its transport bearer (see 3GPP TS 25.413 [26] and 3GPP TS 25.412 [30]). It also terminates the signalling over the Mc interface with the M~~m~~edia G~~g~~ateway.

The MSC server controls the parts of the call state model that pertain to connection control for media channels in an MGW. It also contains the 'Call Control Function' in the BICC model.

5.1.1.2 GMSC Server

The GMSC server mainly comprises the call control and mobility control parts of a GSM/UMTS GMSC as described in 3GPP TS 23.002 [2].

The GMSC server terminates the signalling over the Nc interface and the call control interfaces to the external networks. It also terminates the signalling over the Mc interface towards the Mmedia Ggateway.

The GMSC server controls the parts of the call state model that pertain to connection control for media channels in an MGW. It also contains the 'Call Control Function' in the BICC model

5.1.1.3 Media Gateway

The Mmedia Ggateway terminates the signalling over the Mc interface from the (G)MSC servers. The Media Gateway terminates the Iu transport network control plane signalling with its transport bearer. (see 3GPP TS 25.410 [31] and 3GPP TS 25.414 [32]). The Media Gateway also terminates the Iu user plane protocol (see 3GPP TS 25.415 [20]). It also terminates the bearer control part of the signalling and the transport bearer over the Iu interface and the Nb interface (see 3GPP TS 29.414 [21] and 3GPP TS 29.415 [7]).

The Mmedia Ggateway contains bearer terminations and media manipulation equipment (e.g. transcoders, echo cancellers, or tone senders). It may perform media conversion and framing protocol conversion.

5.1.2 CS Core Network Interfaces and Reference Points

5.1.2.1 Mc Interface

The Mc reference point in the present document considers the aspects of the interface between the (G)MSC server and the MGW. The H.248 protocol [5] together with 3GPP specific extensions/packages shall be used over the Mc interface.

5.1.2.2 Nc Interface

The Network-Network based call control is used over the Nc interface. Any suitable call control protocol may be used over the Nc interface (e.g. BICC).

5.1.2.3 Nb Interface

The bearer control signalling and transport are carried over the Nb interface.

5.2 Network Interworking

5.2.1 Interworking on the Nc Reference Point

Interworking between the Nc reference point, call control protocols and ISUP is defined within the 3GPP stage 3 documentation for each protocol (or by references specified in stage 3 documentation [6]).

5.2.2 Interworking on the Nb Reference Point

The interworking is specified in 3GPP TS 29.415 [7] and 3GPP TS 29.414 and [21].

3GPP TSG CN WG4 Meeting #17 ***N4-021394***
Bangkok, Thailand, 11 – 15 November 2002

CR-Form-v7

CHANGE REQUEST

⌘ **29.010** **CR** **078** ⌘ **rev** **-** ⌘ Current version: **5.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Interworking between security mode procedure and relocation
Source:	⌘	CN4
Work item code:	⌘	TEI5
Date:	⌘	30.10.2002
Category:	⌘	**F**
Release:	⌘	REL-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change: ⌘

1) The mapping between the cause codes received in RANAP Security Mode Reject and the cause codes sent in BSSMAP Cipher Mode Reject is missing.

2) Introduction of a new BSSMAP cause “Relocation triggered” to be used only on the E-interface.

According to TS 25.413, subclause 8.6.2, the RNC can reject a RANAP RAB Assignment Request or Security Mode Command with the corresponding reject message and RANAP cause “Relocation triggered”, if the RNC already sent a Relocation Required message and wants to proceed with the relocation. Currently, after a basic inter-MSC handover, when encapsulated BSSMAP is used on the E-interface, there is no appropriate BSSMAP cause specified in TS 48.008 to which the RANAP cause “Relocation triggered” might be mapped and sent back to MSC-A via the E-interface.

For the RANAP RAB Assignment Response, the current version of TS 29.010 proposes a mapping to BSSMAP cause “No radio resource available”, which will usually result in a release of the call by MSC-A. For RANAP Security Mode Reject no mapping is specified at all, but receipt of a Cipher Mode Reject message usually also results in a release of the call by MSC-A.

It is proposed to add a new BSSMAP cause to TS 48.008, and to specify the corresponding mapping for RANAP Security Mode Reject/BSSMAP Cipher Mode Reject and RANAP RAB Assignment Response/BSSMAP Assignment Failure.

Summary of change: ⌘

1) A table for the mapping of cause codes received in RANAP Security Mode Reject to cause codes sent in BSSMAP Cipher Mode Reject is added.
2) Introduction of the new BSSMAP cause in the mapping tables for RANAP

		Security Mode Reject/BSSMAP Cipher Mode Reject and RANAP RAB Assignment Response/BSSMAP Assignment Failure.
Consequences if not approved:	⌘	If encapsulated BSSMAP is used on the E-interface, and a Cipher Mode Control procedure or Assignment Request procedure via the E-interface collides with a subsequent relocation and is rejected by the serving RNC, the call will be released.

Clauses affected:	⌘	4.7.4.1, 4.7.4.2, 4.7.6				
		Y	**N**			
Other specs affected:	⌘	**X**		Other core specifications	⌘	48.008
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

4.7 Inter-MSC Handover (GSM to UMTS)

…

4.7.4 BSSAP Messages transfer on E-Interface

The handling is described in chapter 4.5.4, additional cases are described in this chapter.

4.7.4.1 Assignment

The interworking between the BSSMAP assignment messages in MAP and the RANAP RAB assignment messages is as follows:

	29.002	25.413	Notes
Forward message	MAP PREPARE HANDOVER request -RANAP service handover -an-APDU(ASSIGNMENT REQUEST) BSSMAP information elements: Channel Type	RAB ASSIGNMENT REQ Service handover RANAP information elements: RAB parameters	
Positive result	MAP PREPARE HANDOVER request -an-APDU(ASSIGNMENT COMPLETE or ASSIGNMENT FAILURE) BSSMAP information elements: Cause	RAB ASSIGNMENT RESPONSE (positive result) RAB ASSIGNMENT RESPONSE (negative result) RANAP information elements: Cause	1
Negative result		MAP U/P –ABORT	

NOTE 1: For the mapping between the cause codes see subclause 4.7.6.

4.7.4.2 Cipher Mode Control

The interworking between the BSSMAP cipher mode messages in MAP and the RANAP security mode messages is as follows:

	29.002	25.413	Notes
Forward message	MAP FORWARD ACCESS SIGN. request -an-APDU(CIPHER MODE CMD)	SECURITY MODE CMD	
	BSSMAP information elements:	RANAP information elements:	
	Encryption information	Integrity protection info Encryption info	
Positive result	MAP PROCESS ACCESS SIGN. request -an-APDU(		
	CIPHER MODE COMPLETE or	SECURITY MODE COMPLETE	
	CIPHER MODE REJECT)	SECURITY MODE REJECT	
	BSSMAP information elements:	RANAP information elements:	
	Encryption information	Integrity protection info Encryption info	
	Cause	Cause	1
Negative result		MAP U/P –ABORT	

NOTE 1: For the mapping between the cause codes see subclause 4.7.6.

********** NEXT MODIFIED SECTION **********

4.7.6 Cause Code Mapping

When a Mobile Station is handed over between GSM and UMTS, a mapping of the cause codes used in the BSSMAP and the RANAP protocols is needed. The mapping described here is applicable to the BSSMAP protocol even when used inside MAP in the E-interface.

