

**Technical Specification Group Services and System Aspects TSGS#7(00)0084
Meeting #7, Madrid, Spain, 15-17 March 2000**

Source: TSG SA WG2
Title: CRs on 23.002 v.3.2.0 and 03.02
Agenda Item: 5.2.3

The following Change Requests (CRs) have been approved by TSG SA WG2 and are requested to be approved by TSG SA plenary #7.

Note: the source of all these CRs is now S2, even if the name of the originating company(ies) is still reflected on the cover page of all the attached CRs.

CRs on 03.02

No CR on 03.02 has been presented since SA plenary #6.

CRs on 23.002 v.3.2.0

spec	CR #	Title	release	cat	TDoc #
23.002	004	General improvements of the split between section 3 (Definitions and abbreviations) and section 4 (The entities of the mobile system).	R99	F	S2-000004
23.002	005r1	Re-ordering of section 4 (The entities of the mobile system).	R99	D	S2-000205
23.002	006	Re-ordering of section 5 (Configuration of a Public Land Mobile Network).	R99	D	S2-000006
23.002	007	Re-ordering of section 6 ("PLMN interfaces").	R99	D	S2-000007
23.002	008	Simplification of the figure 1 (configuration of a PLMN and interfaces)	R99	D	S2-000008
23.002	009r1	Introduction of CAMEL aspects.	R99	B	S2-000206
23.002	011r1	Introduction of CBS aspects	R99	B	S2-000207
23.002	012r2	Add LCS enhancements	R99	C	S2-000596
23.002	013r4	Define GSM LCS parts and add UMTS LCS "hooks" in the network architecture.	R99	C	S2-000597
23.002	014r1	Incorporation of network architecture material coming from section 4 of 29.002	R99	F	S2-000494

S2 meeting #11
Puerto Vallarta, Mexico
January 24-28, 2000

Document S2-000004

3G CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.002 CR 004

Current Version: **v.3.2.0**

3G specification number ↑

↑ CR number as allocated by 3G support team

For submission to TSG **SA#7** for approval (only one box should be marked with an X)
list TSG meeting no. here ↑ for information

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: USIM ME UTRAN Core Network
(at least one should be marked with an X)

Source: **MCC** **Date:** **Jan. 7th, 2000**

Subject: **General improvements of the split between section 3 (Definitions and abbreviations) and section 4 (The entities of the mobile system).**

3G Work item:

Category: F Correction
(only one category shall be marked with an X)
A Corresponds to a correction in a 2G specification
B Addition of feature
C Functional modification of feature
D Editorial modification

Reason for change: In the present version of 23.002, some of the entities of the mobile system are defined in two different places: in section 3 ("Definitions and abbreviations") and in section 4 ("The entities of the mobile system"). This inconsistency leads to a bad readability of the document (some text is duplicated between these two sections, etc.). This CR proposes all the text related to the definition of network entities to be in section 4 (in practice, some text is moved from section 3 but no text is deleted).

Clauses affected: **Sections 3 and 4**

Other specs affected: Other 3G core specifications → List of CRs:
Other 2G core specifications → List of CRs:
MS test specifications → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other comments:



help.doc

<----- double-click here for help and instructions on how to create a CR.

[note: some re-ordering of the sub-sections of section 3 has been made from the broadest (3.1 PLMN definition) to the most specific (3.15 Group Call Area) definitions. The text proposed to be moved within section 3 is not shown with revision mark.]

3 Definitions and abbreviations

In addition to the abbreviations given in the remainder of this clause others are listed in GSM 01.04 and in TR 21.905.

The definitions of the entities of the mobile system are given in the next section.

~~3.2 Authentication Centre (AuC)~~

~~The Authentication Centre (AuC) is an entity which stores data for each mobile subscriber to allow the International Mobile Subscriber Identity (IMSI) to be authenticated and to allow communication over the radio path between the mobile station and the network to be ciphered. The AuC transmits the data needed for authentication and ciphering via the HLR to the VLR, MSC and SGSN which need to authenticate a mobile station.~~

~~3.3 Equipment Identity Register (EIR)~~

~~The Equipment Identity Register (EIR) in the GSM system is the logical entity which is responsible for storing in the network the International Mobile Equipment Identities (IMEIs), used in the GSM system.~~

~~The equipment is classified as "white listed", "grey listed", "black listed" or it may be unknown as specified in TS 22.016 and TS 29.002.~~

~~3.4 Mobile services Switching Centre (MSC)~~

~~The Mobile services Switching Centre (MSC) constitutes the interface between the radio system and the fixed networks. The MSC performs all necessary functions in order to handle the circuit switched services to and from the mobile stations.~~

~~In order to obtain radio coverage of a given geographical area a number of base stations are normally required; i.e. each MSC would thus have to interface several base stations. In addition several MSCs may be required to cover a country.~~

~~3.5 Border Gateway (BG)~~

~~The Border Gateway (BG) is a gateway between a PLMN supporting GPRS and an external inter-PLMN backbone network used to interconnect with other PLMNs also supporting GPRS. The role of the BG is to provide the appropriate level of security to protect the PLMN and its subscribers.~~

~~The BG is only needed in PLMNs supporting GPRS.~~

3.6₁ Public Land Mobile Network (PLMN)

A Public Land Mobile Network (PLMN) is established and operated by an administration or Recognized Private Operating Agency (RPOA) for the specific purpose of providing land mobile telecommunications service services to the public. A PLMN may be regarded as an extension of a network (e.g. ISDN); it is a collection of MSCs areas within a common numbering plan (e.g. same National Destination Code) and a common routing plan. The MSCs are the functional interfaces between the fixed networks and a PLMN for call set-up.

Functionally the PLMNs may be regarded as independent telecommunications entities even though different PLMNs may be interconnected through the ISDN/PSTN and PDNs for forwarding of calls or network information. A similar type of interconnection may exist for the interaction between the MSCs of one PLMN.

3.2 Core Network (CN) and Access Network (AN)

The PLMN infrastructure is logically divided into a Core Network (CN) and an Access Network (AN) infrastructures, as defined in TS 23.101 and TS 23.110. The CN is logically divided into CS domain and PS domain, as defined in next sub-section "3.3 Circuit Switched (CS) and Packet Switched (PS) Domains". The AN is called BSS for GSM and RNS for UMTS, as defined in section "4.10 The Access Network".

3.3 Circuit Switched (CS) and Packet Switched (PS) Domains

The CN is constituted of a Circuit Switched (CS) domain and a Packet Switched (PS) domain. These two domains differ by the way they support user traffic, as explained below.

These two domains are overlapping, i.e. they contain some common entities. A PLMN can implement only one domain or both domains.

3.3.1 CS Domain

The CS domain refers to the set of all the CN entities offering "CS type of connection" for user traffic as well as all the entities supporting the related signalling. A "CS type of connection" is a connection for which dedicated network resources are allocated at the connection establishment and released at the connection release.

The entities specific to the CS domain are: MSC, GMSC, VLR. All the other CN entities defined in section "4 The entities of the mobile system" and not defined as PS domain specific entities (see following sub-section) are common to the CS and to the PS domains.

3.3.2 PS Domain

The PS domain refers to the set of all the CN entities offering "PS type of connection" for user traffic as well as all the entities supporting the related signalling. A "PS type of connection" transports the user information using autonomous concatenation of bits called packets: each packet can be routed independently from the previous one.

The entities specific to the PS domain are the GPRS specific entities, i.e. SGSN and GGSN. All the other CN entities defined in section "4 The entities of the mobile system" and not defined as CS domain specific entities (see previous sub-section) are common to the CS and to the PS domains.

3.4 Location register

To enable communication to a mobile station the network must know where this mobile station is located. This information is stored in a function named location register.

The location register is handled by four different entities:

- by the Home Location Register (HLR)

The Home Location Register (HLR) is the location register to which a mobile subscriber is assigned for record purposes such as subscriber information.

- by the Visitor Location Register (VLR)

The Visitor Location Register (VLR) is the location register for Circuit Switched (CS) services, other than the HLR, used by an MSC to retrieve information for, e.g. handling of calls to or from a roaming mobile station currently located in its area.

- by the Serving GPRS Support Node (SGSN)

The location register function in the SGSN stores subscription information and location information for Packet Switched (PS) services for each subscriber registered in the SGSN.

The SGSN is needed only in a PLMN which supports GPRS.

- by the Gateway GPRS Support Node (GGSN)

The location register function in the GGSN stores subscription information and routing information (needed to tunnel packet data traffic destined for a GPRS MS to the SGSN where the MS is registered) for each subscriber for which the GGSN has at least one PDP context active.

The GGSN is needed only in a PLMN which supports GPRS.

3.75 Cell

[editorial note: the validity of this definition for UMTS has to be further checked]

The cell is an area of radio coverage identified by a Base station identification as defined in GSM-TS 0323.003.

~~3.8 Node B~~

~~A Node B is a network component which serves one cell.~~

3.96 Base Station Controller (BSC) area

The Base Station Controller (BSC) area is an area of radio coverage consisting of one or more cells controlled by one BSC. The boundaries of a BSC area and a location area are independent; a location area may span the boundary between BSC area and a BSC area may span the boundary between location areas.

3.407 Radio Network Controller (RNC) area

The Radio Network Controller (RNC) area is an area of radio coverage consisting of one or more cells controlled by one RNC. The boundaries of a RNC area and a location area are independent; a location area may span the boundary between RNC area and a RNC area may span the boundary between location areas.

3.814 Location Area (LA)

The Location Area (LA) is defined as an area in which a mobile station may move freely without updating the VLR. A location area may include one or several cells.

3.912 Routing Area (RA)

The Routing Area (RA) is defined as an area in which a mobile station, in certain operation modes, may move freely without updating the SGSN. A routing area may include one or several cells. A RA is always contained within a location area.

3.103 MSC area

The MSC area is the part of the network covered by an MSC. An MSC area may consist of one or several location areas. An MSC area may also consist of one or several BSC areas.

~~3.14 GPRS Support Nodes (GSN)~~

~~The UMTS PS services support nodes, Gateway GSN (GGSN) and Serving GSN (SGSN) constitutes the interface between the radio system and the fixed networks for packet switched services. The GSN performs all necessary functions in order to handle the packet transmission to and from the mobile stations.~~

3.4511 VLR area

[editorial note: the difference with the LA should be explicited]

The VLR area is the part of the network controlled by a VLR. A VLR area may consist of one or several MSC areas.

3.4612 SGSN area

The SGSN area is the part of the network served by an SGSN. An SGSN area may consist of one or several routing areas. An SGSN area may also consist of one or several BSC areas. There need not be a one to one relationship between SGSN area and MSC/VLR area.

3.4713 Zones for Regional Subscription

A PLMN operator may define a number of regional subscription areas, each of which is a subset of the service area for an unrestricted mobile subscriber. A regional subscription area may be contained within the service area of a single PLMN, or may lie within the service areas of two or more PLMNs. Each regional subscription area consists of one or more zones; each zone is contained within the service area of a PLMN.

The definition of a mobile subscriber's regional subscription area is stored within the HLR per National Destination Code(s) (NDC) of a PLMN and is transferred to the VLRs and/or SGSNs of that PLMN. The VLR and/or SGSN evaluates this information to extract the restricted or accessible MSC and/or SGNS areas and location areas to which the mobile subscriber is allowed to roam. The VLR and/or SGNS informs the HLR if an entire MSC and/or SGNS area is restricted.

Zones for Regional Subscription and their handling are defined in TS 23.003, TS 23.008 and TS 29.002.

3.4814 Service area

The service area is defined as an area in which a mobile subscriber can be reached by another (mobile or fixed) subscriber without the subscriber's knowledge of the actual location of the mobile station within the area. A service area may consist of several PLMNs. One service area may consist of one country, be a part of a country or include several countries. The location registration system associated with each service area must thus contain a list of all mobile stations located within that service area.

3.4915 Group call area

The group call area is a predefined area composed of one or a number of cells to which a particular Voice Group Call Service (VGCS) or Voice Broadcast Service (VBS) call is distributed. The composition of a group call area is predefined in the network. The group call area may include cells of more than one MSC area and cells of more than one PLMN.

~~3.20 Group Call Register (GCR)~~

~~The Group Call Register (GCR) is a register holding information about VGCS or VBS calls, the voice group or broadcast call attributes, respectively.~~

~~Voice group or broadcast call attributes are defined for a specific voice group or broadcast call reference and include the data required to configure the conference bridge for a VGCS or VBS call and other call-related attributes.~~

~~3.21 Definitions related to Location Services (LCS)~~

[editorial note: the way LCS will be supported in UMTS rel.99 is still under discussion. The following definitions might not apply.]

3.21.1 ~~Serving Mobile Location Center (SMLC)~~

~~The Serving Mobile Location Center (SMLC) node is responsible for managing the overall co-ordination and scheduling of resources required to perform positioning of a mobile, and calculating the final location estimate and accuracy. There may be more than one SMLC in a PLMN.~~

3.21.2 ~~Gateway Mobile Location Center (GMLC)~~

~~The Gateway Mobile Location Center (GMLC) is the first node an external Location Application accesses in the GSM PLMN. The GMLC performs registration authorization and requests routing information from the HLR. There may be more than one GMLC in a PLMN.~~

3.21.3 ~~Location Measurement Unit (LMU)~~

~~The Location Measurement Unit (LMU) gathers radio signal measurements and supplies them over the GSM air interface, via the MSC/VLR, to a particular SMLC associated with the LMU. An LMU interacts with its HLR, serving access network and MSC/VLR like a normal GSM MS, i.e. it has its own IMSI and subscription profile, and supports radio resources and mobility management functions.~~

4 The entities of the mobile system

To provide the mobile service as it is defined, it is necessary to introduce some specific functions. These functional entities can be implemented in different equipments or gathered. In any case, exchanges of data occur between these entities.

4.1 The Home Location Register (HLR)

This functional entity is a data base in charge of the management of mobile subscribers. A PLMN may contain one or several HLRs: it depends on the number of mobile subscribers, on the capacity of the equipment and on the organisation of the network. The following kinds of information are stored there:

- the subscription information;
- some location information enabling the charging and routing of calls towards the MSC where the MS is registered (e.g. the MS Roaming Number, the VLR Number, the MSC Number, the Local MS Identity).

and, if GPRS is supported, also :

- —location information enabling the charging and routing of messages in the SGSN where the MS is currently registered (e.g. the SGSN Number);

and, if LCS is supported, also :

- a LCS privacy exception list, which indicates the privacy class of the MS subscriber;
- a HPLMN GMLC list.

Different types of identity are attached to each mobile subscription and are stored in the HLR. The following identities are stored:

- the International Mobile Station Identity (IMSI);
- one or more Mobile Station International ISDN number(s) (MSISDN);

if GPRS is supported, the following identity is also stored :

- zero or more Packet Data Protocol (PDP) address(es).

and, if LCS is supported, the following identity is also stored:

- the LMU indicator.

There is always at least one identity, apart from the IMSI, attached to each mobile subscription and stored in the HLR.

The IMSI or, the MSISDN may be used as a key to access the information in the database for a mobile subscription.

The data base contains other information such as:

- teleservices and bearer services subscription information;
- service restrictions (e.g. roaming limitation);
- a list of all the group IDs a service subscriber is entitled to use to establish voice group or broadcast calls;
- supplementary services; the HLR contains the parameters attached to these services;

and, if GPRS is supported, also :

- information about if a GGSN is allowed to dynamically allocate PDP addresses for a subscriber.

