Technical Specification Group Services and System Aspects
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SP-020045	22.003	009	-	Rel-4	F	Editorial CR to correct terms and references	4.2.0	4.3.0	S1-020457
SP-020045	22.003	010	-	Rel-5	A	Editorial CR to correct terms and references	5.0.0	5.1.0	S1-020457
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Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

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CHANGE REQUEST

⌘ **22.001** **CR 007** ⌘ ev **-** ⌘ Current version: **4.2.0** ⌘

Spec Title: **Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLMN)** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-5

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications
	⌘	
Other comments:	⌘	

~~3G~~3GPP TS 22.001 V4.2.0 (2001-06)

Technical Specification

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Contents

Foreword

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

The present document defines the telecommunication services supported by a GSM PLMN within the digital cellular telecommunications system (Phase 2+).

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

Version x.y.z

where:

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

0 Scope

The present document covers the definition of the circuit telecommunication services supported by a PLMN. The purpose of the present document is to provide a method for the characterization and the description of these telecommunication services.

TS 22.101 describes overall service principles of a PLMN.

0.1 References

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

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

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

[2] ITU-T Recommendation I.221: "Common specific characteristics of services".

[3] ITU-T Recommendation X.200: "Information technology - Open Systems Interconnection - Basic reference model: The basic model".

[4] TS 22.101: "~~UMTS~~ Service Principles".

[5] TS 22.002: "Bearer services supported by a PLMN".

[6] TS 22.003: "Teleservices supported by a PLMN".

[7] TS 22.004: "General on Supplementary Services".

[8] TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[9] TS 22.030: "Man-Machine Interface (MMI) of the User equipment (MS)".

[10] TS 22.081: "Line Identification Supplementary Servicess; Stage 1".

[11] TS 22.135: "Multicall; Stage 1".

[12] TR 21.905: "Vocabulary for 3GPP Specifications".

[13] ~~GSM 0~~TS 24.008: "~~Digital cellular telecommunications system (Phase 2+);~~ Mobile radio interface layer 3 specification".

[14] TS 22.011: "Service accessibility".

[15] TS 23.003: "Numbering, addressing and identification".

0.2 Abbreviations

Abbreviations used in the present document are listed in ~~GSM 01.04 and~~ TR 21.905 [12].

1 Framework for the description of telecommunication services

1.1 The attribute method of characterization of circuit telecommunication services

This characterization is made by using a set of attributes. A telecommunication service attribute is a specific characteristic of that service whole values distinguish it from other telecommunication services. Particular values are assigned to each attribute when a given telecommunication service is described and defined.

A list of definitions of attributes and values used for bearer services and teleservices is contained in, respectively, annex A and annex B.

2 Description of circuit telecommunication services by the attribute method

2.1 General

Telecommunication services are described by attributes which define service characteristics as they apply at a given reference point where the customer accesses the service. The description of a telecommunication service by the method of attributes is composed of:

- technical attributes as seen by the customer; and
- other attributes associated with the service provision, e.g. operational and commercial attributes.

2.2 Categorisation of telecommunication services

The concepts introduced in the present document are illustrated in table1.

Table 1: Categorisation of telecommunication services

TELECOMMUNICATION SERVICES			
BEARER SERVICE		**TELESERVICE**	
Basic Bearer Service	Basic Bearer service + supplementary services	Basic Teleservice	Basic Teleservice + supplementary service

3 Characterization of circuit telecommunication services

3.1 General

A telecommunication service supported by a PLMN is characterized and described by service attributes.

There are two groups of service attributes applicable to user information flow:

- low layer attributes;
- high layer attributes.

Bearer services are characterized only by low layer attributes. Teleservices are characterized by both low layer attributes and high layer attributes.

The basic characteristics of a telecommunication service are described by the basic service attributes.

The additional characteristics associated with a supplementary service which modify or supplement a basic telecommunication service are described in Specification TS 22.004 [7].

3.2 Bearer services

Bearer services are characterized by a set of low layer attributes in Specification TS~~GSM~~ 2~~0~~2.002[5]. These attributes are classified into four categories:

- information transfer attributes;
- access attributes;
- interworking attributes;
- general attributes, including operational and commercial attributes.

The bearer capability defines the technical features of a bearer service as they appear to the user at the appropriate access point. For the time being, the bearer capability is characterized by information transfer, access and interworking attributes. A bearer capability is associated with every bearer service.

3.3 Teleservices

Circuit teleservices provide the full capacity for communication by means of terminals and network functions and possibly functions provided by dedicated centres.

Circuit teleservices are specified in TS 22.003 [6]. Teleservices are characterized by a set of low layer attributes, a set of high layer attributes and operational and commercial attributes.

Low layer attributes are those used to characterize the bearer capability. High layer attributes are used in Specification TS 22.003 [6] to describe high layer (i.e. layer 4-7) information transfer related characteristics. They refer to functions and protocols of layers 4-7 in the ITU-T Recommendation X.200 framework which are concerned with the transfer, storage and processing of user messages (provided by a subscriber's terminal, a retrieval centre or a network service centre).

Therefore, not all attributes can be applied directly at the user to terminal interface as they represent two kinds of features, the bearer capability and the terminal features, that are not directly perceived by the user.