The mapping between the cause codes received in BSSMAP Handover Required and the cause codes sent in RANAP Relocation Request is as follows:

48.008	25.413	Notes
HANDOVER REQUIRED	RELOCATION REQUEST	
-Better Cell	-Time critical reloc.	
-Directed retry	-Directed retry	
-Distance	-Time critical reloc.	
-Downlink quality	-Time critical reloc.	
-Downlink strength	-Time critical reloc.	
-O and M intervention	-O and M intervention	
-Preemption	-RAB pre-empted	
-Response to MSC invocation	-Time critical reloc.	
-Switch circuit pool		1
-Traffic	-Time critical reloc.	
-Uplink quality	-Time critical reloc.	
-Uplink strength	-Time critical reloc.	
-Any other value	-Time critical reloc.	

NOTE 1: Cause code not used at inter-system handover.

The mapping between the cause codes received in BSSMAP Handover Request and the cause codes sent in RANAP Relocation Request is as follows (the mapping is only used for the MAP-E interface):

48.008	25.413	Notes
HANDOVER REQUEST	RELOCATION REQUEST	
-Better Cell	-Time critical reloc.	
-Directed retry	- Directed retry	
-Distance	-Time critical reloc.	
-Downlink quality	-Time critical reloc.	
-Downlink strength	-Time critical reloc.	
-O and M intervention	-O and M intervention	
-Preemption	-RAB pre-empted	
-Response to MSC invocation	-Time critical reloc.	
-Switch circuit pool		1
-Traffic	-Time critical reloc.	
-Uplink quality	-Time critical reloc.	
-Uplink strength	-Time critical reloc.	
-Any other value	-Time critical reloc.	

NOTE 1: Cause code not used at inter-system handover.

The mapping between the cause codes received in BSSMAP Handover Failure and the cause codes sent in RANAP Iu Release Command is as follows:

48.008	25.413	Notes
HANDOVER FAILURE	IU RELEASE COMMAND	
-Ciphering algorithm not supported		2
-Circuit pool mismatch		1
-Equipment failure	-Relocation cancelled	
-Invalid message contents	-Abstract Syntax Error	
-No radio resource available		2
-O and M intervention	-O and M intervention	
-Radio interface failure, reversion to old channel	-Relocation cancelled	
-Radio interface message failure	-Relocation cancelled	
-Requested speech version unavailable		2
-Requested terrestrial resource unavailable		2
-Requested transcoding/rate adaption unavailable		2
-Switch circuit pool		1
-Terrestrial circuit already allocated	-Relocation cancelled	
-Any other value	-Relocation cancelled	

NOTE 1: Cause code not used at inter-system handover.

NOTE 2: Cause code not applicable to this traffic case.

The mapping between the cause codes received in RANAP Relocation Failure and the cause codes sent in BSSMAP Handover Failure is as follows (this mapping is only used for the MAP-E interface):

25.413	48.008	Notes
RELOCATION FAILURE	HANDOVER FAILURE	
-GERAN Iu-mode failure	-GERAN Iu-mode failure	
-Any other value	-No radio resource available	

The mapping between the cause codes received in RANAP Relocation Failure and the cause codes sent in BSSMAP Handover Required Reject is as follows:

25.413	48.008	Notes
RELOCATION FAILURE	HANDOVER REQUIRED REJECT	
-GERAN Iu-mode failure	-GERAN Iu-mode failure	
-Any other value	-No radio resource available	

The mapping between the RANAP and the BSSMAP assignment messages is used in the MAP-E interface. RANAP RAB Assignment Response with successful result is mapped to BSSMAP Assignment Complete; RANAP RAB Assignment Response with unsuccessful result is mapped to BSSMAP Assignment Failure. The mapping between the cause codes received in RANAP RAB Assignment Response and the cause codes sent in BSSMAP Assignment Failure is as follows (this mapping is only used for the MAP-E interface):

25.413	48.008	Notes
RAB ASSIGNMENT RESPONSE	ASSIGNMENT FAILURE	
-Requested traffic class not available	–No radio resource available	
-Invalid RAB parameters value	–Invalid msg. contents	
-Requested max bit rate not available	–No radio resource available	
-Requested max bit rate for DL not available	–No radio resource available	
-Requested max bit rate for UL not available	–No radio resource available	
-Requested guaranteed bit rate not available	–No radio resource available	
-Requested guaranteed bit rate for DL not available	–No radio resource available	
-Requested guaranteed bit rate for UL not available	–No radio resource available	
-Requested transfer delay not achievable	–No radio resource available	
-Invalid RAB param. combination	–Invalid msg. contents	
-Condition violation for SDU parameters	–Invalid msg. contents	
-Condition violation for traffic handling priority	–Invalid msg. contents	
-Condition violation for guaranteed bit rate	–Invalid msg. contents	
-User plane not supported	–No radio resource available	
-Iu UP failure	–Equipment failure	
-Tqueuing expiry	–Radio interface message failure	
-Invalid RAB id	–Invalid msg. contents	
-Request superseeded	–No radio resource available	
~~-Relocation triggered~~	~~-No radio resource available~~	
-Relocation triggered	-Relocation triggered	
-GERAN Iu-mode failure	-GERAN Iu-mode failure	
-Any other value	–Radio interface message failure	

The mapping between the cause codes received in RANAP Security Mode Reject and the cause codes sent in BSSMAP Cipher Mode Reject is as follows (this mapping is only used for the MAP-E interface):

25.413	48.008	Notes
SECURITY MODE REJECT	CIPHER MODE REJECT	
-Requested ciphering and/or integrity protection algorithms not supported	-Ciphering algorithm not supported	
-Failure in the radio interface procedure	-Radio interface message failure	
-Change of ciphering and/or integrity protection is not supported	-Invalid msg. contents	
-Relocation triggered	-Relocation triggered	
-Any other value	-Radio interface message failure	

The mapping between the cause codes received in RANAP Location Report and the cause codes sent in BSSMAP Handover Performed is as follows (this mapping is only used for the MAP-E interface):

25.413	48.008	Notes
LOCATION REPORT	HANDOVER PERFORMED	
-User restriction start ind.	-O&M intervention	
-User restriction start ind.	-O&M intervention	
-Requested report type not supported		1
-Any other value	-Better cell	

NOTE 1: In this case, no Handover Performed is sent.

3GPP TSG CN WG4 Meeting #16 ***N4-021122***
Miami, Florida, USA, 23rd – 27th September 2002

CR-Form-v7

CHANGE REQUEST

⌘ **30.002** **CR** **006** ⌘ **rev** ⌘ Current version: **4.0.1** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Alignment with use of ASN.1 (1997) standard
Source:	⌘	CN4
Work item code:	⌘	TEI5
Date:	⌘	23/07/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	CR 29.002-474r3, approved in CN #17, replaced the reference to the 1988 ASN.1 standard with a reference to the 1997 ASN.1 standard. The presentation of the ASN.1 protocol specification in 29.002 has changed, so the guidance in 30.002 needs to change.
Summary of change:	⌘	References to ITU-T recommendations defining ASN.1 have been updated. Redundant abbreviations have been deleted. Changes to the contents of 29.002 subclauses 17.5 and 17.6 have been reflected (subclause 17.5 now contains only the list of supported operations; the operation and error codes are defined in subclause 17.6). Changes to the notation used to define operations have been reflected in the ASN.1 examples. The term "ccitt identified-organization" in the ASN.1 examples has been systematically replaced by "itu-t identified-organization", to reflect the same change in 29.002.
Consequences if not approved:	⌘	Misleading guidance on how to make changes to the ASN.1 protocol definition in 29.002.