NOTE: Supplementary services parameters need not all be stored in the HLR. However, it seems safer to store all subscription parameters in the HLR even when some are stored in a subscriber card.

The organisation of the subscriber data is outlined in GSM 03.08.

4.2 The Visitor Location Register (VLR)

A mobile station roaming in an MSC area is controlled by the Visitor Location Register in charge of this area. When a Mobile Station (MS) enters a new location area it starts a registration procedure. The MSC in charge of that area notices this registration and transfers to the Visitor Location Register the identity of the location area where the MS is situated. If this MS is not yet registered, the VLR and the HLR exchange information to allow the proper handling of calls involving the MS.

A VLR may be in charge of one or several MSC areas.

The VLR contains also the information needed to handle the calls set-up or received by the MSs registered in its data base (for some supplementary services the VLR may have to obtain additional information from the HLR) the following elements are included:

- the International Mobile Subscriber Identity (IMSI);
- the Mobile Station International ISDN number (MSISDN);
- the Mobile Station Roaming Number (MSRN), see TS 23.003 for allocation principles;
- the Temporary Mobile Station Identity (TMSI), if applicable;
- the Local Mobile Station Identity (LMSI), if used;
- the location area where the mobile station has been registered.
- the identity of the SGSN where the MS has been registered. Only applicable to PLMNs supporting GPRS and which have a Gs interface between MSC/VLR and SGSN:
- the last known location and the initial location of the MS;

and, if LCS is supported, the following elements for the LMUs registered in its database:

- an indication of whether the LMU was successfully registered in an associated SMLC;
- the SMLC address. The information is passed between VLR and HLR by the procedures described in TS 23.012.

The VLR also contains supplementary service parameters attached to the mobile subscriber and received from the HLR. The organisation of the subscriber data is outlined in TS 23.008.

4.3 The Authentication Centre (AuC)

The Authentication Centre (AuC) is an entity which stores data for each mobile subscriber to allow the International Mobile Subscriber Identity (IMSI) to be authenticated and to allow communication over the radio path between the mobile station and the network to be ciphered. The AuC transmits the data needed for authentication and ciphering via the HLR to the VLR, MSC and SGSN which need to authenticate a mobile station.

The Authentication Centre (AuC) is associated with an HLR, and stores an identity key for each mobile subscriber registered with the associated HLR. This key is used to generate:

- data which are used to authenticate the International Mobile Subscriber Identity (IMSI);
- a key used to cipher communication over the radio path between the mobile station and the network.

The AuC communicates only with its associated HLR over an interface denoted the H-interface (see clause 5).

4.4 The Equipment Identity Register (EIR)

The Equipment Identity Register (EIR) in the GSM system is the logical entity which is responsible for storing in the network the International Mobile Equipment Identities (IMEIs), used in the GSM system.

The equipment is classified as "white listed", "grey listed", "black listed" or it may be unknown as specified in TS 22.016 and TS 29.002.

This functional entity contains one or several databases which store(s) the IMEIs used in the GSM system.

The mobile equipment may be classified as "white listed", "grey listed" and "black listed" and therefore may be stored in three separate lists.

An IMEI may also be unknown to the EIR.

An EIR shall as a minimum contain a "white list" (Equipment classified as "white listed").

4.5 The Mobile-services Switching Centre (MSC)

The Mobile-services Switching Centre (MSC) constitutes the interface between the radio system and the fixed networks. The MSC performs all necessary functions in order to handle the circuit switched services to and from the mobile stations.

In order to obtain radio coverage of a given geographical area a number of base stations are normally required; i.e. each MSC would thus have to interface several base stations. In addition several MSCs may be required to cover a country.

The Mobile-services Switching Centre is an exchange which performs all the switching and signalling functions for mobile stations located in a geographical area designated as the MSC area. The main difference between a MSC and an exchange in a fixed network is that the MSC has to take into account the impact of the allocation of radio resources and the mobile nature of the subscribers and has to perform in addition, at least the following procedures:

- procedures required for the location registration (see TS 23.012);
- procedures required for handover (see TS 23.009).

NOTE: When this improves the readability (e.g. when dealing with inter-releases handover), the term 2G-MSC can be used to refer to an MSC Release 98 or prior, and the term 3G-MSC can be used to refer to an MSC Release 99 or later.

4.6 The Gateway MSC (GMSC)

If a network delivering a call to the PLMN cannot interrogate the HLR, the call is routed to an MSC. This MSC will interrogate the appropriate HLR and then route the call to the MSC where the mobile station is located. The MSC which performs the routing function to the actual location of the MS is called the Gateway MSC (GMSC).

The acceptance of an interrogation to an HLR is the decision of the operator.

The choice of which MSCs can act as Gateway MSCs is for the operator to decide (i.e. all MSCs or some designated MSCs).

4.7 SMS Gateway MSC (SMS-GMSC)

The SMS Gateway MSC (SMS-GMSC) acts as an interface between a Short Message Service Centre and the PLMN, to allow short messages to be delivered to mobile stations from the Service Centre (SC).

4.8 SMS Interworking MSC

The SMS Interworking MSC acts as an interface between the PLMN and a Short Message Service Centre (SC) to allow short messages to be submitted from Mobile Stations to the SC.

4.9 The Interworking Function (IWF)

The Interworking Function (IWF) is a functional entity associated with the MSC. The IWF provides the functionality necessary to allow interworking between a PLMN and the fixed networks (ISDN, PSTN and PDNs). The functions of the IWF depend on the services and the type of fixed network. The IWF is required to convert the protocols used in the PLMN to those used in the appropriate fixed network. The IWF may have no functionality where the service implementation in the PLMN is directly compatible with that at the fixed network. The interworking functions are described in TS Technical Specifications 29.004, 29.005, 29.007 and 09.09.

4.10 The Access Network

Two different types of access network are used by the CN: the Base Station System (BSS) and the Radio Network System (RNS). The BSS offers a Time Division Multiple Access (TDMA) based technology to access the Mobile Station whereas the RNS offers a Wideband-Code Division Multiple Access (W-CDMA) based technology. The MSC (resp. SGSN) can connect to one of these Access Network type or to both of them.

4.10.1 The Base Station System (BSS)

The Base Station System (BSS) is the system of base station equipments (transceivers, controllers, etc...) which is viewed by the MSC through a single A-interface as being the entity responsible for communicating with Mobile Stations in a certain area. Similarly, in PLMNs supporting GPRS, the BSS also has an interface to an SGSN. The radio equipment of a BSS may support one or more cells. A BSS may consist of one or more base stations. Where an Abis-interface is implemented. The BSS consists of one Base Station Controller (BSC) and one or more Base Transceiver Station (BTS). The functionality is described in GSM 08.02.

4.10.1.1 Base Station Controller (BSC)

A Base Station Controller (BSC) is a network component in the PLMN with the functions for control of one or more BTS.

4.10.1.2 Base Transceiver Station (BTS)

A Base Transceiver Station (BTS) is a network component which serves one cell.

The split of functions between BSS and CN is described in the 08-series of GSM Technical Specifications.

4.10.2 The Radio Network System (RNS)

The Radio Network System (RNS) is the system of base station equipments (transceivers, controllers, etc...) which is viewed by the MSC through a single Iu-interface as being the entity responsible for communicating with Mobile Stations in a certain area. Similarly, in PLMNs supporting GPRS, the RNS also has an interface to a SGSN. The radio equipment

of a RNS may support one or more cells. A RNS may consist of one or more base stations. The RNS consists of one Radio Network Controller (RNC) and one or more Node B. The functionality is described in TS 25.410.

4.10.2.1 Radio Network Controller (RNC)

A Radio Network Controller (RNC) is a network component in the PLMN with the functions for control of one or more Node B.

4.10.2.2 Node B

A Node B is a network component which serves one cell.

The split of functions between RNS and CN is described in the 2825-series of UMTS Technical Specifications.

4.11 The Mobile Station (MS)

The mobile station consists of the physical equipment used by a PLMN subscriber; it comprises the Mobile Equipment (ME) and the Subscriber Identity Module (SIM), called UMTS Subscriber Identity Module (USIM) for Release 99 and following. The ME comprises the Mobile Termination (MT) which, depending on the application and services, may support various combinations of Terminal Adapter (TA) and Terminal Equipment (TE) functional groups. These functional groups are described in GSM 04.02.

4.12 The Group Call Register (GCR)

The Group Call Register (GCR) is a register holding information about VGCS or VBS calls, the voice group or broadcast call attributes, respectively.

Voice group or broadcast call attributes are defined for a specific voice group or broadcast call reference and include the data required to configure the conference bridge for a VGCS or VBS call and other call related attributes.

The Group Call Register (GCR) shall hold for a related MSC area for each group ID and cell from which Voice Group Call Service (VGCS) or Voice Broadcast Service (VBS) calls can be established by mobile stations the voice group call reference or voice broadcast call reference to be used for a VGCS or VBS call to be established and an indication whether the originating MSC is the MSC responsible for that call.

If the originating MSC is not responsible for that call, the GCR shall hold the routing information identifying the MSC responsible for that call.

A GCR may be in charge of one or several MSC. Each MSC involved in a voice group or broadcast call requests its proper voice group or broadcast call attributes from its related GCR by use of the voice group or broadcast call reference.

The contents of each list related to requests of the MSC responsible for a voice group or broadcast call is as follows:

- a list of cells inside the MSC area of the requesting MSC into which the call is to be sent (part of the group call area);
- a list of other MSCs into which the call is to be sent;
- a list of identities of dispatchers to which a dedicated link is to be established;
- a list of identities of dispatchers which are allowed to initiate the voice group or broadcast call;
- a list of identities of dispatchers which are allowed to terminate the voice group or broadcast call;
- the length of time over which no activity is detected before the voice group call is automatically terminated;
- the default priority level related to the voice group or broadcast call if the eMLPP supplementary service applies;
- a flag indicating if acknowledgements are required for this voice group or broadcast call.

The contents of each list related to requests of an MSC not responsible for a voice group or broadcast call is as follows:

- a list of cells inside the MSC area of the requesting MSC into which the call is to be sent (part of the group call area).

More information is provided in TS 23.068 and 23.069.

4.13 Shared InterWorking Function (SIWF)

Shared InterWorking Function (SIWF) is a network function that provides interworking for data/fax calls. SIWF consists of a SIWF Controller (SIWFC) functionality located in MSCs and SIWF Server(s) (SIWFS) located in the PLMN. An SIWFS contains IWF capabilities as described in subclause 3.9. An SIWFS can be accessed by several other network nodes e. g. any MSC in the same PLMN.

More information is provided in GSM 03.54.

4.13a GPRS Support Nodes (GSN)

The UMTS PS-services support nodes, Gateway GSN (GGSN) and Serving GSN (SGSN) constitutes the interface between the radio system and the fixed networks for packet switched services. The GSN performs all necessary functions in order to handle the packet transmission to and from the mobile stations.

4.14 Serving GPRS Support Node (SGSN)

The location register function in the SGSN stores two types of subscriber data needed to handle originating and terminating packet data transfer:

- Subscription information:
 - The IMSI;
 - One or more temporary identities;
 - Zero or more PDP addresses.
- Location information:
 - Depending on the operating mode of the MS, the cell or the routing area where the MS is registered;
 - The VLR number of the associated VLR (if the Gs interface is implemented);
 - The GGSN address of each GGSN for which an active PDP context exists.

The organisation of the subscriber data in the SGSN is defined in TS 23.008 and TS 23.060.

The procedures for information transfer between the SGSN, the GGSN, the VLR and the HLR are defined in TS 23.016 and TS 23.060.

Note: When this improves the readability (e.g. when dealing with inter-releases handover), the term 2G-SGSN can be used to refer to an MSC Release 98 or prior, and the term 3G-SGSN can be used to refer to an MSC Release 99 or later.

4.15 Gateway GPRS Support Node (GGSN)

The location register function in the GGSN stores subscriber data received from the HLR and the SGSN. There are two types of subscriber data needed to handle originating and terminating packet data transfer:

- Subscription information:
 - The IMSI;
 - Zero or more PDP addresses.
- Location information:

- The SGSN address for the SGSN where the MS is registered;

The organisation of the subscriber data in the GGSN is defined in TS 23.008 and TS 23.060.

The procedures for information transfer between the GGSN, the SGSN and the HLR are defined in TS 23.016 and TS 23.060.

4.16 Border Gateway (BG)

The Border Gateway (BG) is a gateway between a PLMN supporting GPRS and an external inter-PLMN backbone network used to interconnect with other PLMNs also supporting GPRS. The role of the BG is to provide the appropriate level of security to protect the PLMN and its subscribers.

The BG is only needed in PLMNs supporting GPRS.

4.17 Entities specific to Location Services (LCS) provisioning

[editorial note: the way LCS will be supported in UMTS rel.99 is still under discussion. The following definitions might not apply.]

4.17.1 Serving Mobile Location Center (SMLC)

The Serving Mobile Location Center (SMLC) node is responsible for managing the overall co-ordination and scheduling of resources required to perform positioning of a mobile, and calculating the final location estimate and accuracy. There may be more than one SMLC in a PLMN.

4.17.2 Gateway Mobile Location Center (GMLC)

The Gateway Mobile Location Center (GMLC) is the first node an external Location Application accesses in the GSM PLMN. The GMLC performs registration authorization and requests routing information from the HLR. There may be more than one GMLC in a PLMN.

4.17.3 Location Measurement Unit (LMU)

The Location Measurement Unit (LMU) gathers radio signal measurements and supplies them over the GSM air interface, via the MSC/VLR, to a particular SMLC associated with the LMU. An LMU interacts with its HLR, serving access network and MSC/VLR like a normal GSM MS, i.e. it has its own IMSI and subscription profile, and supports radio resources and mobility management functions.

S2 meeting #11
Puerto Vallarta, Mexico
January 24-28, 2000

Document S2-000205

3G CHANGE REQUEST

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23.002 CR 005r1

Current Version: **v.3.2.0**

3G specification number ↑

↑ CR number as allocated by 3G support team

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Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: (at least one should be marked with an X)
USIM ME UTRAN Core Network

Source: MCC **Date:** Jan. 7th, 2000

Subject: Re-ordering of section 4 (The entities of the mobile system).

3G Work item:

Category: (only one category shall be marked with an X)
F Correction
A Corresponds to a correction in a 2G specification
B Addition of feature
C Functional modification of feature
D Editorial modification

Reason for change: This CR proposes to re-structure section 4 as to ease the introduction of new entities: the former section 4 is divided into a new section 4 containing the basic entities and a new section 4a containing the service specific entities. In the new section 4, the entities are sorted according to the concepts presented in section 3 (CN vs AN, PS vs CS domains, etc.).
It relies on CR 004 and forms a consistent set with CR 006 and 007.
[note: only the section/subsection titles are shown. The text under each paragraph is supposed to remain unchanged.]