4 Provision of telecommunication services

Specifications ~~GSM~~ TS ~~0~~2.101[4] and TS~~GSM~~ 2~~0~~2.011 [14] define some aspects of the provisions of telecommunication services by a ~~GSM PLMN~~3GPP system.

The provision of telecommunication services implies:

- subscription of basic services and possibly subscription to supplementary services;
- registration into a service directory;
- compatibility between terminals;
- interworking capabilities (see ~~GSM~~ 3GPP 2~~0~~9 series of specifications).

The user's subscription to a Basic or Supplementary service is normally verified by the network prior to completion of Call Establishment and/or Supplementary Service operation. This subscription checking shall be performed in accordance with the following subclauses.

4.1 Subscription checking for Basic Services

General

Subscription checking is the function/process to ascertaining whether a subscriber has the authorization to use the particular Basic Service deduced from the call set-up parameters. It is the responsibility of the HPLMN to transfer, to the VPLMN, only the subscription data corresponding to those services a given subscriber is entitled to use in that VPLMN.

For mobile originated calls, subscription checking is performed in the VLR, whilst for mobile terminated calls it is performed in either the HLR or the VLR (determined as described below). The prerequisite for executing the subscription check is a successful deduction of a Basic Service from the Compatibility Information contained in the call set up, i.e. Bearer Capability Information Element and, in some cases, also the Low Layer and High Layer Compatibility Information elements.

For mobile originated calls an UE shall indicate the requested service by appropriate compatibility information elements according to ~~GSM~~ TS 27.001 [8]. This information is mapped to an individual Basic Service code (i.e. the MAP representation) by the MSC in order to be compared with the subscriber data available in the VLR.

An equivalent process is required in the HLR for mobile terminated calls, where the caller's requested service is indicated to the HLR (by the ISDN) by exhaustive compatibility information consisting of ISDN Bearer Capability Information Elements and in some cases - depending on the service requested - also of Low Layer and High layer Compatibility information elements. In case the compatibility information is not exhaustive, e.g. when the call is originated/transited by a PSTN, no Basic Service can be deduced and subscription checking cannot be performed in the "normal" way. Instead, rules for the Single and Multi Numbering Schemes apply.

In the Multi Numbering Scheme the Basic Service can be deduced by information stored in the HLR against the called number and hence an implicit subscription check is performed. In the Single Numbering Scheme, the Basic Service cannot be deduced until the UE has responded to the set up and therefore the HLR cannot perform subscription check. Instead, the VLR/MSC will perform the subscription check or calls are passed "unfiltered" (as regards subscription check), at the network operators' discretion.

Bearer Services

TS 22.002[5] ~~GSM 02.02~~ lists the Bearer Services, each of them with a specific "BS number". Single services defined independent of the fixed network user rate are called General Bearer Services. These distinct [numbered] services may individually be provided to a subscriber. Whichever the subscription arrangements are, all PLMNs (MSCs, VLRs and HLRs) shall be able to allow - as regards subscription checking - the use of individually subscribed-to Basic Services, within the range of services supported by the PLMN. That is, whenever it is possible to deduce the Basic Service from a call set up, subscription check shall be performed at the granularity of that particular Basic Service or the group to which it belongs.

TeleServices

TS 22.003 [6] lists the TeleServices, each of them with a specific "TS number". These may be provided to subscribers individually or combined, to the operators' discretion, however TS 12 (Emergency calls) and TS 23 (CBS) are not subscribable. But, as for Bearer Services, networks shall be able to handle subscription checking at the granularity of individual TeleServices.

Table 2 summarizes the basis on which a successful subscription checking will result. It also describes on which basis Supplementary Service handling for a given call set-up should be performed.

Table 2

Set Up	Subscription Check	SS handling
BS 20	BS 20	BS Group 2x
BS 30	BS 30	BS Group 3x
TS 11	TS 11, TS Group 1x or TS Group All	TS Group 1x
TS 12	N.A.	
TS 21	TS 21, TS Group 2x or TS Group All	TS Group 2x
TS 22	TS 22, TS Group 2x or TS Group All	TS Group 2x
TS 23	N.A.	
TS 61	TS 61, TS Group 6x or TS Group All	TS Group 6x
TS 62	TS 61, 62, Group 6x or TS Group All	TS Group 6x
TS 91	TS 91, TS Group 9x or TS Group All	TS Group 9x
TS 92	TS 92, TS Group 9x or TS Group All	TS Group 9x
Legend: - set-up: The Basic Service which is set up for the call; - subscription check: Required VLR or HLR data for successful subscription check; - SS handling: Against which VLR or HLR data SS handling should be performed. For example; a call set-up indicating BS61 and Asynchronous mode should be treated for SS purposes in accordance with the SS-data stored against BS group 2x.		

When TS61 is requested in a call set-up and the subscription check for TS61 is negative, but a subscription check for TS62 is positive, then the call shall proceed according to the TS 22.003 [6]and TS 27.001 [8]. If a subscription check for both TS61 and TS62 is negative, then the call shall be released.

4.2 Subscription checking for Supplementary Services

This is described in ~~GSM~~ TS ~~0~~2.0~~0~~4 [7]~~ and the GSM 03.8x series of specifications~~.