Clauses affected:	⌘	1.2; 1.3; 2.2; 2.3; 2.3.1; 2.3.2 (and all its subclauses); 2.3.3 (and all its subclauses); 2.3.4 (and all its subclauses); 2.3.5 (and all its subclauses); 2.3.6 (and all its subclauses); 2.3.8 (and all its subclauses); 2.3.9; 2.3.11; 2.3.12

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	The word "section" has been systematically replaced by "clause" or "subclause", as appropriate. The 3GPP drafting rules for the use of auxiliary verbs ("shall", "should" and "may") have been applied. The appropriate styles for ASN.1 modules have been applied

****** First modified section ******

1.2 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.

[1] 3GPP TS 29.002 "Mobile Application Part (MAP) specification".

[2] ETSI prETR 060 "Signalling Protocols and Switching (SPS); Guidelines for using Abstract Syntax Notation One (ASN.1) in telecommunication ~~-~~application protocols".

[3] ITU-T Recommendations Q.771 to Q.775 (Blue Book 1988/White Book 1993) "Specification of signalling system no. 7, transaction capabilities (TC)".

[4] Addendum to Recommendation ITU-T Recommendations Q.1400 (1994) "Architecture framework for the development of signalling and OAM protocols using OSI concepts. Add section 12.5".

[5] ~~CCITT~~ ITU-T Recommendation X.680 ~~X.208 (Blue Book 1988)~~ " Information technology – ~~Specification of a~~Abstract ~~s~~Syntax ~~n~~Notation ~~o~~One (ASN.1): Specification of basic notation".

[6] ITU-T Recommendation X.681: "Information technology – Abstract Syntax Notation One (ASN.1): Information object specification"~~CCITT Recommendation X.209 (Blue Book 1988) "Specification of basic encoding rules for ASN.1"~~.

[7] ITU-T Recommendation X.690 " Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)".~~ITU-T Recommendations X.680 to X.683 (1993) "Specification of abstract syntax notation one (ASN.1)" including Amendment 1 "Rules of extensibility" (1994).~~

[8] ~~ITU-T Recommendations X.690 to X.691 (1993/94) "Specification of ASN.1 encoding rules".~~ITU-T Recommendation X.880: "Data networks and open system communication - Open System Interconnection - Service definitions - Remote operations: Concepts, model and notation".

1.3 Abbreviations

MAP	Mobile Application Part
AC	Application Context
SMS	Short Message Service
USSD	Unstructured Supplementary Service Data
ASN.1	Abstract Syntax Notation One
TCAP	Transaction Capability Application Part
SCCP	Signalling Connection Control Part
SS ~~No~~NO.7	Signalling System No. 7
ISUP	ISDN User Part
ISDN	Integrated Services Digital Network
ITU	International Telecommunication Union
~~CCITT~~	~~International Telegraph and Telephone Consultative Committee~~
ETSI	European Telecommunication Standard Institute
~~ETS~~	~~European Telecommunication Standard~~
~~ETR~~	~~European Technical Report~~
~~TC TR~~	~~Technical Committee Technical Report~~

****** Next modified section ******

2.2 General aspects on MAP modifications

While the MAP specification for GSM phase 2 contains text which is applicable to phase 1 and phase 2, the later versions of the MAP specification shall only include material which is applicable for the latest AC versions. As an exception to this prionciple, definitions of operation packages and application contexts for earlier versions shall be kept in ~~section~~ clause 17 of the MAP specification.

Based on the stage 2 definition, MAP modifications should be done step by step to ensure a systematic approach. The following ~~sections~~ subclauses describe typical steps of analysis and implementation of changes in the MAP specification.

References in the present document to MAP clauses and subclauses are to clauses and subclauses in the MAP specification, 3GPP TS 29.002 [1].

****** Next modified section ******

2.3 Introduction of changes in MAP

After all requirements have been classified changes can be introduced in the MAP ~~document~~ specification as described below. Normally only the following ~~MAP sections~~clauses and subclauses are affected:

- MAP subclause ~~section~~ 7.6: Definition of parameters
  Textual description of parameters.

- MAP clauses ~~sections~~ 8 to 13: MAP Service User specific services
  Description of the MAP services offered by the MAP Service Provider to specific MAP Service Users (see MAP section 7.2).

- MAP subclause ~~section~~ 16.2.2.4: Mapping between operations and services
  Definition of mapping of services to operations and vice versa.

- MAP subclause ~~section~~ 17.2: Operation packages
  Definition of groups of operations for use within Application Contexts.

- MAP subclause ~~section~~ 17.3: Application contexts
  Definition of which operations are available to the initiator of a dialogue and which are available to the responder when using the application context.

- MAP subclause ~~section~~ 17.5: MAP operation and error codes
  ASN.1 definition of supported operations in the current version of the MAP specification, and of operation and error values used in earlier versions of the MAP specification.

- MAP subclause ~~section~~ 17.6: MAP operations and errors ~~types~~
  ASN.1 definition of operations and errors, including operation and error values used in the current version of the MAP specification ~~types~~.

- MAP subclause ~~section~~ 17.7: MAP constants and data types
  ASN.1 definition of constants and data types.

- MAP clauses ~~sections~~ 19 to 25: Procedure descriptions
  SDL description of the Service User procedures.

- MAP Annexes A and B: ASN.1 cross reference and expanded source
  cross reference and expanded source, automatically generated out of the ASN.1 ~~sections~~subclauses.

2.3.1 Relationship between MAP service and MAP operation

As described above the additional protocol elements required can be directly derived from the Stage 2 definition.

A new MAP message requires the specification of a new MAP service (MAP ~~sections~~clauses 8 to 13). New MAP parameters can be defined in MAP ~~section~~subclause 7.6. They can be included directly or indirectly in the MAP Services (for details see below).

A MAP service is used by the Service User to instruct the Service Provider to send a message on an interface and to be able to receive a message via the Service Provider.

The following cases may exist for a MAP specific Service:

- The service is used for only one interface.
- The service is used for more than one interface.

In the second case a specific parameter included in the service may be used for one of these interfaces but ~~must~~ shall not be used on another. In this case the parameter ~~should~~ shall be defined as conditional in the service description so that it can be omitted on the interface where it is not required.

The interface between MSC and VLR is specified as an internal interface. It is only used as a descriptive interface on which communication is defined by the service description (see MAP ~~sections~~ clauses 8 to 13).

Only messages and parameters used on external interfaces are specified by operations in the ASN.1 definition (see MAP ~~section~~ clause 17). For external interfaces, normally all parameters in the service description shall also be included in the ASN.1 definition of the corresponding operation.

Except for the Invoke Id and the Provider Error the following mapping between parameters in the service definition and the ASN.1 definition applies:

- Parameters defined in the request and indication columns map to and from parameters under the ASN.1 operation ARGUMENT.
- Parameters defined in the response and confirmation columns map to and from parameters under the ASN.1 operation RESULT.
- User Error Parameters defined in the response and confirmation columns map to and from the errors and parameters under ASN.1 operation ERRORS.

A parameter which is shown as conditional or optional in the service description maps to and from an OPTIONAL parameter in the ASN.1 definition.

A parameter which is shown as mandatory in the service description maps to and from a mandatory parameter in the ASN.1 definition.

Note that DEFAULT parameters are not used in MAP for the time being. They are shown as conditional or optional parameters in the service description.