Clauses affected: Section 4

Other specs affected:
Other 3G core specifications → List of CRs:
Other 2G core specifications → List of CRs:
MS test specifications → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other comments:



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4 The basic entities of the mobile system

4.1 The Core Network (CN) entities

4.1.1 Entities common to the PS and the CS domains

- 4.1.1.1 The Home Location Register (HLR)
- 4.1.1.2 The Visitor Location Register (VLR)
- 4.1.1.3 The Authentication Centre (AuC)
- 4.1.1.4 The Equipment Identity Register (EIR)
- 4.1.1.5 SMS Gateway MSC (SMS-GMSC)
- 4.1.1.6 SMS Interworking MSC

4.1.2 Entities of the CS domain

- 4.1.2.51 The Mobile-services Switching Centre (MSC)
- 4.1.2.26 The Gateway MSC (GMSC)
- ~~4.7 SMS Gateway MSC (SMS-GMSC)~~
- ~~4.8 SMS Interworking MSC~~
- 4.1.2.39 The Interworking Function (IWF)

4.1.3a Entities of the PS domain~~GPRS Support Nodes (GSN)~~

- 4.1.3.14 Serving GPRS Support Node (SGSN)
- 4.1.3.25 Gateway GPRS Support Node (GGSN)
- 4.1.3.36 Border Gateway (BG)

4.402 The Access Network (AN) entities

4.402.1 The Base Station System (BSS)

- 4.402.1.1 Base Station Controller (BSC)
- 4.402.1.2 Base Transceiver Station (BTS)

4.402.2 The Radio Network System (RNS)

4.402.2.1 Radio Network Controller (RNC)

4.402.2.2 Node B

4.413 The Mobile Station (MS)

4a The specific entities of the mobile system

The entities presented in this section are dedicated to the provisioning of a given (set of) service(s). The fact they are implemented or not in a given PLMN should have a limited impact on all the other entities of the PLMN.

All the specific entities defined so far are located in the Core Network.

~~4a.12~~ The Group Call Register (GCR) entity

~~4a.132~~ Shared InterWorking Function (SIWF) entity

~~4a.173~~ Entities specific to Location Services (LCS) entities provisioning

4a.173.1 Serving Mobile Location Center (SMLC)

4a.173.2 Gateway Mobile Location Center (GMLC)

4a.173.3 Location Measurement Unit (LMU)

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Document S2-000006

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23.002 CR 006

Current Version: **v.3.2.0**

3G specification number ↑

↑ CR number as allocated by 3G support team

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Proposed change affects:

(at least one should be marked with an X)

USIM

ME

UTRAN

Core Network

Source:

MCC

Date: Jan. 7th, 2000

Subject:

Re-ordering of section 5 (Configuration of a Public Land Mobile Network).

3G Work item:

Category:

(only one category shall be marked with an X)

- F Correction
- A Corresponds to a correction in a 2G specification
- B Addition of feature
- C Functional modification of feature
- D Editorial modification

Reason for change:

This CR proposes to re-structure section 5 as to ease the introduction of new entities: the former section 5 is divided into a new section 5 containing the basic entities and a new section 5a containing the optional (service specific) entities. It forms a consistent set together with CR 005 and 007.

Clauses affected:

Section 5

Other specs affected:

- Other 3G core specifications → List of CRs:
- Other 2G core specifications → List of CRs:
- MS test specifications → List of CRs:
- BSS test specifications → List of CRs:
- O&M specifications → List of CRs:

Other comments:



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5 Configuration of a Public Land Mobile Network

5.1 Basic configuration~~General~~

The basic configuration of a Public Land Mobile Network (PLMN) supporting GPRS and the interconnection to the PSTN/ISDN and PDN is presented in figure 1. ~~The basic configuration of a PLMN supporting GPRS and the interconnection to external PDN is presented in figures 2 and 3.~~ This configuration presents signalling interfaces which can be found in a PLMN. Implementations may be different: some particular functions may be gathered in the same equipment and then some interfaces may become internal interfaces.

~~5.2~~ Basic configuration

In the basic configuration presented in figure 1, all the functions are considered implemented in different equipments. Therefore, all the interfaces within PLMN are external. Interfaces A and Abis are defined in the GSM 08-series of Technical Specifications. Interfaces Iu, Iur and Iubis are defined in the UMTS ~~2825.4xx~~-series of Technical Specifications. Interfaces B, C, D, E, F and G need the support of the Mobile Application Part of the signalling system No. 7 to exchange the data necessary to provide the mobile service. No protocols for the H-interface and for the I-interface are standardized. All the GPRS-specific interfaces (G- series) are defined in the UMTS 23-series and 24-series of Technical Specifications.

From this configuration, all the possible PLMN organisations can be deduced. In the case when some functions are contained in the same equipment, the relevant interfaces become internal to that equipment.

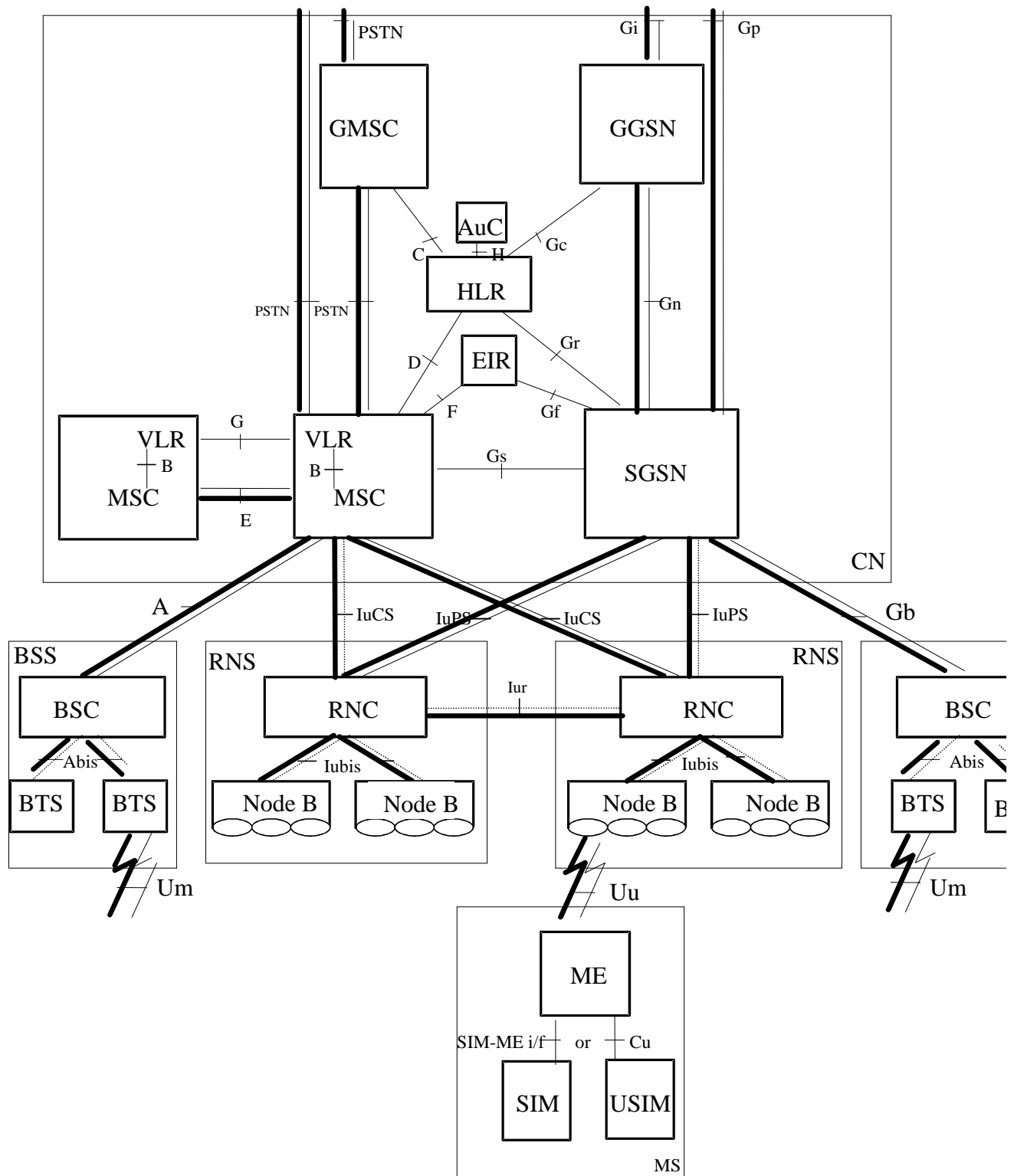


Figure 1: **Basic Configuration of a PLMN and interfaces supporting CS and PS services**

Legend:

Bold lines: interfaces supporting user traffic

Dashed lines: interfaces supporting signalling

NOTE 1: the figure shows direct interconnections between the entities. The actual links may be provided by an underlying network (e.g. SS7 or IP): this needs further studies.

NOTE 2: ~~the following entities are not shown:~~

- ~~–the entities specific to the provisioning of Group Call (GCR)~~
- ~~–the entities specific to the provisioning of Location Services (shown in 5.3 — Basic configuration with support for LCS)~~
- ~~–the entities specific to the provisioning of Short Message Services~~
- ~~–the other entities related to specific tasks not correctly reflected in this version of this TS, e.g. Camel Server (CS), Cell Broadcast Center (CBC), Short Message Service Center (SMSCB)~~

NOTE 3: when the MSC and the SGSN are integrated in a single physical entity, this entity is called UMTS MSC (UMSC).

5.32 ~~Basic e~~Configuration with support for of LCS entities

[editorial note: to be updated]

The configuration of LCS entities ~~In the basic configuration is~~ presented in figure 42. In the figure, all the functions are considered implemented in different logical nodes. If two logical nodes are implemented in the same physical equipment, the relevant interfaces may become internal to that equipment.

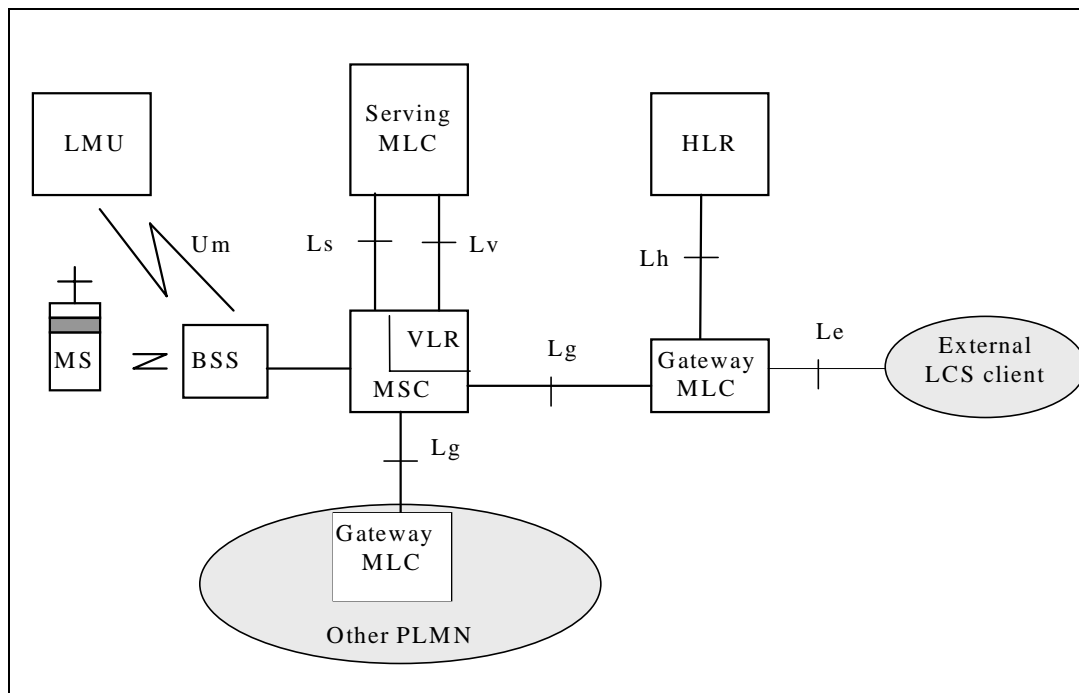


Figure 42: Configuration of a PLMN supporting LCS entities

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Document S2-000007

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23.002 CR 007

Current Version: **v.3.2.0**

3G specification number ↑

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Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: USIM ME UTRAN Core Network
(at least one should be marked with an X)

Source: MCC **Date:** Jan. 7th, 2000

Subject: Re-ordering of section 6 ("PLMN interfaces").

3G Work item:

Category:
(only one category shall be marked with an X)
F Correction
A Corresponds to a correction in a 2G specification
B Addition of feature
C Functional modification of feature
D Editorial modification

Reason for change: This CR proposes to re-structure section 6 as to ease the introduction of new entities: the former section 6 is divided into a new section 6 containing the basic interfaces and a new section 6a containing the service specific interfaces. In the new section 6, the entities are sorted according to the concepts presented in section 3 (CN vs AN, PS vs CS domains, etc.).
It relies on CR 004 and forms a consistent set with CR005 and 006.
[note: in most cases, only the section/subsection titles are shown. The text under each paragraph remains unchanged except is specific change indication is shown.]

Clauses affected: Section 6

Other specs affected:
Other 3G core specifications → List of CRs:
Other 2G core specifications → List of CRs:
MS test specifications → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other comments:



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6 PLMN basic interfaces

~~6.1~~ General

The implementation of the mobile service with international roaming implies the exchange of data between the equipment involved in the service. The same No.7 signalling network should be used to transfer these data and the call-related signalling information.

6.12 Interfaces between Mobile Station and the Fixed Infrastructure

6.12.1 Interface between Mobile Station and Base Station System (Um-interface)

6.12.2 Interface between Mobile Station and Radio Network System (Uu-interface)

6.2 Interfaces between the MSC-Core Network and the Access Network

6.2.1 Interfaces between the CS domain and the Access Network

6.2.1.1 Interface between the MSC and Base Station System (A-interface)

6.2.1.2 Interface between the MSC and RNS (Iu_CS interface)

~~6.17~~ ~~Interface between SGSN and the Access Network~~

6.2.2 Interfaces between the PS domain and the Access Network

~~6.17.2.1~~ Interface between SGSN and BSS (Gb-interface)

~~6.17.2.2~~ Interface between SGSN and RNS (Iu_PS-interface)

6.3 Interfaces internal to the Access Network

6.3.1 Interface between BSC and BTS (Abis-interface)

6.3.2 Interface between RNC and Node B (Iubis-interface)

6.43.3 Interface between two RNCs (Iur-interface)

~~to be completed~~ This interface is defined in the 25.42x series of recommendation.