Annex A (normative): List of definition of attributes and values used for bearer services

A.1 Information transfer attributes

A.1.1 Information transfer capability

This attribute describes the capability associated with the transfer of different types of information through a PLMN and another network or through a PLMN.

Values:

- unrestricted digital information;
  transfer of information sequence of bits at its specified bit rate without alteration; this implies bit sequence independence, digit sequence integrity and bit integrity.

- speech;
  digital representation of speech information and audible signalling tones of the PSTN coded according to the encoding rule defined in the TS~~GSM 0~~26 series of specifications.

- 3,1 kHz Ex PLMN;
  unrestricted digital information transfer within the PLMN and 3.1 kHz audio restricted within the ISDN.

- group 3 Fax;
  transfer of Group 3 Fax information.

A.1.2 Information transfer mode

This attribute describes the operational mode of transferring (transportation and switching) through a PLMN.

Values:

- circuit.

A.1.3 Information transfer rate

This attribute describes the bit rate (circuit mode). It refers to the transfer of digital information between two access points or reference points.

Values:

- appropriate bit rate, throughput rate.

A.1.4 Structure

This attribute refers to the capability of the PLMN and if involved other networks to deliver information to the destination access point or reference point in a structure.

Note~~OTE~~: ~~-~~This attribute has not been utilised in TS 22.002 [5] or TS 22.003 [6].

Values:

- not applicable.

A.1.5 Establishment of communication

This attribute associated with a telecommunication service describes the mode of establishment used to establish and a given communication.

In every telecommunication service communication may be between users within the PLMN or between a user in the PLMN and a user in another network.

Values:

- demand Mobile Originated (MO) only;
- demand Mobile Terminated (MT) only;
- demand Mobile Originated or Terminated (MO, MT).

A.1.6 Communication configuration

This attribute describes the spatial arrangement for transferring information between two or more access points. It completes the structure associated to a telecommunication services as it associates the relationship between the access points involved and the flow of information between these access points.

Values:

- point-to-point communication;
  this value applies when there are only two access points.
- multipoint communication;
  this value applies when more than two access points (1) are provided by the service. The exact characteristics of the information flows must be specified separately based on functions provided by the PLMN.

NOTE 1: The number of access points can be undefined.

- broadcast communication;
  this value applies when more than two access points (2) are provided by the service. The information flows are from a unique point (source) to the others (destination) in only one direction.

NOTE 2: The number of destination access points can be undefined.

A.1.7 Symmetry

This attribute describes the relationship of information flow between two (or more) access points or reference points involved in a communication.

It characterizes the structure associated to a communication service.

Values:

- unidirectional;
  this value applies when the information flow is provided only in one direction.
- bidirectional symmetric;
  this value applies when the information flow characteristics provided by the service are the same between two (or more) access points or reference points in the forward and backward directions.
- bidirectional asymmetric;
  this value applies when the information flow characteristics provided by the service are different in the two directions.

A.1.8 Data compression

This attribute indicates whether use of a data compression function is desired (and accepted) between an MT and IWF.

Values:

- use of data compression requested/not requested;
- use of data compression accepted/not accepted.

A.2 Attributes describing the access at the user equipment

A.2.1 Signalling access

This attribute characterized the protocol on the signalling channel at a given access point or reference point Values:

- manual;
- appropriate V-series protocol;
- appropriate X-series protocol;
- I-series stack of signalling protocols.

A.2.2 Information access

A.2.2.1 Rate

This attribute describes either the bit rate (circuit mode including transparent access to a PSPDN) or variable bit rate (packet mode) used to transfer the user information at a given access point or reference.

Values:

- appropriate bit rate;
- variable bit rate.

A.2.2.2 Interface

This attribute describes the interface according to the protocol used to transfer user information at a given access point or reference.

Values:

- appropriate V-series DTE/DCE interface;
- appropriate X-series interface;
- S interface;
- analogue 4-Wire interface.

A.3 Interworking attribute

A.3.1 Type of terminating network

Communication can be established between a UE in a PLMN (originating network) and a terminal in a network (terminating network) including the same PLMN or another PLMN. The attribute designates the terminating network.

NOTE 1: The terms "originating" and "terminating" do not indicate the direction of communication establishment.

NOTE 2: This attribute does not reflect whether there is none, one or several transit networks between the originating and terminating networks.

Values:

- PSTN;
- ISDN;
- PSPDN;
- PDN;
- PLMN;
- direct access networks.

A.3.2 Terminal to terminating network interface

This attribute describes the interface between a terminal equipment and the terminating network.

Values:

- appropriate V-series (DTE/DCE) interface;
- appropriate X-series interface;
- analogue 2 resp. 4 wire interface;
- S interface (D+B+B).

A.4 General attributes

A.4.1 Supplementary services provided

This attribute refers to the supplementary services to a given telecommunication service.

Values:

- appropriate supplementary services.

A.4.2 Quality of service

The Bearer Services use the Quality of Service attribute to indicate one of the following values:

- transparent;
  service characterized by constant throughput, constant transit delay and variable error rate.
- non-transparent;
  service characterized by an improved error rate with variable transit delay and throughput.