However, when a MAP service is used for an external and an internal interface it may occur that a parameter is defined as conditional in the service description but is not included in the ASN.1 definition. This is because the parameter is used only internally and not externally.

2.3.2 Definition of a new parameter

A new parameter may be required for new or existing operations and errors. The parameter should be defined in MAP ~~section~~ subclause 7.6. The text should unambiguously define the relationship of the parameter in the stage 2 and the protocol definition (Stage 3).

2.3.2.1 A new parameter in the service description

The use of a new parameter with specific services is given in the service descriptions in MAP ~~sections~~ clauses 8 to 13. Operation and Error parameters need to be distinguished.

2.3.2.1.1 A new operation parameter

Not all parameters of a MAP service are explicitly shown in the service description table; ~~but~~ they may be included in a constructed parameter (hierarchical structure). A constructed parameter is shown in the service description if a common use of all sub-parameters can be assumed.

In the following cases the parameter should be explicitly listed in the service description:

- If the use of an operation is modified substantially by a new parameter. This may also need to be reflected under 'Definition' of the Service description.
- If a new parameter has no common use with other parameters.

Otherwise only the constructed parameter description in MAP ~~section~~ subclause 7.6 will reference the sub parameter.

- If required, a new operation parameter name should be included in the table just before user error and provider error.
  - If the parameter is included in the invoke component, the Request and Indication column shall be marked with U, C or M;
  - If the parameter is included in the result component, the Response and Confirmation column shall be marked with U, C or M. The use of this marking is defined in MAP subclause ~~section~~ 7.3. Note that although this definition is applied to the MAP common services, it is valid generally for all MAP services.
- 'U' is used if the support of the parameter is optional. Normally 'U' shall be used only in the request and response column. In this case the right neighbour column shall include 'C(=)' (see subclause ~~section~~ 2.3.8.2). In special cases the indication and confirmation columns may be marked with 'U'.
- 'M' is used if the parameter is mandatory.
- 'C' is used if the parameter shall be included under specific conditions (application defined).
- '(=)' means that the parameter takes the same value as in the left neighbour column.
- 'O' shall not be used because it is not available for the MAP User.

Note that a parameter other than 'User Error' can be added only if the operation is of a class which can return a result (see subclause ~~section~~ 2.3.4.1).

2.3.2.1.2 A new error parameter

Error parameters are not explicitly shown under the service primitives. If required some references can be given with the description of the relevant user error description.

2.3.2.2 A new parameter in the ASN.1 protocol definition

The coding of parameters is defined in the ASN.1 protocol in MAP section 17.7. Error parameters are defined in MAP subclause ~~subsection~~ 17.7.7. Commonly used parameters are specified in MAP subclause ~~subsection~~ 17.7.8. For all other parameters the subsection can be chosen corresponding to MAP subclause ~~section~~ 7.6.

- The parameter name shall in principle be the same as in MAP section 7.6. In addition the syntax rules given in subclause ~~section~~ 2.3.8.1 shall apply.
- If possible, the coding of a parameter shall be defined separately from the place where it is actually used. This means that an ASN.1 type is defined and identified by a name and this identifier is assigned to the parameter name where it is actually used.
- The new parameter ~~must~~ shall not be used in the old version of the protocol. Care must be taken to allow the new parameter to be unambigiously identified even against parameters which are only used in the old version of the protocol.

e.g.: **old version**

```
LocationInfo ::= CHOICE {
    roamingNumber                   [0] ISDN-AddressString,
    -- roamingNumber must not be used in version greater 1
    msc-Number                      [1] ISDN-AddressString}
```

new version

```
LocationInfo ::= CHOICE {
    msc-Number                      [1] ISDN-AddressString,
    newAlternative                  [2] ISDN-AddressString}
```

2.3.3 Definition of a new error

New user errors may be required by new or existing operations. User errors are defined in MAP ~~section~~ subclause 7.6.1.4. The text should unambiguously define the relation of the error messages in the stage 2 and the return errors in the protocol definition (Stage 3).

Note that the introduction of new provider errors is not described here.

2.3.3.1 A new error in the service description

The use of a new error and its parameters with specific operations is described in the service descriptions in MAP ~~sections~~ clauses 8 to 13. The name of the error shall be unique over the entire MAP protocol. In general the name expresses the problem to be indicated to the remote node e.g. 'Illegal Equipment'.

If required parameters shall be defined as described in the sections above.

Note that a user error may be added only if the operation is of a class which can return an error (see ~~section~~ subclause 2.3.4.1)

2.3.3.2 A new error in the ASN.1 definition

In general the coding of errors shall be defined in the ASN.1 protocol in MAP subclause ~~section~~ 17.6.6.

- The ASN.1 name is derived from the error name given in MAP subclause ~~section~~ 7.6.1.4. The name is changed according to the syntax rules given in subclause ~~section~~ 2.3.8.1.

- In MAP subclause ~~section~~ 17.6.~~65~~ a local value ~~must~~ shall be assigned to the error under the appropriate headline. A value close to those already used shall be chosen. Note that the SS-Protocol defined in ~~GSM 04.80~~3GPP TS 24.080 allocates error values beginning at the upper limit of 127 (decreasing values). To simplify interworking a specific value should not be assigned twice.

    - The new error ~~must~~ shall not be used in the old version of the protocol~~.~~, i.e. the local value of the new error must be different from any local value of any error in any previous ~~MAP~~ version of the MAP specification.

If required, parameters shall be defined as described in the sections above.

In order to allow for future extensibility, extensible parameters (SEQUENCE with extension marker) shall be defined for all new errors.

2.3.4 Definition of a new operation

2.3.4.1 A new operation in the service description

The function of a new operation and its parameters and errors are defined in the service descriptions in MAP ~~sections~~ clauses 8 to 13. A new operation requires a new ~~subsection~~ subclause under the section to which the function of the operation relates. The text should unambiguously define the relationship of the message in the stage 2 and the MAP service (operation) in the protocol definition (Stage 3). In addition the entities using this service need to be defined, i.e. the applicable interfaces.

The name of the service shall be unique over the entire MAP protocol. In general the name expresses a command to the remote node, e.g. 'Update Location'.

The following relationship between the class of an operation and the table in the service description exists (see also ~~section~~ subclause 2.3.1.2.1 and MAP subclause ~~section~~ 17.1.2):

- Class 1 (result and error reported):
  - The table includes Request, Indication, Response and Confirmation columns.
  - The Invoke Id is a mandatory parameter (marked with 'M') in all the above columns.
  - The User Error is a conditional parameter (marked with 'C') in the Response and Confirmation columns.
  - The Provider Error is an optional parameter (marked with 'O') in the Confirmation column.
- Class 2 (only error reported)
  - The table includes Request, Indication, Response and Confirmation columns.
  - The Invoke Id is a mandatory parameter (marked with 'M') in all the above columns.
  - The User Error is a conditional parameter (marked with 'C') in the Response and Confirmation columns.
  - The Provider Error is an optional parameter (marked with 'O') in the Confirmation column.
- Class 3 (only result reported)
  - The table includes Request, Indication, Response and Confirmation columns.
  - The Invoke Id is a mandatory parameter (marked with 'M') in all the above columns.
  - There is no User Error in the Response and Confirmation columns.
  - The Provider Error is an optional parameter (marked with 'O') in the Confirmation column.
- Class 4 (neither result nor error reported)
  - The table includes only Request and Indication columns.
  - The Invoke Id is a mandatory parameter (marked with 'M') in both the above columns.