6.4 Interfaces internal to the Core Network

6.4.1 Interfaces internal to the CS domain

6.4.1.1 Interface between the MSC and its associated VLR (B-interface)

6.4.1.2 Interface between the HLR and the MSC (C-interface)

6.4.1.3 Interface between the HLR and the VLR (D-interface)

6.4.1.4 Interface between MSCs (E-interface)

6.4.1.5 Interface between MSC and EIR (F-interface)

6.4.1.6 Interface between VLRs (G-interface)

6.4.2 Interfaces internal to the PS domain

6.4.2.1 Interface between SGSN and HLR (Gr-interface)

6.4.2.2 Interface between SGSN and GGSN (Gn- and Gp-interface)

6.4.2.3 Signalling Path between GGSN and HLR (Gc-interface)

6.4.2.4 Interface between SGSN and EIR (Gf-interface)

6.4.3 Interfaces used by CS and PS domain

6.4.3.1 Interface between MSC/VLR and SGSN (Gs-interface)

6.4.3.2 Interface between HLR and AuC (H-Interface)

6a PLMN specific interfaces

6a.1 GCR-specific interface

6a.1.1 Interface between the MSC and its associated GCR (I-interface)

6a.2 SIWFS-specific interface

6a.2.1 Interface between MSC and SIWFS (K-Interface)

6a.3 LCS-specific interfaces

6a.3.1 Interface between MSC and GMLC (Lg-interface)

~~6a.3.2.22~~ Interface between MSC and SMLC (Ls-interface)

~~6a.3.3.23~~ Interface between VLR and SMLC (Lv-interface)

~~6a.3.4.24~~ Interface between GMLC and HLR (Lh-interface)

~~6a.3.5.25~~ Interface between BTS and LMU (Um-interface)

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Document **S2-000008**

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23.002 CR 008

Current Version: **v.3.2.0**

3G specification number ↑

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Proposed change affects:

(at least one should be marked with an X)

USIM

ME

UTRAN

Core Network

Source:

MCC

Date:

Jan. 6th, 2000

Subject:

Simplification of the figure 1 (configuration of a PLMN and interfaces)

3G Work item:

Category:

*(only one category
shall be marked
with an X)*

- F Correction
- A Corresponds to a correction in a 2G specification
- B Addition of feature
- C Functional modification of feature
- D Editorial modification

Reason for change:

The figure 1 of 23.002 (configuration of a PLMN and interfaces) is presently unnecessary complex and can be simplified by the removal of duplicated entities. This is what is proposed in this CR.

Clauses affected:

Section 5.2

Other specs affected:

- Other 3G core specifications → List of CRs:
- Other 2G core specifications → List of CRs:
- MS test specifications → List of CRs:
- BSS test specifications → List of CRs:
- O&M specifications → List of CRs:

Other comments:



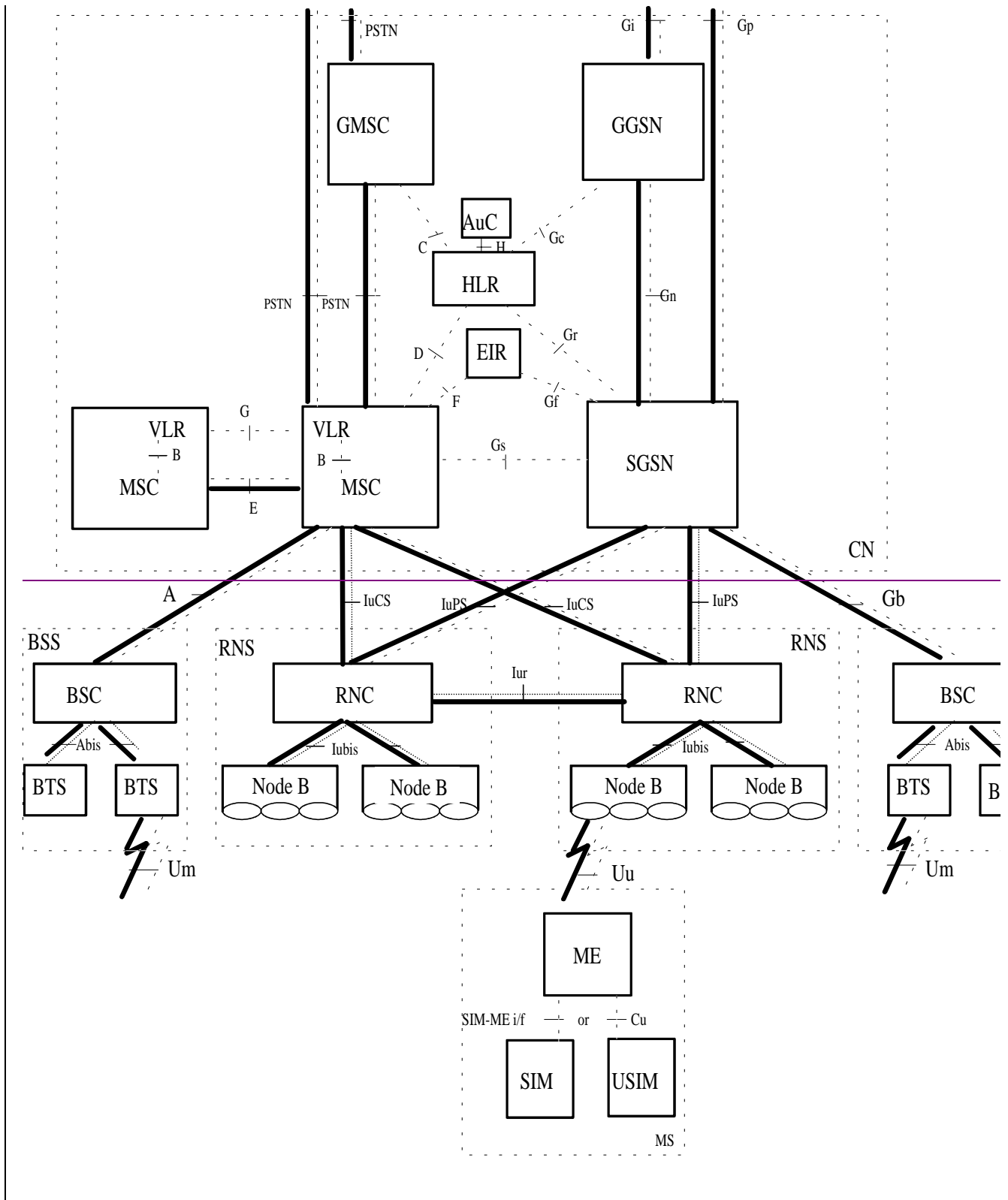
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5.2 Basic configuration

In the basic configuration presented in figure 1, all the functions are considered implemented in different equipments. Therefore, all the interfaces within PLMN are external. Interfaces A and Abis are defined in the GSM 08-series of Technical Specifications. Interfaces Iu and Iubis are defined in the UMTS 28-series of Technical Specifications. Interfaces B, C, D, E, F and G need the support of the Mobile Application Part of the signalling system No. 7 to exchange the data necessary to provide the mobile service. No protocols for the H-interface and for the I-interface are standardized. All the GPRS-specific interfaces (G- series) are defined in the UMTS 23-series and 24-series of Technical Specifications.

From this configuration, all the possible PLMN organisations can be deduced. In the case when some functions are contained in the same equipment, the relevant interfaces become internal to that equipment.



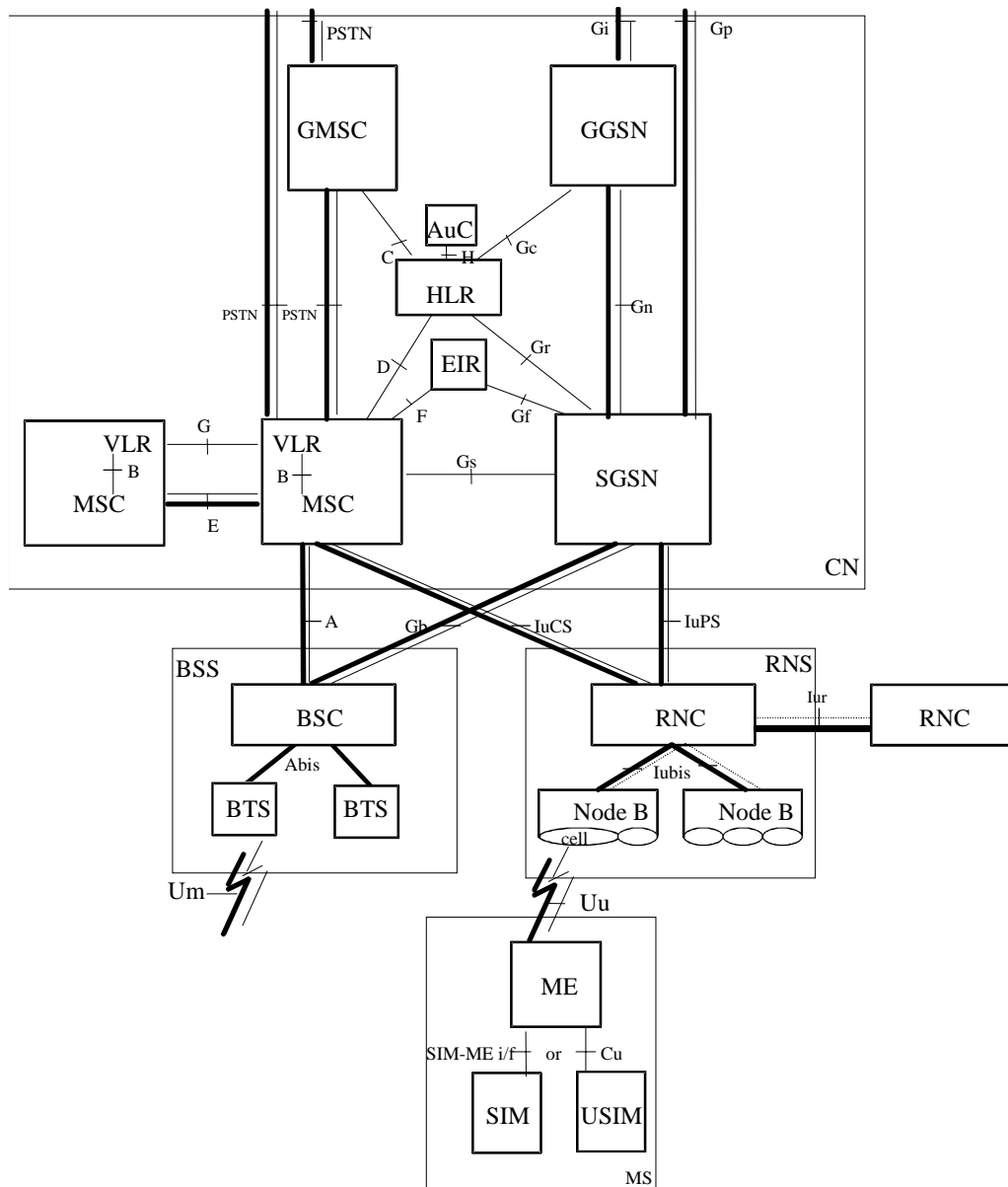


Figure 1: Configuration of a PLMN and interfaces

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Document S2-000206

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23.002 CR 009r1

Current Version: **v.3.2.0**

3G specification number ↑

↑ CR number as allocated by 3G support team

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Proposed change affects: USIM ME UTRAN Core Network
(at least one should be marked with an X)

Source: MCC **Date:** Jan. 7th, 2000

Subject: Introduction of CAMEL aspects.

3G Work item:

Category:
(only one category shall be marked with an X)
F Correction
A Corresponds to a correction in a 2G specification
B Addition of feature
C Functional modification of feature
D Editorial modification

Reason for change: This CR proposes to add CAMEL aspects to 23.002. It is based on the new structure based in CRs 004 to 007.

Clauses affected: Sections 2, 4a, 5, 6.4, 6a

Other specs affected:
Other 3G core specifications → List of CRs:
Other 2G core specifications → List of CRs:
MS test specifications → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other comments:



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2 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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1999 document, references to GSM documents are by default for Release 1999 versions (version 8.x.y).

[1] GSM 01.04 : "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[1a] TR 21.905: "3G Vocabulary".

[2] TS 22.016: "Digital cellular telecommunications system (Phase 2+); International Mobile station Equipment Identities (IMEI)".

[2c] TS 22.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL); Service description, Stage 1".

[2a] TS 22.060: "Digital cellular telecommunications system (Phase 2+); General Packet radio Service (GPRS); Service Description; Stage 1".

[2b] TS 22.071: "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Service Description; Stage 1".

[3] TS 23.003: "Digital cellular telecommunications system (Phase 2+); Numbering, addressing and identification".

[4] [void]

[5] TS 23.008: "Digital cellular telecommunications system (Phase 2+); Organisation of subscriber data".

[6] TS 23.009: "Digital cellular telecommunications system (Phase 2+); Handover procedures".

[7] TS 23.012: "Digital cellular telecommunications system (Phase 2+); Location registration procedures".

[8] [void]

[9] TS 23.054: "Digital cellular telecommunications system (Phase 2+); Description for the use of a Shared Inter Working Function (SIWF) in a GSM PLMN".

[9a] TS 23.060 "Digital cellular telecommunication system (Phase 2+); General Packet Radio Service (GPRS); Service Description; Stage 2".

[10] TS 23.068 "Digital cellular telecommunications system (Phase 2+); Voice Group Call Service (VGCS) stage 2".

- [10a] GSM 03.64: "Digital cellular telecommunication system (Phase 2+); Overall Description of the General Packet Radio Service (GPRS) Radio Interface; Stage 2".
- [10b] TS 23.071: "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Functional Description; Stage 2".
- [10c] TS 23.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3 - Stage 2".
- [11] ITU-T Q.1214, May 1995: "Distributed Functional Plane for Intelligent Network CS-1"~~[void]~~
- [11a] TS 23.101: "General UMTS Architecture".
- [11b] TS 23.110: "Access Stratum (AS): Services and Functions".
- [12] GSM 04.02 R98: "Digital cellular telecommunications system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".
- [13] GSM 08.01: "Digital cellular telecommunications system (Phase 2+); Base Station System - Mobile-services Switching Centre (BSS - MSC) interface General aspects".
- [14] GSM 08.02: "Digital cellular telecommunications system (Phase 2+); Base Station System - Mobile-services Switching Centre (BSS - MSC) interface Interface principles".
- [14a] TS 25.410: "UTRAN Iu Interface: General Aspects and Principles".
- [14b] TS 25.41x-series on definition of the Iu interface
- [15] GSM 08.04: "Digital cellular telecommunications system (Phase 1); Base Station System - Mobile-services Switching Centre (BSS - MSC) interface Layer 1 specification".
- [16] GSM 08.06: "Digital cellular telecommunications system (Phase 2+); Signalling transport mechanism specification for the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".
- [17] GSM 08.08: "Digital cellular telecommunications system (Phase 2+); Mobile Switching Centre - Base Station System (MSC - BSS) interface _ Layer 3 specification".
- [18] TS 28.020: "Digital cellular telecommunications system (Phase 2+); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".
- [19] GSM 08.51: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC - BTS) interface _ General aspects".
- [20] GSM 08.52: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC - BTS) interface _ Interface principles".
- [21] GSM 08.54: "Digital cellular telecommunications system (Phase 2+); Base Station Controller (BSC) to Base Transceiver Station (BTS) interface _ Layer 1 structure of physical circuits".
- [22] GSM 08.56: "Digital cellular telecommunications system (Phase 2+); Base Station Controller (BSC) to Base Transceiver Station (BTS) _ Layer 2 specification".
- [23] GSM 08.58: "Digital cellular telecommunications system (Phase 2+); Base Station Controller (BSC) to Base Transceiver Station (BTS) interface _ Layer 3 specification".
- [24] GSM 08.60: "Digital cellular telecommunications system (Phase 2+); Inband control of remote transcoders and rate adaptors".
- [25] GSM 08.61: "Digital cellular telecommunications system (Phase 2+); Inband control of remote transcoders and rate adaptors (half rate)".
- [26] TS 29.002: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".