A.4.3 Commercial and operational

A.4.4 Service interworking

Annex B (normative): List of definitions of attributes and values used for teleservices

B.1 High layer attributes

B.1.1 Type of user information

This attribute describes the type of information which the communication offered to the user by the teleservice is based on.

Values:

- speech;
- short message;
- facsimile.

B.1.2 Layer 4 protocol functions

B.1.3 Layer 5 protocol functions

B.1.4 Layer 6 protocol functions

B.1.5 Layer 7 protocol functions

B.2 Low layer attribute (bearer capabilities)

The low layer attributes describe the bearer capabilities which support the teleservice. These low layer attributes and their values are the same as presented in Annex A: List of definitions of attributes and values used for bearer services.

B.3 General attributes

The general attributes are the same as presented in annex A: List of definitions and values used for bearer services.

Annex C (normative): Definition of "busy" in a PLMN

C.1 Scope

This annex describes the conditions under which a given mobile subscriber (station) is considered as "busy". In general, this occurs whenever the resources associated with that UE (and needed to successfully complete the call) exist but are not available for that call. The description is based on the busy definition in the ISDN (CCITT Recommendation I.221).

In addition, the operation of some Supplementary Services occurs when certain of these resources are busy. Therefore, these "resources busy" are also described herein.

This annex does not cover the cases, when network resources not associated with a given destination are unavailable, or when such resources are out-of-service or otherwise non-functional.

C.2 Network Determined User Busy (NDUB) condition

This condition occurs, when a call is about to be offered, if the information (i.e. traffic) channel is busy and the maximum number of total calls has been reached (see note).

This condition also occurs, when a call is about to be offered and an already on-going call attempt (incoming or outgoing) is in the establishing phase, i.e. not yet active.

When NDUB condition occurs, the PLMN will clear the call and indicate "busy" back towards the calling subscriber (see also clause 4).

NOTE: The value of the maximum number of calls is 1 for the basic call. When the supplementary service "Call Waiting" is applicable the value is n+1 where n is the maximum number of calls that can be waiting.

TS 22.135 [11] defines NDUB for Multicall environment.

C.3 User Determined User Busy (UDUB) condition

This condition occurs when a call is offered to a user equipment and the UE responds "user busy" because the subscribers resources (terminal or person using them) are busy. Then the PLMN will clear the call with the indication "busy" back towards the calling subscriber (see also clause 4).

C.4 Mobile subscriber busy

A mobile subscriber is considered to be busy if either a "Network Determined User Busy" or a "User Determined User Busy" condition occurs.

Some supplementary services (e.g. Call Forwarding on Busy) may cause the call not to be cleared when a busy condition occurs.

Annex D (normative): Call set-up procedures

D.1 Scope

This annex specifies the service requirements for call set-up, both Mobile originated and mobile terminated, in a network, including the establishment of radio contact.

D.2 Mobile Originated Call Set-up

When an UE wishes to start a call and there is no existing radio connection, it requests a signalling channel. When such a signalling channel has been allocated to the UE, the UE can transfer the call set-up information.

A traffic channel may be allocated at any time before the network informs the UE that the remote user has answered.

For a call to be set up, certain information needs to be sent by the UE to the network, defining the call. This information may be provided as default by the MS, it may be derived from the SIM/USIM or be entered by the user either directly into the UE or from a DTE by using the DTE/DCE Interface.

The following information is sent. Where necessary, default values will generally be inserted by the UE if not directly specified by the user. The Teleservice Emergency Calls are set up using a special procedure not using the fields described in this clause (except for the Bearer Capability).

D.2.1 Called Party Address

This is the address of the called party, generally as defined in ~~GSM~~ TS 2~~0~~3.003[15], using the TON/NPI specified below~~. In the case of Dedicated PAD or Packet Access, if NPI is set to PNP, the called party address field may be used to specify the profile to be used. In that case, the address of the called DTE will be given in-band as the second part of two-stage call set-up.~~

D.2.2 Calling/Called Party Sub-address

This is the sub-address of the calling/called party, as defined in ~~GSM~~ TS 2~~0~~3.003[15], in order to provide interworking with ISDN. This is described in more detail in ETS 300 059. Support and use of these fields are optional.

D.2.3 Type of Number

This indicates the format of the called party address. The selection procedure is given in TS 22.030 [9]. The following Types of Number are commonly used:

- International Format;
- Open Format ("Unknown");
- ~~Dedicated PAD/Packet Access.~~

D.2.4 Number Plan Indicator

This indicates the number plan of the called party address. Either of the following number plans may be the "default", depending on the contents of the Called Party Address (see TS 22.030 [9]):

- ISDN/Telephony E.164;
- unknown.

Alternatively, one of these number plans may be specified if appropriate:

- data network X.121;
- telex network F.69;
- National Numbering Plan;
- Private Numbering Plan.

D.2.5 Bearer Capability

This is used to define the type of call to be set up (telephony, data, rate etc.) For most applications, the UE will use a set of default conditions, generally on the assumption of a telephony call, unless otherwise set. These may be overridden by the user (or DTE via the DTE/DCE Interface) if desired except for the determination of the channel mode (full or half rate, speech codec conversion).