The mapping between service and operation in the table in MAP subclause ~~section~~ 16.2.2.4 needs to be updated. The ASN.1 operation name is defined in MAP ~~section~~ clause 17 (see subclause ~~section~~ 2.3.4.2).

If required new errors and parameters shall be defined as described in the sections above.

In order to allow for future extensiblity new operations should be defined as class 1 operations ~~except for the case where~~ unless it is foreseen to invoke the new operation in a TC-END message.

2.3.4.2 A new operation in the ASN.1 protocol definition

If a new operation is required the coding shall be defined in the ASN.1 protocol in MAP ~~section~~ subclause 17.6. The subsection to be used shall be chosen corresponding to MAP ~~section~~ clauses 8 to 13.

- In MAP subclause ~~section~~ 17.6~~5~~ a local value ~~must~~ shall be assigned to the operation under the appropriate headline. A value close to those already used shall be chosen. Note that the SS-Protocol defined in 3GPP TS 24.080 ~~GSM 04.80~~ allocates operation values beginning at the upper limit of 127 (decreasing values). To simplify interworking a specific value should not be assigned twice.
- The ASN.1 name is derived from the MAP service name. The word 'MAP' is removed and the syntax is then changed according the description in subclause ~~section~~ 2.3.8.1 (see below).
- The new operation ~~must~~ shall not be used in the old version of the protocol. Care must be taken to allow the new operation to be unambigiously identified even against operations which are only used in the old version of the protocol, i.e. the local value of the new operation must be different from the local value of any operation in any previous MAP version.

- A timer value to supervise the response to the operation shall be defined in the ASN.1 comment. One of the values defined in MAP subclause ~~section~~ 17.1.2 may be chosen. Note that for class 4 operations a timer is also required to supervise possible rejection of the operation.

- The ASN.1 keyword ARGUMENT is included only if parameters are defined for the invoke component. If there is no option for the invoke component to be sent without parameters, the error DataMissing ~~must~~ shall be specified for the new operation, so that the responding entity can respond correctly to an invoke component with no parameters.

- The ASN.1 keywords RESULT and ERRORS ~~must~~ shall be included depending on the class of the operation (see above).

    - If parameters are defined after the keyword ARGUMENT or RESULT but the invoke or result component may be sent without parameters this shall be indicated by the ASN.1 comment '-- optional'. The keyword OPTIONAL ~~must~~ shall not be used in this case, e.g.

```
-- NewOperation ::= OPERATION                    --Timer m
   NewOperation OPERATION ::= {                                  --Timer m
   RESULT
      OperationRes~~_____~~   OperationRes
      -- optional
   CODE local:10 }
-- newOperation NewOperation ::= localValue 10
```

If required, errors and parameters shall be defined as described in the ~~sections~~ subclauses above.

2.3.5 Addition of parameters to an existing operation or error

2.3.5.1 Addition of parameters in the service description

Before a parameter is added to an existing service description the class of the operation needs to be checked (see ~~section~~ subclause 2.3.4.1).

- parameters can be added to existing services and their errors as described in subclause ~~section~~ 2.3.2. However it is not allowed to add a parameter (other than 'User Error') for the result or confirm of a service which corresponds to an operation of a class which does not return a result. Such a change requires a new operation.

2.3.5.2 Addition of parameters in the ASN.1 definition

Addition of new parameters to existing operations or errors shall follow the extensibility rules defined in [4] and [5~~7~~]. Additional information is given in [2]. The following text explains the most important items for MAP from the referenced documents and explains some further rules.

In the following cases a parameter may be added to an existing operation argument, result or error:

- It may be added as a new component in any SEQUENCE type.

- It may be added as a new alternative in any CHOICE type.

- It may be added as a new value in any ENUMERATED type.

- It may be added as a new assignment in any BIT STRING type.

- It may be added to an operation argument, result or error if this component was previously empty.

Whenever a parameter is added as a new alternative in a CHOICE type or to an operation argument, result or error which was previously empty, it should be embedded in a sequence parameter to allow future extension additions at this level. A new sequence parameter is not necessary if there is already an extensible sequence available at this level.

e.g.

```
-- --  OperationNameArg ::= SEQUENCE {
   OperationNameArg ::= SEQUENCE {
      firstParameter            FirstParameterType,
   ...}
-- ----------firstParameter            FirstParameterType,
```

~~. . .}~~

2.3.6 Addition of errors to operations

2.3.6.1 Addition of errors in the service description

- User errors can simply be added to the error list in the service description.

Note that this is only allowed when the user error is already marked as present in the response column of the table, i.e. the TCAP class of the operation must not be changed. Otherwise a new operation may be required (see ~~section~~ subclause 2.3.4.1).

2.3.6.2 Addition of errors in the ASN.1 definition

- Errors can simply be added to the ASN.1 definition of the operation in MAP ~~section~~ subclause 174.6.

****** Next modified section ******

2.3.8 ASN.1 guide-lines and compatibility

2.3.8.1 ASN.1 names

The following syntax rules for MAP ASN.1 names shall apply (see also MAP ~~section~~ subclause 17.1.5):

- If the parameter name consists of more than one word the character following a space shall be converted to a capital letter and afterwards spaces are removed.
- The name of an ASN.1 derived data type starts with a capital letter; the name of a parameter or a value starts with a lower case letter.
- Abbreviations or acronyms are normally in capital letters and are separated by '-' from the following word. Abbreviations or acronyms at the beginning of ASN.1 names are always in lower case letters and are separated by '-' from the following word.
- The length of a name should not exceed 25 characters;

Note that the above rules are not valid in MAP subclauses ~~sections~~ 17.2 and 17.3.

2.3.8.2 Essential and non-essential modifications and the use of Application Contexts

As shown above, new functionality, possibly together with the addition of new parameters to existing operations, may be specified as an essential or non-essential modification.

Non-essential modifications:

Support of this type of protocol change is optional on the sending side as well as on the receiv~~spond~~ing side. Therefore this kind of parameter is marked as optional ('U') in the request and/or response columns.

> This class of modifications will use an existing AC and AC version and will therefore not have an impact on the version negotiation. Only Extension Additions after an Extension Marker may be added in this case (see MAP ~~section~~ subclause 17.1.4).

This kind of modification may be added as an optional Extension Addition to an already published protocol version without the nee~~cessity~~ to upgrade the AC version. This will prevent unnecessary version negotiation. However non-essential information may be discarded by a receiving node which does not support this protocol extension without any notice to the sender, although it is part of the actual AC version.

There are only limited possibilities for the sending entity to be aware of whether the receiving entity supports a non-essential modification and to react to that information.

If entity X sends a request message with a non-essential modification to entity Y, then entity Y can inform entity X that it supports the new function which uses the non-essential modification only by including a non-essential modification in the response message. Entity X can deduce from the presence or absence of the non-essential modification in the response message whether or not entity Y supports the new function; however the possibilities for entity X to react to this information are very limited if the dialogue between entities X and Y does not continue after the response from entity Y. The dialogue structure is part of the application context definition, so if a change to the dialogue structure is needed it will be necessary to raise the application context version. For most dialogue types, therefore, it will be necessary to raise the application context version if entity X needs to be aware of, and react to, whether entity Y supports the function which uses a protocol modification.