- [27] GSM 09.03 R98 : "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)".
- [28] TS 29.004: "Digital cellular telecommunications system (Phase 2+); Interworking between the Public Land Mobile Network (PLMN) and the Circuit Switched Public Data Network (CSPDN)".
- [29] TS 29.005: "Digital cellular telecommunications system (Phase 2+); Interworking between the Public Land Mobile Network (PLMN) and the Packet Switched Public Data Network (PSPDN) for Packet Assembly/Disassembly facility (PAD) access".
- [30] TS 29.006: "Digital cellular telecommunications system (Phase 2+); Interworking between a Public Land Mobile Network (PLMN) and a Packet Switched Public Data Network/Integrated Services Digital Network (PSPDN/ISDN) for the support of packet switched data transmission services".
- [31] TS 29.007: "Digital cellular telecommunications system (Phase 2+); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".
- [32] TS 29.010: "Digital cellular telecommunications system (Phase 2+); Information element mapping between Mobile Station - Base Station System and BSS - Mobile-services Switching Centre (MS - BSS - MSC) - Signalling procedures and the Mobile Application Part (MAP)".
- [33] TS 29.011: "Digital cellular telecommunications system (Phase 2+); Signalling interworking for supplementary services".

4a.4 CAMEL entities

The entities of this subsection support the CAMEL feature (Customised Applications for Mobile network Enhanced Logic). This feature provides the mechanisms to support services consistently independently of the serving network, as described in 22.078 [2c]. The following definitions are extracted from 23.078 [10c], which completely specify CAMEL stage 2.

4a.4.1 GSM Service Control Function (gsmSCF)

A functional entity that contains the CAMEL service logic to implement Operator Specific Service. It interfaces with the gsmSSF, the gsmSRF and the HLR.

4a.4.2 GSM Service Switching Function (gsmSSF)

A functional entity that interfaces the MSC/GMSC to the gsmSCF. The concept of the gsmSSF is derived from the IN SSF, but uses different triggering mechanisms because of the nature of the mobile network.

4a.4.3 GSM Specialised Resource Function (gsmSRF)

A functional entity which provides various specialized resources. It interfaces with the gsmSCF and with the MSC. This entity is defined in ITU-T Q.1214 [11] with variations defined in 23.078.

5.3 Configuration of CAMEL entities

The following figure shows the interconnection of the CAMEL-specific entities with the rest of the network. Only the interfaces specifically involved in CAMEL provisioning are shown, i.e. all the GMSC, MSC and HLR interfaces depicted in figure 1 are still supported by these entities even if not shown.

Note: The CAMEL-specific interfaces have no particular name. They are designated by the name of the two entities they link together, e.g. "the gsmSSF-gsmSCF interface".

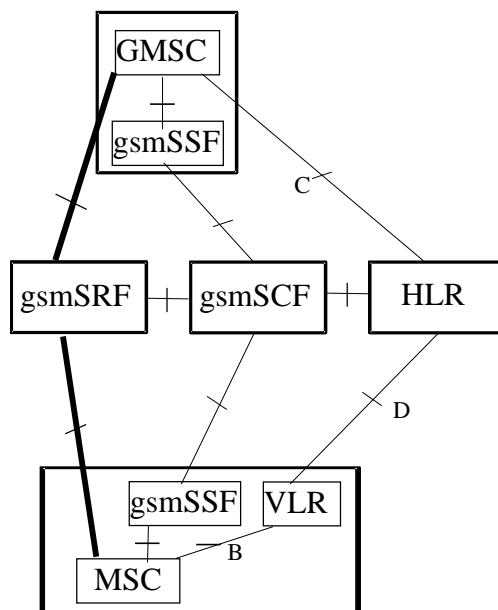


Figure 3: configuration of CAMEL entities and interfaces

The bold lines are used for interfaces supporting user data only, the dashed lines are used for interfaces supporting signalling only

6.4 Interfaces internal to the Core Network

6.4.1.2 Interface between the HLR and the MSC (C-interface)

The Gateway MSC must interrogate the HLR of the required subscriber to obtain routing information for a call or a short message directed to that subscriber.

Signalling on this interface uses the Mobile Application Part (MAP), which in turn uses the services of Transaction Capabilities. See TS 29.002.

For CAMEL purposes, this interface is used as described in 23.078. It is used e.g. at terminating calls to exchange routing information, subscriber status, location information, subscription information, etc.

6.4.1.3 Interface between the HLR and the VLR (D-interface)

This interface is used to exchange the data related to the location of the mobile station and to the management of the subscriber. The main service provided to the mobile subscriber is the capability to set up or to receive calls within the whole service area. To support this, the location registers have to exchange data. The VLR informs the HLR of the location of a mobile station managed by the latter and provides it (either at location updating or at call set-up) with the roaming number of that station. The HLR sends to the VLR all the data needed to support the service to the mobile subscriber. The HLR then instructs the previous VLR to cancel the location registration of this subscriber. Exchanges of data may occur when the mobile subscriber requires a particular service, when he wants to change some data attached to his subscription or when some parameters of the subscription are modified by administrative means.

Signalling on this interface uses the Mobile Application Part (MAP), which in turn uses the services of Transaction Capabilities. See TS 29.002.

For CAMEL purposes, this interface is used to send the CAMEL related subscriber data to the visited PLMN and for provision of MSRN. The interface is also used for the other purposes described in 23.078, e.g. to retrieve subscriber status and location information of the mobile subscriber or to indicate suppression of announcement for a CAMEL service.

6a PLMN specific interfaces

6a.4 CAMEL-specific interfaces

The CAMEL-specific interfaces are detailed in 23.078 [10c]. These interfaces are:

6a.4.1 GMSC - gsmSSF interface

This is an internal interface. The interface is described in the specification to make it easier to understand the handling of Detection Points (arming/disarming of DPs, DP processing etc.).

6a.4.2 gsmSSF - gsmSCF interface

This interface is used by the gsmSCF to control a call in a certain gsmSSF and to request the gsmSSF to establish a connection with a gsmSRF. Relationships on this interface are opened as a result of the gsmSSF sending a request for instructions to the gsmSCF.

6a.4.3 MSC - gsmSSF interface

This is an internal interface. The interface is described in the specification to make it easier to understand the handling of DPs (arming/disarming of DPs, DP processing etc.).

6a.4.4 gsmSCF - HLR interface

This interface is used by the gsmSCF to request information from the HLR. As a network operator option the HLR may refuse to provide the information requested by the gsmSCF.

This interface is also used for USSD operations, both for gsmSCF-initiated dialogues and MS-initiated dialogues (relayed via HLR). It is a network operator option whether to support or not USSD operations on this interface.

6a.4.5 gsmSCF - gsmSRF interface

This interface is used by the gsmSCF to instruct the gsmSRF to play tones/announcements to the users.

6a.4.6 MSC - gsmSCF interface

This interface is used by the MSC to send supplementary service invocation notifications to the gsmSCF.

S2 meeting #11
Puerto Vallarta, Mexico
January 24-28, 2000

Document S2-000207

3G CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.002 CR 011r1

Current Version: **v.3.2.0**

3G specification number ↑

↑ CR number as allocated by 3G support team

For submission to TSG **SA#7** for approval (only one box should be marked with an X)
list TSG meeting no. here ↑ for information

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf>

Proposed change affects: USIM ME UTRAN Core Network
(at least one should be marked with an X)

Source: D2 Mannesmann **Date:** Jan. 17th, 2000

Subject: Introduction of the CBS Network Architecture

3G Work item:

Category: F Correction
A Corresponds to a correction in a 2G specification
(only one category shall be marked with an X) B Addition of feature
C Functional modification of feature
D Editorial modification

Reason for change: The Cell Broadcast Service is defined as a architecture requirement for UMTS Release '99. This CR introduces the CBS Architecture into the 23.002. The new document structure is used according to CR's 005 – 007.

The interface between CBC and RNC is renamed from Bc to luBC to underline the relationship to the lu-Interface.

Clauses affected: Sections 2, 4a, 5, 6a

Other specs affected: Other 3G core specifications → List of CRs:
Other 2G core specifications → List of CRs:
MS test specifications → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other comments:



help.doc

<----- double-click here for help and instructions on how to create a CR.

2 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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1999 document, references to GSM documents are by default for Release 1999 versions (version 8.x.y).

- [1] GSM 01.04 : "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [1a] TR 21.905: "3G Vocabulary".
- [2] TS 22.016: "Digital cellular telecommunications system (Phase 2+); International Mobile station Equipment Identities (IMEI)".
- [2a] TS 22.060: "Digital cellular telecommunications system (Phase 2+); General Packet radio Service (GPRS); Service Description; Stage 1".
- [2b] TS 22.071: "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Service Description; Stage 1".
- [3] TS 23.003: "Digital cellular telecommunications system (Phase 2+); Numbering, addressing and identification".
- [4] [void]
- [5] TS 23.008: "Digital cellular telecommunications system (Phase 2+); Organisation of subscriber data".
- [6] TS 23.009: "Digital cellular telecommunications system (Phase 2+); Handover procedures".
- [7] TS 23.012: "Digital cellular telecommunications system (Phase 2+); Location registration procedures".
- [7a] TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".
- [8] [void]
- [9] TS 23.054: "Digital cellular telecommunications system (Phase 2+); Description for the use of a Shared Inter Working Function (SIWF) in a GSM PLMN;
- [9a] TS 23.060 "Digital cellular telecommunication system (Phase 2+); General Packet Radio Service (GPRS); Service Description; Stage 2".
- [10] TS 23.068 "Digital cellular telecommunications system (Phase 2+); Voice Group Call Service (VGCS) stage 2".

- [10a] GSM 03.64: "Digital cellular telecommunication system (Phase 2+); Overall Description of the General Packet Radio Service (GPRS) Radio Interface; Stage 2".
- [10b] TS 23.071: "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Functional Description; Stage 2".
- [11] [void]
- [11a] TS 23.101: "General UMTS Architecture".
- [11b] TS 23.110: "Access Stratum (AS): Services and Functions".
- [12] GSM 04.02 R98: "Digital cellular telecommunications system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".
- [13] GSM 08.01: "Digital cellular telecommunications system (Phase 2+); Base Station System - Mobile-services Switching Centre (BSS - MSC) interface General aspects".
- [14] GSM 08.02: "Digital cellular telecommunications system (Phase 2+); Base Station System - Mobile-services Switching Centre (BSS - MSC) interface Interface principles".
- [14a] TS 25.410: "UTRAN Iu Interface: General Aspects and Principles".
- [14b] TS 25.41x-series on definition of the Iu interface
- [15] GSM 08.04: "Digital cellular telecommunications system (Phase 1); Base Station System - Mobile-services Switching Centre (BSS - MSC) interface Layer 1 specification".
- [16] GSM 08.06: "Digital cellular telecommunications system (Phase 2+); Signalling transport mechanism specification for the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".
- [17] GSM 08.08: "Digital cellular telecommunications system (Phase 2+); Mobile Switching Centre - Base Station System (MSC - BSS) interface Layer 3 specification".
- [18] TS 28.020: "Digital cellular telecommunications system (Phase 2+); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".
- [19] GSM 08.51: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC - BTS) interface General aspects".
- [20] GSM 08.52: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC - BTS) interface Interface principles".
- [21] GSM 08.54: "Digital cellular telecommunications system (Phase 2+); Base Station Controller (BSC) to Base Transceiver Station (BTS) interface Layer 1 structure of physical circuits".
- [22] GSM 08.56: "Digital cellular telecommunications system (Phase 2+); Base Station Controller (BSC) to Base Transceiver Station (BTS) Layer 2 specification".
- [23] GSM 08.58: "Digital cellular telecommunications system (Phase 2+); Base Station Controller (BSC) to Base Transceiver Station (BTS) interface Layer 3 specification".
- [24] GSM 08.60: "Digital cellular telecommunications system (Phase 2+); Inband control of remote transcoders and rate adaptors".
- [25] GSM 08.61: "Digital cellular telecommunications system (Phase 2+); Inband control of remote transcoders and rate adaptors (half rate)"
- [26] TS 29.002: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".
- [27] GSM 09.03 R98 : "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)".

- [28] TS 29.004: "Digital cellular telecommunications system (Phase 2+); Interworking between the Public Land Mobile Network (PLMN) and the Circuit Switched Public Data Network (CSPDN)".
- [29] TS 29.005: "Digital cellular telecommunications system (Phase 2+); Interworking between the Public Land Mobile Network (PLMN) and the Packet Switched Public Data Network (PSPDN) for Packet Assembly/Disassembly facility (PAD) access".
- [30] TS 29.006: "Digital cellular telecommunications system (Phase 2+); Interworking between a Public Land Mobile Network (PLMN) and a Packet Switched Public Data Network/Integrated Services Digital Network (PSPDN/ISDN) for the support of packet switched data transmission services".
- [31] TS 29.007: "Digital cellular telecommunications system (Phase 2+); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".
- [32] TS 29.010: "Digital cellular telecommunications system (Phase 2+); Information element mapping between Mobile Station - Base Station System and BSS - Mobile-services Switching Centre (MS - BSS - MSC) Signalling procedures and the Mobile Application Part (MAP)".
- [33] TS 29.011: "Digital cellular telecommunications system (Phase 2+); Signalling interworking for supplementary services".

4 The entities of the mobile system

4a.6 CBS-specific entities

The cell broadcast service (CBS) is a Teleservice which enables an Information Provider to submit short messages for broadcasting to a specified area within the PLMN. The 3G Technical Specification 23.041 [7a] contains the technical realization of the service.

4a.6.1 Cell Broadcast Center (CBC)

The CBC shall be responsible for the management of CBS messages and for determining the CBS delivery parameters of the RNS. The CBC may be connected to several BSCs/RNCs. In UMTS the CBC is regarded to be integrated as a node into the core network.

Note: Whether it should be possible that an RNC is connected to at least two CBCs at the same time (the "normal" one as in GSM and a second one for LCS) is for further study and depends on the solution taken for LCS.

5.5 Configuration of CBS entities

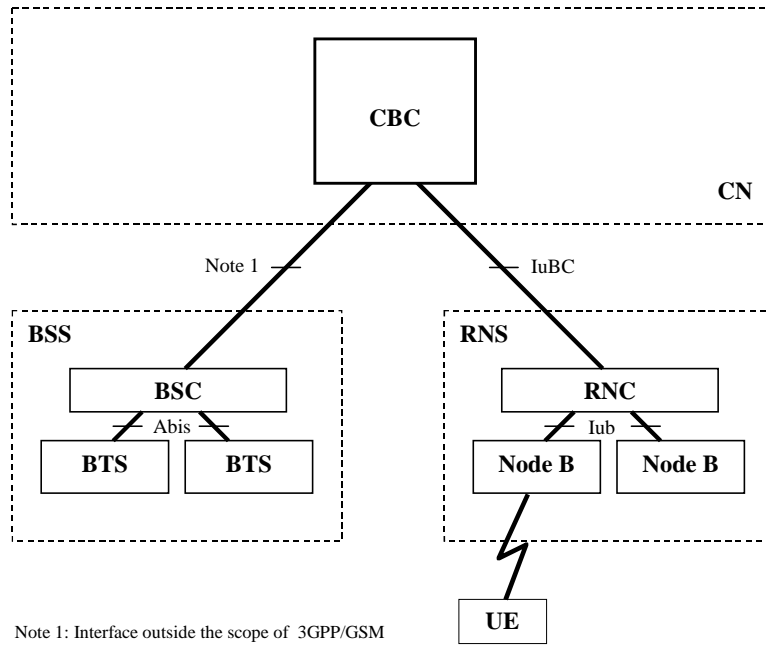


Figure X: Configuration of a PLMN supporting Cell Broadcast Service

6a.6 CBS-specific interfaces

6a.6.1 Interface between the CBC and RNS (Iu_{BC} Interface)

The interface between the CBC and the RNS is specified in the 25.41x-series of 3G Technical Specifications.