The UE shall indicate to the network its channel mode capability in terms of the data channels and the speech codec versions supported.

The network decides which mode to use on the basis of the requested bearer or teleservice, the available network resources and the channel mode capability of the UE:

- for the "alternate" and "followed-by" services, the same principle applies (with the exception of TS61, where a Full Rate or an Enhanced Full Rate channel shall be provided);
- for the full set of parameters and values, refer to ~~GSM~~ TS 2~~0~~4.0[13];
- for data services see the 3GPP~~GSM~~ 2~~0~~7 series.

Lower Layer Compatibility and Higher Layer Compatibility Information Elements may also be included.

D.2.6 Calling Line Indication Restriction Override

If the user wishes to override the calling line identification restriction, he may indicate this on a per-call basis as described in TS 22.030 [9] and TS 22.081 [10].

D.2.7 Action of the Network on Call Set-up

On receipt of the call set-up message, the network shall attempt to connect the call. However, if insufficient information has been provided by the UE to indicate the exact Bearer Capability requirements (e.g. due to missing or optional values or for rate adaptation for data), the network may insert the missing information, if this is possible, and the call set-up shall proceed using the new information. If the call set-up is unsuccessful, the network shall notify the UE of the cause.

D.3 Mobile Terminated Call Set-up

Using the procedures described in TS 22.011, the network knows the location area where the UE is positioned. If the UE is not already in two way radio communication with the network, the network pages the MS. Upon receiving its page message, the UE establishes communication with the selected cell. The network then allocates a channel which is used for signalling and sends call set-up information to the UE.

A traffic channel may be allocated at any instant until just after the call is answered by the UE.

The network indicates to the UE that it wishes to offer the UE a call. This notification includes the proposed bearer capability information, where available (see subclause D.2.5).

D.3.1 Bearer Type

If the calling party specifies the required bearer capability this shall be used for the call set-up attempt. If the calling party does not specify the required bearer capability (e.g. because the call originated in the PSTN), the network shall attempt to determine the bearer capability to be used as described below.

The network may use a multi-numbering scheme to define the bearer capability by the MSISDN. In a multi-numbering scheme several MSISDNs are associated with one IMSI. Each MSISDN is used for a different bearer capability. If the network uses a multi-numbering scheme and the calling party has not specified the required bearer capability then the network shall use the bearer capability associated with the called party MSISDN.

The network may use a single-numbering scheme, in which one MSISDN is associated with each IMSI. If the network uses a single-numbering scheme and the calling party has not specified the required service then the network shall omit the bearer capability information.

D.3.2 Response of the UE

On receipt of the call set-up request from the network, the UE shall check that it is able to support the type of call requested and that it is not User Determined User Busy (see annex C). The UE then alerts the user.

If the UE is unable to support the type of call requested, or the information is incomplete, the UE shall, if possible and not restricted by requirements in other ETSs, reply to the network proposing an alternative set of parameters, indicating those that are different from those proposed by the network. The network then either accepts this new proposal or terminates the call attempt.

D.3.3 Description of Call Re-establishment

Call re-establishment allows the user equipment to attempt to reconnect a call following the loss of radio coverage between the UE and the network while a call is in progress. Call re-establishment may be initiated by the UE when it detects this situation, if supported in the network.

Call re-establishment is mandatory in the ME and optional in the network.

Annex E (normative): Automatic calling repeat call attempt restrictions

Call set up attempts referred to in this annex are assumed to be initiated from peripheral equipment or automatically from the MT itself.

A repeat call attempt may be made when a call attempt is unsuccessful for the reasons listed below (as defined in TS~~GSM~~ 2~~0~~4.0~~0~~8 [13~~2~~]).

These reasons are classified in three major categories:

1) "Busy destination":
   - cause number 17 User busy.
2) "Unobtainable destination - temporary":
   - cause number 18 No user responding;
     19 User alerting, no answer;
     27 Destination out of order;
     34 No circuit/channel available;
     41 Temporary failure;
     42 Switching Equipment congestion;
     44 Requested circuit/channel not available;
     47 Resources unavailable, unspecified.
3) "Unobtainable destination - permanent/long term":
   - cause number 1 Unassigned (unallocated) number;
     3 No route to destination;
     22 Number changed;
     28 Invalid number format (uncompleted number);
     38 Network out of order.

NOTE 1: Optionally, it is allowed to implement cause number 27 in Category 3, instead of Category 2, as this is desirable already in Phase 1.

The table below describes a repeat call restriction pattern to any B number. This pattern defines a maximum number (n) of call repeat attempts; when this number n is reached, the associated B number shall be blacklisted by the MT until a manual re-set at the MT is performed in respect of that B number. When a repeat attempt to anyone B number fails, or is blacklisted, this does not prevent calls being made to other B numbers.

For the categories 1 and 2 above, n shall be 10; for category 3, n shall be 1.

call attempts	Minimum duration between Call attempt
Initial call attempt	-
1st repeat attempt	5 sec
2nd repeat attempt	1 min
3rd repeat attempt	1 min
4th repeat attempt	1 min
5th repeat attempt	3 min
nth repeat attempt	3 min

The number of B numbers that can be held in the blacklist is at the manufacturers discretion but there shall be at least 8. However, when the blacklist is full the MT shall prohibit further automatic call attempts to any one number until the blacklist is manually cleared at the MT in respect of one or more B numbers.