The possibilities for the sender of a reponse including a non-essential modification to determine whether the receiver supports the non-essential modification are also limited. The most practical solution is for the sender of the request (which will be the receiver of the response) to include in the request an indication of the capabilities (implied by the possible non-essential modifications which can be included in the response) which it supports. If a new version of the protocol specification includes several non-essential modifications in the response, a capability indication would be required for each function which uses a non-essential modification. The only alternative exists if the dialogue continues after the response message containing the non-essential modification, which allows a process of negotiation between the two entities concerned.

Note that non-essential extension of a sequence is allowed only at the end of already defined extension additions, i.e. after an extension marker and just before '}' (see subclause 2.3.8.4.1). If no extension marker is available the protocol only allows an essential modification (see below).

Essential modifications:

Support of this type of protocol change is mandatory at least at the receiving side. Therefore parameters of this kind are either marked as conditional ('C') or mandatory ('M') in the indication and/or in the confirmation column.

This class of modifications requires application context (AC) version negotiation, i.e. it needs a new AC or AC version.
- If fallback is required a new version of an existing AC should be chosen.
- If fallback is not required a new AC should be chosen.

New operations and errors may be introduced without any restrictions. New parameters in existing operations or errors may be introduced; the only restriction is that the creation of a superset protocol covering all older versions and the new version of the operation or error must be possible. This can be achieved by tagging the outermost sequence of the argument, result and error parameter of an existing operation in a new version with a new context specific tag.

2.3.8.3 Order of information in the ASN.1 definition

Although the following guide-lines are not based on ASN.1 rules, they will help the human reader to check and maintain the ASN.1 modules defined in MAP:

- In MAP ~~section~~ subclause 17.5 a new operation shall be added to the list of supported MAP operations in a position corresponding to the entry in MAP subclause 17.6~~or error shall be added at the end of the list under the appropriate headline. Operations and errors are not sorted according to their value~~.

- In MAP ~~sections~~ subclauses 17.6.1 to 17.6.5 and 17.6.7 onwards, new operations shall be added at the end of the appropriate ASN.1 module. In the list of errors following the keyword ERRORS the order is defined by the order in MAP subclause ~~section~~ 17.6.6~~5~~.

~~- In MAP section 17.6.6 the order of errors shall be identical to the order in section 17.5~~

- In MAP subclause ~~section~~ 17.7 a new parameter of an operation should be inserted after already existing parameters of that operation.

- Parameters used by more than one ASN.1 module may be moved to the common data types in MAP subclause ~~section~~ 17.7.8.

2.3.8.4 Future Extensions

In order to cope with future extension requirements the following is recommended:

2.3.8.4.1 ENUMERATED types

If applicable, ENUMERATED types should be enhanced with ellipsis notation. An exception handling ~~has to~~shall be defined.~~:~~ Reasonable ranges of unused values should be defined for a specific exception handling.
e.g.:

```
RegionalSubscriptionResponse ::= ENUMERATED {
    msc-AreaRestricted              (0),
    tooManyZoneCodes                (1),
    zoneCodesConflict               (2),
    regionalSubscNotSupported       (3),
    ...}
    -- exception handling:
    -- reception of values in the range 4 - 13 shall be treated like
    -- regionalSubscriptionResponse not present
    -- reception of values in the range 14 - 23 shall be treated like
    -- reception of value 0
    -- reception of values in the range 24 - 33 shall be treated like
    -- reception of value 1
    -- reception of values in the range 34 - 43 shall be treated like
    -- reception of value 2
    -- reception of values in the range 44 - 53 shall be treated like
    -- reception of value 3
    -- other values shall be rejected (unexpected data value)
```

NOTE: If the ENUMERATED type is a component of an extensible SEQUENCE, then the ENUMERATED type does not need to be enhanced with ellipsis notation. The implicit extensibility mechanism may be used as described below.

2.3.8.4.2 CHOICE types

If applicable, CHOICE types should be defined with one extra alternative which is reserved for future extension. An exception handling ~~has to~~shall be defined.

e.g.:

old version:

```
SM-RP-OA ::= CHOICE {
    msisdn                          [2] ISDN-AddressString,
    serviceCentreAddressOA          [4] AddressString,
    noSM-RP-OA                      [5] NULL}
```

new version:

```
SM-RP-OA ::= CHOICE {
    msisdn                          [2] ISDN-AddressString,
    serviceCentreAddressOA          [4] AddressString,
    noSM-RP-OA                      [5] NULL,
    extraAlternative                [6] ExtraAlternative}
    -- exception handling: reception of extraAlternative shall be treated like
    -- reception of noSM-RP-OA
```

```
ExtraAlternative ::= SEQUENCE {
    extensionContainer              ExtensionContainer,
    ...}
```

NOTE: If the CHOICE type is a component of an extensible SEQUENCE, then the CHOICE type does not need to be defined with an extra alternative. The implicit extensibility mechanism may be used as described below.

2.3.8.4.3 BIT STRING types

If applicable, BIT STRING types should be defined with reasonable SIZE rages. An exception handling shall~~ould~~ be defined.
e.g.:

```
ODB-GeneralData ::= BIT STRING {
    allOG-CallsBarred  (0),
    internationalOGCallsBarred  (1),
    internationalOGCallsNotToHPLMN-CountryBarred  (2),
    premiumRateInformationOGCallsBarred  (3),
    premiumRateEntertainementOGCallsBarred  (4),
    ss-AccessBarred  (5)} (SIZE (6..32))
    -- exception handling: reception of unknown bit assignments shall be treated
    -- like unsupported ODBs
```

2.3.8.4.4 OCTET STRING types

If applicable, OCTET STRING types should be defined with reasonable SIZE ranges. An exception handling ~~has to~~shall be defined.

If a received OCTET STRING conforms to the length constraints in the ASN.1 definition, it shall be treated as syntactically correct. If the component is syntactically optional but not required in the context in which the operation is used, the receiving entity shall treat the OCTET STRING as having an unexpected data value, as defined in ~~3GPP TS 29.002 section~~MAP subclause 7.6.1.4. If ASN.1 comments are used to define the internal structure of the OCTET STRING and the internal structure of the received OCTET STRING does not conform to the definition in the ASN.1 comment, the receiving entity shall treat the OCTET STRING as having an unexpected data value.

Note that the response by the receiving entity to a component with an unexpected data value depends on the individual application. If the component is part of the ARGUMENT of an operation and the receiving entity is to return an error when it receives a component with an unexpected data value, it shall use the error UnexpectedDataValue. The designer of an application which requires a new operation should therefore specify the error UnexpectedDataValue for the new operation if the ARGUMENT includes a component of type OCTET STRING for which the internal structure is not completely unrestricted and an error is to be returned if the component has an unexpected data value.

2.3.8.4.5 INTEGER types

If applicable, INTEGER types should be defined with reasonable value ranges. An exception handling ~~has to~~shall be defined.

2.3.8.4.6 Non-sequential data structures~~ON-SEQUENTIAL DATA STRUCTURES~~

Non-Sequential Operation Arguments or Results should be replaced with a SEQUENCE type containing the original parameter as component. Empty Operation Arguments or Results should be replaced with an empty optional SEQUENCE.

e.g.:

old version:

```
ProvideRoamingNumber ::= OPERATION ::= {                          --Timer m--
    ARGUMENT
        provideRoamingNumberArg      ProvideRoamingNumberArg
    RESULT
        roamingNumber                ISDN-AddressString
    ERRORS {
        SsystemFailure, |
        DdataMissing, |
        UunexpectedDataValue, |
        FfacilityNotSupported, |
        AabsentSubscriber, |
        NnoRoamingNumberAvailable}
    CODE local:4 }
```

new version:

```
ProvideRoamingNumber ::= OPERATION ::= {                          --Timer m--
    ARGUMENT
        provideRoamingNumberArg      ProvideRoamingNumberArg
    RESULT
        provideRoamingNumberRes      ProvideRoamingNumberRes
    ERRORS {
        SsystemFailure, |
        DdataMissing, |
        UunexpectedDataValue, |
        FfacilityNotSupported, |
        AabsentSubscriber, |
        NnoRoamingNumberAvailable}
    CODE local:4 }
```

```
ProvideRoamingNumberRes ::= SEQUENCE {
    roamingNumber                ISDN-AddressString,
    extensionContainer           ExtensionContainer            OPTIONAL,
    ...}
```

Non-extensible ERROR parameters and ERRORS without parameters shall be enhanced with extensible parameters.