The CBC-RNS interface is used to carry information concerning:

- the CBS messages it self
- and CBS delivery parameter

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.002 CR 012rev1

Current Version: **3.1.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **SA2 #12**
list expected approval meeting # here ↑

for approval
For information

strategic
non-strategic (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: S2 LCS drafting session **Date:** 7 March 2000

Subject: Add LCS enhancements

Work item: Location Services (LCS)

PT SMG CR cover form is available from: http://docbox.etsi.org/tech-org/smg/Document/smg/tools/CR_form/crf28_1.zip

Category: <small>(one category and one release only shall be marked with an X)</small>	F Correction	<input type="checkbox"/>	Release:	Phase 2	<input type="checkbox"/>
	A Corresponds to a correction in an earlier release	<input type="checkbox"/>		Release 96	<input type="checkbox"/>
	B Addition of feature	<input type="checkbox"/>		Release 97	<input type="checkbox"/>
	C Functional modification of feature	<input checked="" type="checkbox"/>		Release 98	<input type="checkbox"/>
	D Editorial modification	<input type="checkbox"/>		Release 99	<input checked="" type="checkbox"/>
			UMTS	<input type="checkbox"/>	

Reason for change: Add and modify definitions for the new nodes and interfaces introduced by the Location Services (LCS). It is applicable only for circuit switched side.

Clauses affected:

Other specs affected:	Other releases of same spec	<input type="checkbox"/>	→ List of CRs:	
	Other core specifications	<input type="checkbox"/>	→ List of CRs:	
	MS test specifications / TBRs	<input type="checkbox"/>	→ List of CRs:	
	BSS test specifications	<input type="checkbox"/>	→ List of CRs:	
	O&M specifications	<input type="checkbox"/>	→ List of CRs:	

Other comments:

*** NEXT MODIFIED SECTION ***

3.21 Definitions related to Location Services (LCS)

[editorial note: the way LCS will be supported in UMTS rel.99 is still under discussion. The following definitions might not apply.]

3.21.1 Serving Mobile Location Center (SMLC)

The Serving Mobile Location Center (SMLC) node is responsible for managing the overall co-ordination and scheduling of resources required to perform positioning of a mobile, and calculating the final location estimate and accuracy. There may be more than one SMLC in a PLMN.

Two types of SMLC are possible:

NSS based SMLC: supports the Ls interface.

BSS based SMLC: supports the Lb interface

An NSS based SMLC supports positioning of a target MS via signaling on the Ls interface to the visited MSC. A BSS based SMLC supports positioning via signaling on the Lb interface to the BSC serving the target MS. Both types of SMLC may support the Lp interface to enable access to information and resources owned by another SMLC.

The SMLC controls a number of LMUs for the purpose of obtaining radio interface measurements to locate or help locate MS subscribers in the area that it serves. The SMLC is administered with the capabilities and types of measurement produced by each of its LMUs. Signaling between an NSS based SMLC and LMU is transferred via the MSC serving the LMU using the Ls interface and either the Um interface for a Type A LMU or the Abis interface for a Type B LMU. Signaling between a BSS based SMLC and LMU is transferred via the BSC that serves or controls the LMU using the Lb interface and either the Um interface for a Type A LMU or the Abis interface for a Type B LMU.

For Location Services, when a Cell Broadcast Center (CBC) is associated with a BSC, the SMLC may interface to a CBC in order to broadcast assistance data using existing cell broadcast capabilities. The SMLC shall behave as a user, Cell Broadcast Entity, to the CBC [refer to GSM.03.41].

3.21.2 Gateway Mobile Location Center (GMLC)

The Gateway Mobile Location Center (GMLC) is the first node an external Location Application accesses in the GSM PLMN. The GMLC performs registration authorization and requests routing information from the HLR. There may be more than one GMLC in a PLMN.

3.21.3 Location Measurement Unit (LMU)

~~The Location Measurement Unit (LMU) gathers radio signal measurements and supplies them over the GSM air interface, via the MSC/VLR, to a particular SMLC associated with the LMU. An LMU interacts with its HLR, serving access network and MSC/VLR like a normal GSM MS, i.e. it has its own IMSI and subscription profile, and supports radio resources and mobility management functions.~~

An LMU makes radio measurements to support one or more positioning methods.

Two types of LMU are defined:

Type A LMU: accessed over the normal GSM air interface

Type B LMU: accessed over the Abis interface

A type A LMU is accessed exclusively over the GSM air interface (Um interface): there is no wired connection to any other network element. A type A LMU has a serving BTS and BSC that provide signaling access to a controlling SMLC. With an NSS based SMLC, a type A LMU also has a serving MSC and VLR and a subscription profile in an HLR. A type A LMU always has a unique IMSI and supports all radio resource and mobility management functions of the GSM air interface that are necessary to support signaling using an SDCCH to the SMLC. A type A LMU supports those

connection management functions necessary to support LCS signaling transactions with the SMLC and may support certain call control functions of to support signaling to an SMLC using a circuit switched data connection.

A Type B LMU is accessed over the Abis interface from a BSC. The LMU may be either a standalone network element addressed using some pseudo-cell ID or connected to or integrated in a BTS. Signaling to a Type B LMU is by means of messages routed through the controlling BSC for a BSS based SMLC or messages routed through a controlling BSC and MSC for an NSS based SMLC.

*** NEXT MODIFIED SECTION ***

4.1 The Home Location Register (HLR)

This functional entity is a data base in charge of the management of mobile subscribers. A PLMN may contain one or several HLRs: it depends on the number of mobile subscribers, on the capacity of the equipment and on the organisation of the network. The following kinds of information are stored there:

- the subscription information;
- some location information enabling the charging and routing of calls towards the MSC where the MS is registered (e.g. the MS Roaming Number, the VLR Number, the MSC Number, the Local MS Identity).

and, if GPRS is supported, also :

- location information enabling the charging and routing of messages in the SGSN where the MS is currently registered (e.g. the SGSN Number);

and, if LCS is supported, also :

- a LCS privacy exception list, which indicates the privacy class of the MS subscriber;
- a ~~HPLMN~~-GMLC list;
- a MO-LR list.

Different types of identity are attached to each mobile subscription and are stored in the HLR. The following identities are stored:

- the International Mobile Station Identity (IMSI);
- one or more Mobile Station International ISDN number(s) (MSISDN);

if GPRS is supported, the following identity is also stored :

- zero or more Packet Data Protocol (PDP) address(es).

and, if LCS is supported, the following identity is also stored:

- the LMU indicator.

There is always at least one identity, apart from the IMSI, attached to each mobile subscription and stored in the HLR.

The IMSI or, the MSISDN may be used as a key to access the information in the database for a mobile subscription.

The data base contains other information such as:

- teleservices and bearer services subscription information;
- service restrictions (e.g. roaming limitation);
- a list of all the group IDs a service subscriber is entitled to use to establish voice group or broadcast calls;
- supplementary services; the HLR contains the parameters attached to these services;

and, if GPRS is supported, also :

- information about if a GGSN is allowed to dynamically allocate PDP addresses for a subscriber.

NOTE: Supplementary services parameters need not all be stored in the HLR. However, it seems safer to store all subscription parameters in the HLR even when some are stored in a subscriber card.

The organisation of the subscriber data is outlined in GSM 03.08.

*** NEXT MODIFIED SECTION ***

4.2 The Visitor Location Register (VLR)

A mobile station roaming in an MSC area is controlled by the Visitor Location Register in charge of this area. When a Mobile Station (MS) enters a new location area it starts a registration procedure. The MSC in charge of that area notices this registration and transfers to the Visitor Location Register the identity of the location area where the MS is situated. If this MS is not yet registered, the VLR and the HLR exchange information to allow the proper handling of calls involving the MS.

A VLR may be in charge of one or several MSC areas.

The VLR contains also the information needed to handle the calls set-up or received by the MSs registered in its data base (for some supplementary services the VLR may have to obtain additional information from the HLR) the following elements are included:

- the International Mobile Subscriber Identity (IMSI);
- the Mobile Station International ISDN number (MSISDN);
- the Mobile Station Roaming Number (MSRN), see TS 23.003 for allocation principles;
- the Temporary Mobile Station Identity (TMSI), if applicable;
- the Local Mobile Station Identity (LMSI), if used;
- the location area where the mobile station has been registered.
- the identity of the SGSN where the MS has been registered. Only applicable to PLMNs supporting GPRS and which have a Gs interface between MSC/VLR and SGSN:
- the last known location and the initial location of the MS;

~~and, if LCS is supported, the following elements for the LMUs registered in its database:~~

~~an indication of whether the LMU was successfully registered in an associated SMLC;~~

~~the SMLC address.~~

The information is passed between VLR and HLR by the procedures described in TS 23.012.

The VLR also contains supplementary service parameters attached to the mobile subscriber and received from the HLR. The organisation of the subscriber data is outlined in TS 23.008.

*** NEXT MODIFIED SECTION ***

5.3 Basic configuration with support for LCS

[editorial note: to be updated]

In the basic configuration presented in figure 4, all the functions are considered implemented in different logical nodes. If two logical nodes are implemented in the same physical equipment, the relevant interfaces may become internal to that equipment.

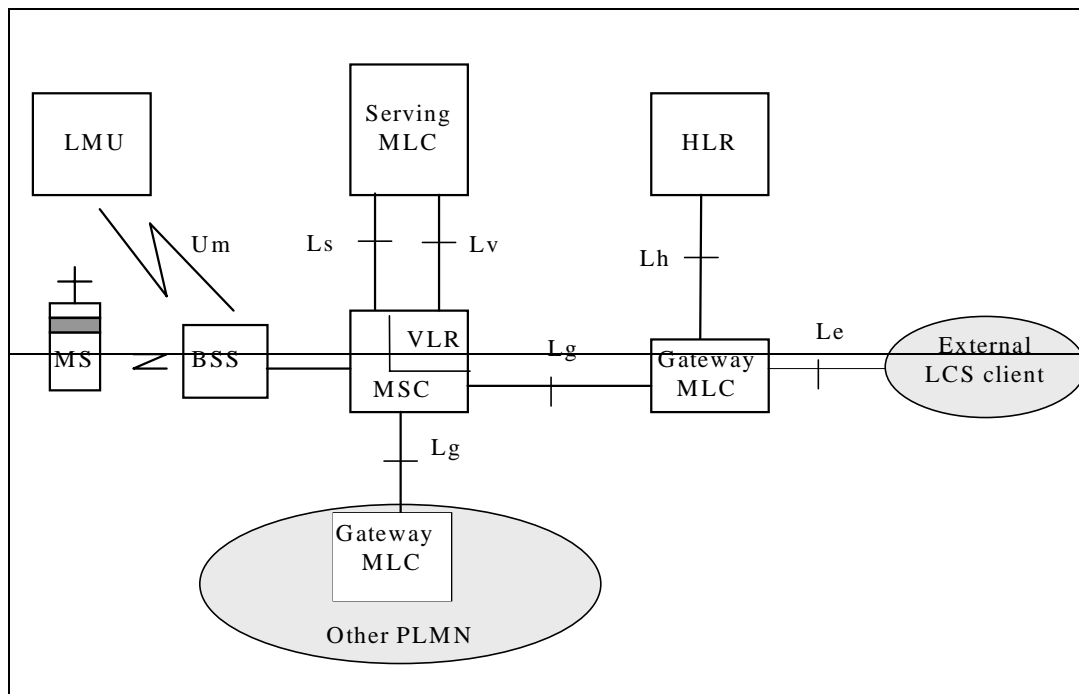
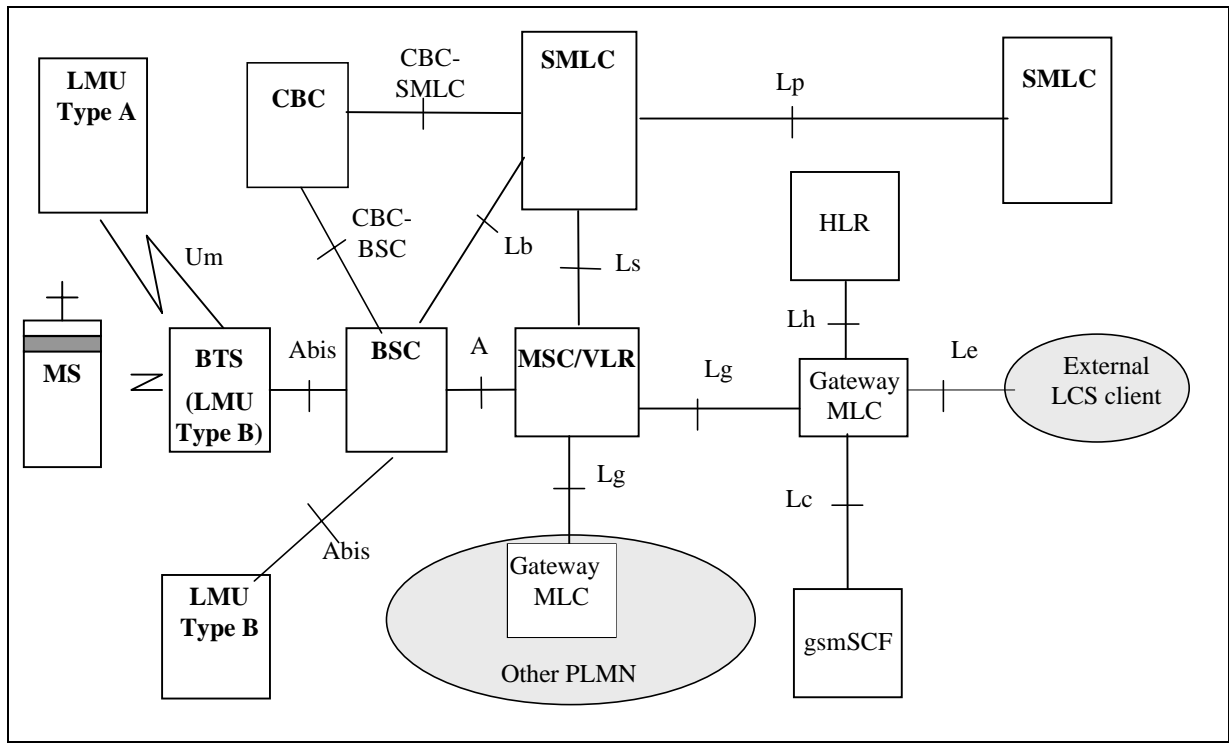


Figure 4: Configuration of a PLMN supporting LCS

*** NEXT MODIFIED SECTION ***

~~6.23 Interface between VLR and SMLC (Lv-interface)~~

~~The VLR-SMLC interface is used to support transferring of registration and deregistration information between the VLR and SMLC.~~

~~Signalling on this interface uses the Mobile Application Part (MAP), which in turn uses the services of Transaction Capabilities (TCAP). See TS 29.002.~~

6.24 Interface between GMLC and HLR (Lh-interface)

This interface is used by the GMLC to retrieve the VMSC location and IMSI for a particular mobile.

Signalling on this interface uses the Mobile Application Part (MAP), which in turn uses the services of Transaction Capabilities (TCAP). See TS 29.002.

6.25 Interface between SMLC and MSC/VLR (Ls-interface)

An NSS based SMLC supports positioning of a target MS via signaling on the Ls interface to the visited MSC.