When automatic calling apparatus is connected to an MT1 or MT2, or where an MTO is capable of auto-calling, then the MT shall process the call requests in accordance with the sequence of repeat attempts defined above, i.e. requests for repeat attempts with less than the minimum allowed duration between them shall be rejected by the MT.

A successful call attempt to a number which has been subject to the call restrictions shown above (i.e. an unsuccessful call set up attempt has previously occurred) shall reset the "counter" for that number.

The "counter" for an unsuccessfully attempted B number shall be maintained in 24 hours or until the MT is switched off.

The automatic calling repeat call attempt restrictions apply to speech and data services.

NOTE 2: The restrictions only apply to unsuccessful Call Control activity, not to Radio Resource Management or to Mobility Management, so multiple attempts at radio channel access are not limited by this mechanism.

Annex F(informative): Procedures for call progress indications

F.1 General

Indications of call progress, such as ringing, engaged, unobtainable, and no radio channel, may in principle be verbal message, tones, displayed text or graphical symbols. Which combination of these applies may depend on the message, the UE and selection by the user or PLMN operator. However, verbal announcements will generally be reserved for situations which are peculiar to a mobile network, where users may be unfamiliar with any tone chosen to indicate conditions such as "call diversion" or "subscriber not available".

It may also be desirable to add comfort indications (e.g. tones, noise, music, clicks) while a call is being connected, since silence may cause an unfamiliar user to believe that nothing is happening.

Generally, on data calls, and on the data part of alternate speech/data or speech-followed-by-data calls, PLMN generated network tones and announcements should be muted.

F.2 Supervisory tones

F.2.1 General

Supervisory Tones, indicating primarily ringing, engaged and unobtainable numbers, may be generated by both the PLMN and PSTN.

Except for ring tone, all tones indicating call progress to a user shall be generated in the UE, on the basis of signals from the network where available, and are according to the standard defined in the present document.

Tones sent to a caller to a UE will be generated in the network, generally local to the caller, and will be to the standard of his local exchange, except for mobile to mobile calls, where the tones will be generated in the calling UE. For mobile terminated calls, the ring tone will be generated in the called MSC (except OACSU).

F.2.2 Method

In the interests of early release of the traffic channel on failure to succeed in setting up a (mobile originated) call, where possible supervisory tones should be indicated over signalling channels. The UE will then generate the required tones. However, if the network generates an in-band announcement this will be indicated to the UE. In this case the UE shall connect the user to the announcement until instructed to release the call, either by the user or by the network. An alternate procedure may apply for UE able to generate appropriate announcements internally.

The ring tone will be sent over the traffic channel, since this channel must be available for traffic immediately it is answered (exception: Off Air Call Set Up). The Ring Tone is therefore generated by the PLMN or PSTN supporting the called phone.

On failed mobile terminated call attempts, the called MSC will either signal to the caller, if this is possible, or else will generate the required supervisory tones.

"Alert" is not a supervisory tone. The indication is signalled, and the UE may generate any form of indication to the user that the UE is being called.

F.2.3 Standard tones

UE generated tones will be generally in accordance with CEPT ~~(GSM)~~, ANSI T1.607 ~~(PCS 1900)~~, or Japan recommendations, where appropriate, and are listed in table 1. Any network originated tones will be according to PLMN or PSTN choice.

F.2.4 Applicability

This method will apply in all cases where signalling is capable of indicating the supervisory tone required. However, for connection to certain fixed networks where this signalling is not possible, fixed network tones will be carried over the traffic channel.

User equipment may employ any suitable technique to indicate supervisory information. However, if tones are employed, they shall be in accordance with the present document. The use of these tones in the MSC is preferred.

NOTE 1: The tones and/or announcement to the calling party should not be provided if the Information transfer capability is set to UDI.

NOTE 2: For a call with information transfer capability set to 3.1 kHz, the use of tones and/or announcement may cause the expiry of an awaiting answer timer in a modem or fax machine.

F.2.5 Comfort tones

If desired by the PLMN operator, the network may optionally introduce "comfort tones" while the call is being connected, during what would otherwise be silence. This would be overridden by indication of a supervisory tone, an announcement or by traffic. PLMNs may offer this feature optionally to incoming or outgoing callers.

The "comfort tones" may take the form of tones, clicks, noise, music or any other suitable form, provided that they cannot be confused with other indications that might be expected.

This feature is intended to indicate to the user that his call is progressing, to prevent him terminating the call prematurely.