The new extensible parameter shall be OPTIONAL if the old parameter was OPTIONAL or the ERROR was defined without a parameter.

The new extensible parameter shall be defined as a CHOICE type with the alternatives being the old parameter and an extensible SEQUENCE including the old parameter as a component, if the ERROR is defined for a ~~phase~~ version 2 or higher operation.

2.3.8.4.7 SEQUENCE types

Every SEQUENCE type should include an extension container which can be used for private extensions, PCS extensions and other non-ETSI extensions.

Every SEQUENCE type should include an extension marker.

e.g.:

```
ProvideRoamingNumberRes ::= SEQUENCE {
    roamingNumber                ISDN-AddressString,
    extensionContainer           ExtensionContainer            OPTIONAL,
    ...}
```

2.3.8.4.8 Implicit Extensibility

ASN.1 types which are components of an extensible SEQUENCE type can be extended implicitly by adding a new component to the SEQUENCE type after the extension marker. For this type of extension an exception handling does not need to be defined.

e.g:
new version:

```
O-BcsmCamelTDP-Data ::= SEQUENCE {
    o-BcsmTriggerDetectionPoint      O-BcsmTriggerDetectionPoint,
    serviceKey                           ServiceKey,
    gsmSCF-Address                   [0] ISDN-AddressString,
    defaultCallHandling              [1] DefaultCallHandling,
    extensionContainer               ExtensionContainer            OPTIONAL,
    ...}
```

```
DefaultCallHandling ::= ENUMERATED {
    continueCall (0) ,
    releaseCall (1) }
```

extended new version:

```
O-BcsmCamelTDP-Data ::= SEQUENCE {
    o-BcsmTriggerDetectionPoint     O-BcsmTriggerDetectionPoint,
    serviceKey                      ServiceKey,
    gsmSCF-Address                  [0] ISDN-AddressString,
    defaultCallHandling             [1] DefaultCallHandling,
                                    -- fallback value
                                    -- to be used if ext-DefaultCallHandling is
                                    -- not supported by the receiving entity
    extensionContainer              ExtensionContainer          OPTIONAL,
    ...,
    ext-DefaultCallHandling         [2] Ext-DefaultCallHandling   OPTIONAL}
```

```
DefaultCallHandling ::= ENUMERATED {
    continueCall (0) ,
    releaseCall (1) }
```

```
Ext-DefaultCallHandling ::= ENUMERATED {
    continueCallWithSpecialTreatment1 (2),
    continueCallWithSpecialTreatment2 (3),
    releaseCallWithSpecialTreatment1  (4),
    releaseCallWithSpecialTreatment2  (5),
    connectToAnnouncement              (6),
    connectToOperator                  (7)}
```

In the example above the new version has an extensible SEQUENCE type (O-BcsmCamelTDP-Data) with one of its components being a non-extensible ENUMERATED type (DefaultCallHandling). The extended new version extends the ENUMERATED type by making use of the Implicit Extensibility mechanism: A new ENUMERATED type with new values (Ext-DefaultCallHandling) is defined and added as a new component to the SEQUENCE type after the extension marker. The non-extensible ENUMERATED type (DefaultCallHandling) is not removed; it is used to define the fallback value for cases where the receiving entity does not support the extension.

2.3.8.4.9 Private Extensions

The privateExtensionList which is a component of the extensionContainer defined in every SEQUENCE type shall be used to define private extensions of the protocol. An example is given below.~~:~~

~~Example for private extension~~

In the following example the ASN.1 modules MAP-CH-DataTypes and MAP-ExtensionDataTypes are modified in order to define three private extensions. The modifications are revision marked in the usual way (inserted text is underlined and deleted text is struck through).

The private extensions are identified by OBJECT IDENTIFIERs.

The three private extensions are:

1. The first private extension defined by protocol designer1, which is a Category and which is identified by the OBJECT IDENTIFIER {? ? ? ? 1 1}.

2. The third private extension defined by protocol designer1, which is an ISDN-AddressString and which is identified by the OBJECT IDENTIFIER {? ? ? ? 1 3}.

3. The first private extension defined by protocol designer5, which is a TeleserviceList and which is identified by OBJECT IDENTIFIER {? ? ? ? 5 1}.

In order to allow the third private extension defined by protocol designer1 to be an extension to ProvideRoamingNumberRes only, the ExtensionContainer in the definition of ProvideRoamingNumberRes has been replaced by PRN-ResContainer which makes use of the PRN-ResExtensionSet.