Signalling on this interface uses BSSAP-LE, which is specified in GSM 09.31.

6.26 Interface between BSC and SMLC (Lb-interface)

A BSS based SMLC supports positioning via signaling on the Lb interface to the BSC serving the target MS.

Signalling on this interface uses BSSAP-LE, which is specified in GSM 09.31.

6.27 Interface between Peer SMLCs (Lp-interface)

Both NSS and BSS-based SMLCs may support the Lp interface to enable access to information and resources owned by another SMLC.

Signalling on this interface uses BSSAPP-LE, which is defined in GSM 09.31, and SMLCPP, which is specified in GSM 08.31.

6.28 Interface between BTS and LMU (Um-interface)

The Um interface specific to LCS is defined in 24.071.

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.002 CR 013r4

Current Version: **3.2.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **SA #7**
list expected approval meeting # here ↑

for approval
For information

strategic
non-strategic (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects:

(at least one should be marked with an X)

(U)SIM ME UTRAN / Radio Core Network

Source:

S2 LCS drafting session

Date:

9 March 2000

Subject:

Define GSM LCS parts and add UMTS LCS "hooks" in the network architecture.

Work item:

Location Services (LCS) in GSM, Location Services (LCS) in UMTS

PT SMG CR cover form is available from: http://docbox.etsi.org/tech-org/smg/Document/smg/tools/CR_form/crf28_1.zip

Category:

(one category and one release only shall be marked with an X)

F Correction
A Corresponds to a correction in an earlier release
B Addition of feature
C Functional modification of feature
D Editorial modification

Release:

Phase 2
Release 96
Release 97
Release 98
Release 99
UMTS

Reason for change:

Add and define UMTS LCS "hooks" in Release 99. Define what paragraphs are applicable to GSM only. References added to 03.71, 23.171 and 25.305

Clauses affected:

4a.3; 3.21; 4.1; 4.2; 5.3: 6.23 – 6.28

Other specs

affected:

Other releases of same specification → List of CRs:
Other core specifications → List of CRs:
MS test specifications / TBRs → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other

comments:

This document is revised from tdoc 594 (575, 389).
This CR applies to the circuit switched domain only in Release 1999. The LCS description in Packet Switched domain is regarded as LCS "hooks" in the core network.

*** NEXT MODIFIED SECTION ***

4a.3 Location Services (LCS) entities

For further details on LCS in GSM, see GSM 03.71.

For further details on LCS in UMTS from system and core network point view, see TS 23.171.

For further details on LCS in UTRAN, see TS 25.305.

*** NEXT MODIFIED SECTION ***

3.21 Definitions related to Location Services (LCS)

[editorial note: the way LCS will be supported in UMTS rel.99 is still under discussion. The following definitions might not apply.]

3.21.1 Serving Mobile Location Center (SMLC)

In GSM, The Serving Mobile Location Center (SMLC) node is responsible for managing the overall co-ordination and scheduling of resources required to perform positioning of a mobile, and calculating the final location estimate and accuracy. There may be more than one SMLC in a PLMN.

In UMTS, the SMLC functionality is integrated in SRNC.

In GSM, two types of SMLC are possible:

NSS based SMLC: supports the Ls interface.

BSS based SMLC: supports the Lb interface

An NSS based SMLC supports positioning of a target MS via signaling on the Ls interface to the visited MSC. A BSS based SMLC supports positioning via signaling on the Lb interface to the BSC serving the target MS. Both types of SMLC may support the Lp interface to enable access to information and resources owned by another SMLC.

The SMLC/ SRNC controls a number of LMUs for the purpose of obtaining radio interface measurements to locate or help locate MS subscribers in the area that it serves. The SMLC/SRNC is administered with the capabilities and types of measurement produced by each of its LMUs.

In GSM, signaling between an NSS based SMLC and LMU is transferred via the MSC serving the LMU using the Ls interface and either the Um interface for a Type A LMU or the Abis interface for a Type B LMU. Signaling between a BSS based SMLC and LMU is transferred via the BSC that serves or controls the LMU using the Lb interface and either the Um interface for a Type A LMU or the Abis interface for a Type B LMU.

In GSM, for Location Services, when a Cell Broadcast Center (CBC) is associated with a BSC, the SMLC may interface to a CBC in order to broadcast assistance data using existing cell broadcast capabilities. The SMLC shall behave as a user, Cell Broadcast Entity, to the CBC [refer to GSM.03.41].

In UMTS, for Location Services the SRNC generates LCS assistance data. Broadcasting, encryption and charging of LCS assistance data in UMTS is for further study and will be specified in later releases.

3.21.2 Gateway Mobile Location Center (GMLC)

The Gateway Mobile Location Center (GMLC) is the first node an external Location Application accesses in the GSM PLMN. The GMLC performs registration authorization and requests routing information from the HLR. There may be more than one GMLC in a PLMN.

3.21.3 Location Measurement Unit (LMU)

The Location Measurement Unit (LMU) gathers radio signal measurements and supplies them over the GSM air interface, via the MSC/VLR, to a particular SMLC associated with the LMU. An LMU interacts with its HLR, serving access network and MSC/VLR like a normal GSM MS, i.e. it has its own IMSI and subscription profile, and supports radio resources and mobility management functions.

An LMU makes radio measurements to support one or more positioning methods.

Two types of LMU are defined:

Type A LMU: accessed over the air interface

Type B LMU: accessed over the base station to controller interface (Abis in GSM and Iub in UMTS)

A type A LMU is accessed exclusively over the air interface: there is no wired connection to any other network element.

In GSM, a type A LMU has a serving BTS and BSC that provide signaling access to a controlling SMLC. With an NSS based SMLC, a type A LMU also has a serving MSC and VLR and a subscription profile in an HLR. A type A LMU always has a unique IMSI and supports all radio resource and mobility management functions of the GSM air interface that are necessary to support signaling using an SDCCH to the SMLC. A type A LMU supports those connection management functions necessary to support LCS signaling transactions with the SMLC and may support certain call control functions of to support signaling to an SMLC using a circuit switched data connection.

In UMTS, a type A LMU has signaling access to the SRNC. Type A LMU is not supported in UMTS release 1999.

In GSM, a Type B LMU is accessed over the Abis interface from a BSC. The LMU may be either a standalone network element addressed using some pseudo-cell ID or connected to or integrated in a BTS. Signaling to a Type B LMU is by means of messages routed through the controlling BSC for a BSS based SMLC or messages routed through a controlling BSC and MSC for an NSS based SMLC.

In UMTS, a Type B LMU is accessed over the Iub interface from an RNC. The LMU may be either a standalone network element addressed using some pseudo-cell ID or connected to or integrated in a Node B.

*** NEXT MODIFIED SECTION ***

4.1 The Home Location Register (HLR)

This functional entity is a data base in charge of the management of mobile subscribers. A PLMN may contain one or several HLRs: it depends on the number of mobile subscribers, on the capacity of the equipment and on the organisation of the network. The following kinds of information are stored there:

- the subscription information;
- some location information enabling the charging and routing of calls towards the MSC where the MS is registered (e.g. the MS Roaming Number, the VLR Number, the MSC Number, the Local MS Identity).

and, if GPRS is supported, also :

- location information enabling the charging and routing of messages in the SGSN where the MS is currently registered (e.g. the SGSN Number);

and, if LCS is supported, also :

- a LCS privacy exception list, which indicates the privacy class of the MS subscriber;
- a ~~HPLMN~~-GMLC list;
- a MO-LR list.

Different types of identity are attached to each mobile subscription and are stored in the HLR. The following identities are stored:

- the International Mobile Station Identity (IMSI);
- one or more Mobile Station International ISDN number(s) (MSISDN);

if GPRS is supported, the following identity is also stored :

- zero or more Packet Data Protocol (PDP) address(es).

and, if LCS is supported, the following identity is also stored:

- the LMU indicator.

There is always at least one identity, apart from the IMSI, attached to each mobile subscription and stored in the HLR.

The IMSI or, the MSISDN may be used as a key to access the information in the database for a mobile subscription.

The data base contains other information such as:

- teleservices and bearer services subscription information;
- service restrictions (e.g. roaming limitation);
- a list of all the group IDs a service subscriber is entitled to use to establish voice group or broadcast calls;
- supplementary services; the HLR contains the parameters attached to these services;

and, if GPRS is supported, also :

- information about if a GGSN is allowed to dynamically allocate PDP addresses for a subscriber.

NOTE: Supplementary services parameters need not all be stored in the HLR. However, it seems safer to store all subscription parameters in the HLR even when some are stored in a subscriber card.

The organisation of the subscriber data is outlined in GSM 03.08.

4.2 The Visitor Location Register (VLR)

A mobile station roaming in an MSC area is controlled by the Visitor Location Register in charge of this area. When a Mobile Station (MS) enters a new location area it starts a registration procedure. The MSC in charge of that area notices this registration and transfers to the Visitor Location Register the identity of the location area where the MS is situated. If this MS is not yet registered, the VLR and the HLR exchange information to allow the proper handling of calls involving the MS.

A VLR may be in charge of one or several MSC areas.

The VLR contains also the information needed to handle the calls set-up or received by the MSs registered in its data base (for some supplementary services the VLR may have to obtain additional information from the HLR) the following elements are included:

- the International Mobile Subscriber Identity (IMSI);
- the Mobile Station International ISDN number (MSISDN);
- the Mobile Station Roaming Number (MSRN), see TS 23.003 for allocation principles;
- the Temporary Mobile Station Identity (TMSI), if applicable;
- the Local Mobile Station Identity (LMSI), if used;
- the location area where the mobile station has been registered.
- the identity of the SGSN where the MS has been registered. Only applicable to PLMNs supporting GPRS and which have a Gs interface between MSC/VLR and SGSN;
- the last known location and the initial location of the MS;

~~and, if LCS is supported, the following elements for the LMUs registered in its database:~~

~~an indication of whether the LMU was successfully registered in an associated SMLC;~~

~~the SMLC address.~~

The information is passed between VLR and HLR by the procedures described in TS 23.012.

The VLR also contains supplementary service parameters attached to the mobile subscriber and received from the HLR. The organisation of the subscriber data is outlined in TS 23.008.

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

5.3 Basic configuration with support for LCS

[editorial note: to be updated]

In the basic configuration of GSM LCS presented in figure 4, all the functions are considered implemented in different logical nodes. If two logical nodes are implemented in the same physical equipment, the relevant interfaces may become internal to that equipment.

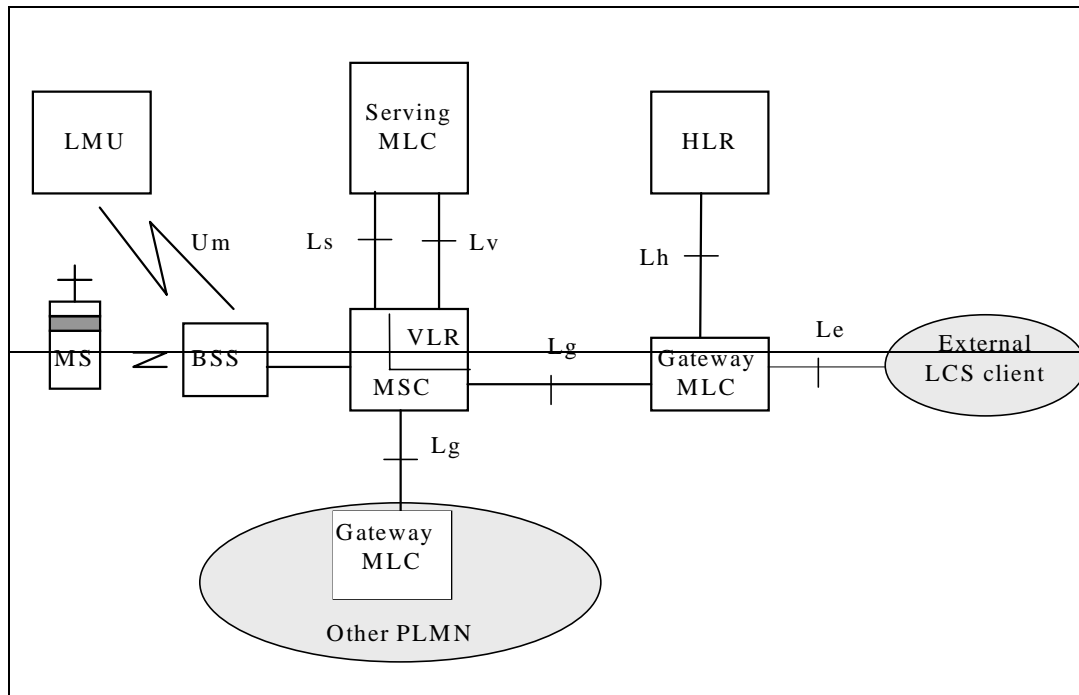
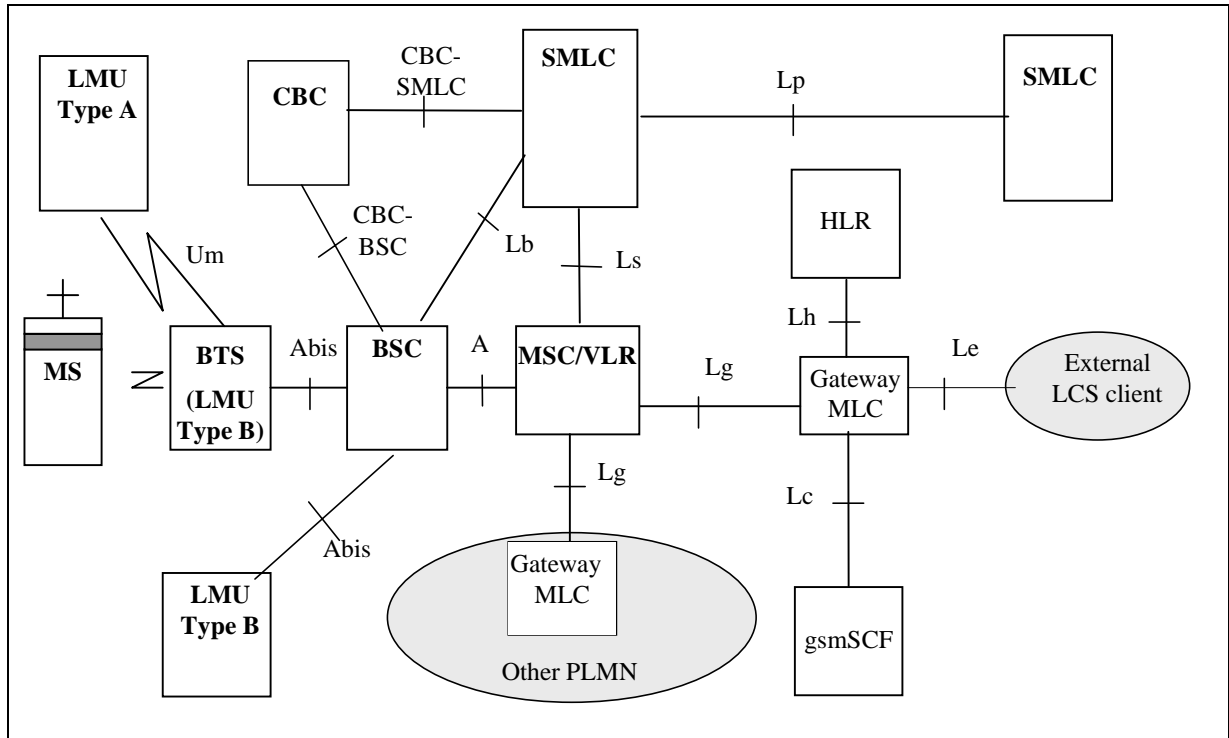


Figure 4: Configuration of a GSM-PLMN supporting LCS

The basic configuration of UMTS LCS is presented in Figure 5. There is no SMLC entity in figure 5, because the SMLC functionality of UTRAN is integrated in SRNC.