Table 1: Supervisory tones in UEs

Tone		Frequency			Tolerance		Type		
		CEPT	ANSI	Japan	CEPT ANSI	Japan	CEPT	ANSI	Japan
1	Dial tone (optional)	425 Hz	350 Hz added to 440 Hz	400 Hz	15 Hz	20Hz	Conti-nuous	Continuous	Conti-nuous
2 *	Subscriber Busy (Called Number)	425 Hz	480 Hz added to 620 Hz	400 Hz	15 Hz	20Hz	Tone on 500ms Silence 500ms	Tone on 500ms Silence 500ms	Tone on 500ms Silence 500ms
3 *	Congestion	425 Hz	480 Hz added to 620 Hz	Optional	15 Hz	Optional	Tone on 200ms Silence 200ms	Tone on 250ms Silence 250ms	Optional
4	Radio Path Acknowledgement (Mobile Originated only) (optional)	425 Hz	425 Hz	400 Hz	15 Hz	20 Hz	Single tone 200ms	Single tone 200ms	Tone on 1 Sec Silence 2 Sec
5	{Radio Path Not Available {Call Dropped – Mobile originated only	425 Hz	425 Hz	Optional	15 Hz	Optional	200ms} On/off 200ms} for 3 burst	200ms} On/off 200ms} for 3 burst	Optional
6 *	Error/Special Information} Number Unobtainable } Authentication Failure }	950 Hz 1400 Hz 1800 Hz	950 Hz 1400 Hz 1800 Hz	Optional	50 Hz 50 Hz 50 Hz	Optional	{Triple Tone {Tones on 330ms {Silence 1.0s	Triple Tone {Tones on 330ms {Silence 1.0s	Optional
7	Call Waiting Tone (CEPT)	425 Hz (tolerance 15 Hz), on for 200 ms, off for 600 ms on for 200 ms, off for 3 s, on for 200 ms, off for 600 ms on for 200 ms. This tone is superimposed on the audio traffic received by the called user. Alternate tones are *acceptable* but not preferred.							
7	Call Waiting Tone (ANSI)	440 Hz, on for 300 ms, 9,7 s off followed by (440 Hz, on for 100 ms off for 100 ms, on for 100 ms, 9,7s off and repeated as necessary) This tone is superimposed on the audio traffic received by the called user.							
7	Call Waiting Tone (Japan)	Optional							
Definition of these and other tones, together with advice on announcements, may be found in CEPT T/CS 20-15 and in T/SF 23.									
NOTE: *: The duration of these tones is an implementation option. However, in each case, the UE should be returned immediately to the idle state, and will be able to originate/receive calls, which will override these tones.									
Ringing Tone (Alternative National options permitted)		425Hz	440 Hz added to 480 Hz	Optional	15 Hz	Optional	Tone on 1 s Silence 4 s	Tone on 2 s Silence 4 s	Optional
For application of Call Control Cause Information Elements to these tones, see F.4.									

F.3 Recorded announcements

In present networks, both fixed and cellular, the language of recorded announcements and displayed information is invariably that of the country of origin. However, this is generally undesirable in a multi-lingual environment such as is encountered on a global network with international roaming. It is therefore probably desirable to minimise the number of such announcements.

Advanced UEs may be designed which have the ability to generate announcements in the form desired by the user, e.g. in the language preferred by the user. In this case, it becomes necessary to block any verbal announcements sent from the network towards the UE, to avoid clashes with those generated by the UE. The UE may be allowed to block in-band announcements in case appropriate announcements according to the Cause Information Elements (F.3) can be generated. The default setting of the UE shall be "non blocking", which could be set by MMI command to "blocking".

Announcements generated by the PLMN and sent to callers to that PLMN will generally be in the language of the PLMN. However, on some fixed networks it will be possible for the message to be signalled back to the caller's local exchange, which will then generate the announcement in its local language.

F.4 Application of call control cause information elements to supervisory tones

The Cause Information Elements are listed and defined in TS~~GSM~~ 2~~0~~4.0~~0~~8 [13]. This annex lists these elements and indicates which supervisory tone should be generated in response. It should be noted that some conditions (e.g. radio path not available, dropped call) may be deduced by the UE, rather than signalled explicitly over the air interface. All causes not listed below should result in the generation of tone 6. In case of multiple calls a tone should only be generated if it does not disturb an ongoing active call. "-" indicates no tone required.

Cause CC		Tone (see table 1)
16	Normal Clearing	1
17	User Busy	2
22	Number Changed	-
30	Response to STATUS ENQUIRY	-
31	Normal, unspecified	-
34	No circuit/channel available	3
41	Temporary Failure	3
42	Switching Equipment Congestion	3
44	Requested circuit/channel not available	3
49	Quality of Service Unavailable	3
58	Bearer Capability not available	3

Annex G (informative): Change history

Change history											
TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	WI
Dec 1999			02.01					Transferred to 3GPP SA1	8.1.0	3.0.0	
SP-06	SP-99519	S1-991076	22.001	001		R99	D	Mainly an editorial update for GSM/3GPP use	3.0.0	3.1.0	
SP-07	SP-000069	S1-000124	22.001	002		R99	D	Editorial modification for change of SMS-CB to CBS	3.1.1	3.2.0	
SP-07	SP-000053	S1-000133	22.001	003		R99	C	Procedure for call progress indications	3.1.1	3.2.0	
SP-09	SP-000389	S1-000642	22.001	004		R4	B	CR on TS22.001 for Bearer Modification without pre-notification	3.2.0	4.0.0	
SP-10	SP-000539	S1-000772	22.001	005		Rel-4	B	Subscription Check	4.0.0	4.1.0	BMWPN
								Accepting change bars introduced at SP-10	4.1.0	4.1.1	
SP-12	SP-010264	S1-010540	22.001	006		Rel-4	F	Removal Bearer modification without pre-modification from 22.001	4.1.1	4.2.0	BMWPN

Version	Date	Information about changes
V3.0.0	December 1999	Transferred to TSG SA at 3GPP SA#6. Under TSG TSG SA Change Control.
V3.1.0	December 1999	Implemented CRs approved at SA #06.
V3.2.0	March 2000	Implemented CRs approved at SA #07.
V4.0.0	October 2000	Implemented CRs approved at SA #09 to create Release 4 version.
V4.1.0	January 2001	Implemented CRs approved at SA #10.
V4.1.1	February 2001	Change bars introduced at SP-10 have been accepted.
V4.2.0	June 2001	Implemented CRs approved at SA #12.