In order to allow the first private extension defined by protocol designer1 and the first private extension defined by protocol designer5 to be extensions to SendRoutingInfoArg only, the ExtensionContainer in the definition of SendRoutingInfoArg has been replaced by SRI-ArgContainer which makes use of the SRI-ArgExtensionSet.

```
MAP-CH-DataTypes {
   ~~ccitt~~ itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CH-DataTypes (13) version3 (3)}

DEFINITIONS
```

```
IMPLICIT TAGS

::=

BEGIN

EXPORTS
    SendRoutingInfoArg,
    SendRoutingInfoRes,
    ProvideRoamingNumberArg,
    ProvideRoamingNumberRes,
    NumberOfForwarding
;

IMPORTS
    CUG-Interlock,
    ForwardingData
FROM MAP-SS-DataTypes {
   ~~ccitt~~ itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SS-DataTypes (14) version3 (3)}

    ISDN-AddressString,
    ExternalSignalInfo,
    IMSI,
    LMSI
FROM MAP-CommonDataTypes {
   ~~ccitt~~ itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version3 (3)}

    ExtensionContainer,
    PRN-ResContainer,
    SRI-ArgContainer
FROM MAP-ExtensionDataTypes {
   ~~ccitt~~ itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version3 (3)}
;

CUG-CheckInfo ::= SEQUENCE {
    cug-Interlock                   CUG-Interlock,
    cug-OutgoingAccess              NULL                        OPTIONAL,
    extensionContainer              ExtensionContainer          OPTIONAL,
    ...}

NumberOfForwarding ::= INTEGER (1..5)

SendRoutingInfoArg ::= SEQUENCE {
    msisdn                          [0] ISDN-AddressString,
    cug-CheckInfo                   [1] CUG-CheckInfo           OPTIONAL,
    numberOfForwarding              [2] NumberOfForwarding      OPTIONAL,
    networkSignalInfo               [10] ExternalSignalInfo     OPTIONAL,
    ~~extensionContainer~~          ~~[11] ExtensionContainer~~ ~~OPTIONAL,~~
    sri-ArgExtension                [11] SRI-ArgContainer       OPTIONAL,
    ...}

SendRoutingInfoRes ::= SEQUENCE {
    imsi                            IMSI,
    routingInfo                     RoutingInfo,
    cug-CheckInfo                   CUG-CheckInfo               OPTIONAL,
    extensionContainer              [0] ExtensionContainer      OPTIONAL,
    ...}

RoutingInfo ::= CHOICE {
    roamingNumber                   ISDN-AddressString,
    forwardingData                  ForwardingData}

ProvideRoamingNumberArg ::= SEQUENCE {
    imsi                            [0] IMSI,
    msc-Number                      [1] ISDN-AddressString,
    msisdn                          [2] ISDN-AddressString      OPTIONAL,
    lmsi                            [4] LMSI                    OPTIONAL,
    gsm-BearerCapability            [5] ExternalSignalInfo      OPTIONAL,
    networkSignalInfo               [6] ExternalSignalInfo      OPTIONAL,
    extensionContainer              [7] ExtensionContainer      OPTIONAL,
    ...}
```

```
ProvideRoamingNumberRes ::= SEQUENCE {
    roamingNumber                   ISDN-AddressString,
    extensionContainer              ExtensionContainer              OPTIONAL,
    prn-ResExtension                PRN-ResContainer                OPTIONAL,
    ...}

END
MAP-ExtensionDataTypes {
   ccitt itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version3 (3)}

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS

    PrivateExtension,
    ExtensionContainer,
    PRN-ResContainer,
    SRI-ArgContainer;
IMPORTS
    ISDN-AddressString,
    TeleserviceList,
    Category
FROM MAP-CommonDataTypes {
   ccitt itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version3 (3)}
;

-- IOC for private MAP extensions

MAP-EXTENSION ::= CLASS {
    &ExtensionType                  OPTIONAL,
    &extensionId                    OBJECT IDENTIFIER }

-- data types

ExtensionContainer ::= SEQUENCE {
    privateExtensionList            [0] PrivateExtensionList        OPTIONAL,
    pcs-Extensions                  [1] PCS-Extensions              OPTIONAL,
    ...}

PRN-ResContainer ::= SEQUENCE {
    prn-ResExtensionList            [0] PRN-ResExtensionList        OPTIONAL,
    pcs-Extensions                  [1] PCS-Extensions              OPTIONAL,
    ...}

SRI-ArgContainer ::= SEQUENCE {
    sri-ArgExtensionList            [0] SRI-ArgExtensionList        OPTIONAL,
    pcs-Extensions                  [1] PCS-Extensions              OPTIONAL,
    ...}

PrivateExtensionList ::= SEQUENCE SIZE (1..maxNumOfPrivateExtensions) OF
                                    PrivateExtension

PRN-ResExtensionList ::= SEQUENCE SIZE (1..maxNumOfPrivateExtensions) OF
                                    PRN-ResExtension

SRI-ArgExtensionList ::= SEQUENCE SIZE (1..maxNumOfPrivateExtensions) OF
                                    SRI-ArgExtension

PrivateExtension ::= SEQUENCE {
    extId                           MAP-EXTENSION.&extensionId
                                    ({ExtensionSet}),
    extType                         MAP-EXTENSION.&ExtensionType
                                    ({ExtensionSet}{@extId})        OPTIONAL
    }
```

```
PRN-ResExtension ::= SEQUENCE {
    extId                           MAP-EXTENSION.&extensionId
                                    ({PRN-ResExtensionSet}),
    extType                         MAP-EXTENSION.&ExtensionType
                                    ({PRN-ResExtensionSet}{@extId})
        OPTIONAL
    }
```

```
SRI-ArgExtension ::= SEQUENCE {
    extId                           MAP-EXTENSION.&extensionId
                                    ({SRI-ArgExtensionSet}),
    extType                         MAP-EXTENSION.&ExtensionType
                                    ({SRI-ArgExtensionSet}{@extId})
        OPTIONAL
    }
```

```
maxNumOfPrivateExtensions –INTEGER ::= 10
```

```
ExtensionSet                        MAP-EXTENSION ::=
        {...
         -- ExtensionSet is the set of all defined private extensions
    }
```

```
PRN-ResExtensionSet                 MAP-EXTENSION ::=
        {thirdDesigner1Extension
        -- PRN-ResExtensionSet is the set of all defined private extensions
        -- for ProvideRoamingNumberRes
    }
```

```
SRI-ArgExtensionSet                 MAP-EXTENSION ::=
        {firstDesigner1Extension |
        firstDesigner5Extension
        -- SRI-ArgExtensionSet is the set of all defined private extensions
        -- for SendRoutingInfoArg
    }
```

```
firstDesigner1Extension             MAP-EXTENSION::= {
        &ExtensionType              Category,
        &extensionId                {? ? ? ? 1 1}
    }
```

```
thirdDesigner1Extension             MAP-EXTENSION::= {
        &ExtensionType              ISDN-AddressString,
        &extensionId                {? ? ? ? 1 3}
    }
```

```
firstDesigner5Extension             MAP-EXTENSION::= {
        &ExtensionType              TeleserviceList,
        &extensionId                {? ? ? ? 5 1}
    }
```

```
PCS-Extensions ::= SEQUENCE {
    ...}
```

```
END
```

2.3.9 Definition of a new Application Context

If a new application context is required, a new operation package defining the group of operations for use within the new application context shall be defined in MAP ~~section~~ subclause 17.2.

In MAP subclause ~~section~~ 17.3.2 the new application context shall be defined using the new operation packages. This definition shall indicate, which operations are available to the initiator of the dialogue and which are available to the responder when using the new application context. An application context name shall ~~must~~ be assigned to that definition. A value close to those already used shall be chosen.

The new application context ~~has to~~shall be added to MAP subclause ~~section~~ 17.3.3.

****** Next modified section ******

2.3.11 Update of procedural descriptions

If existing procedural descriptions in MAP ~~sections~~ clauses 19 to 25 are affected by new or modified services and features, the procedural descriptions shall be updated according to the appropriate stage 2 specification. Procedural descriptions which describe GSM phase 1 or phase 2 functionality only and which are not applicable to the latest AC versions shall be deleted.

2.3.12 Error handling

The principles in this section ~~must~~ shall be followed when a new operation (and hence a new operation procedure) is added or when the procedure for an existing operation is modified.

3GPP TS 29.002 specifies that the parameter of an invoke component is syntactically optional, but semantically mandatory unless the ASN.1 definition shows that the parameter is semantically optional (see ~~section~~ subclause 2.3.4.2). If a responding entity receives an invoke component with no parameters and the ASN.1 definition shows that the ARGUMENT of the operation is semantically mandatory, the responding entity shall return an error component with the user error DataMissing.

If the dialogue structure allows a responding entity to return a result component in a TC-CONTINUE message, the procedure definition shall specify the action to be taken by the requesting entity if a result component which is specified to include a parameter is empty.

If the procedure for a new operation uses a parameter of the operation as the key to access a database and the key value does not correspond to a record in the database in the responding entity, the procedure in the responding entity shall return an appropriate error, which ~~has to~~shall be defined for the new operation.

Even if there is no functional requirement for the application at a responding entity to return a user error such as data missing or unexpected data value, if the definition of the operation allows the condition which would trigger the error to be detected then the corresponding error should be defined for the operation. This will allow the O & M subsystems in both peer entities to compile statistics on badly constructed requests. The handling of the conditions which would trigger the- error at the responding entity and the handling of the user errors at the requesting entity shall be described either in the procedure in MAP ~~sections~~ clauses 18 to 25 or in the application procedures in the stage 2 definition.

****** End of document ******