Note 1): The usage of CBC for LCS assistance data in UMTS is for further study. The assistance data is generated in SRNC.

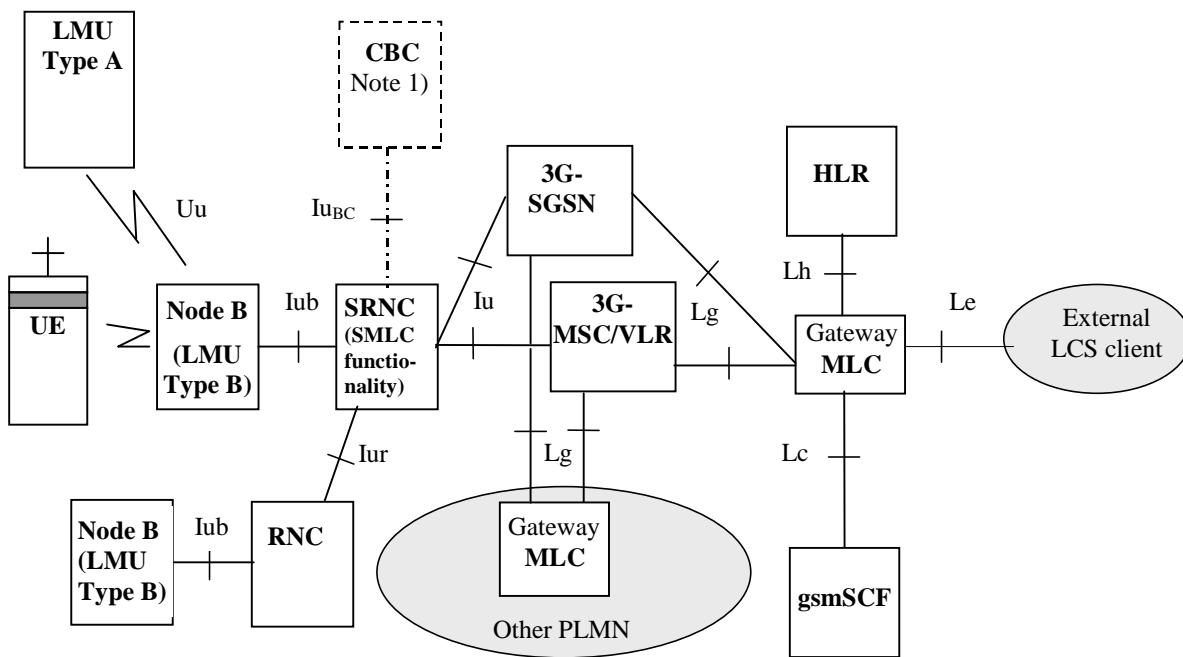


Figure 5: Configuration of a UMTS-PLMN supporting LCS

*** NEXT MODIFIED SECTION ***

6.23 ~~Interface between VLR and SMLC (Lv-interface)~~

~~The VLR-SMLC interface is used to support transferring of registration and deregistration information between the VLR and SMLC.~~

~~Signalling on this interface uses the Mobile Application Part (MAP), which in turn uses the services of Transaction Capabilities (TCAP). See TS 29.002.~~

6.24 Interface between GMLC and HLR (Lh-interface)

This interface is used by the GMLC to retrieve the VMSC location and IMSI for a particular mobile.

Signalling on this interface uses the Mobile Application Part (MAP), which in turn uses the services of Transaction Capabilities (TCAP). See TS 29.002.

6.25 Interface between SMLC and MSC/VLR (Ls-interface)

In GSM, an NSS based SMLC supports positioning of a target MS via signaling on the Ls interface to the visited MSC. Signalling on this interface uses BSSAP-LE, which is specified in GSM 09.31.

In UMTS, the Ls interface is not standardized, because the SMLC functionality is included in SRNC.

6.26 Interface between BSC and SMLC (Lb-interface)

In GSM, A BSS based SMLC supports positioning via signaling on the Lb interface to the BSC serving the target MS. Signalling on this interface uses BSSAP-LE, which is specified in GSM 09.31.

In UMTS, the Lb interface is not standardized, because the SMLC functionality is included in SRNC.

6.27 Interface between Peer SMLCs (Lp-interface)

In GSM, both NSS and BSS-based SMLCs may support the Lp interface to enable access to information and resources owned by another SMLC. Signalling on this interface uses BSSAPP-LE, which is defined in GSM 09.31, and SMLCPP, which is specified in GSM 08.31.

In UMTS, the SMLC functionality is included in SRNC and the Iur interface shall include the Lp interface type of functionality.

6.28 Interface between BTS and LMU (Um-interface)

The Um/Uu interface specific to LCS is defined in 24.071.

S2 meeting #12
Tokyo, Japan
March 6-9, 2000

Document S2-
000494381

3G CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.002 CR 014rev1

Current Version: **v.3.2.0**

3G specification number ↑

↑ CR number as allocated by 3G support team

For submission to TSG **SA#7** for approval (only one box should be marked with an X)
list TSG meeting no. here ↑ for information

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: USIM ME UTRAN Core Network
(at least one should be marked with an X)

Source: **MCC, Ericsson** **Date:** **Mar. 1st, 2000**

Subject: **Incorporation of network architecture material coming from section 4 of 29.002**

3G Work item:

Category: F Correction
(only one category shall be marked with an X)
A Corresponds to a correction in a 2G specification
B Addition of feature
C Functional modification of feature
D Editorial modification

Reason for change: It was conditionally agreed with N2 to delete section 4 from 29.002 ("Configuration of the mobile network") because its scope was overlapping with the one of 23.002. The condition is to re-integrate all the potential material in 29.002 not in 23.002. This is what is provided with this CR. Mainly Number Portability aspects are concerned.

Clauses affected: **Sections 4, 4a, 6a**

Other specs affected: Other 3G core specifications → List of CRs: **29.002**
Other 2G core specifications → List of CRs:
MS test specifications → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other comments:



help.doc

<----- double-click here for help and instructions on how to create a CR.

4 The entities of the mobile system

To provide the mobile service as it is defined, it is necessary to introduce some specific functions. These functional entities can be implemented in different equipments or gathered. In any case, exchanges of data occur between these entities.

4.1 The Home Location Register (HLR)

This functional entity is a data base in charge of the management of mobile subscribers. A PLMN may contain one or several HLRs: it depends on the number of mobile subscribers, on the capacity of the equipment and on the organisation of the network. The following kinds of information are stored there:

- the subscription information;
- some location information enabling the charging and routing of calls towards the MSC where the MS is registered (e.g. the MS Roaming Number, the VLR Number, the MSC Number, the Local MS Identity).

and, if GPRS is supported, also :

- location information enabling the charging and routing of messages in the SGSN where the MS is currently registered (e.g. the SGSN Number);

and, if LCS is supported, also :

- a LCS privacy exception list, which indicates the privacy class of the MS subscriber;
- a HPLMN GMLC list.

Different types of identity are attached to each mobile subscription and are stored in the HLR. The following identities are stored:

- the International Mobile Station Identity (IMSI);
- one or more Mobile Station International ISDN number(s) (MSISDN);

if GPRS is supported, the following identity is also stored :

- zero or more Packet Data Protocol (PDP) address(es).

and, if LCS is supported, the following identity is also stored:

- the LMU indicator.

There is always at least one identity, apart from the IMSI, attached to each mobile subscription and stored in the HLR.

The IMSI or, the MSISDN may be used as a key to access the information in the database for a mobile subscription.

The data base contains other information such as:

- teleservices and bearer services subscription information;
- service restrictions (e.g. roaming limitation);
- a list of all the group IDs a service subscriber is entitled to use to establish voice group or broadcast calls;
- supplementary services; the HLR contains the parameters attached to these services;

and, if GPRS is supported, also :

- information about if a GGSN is allowed to dynamically allocate PDP addresses for a subscriber.

NOTE: Supplementary services parameters need not all be stored in the HLR. However, it seems safer to store all subscription parameters in the HLR even when some are stored in a subscriber card.

The organisation of the subscriber data is outlined in GSM 0323.008.

4.4 The Equipment Identity Register (EIR)

This functional entity contains one or several databases which store(s) the IMEIs used in the GSM system.

The mobile equipment may be classified as "white listed", "grey listed" and "black listed" and therefore may be stored in three separate lists.

An IMEI may also be unknown to the EIR.

An EIR shall as a minimum contain a "white list" (Equipment classified as "white listed").

See also TS 22.016 on IMEI.

4.6 The Gateway MSC (GMSC)

If a network delivering a call to the PLMN cannot interrogate the HLR, the call is routed to an MSC. This MSC will interrogate the appropriate HLR and then route the call to the MSC where the mobile station is located. The MSC which performs the routing function to the actual location of the MS is called the Gateway MSC (GMSC).

The acceptance of an interrogation to an HLR is the decision of the operator.

The choice of which MSCs can act as Gateway MSCs is for the operator to decide (i.e. all MSCs or some designated MSCs).

If the call is a voice group/broadcast call, it is routed directly from the GMSC to the VBS/VGCS Anchor MSC, based on information (VBS/VGCS call reference) contained in the dialled number. See also GSM 03.68 and 03.69.

4.7 SMS Gateway MSC (SMS-GMSC)

The SMS Gateway MSC (SMS-GMSC) acts as an interface between a Short Message Service Centre and the PLMN, to allow short messages to be delivered to mobile stations from the Service Centre (SC).

The choice of which MSCs can act as SMS Gateway MSCs is a network operator matter (e.g. all MSCs or some designated MSCs).

4.8 SMS Interworking MSC

The SMS Interworking MSC acts as an interface between the PLMN and a Short Message Service Centre (SC) to allow short messages to be submitted from Mobile Stations to the SC.

The choice of which MSCs can act as SMS Interworking MSCs is a network operator matter (e.g. all MSCs or some designated MSCs).

4.10 The Access Network

Two different types of access network are used by the CN: the Base Station System (BSS) and the Radio Network System (RNS). The BSS offers a Time Division Multiple Access (TDMA) based technology to access the Mobile Station whereas the RNS offers a Wideband-Code Division Multiple Access (W-CDMA) based technology. The MSC (resp. SGSN) can connect to one of these Access Network type or to both of them.

4.10.1 The Base Station System (BSS)

The Base Station System (BSS) is the system of base station equipments (transceivers, controllers, etc...) which is viewed by the MSC through a single A-interface as being the entity responsible for communicating with Mobile Stations in a certain area. Similarly, in PLMNs supporting GPRS, the BSS ~~also has an interface to an~~ is viewed by the SGSN through a single Gb interface. The functionality for the A interface is described in GSM 08.02 and for the Gb interface in TS 23.060.

The radio equipment of a BSS may support one or more cells. A BSS may consist of one or more base stations. Where an Abis-interface is implemented, ~~t~~ The BSS consists of one Base Station Controller (BSC) and one or more Base Transceiver Station (BTS). The functionality is described in GSM 08.02.

A Base Station Controller (BSC) is a network component in the PLMN with the functions for control of one or more BTS.

A Base Transceiver Station (BTS) is a network component which serves one cell.

The split of functions between BSS and CN is described in the 08-series of GSM Technical Specifications.

4.10.2 The Radio Network System (RNS)

The Radio Network System (RNS) is the system of base station equipments (transceivers, controllers, etc...) which is viewed by the MSC through a single Iu-interface as being the entity responsible for communicating with Mobile Stations in a certain area. Similarly, in PLMNs supporting GPRS, the RNS is viewed by the also has an interface to a SGSN through a single Iu-PS interface. The functionality for the Iu-CS interface is described in TS 25.410 and for the Iu-CPS interface in TS 23.060. The radio equipment of a RNS may support one or more cells. A RNS may consist of one or more base stations. The RNS consists of one Radio Network Controller (RNC) and one or more Node B. ~~The functionality is described in TS 25.410.~~

A Radio Network Controller (RNC) is a network component in the PLMN with the functions for control of one or more Node B.

A Node B is a network component which serves one cell.

The split of functions between RNS and CN is described in the 28-series of UMTS Technical Specifications.

4a.6 Number Portability Specific entities

Database (NPDB)

Two different solutions are defined to support Number Portability. The first one is an IN based solution and is described in the next sub-section. The second one is a "Signalling Relay" based solution described in next but one sub-section.

For details on MNP see TS 23.066.

4a.6.1 IN-based solution: Number Portability Database (NPDB)

The Number Portability Database (NPDB) is the central element of the IN based solution for Mobile Number Portability (MNP). MNP is the ability for a mobile subscriber to change the GSM subscription network within a portability cluster (e.g. a country) whilst retaining his/her original MSISDN or MSISDNs.

The NPDB stores the table of correspondence between MSISDNs and Subscription networks. Upon request of the (gateway or visited) MSC, the NPDB retrieves from the MSISDN the Routing Number pointing out the Subscription network.

For details on MNP see TS 23.066.

[editorial note: the use of NPLR (Number Portability Location Register) should be further checked]

4a.6.2 Signalling Relay-based solution: Mobile Number Portability/Signalling Relay function (MNP-SRF)

The MNP-Signalling Relay Function (MNP-SRF) is the central element of the Signalling Relay based solution for Mobile Number Portability

The MNP-SRF obtains the routing information from a NP database to identify the subscription network associated with a particular national MSISDN. Upon request from gateway MSC, the MNP-SRF may perform one of the following actions:

1. -The MNP-SRF will reply back to the GMSC with the necessary routing information to route the call
2. -The message is relayed to the HLR
3. -The message is relayed to MNP-SRF in the subscription network

For non-call related signalling (e.g. delivery of SMS), only cases 2 and 3 are applicable.

6a PLMN specific interfaces

6a.6 Number portability specific interfaces

6a.6.1 IN-based solution

6a.6.1.1 NPDB to MSC interface

Upon receiving an ISUP IAM, the (gateway or visited) MSC send a database query to the NPDB as a result of analysis of the received MSISDN. The MSISDN is included in the query to the NPDB. The NPDB determines whether the MSISDN is ported or not. If not, it responds back to the MSC to continue the normal call setup procedure for MT calls (optionally providing the Routing Number). If it is ported, the NPDB responds back to the MSC with a Routing Number pointing out the Subscription network.

6a.6.2 Signalling Relay-based solution

6a.6.2.1 GMSC to MNP-SRF interface

Upon receiving an ISUP IAM, the gateway MSC sends a routing interrogation to the MNP-SRF, which in turn will perform one of the actions, described in subclause 4a.7, depending on the portability status of the subscriber and the network configuration. For more details see TS 23.066

6a.6.32.2 MNP-SRF to HLR interface

When the MNP-SRF receives a routing interrogation from the GMSC or an interrogating network entity (non/call related signalling), and it determines that the subscriber is not ported or it has been ported from another network, the MNP-SRF relays the message to the HLR.