CR-Form-v4

CHANGE REQUEST

⌘ **22.228** **CR** **012** ⌘ ev **-** ⌘ Current version: **5.4.0** ⌘

Spec Title: **Service requirements for the IP Multimedia Core Network Subsystem (Stage 1)** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

2.1 Normative references

[1] 3GPP TS 22.003: " CS Teleservices supported by a PLMN".

[2] 3GPP TS 22.011: "Service Accessibility".

[3] 3GPP TS 22.060: "General Packet Radio Service (GPRS) stage 1".

[4] 3GPP TS 22.066: "Support of Mobile Number Portability (MNP)".

[5] 3GPP TS 22.101: "Service principles".

[6] 3GPP TS 22.105: "Services and Service Capabilities".

[7] 3GPP TS 22.121: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; The Virtual Home Environment"

[8] 3GPP TS 22.129: "Handover requirements between UTRAN~~MTS~~ and GERAN~~SM~~ and other Radio Systems".

[9] RFC2543: "SIP: Session Initiation Protocol"

[10] 3GPP TS 22.078: ”; Customised Applications for Mobile network Enhanced Logic (CAMEL); Service definition - Stage 1”

[11] 3GPP TS 22.057: ”; Mobile Execution Environment (MExE); Service description, Stage 1”

[12] 3GPP TS 22.038: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; USIM/SIM Application Toolkit (USAT/SAT); Service description; Stage 1"

[13] 3GPP TS 22.127: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Stage 1 Service Requirement for the Open Service Access (OSA)

[14] 3GPP TR 21.905 : “Vocabulary for 3GPP specifications”

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

Annex A (informative): Example IP multimedia application scenarios

The following example scenarios describe the personalised handling of individual media in multimedia applications (note that this list is neither complete nor exhaustive):-

1. The user is in a voice communication, and receives an incoming IP video communication. The user decides not to accept the communication, but diverts the incoming video to a messaging system. Further, the user is given an indication that there is a video message in his mail box

2. The user is in a voice communication, and receives an incoming video communication. The user decides to accept the communication but wishes to switch between the two communications.

3. The user is idle in a network and not involved in a communication. The user modifies his user profile to divert all voice communications other than those from high priority, pre-identified callers (e.g. his boss). In this scenario all emails and text messages continue to be received regardless of the sender.

4. On receiving a communication, the calling party's identity is displayed (if not restricted) and user shall be able to decide whether to accept the communication, or divert to a messaging system. The user shall be able to request media handling of the communication (e.g. media splitting to different destinations, media conversion).

5. The user is busy in a communication when receiving an incoming communication, but responds to the originating party that he will respond later. The user may request that the originating party's details (if not restricted) are stored with a reminder in user's profile.

6. The user is in a voice communication, and receives an incoming IP video communication. The user decides not to accept the communication, but diverts the incoming video to a messaging system. Further, the user is given an indication that there is a video message in his mail box

7. The user is in a voice communication, and receives an incoming video communication. The user decides to accept the communication but wishes to switch between the two communications.

8. The user is idle in a network and not involved in a communication. The user modifies his user profile to divert all voice communications other than those from high priority, pre-identified callers (e.g. his boss). In this scenario all emails and text messages continue to be received regardless of the sender.

9. On receiving a communication, the calling party's identity is displayed (if not restricted) and user shall be able to decide whether to accept the communication, or divert to a messaging system. The user shall be able to request media handling of the communication (e.g. media splitting to different destinations, media conversion).

10. The user is busy in a communication when receiving an incoming communication, but responds to the originating party that he will respond later. The user may request that the originating party's details (if not restricted) are stored with a reminder in user's profile.

11. Hi-fi sound (nuances, character of voice)
    Person(s): Marketing Manager, Rita
    Situation: She is at a launch party for some customers in London. In the break she listens to her messages and one from another customer in Tokyo gets her attention. He just wants her to call, but doesn't say if it is urgent or not.
    Solution: Due to the excellent sound quality of the terminals involved and the messaging system, she picks up the faint irritation in his voice and decides to call him immediately. It was urgent and she could remedy the situation easily by emailing the information from her built in PDA storage. The customer was relieved as he was just going in to a very important meeting.
    Benefit(s): Good sound quality gives more information to base judgements on, i.e. emulates real life meetings better.

12. Stereo sound (nuances, character of voice plus positions, sound-scapes)
    Person(s): Purchase Officer, Gustavo
    Situation: Participates in a conference to discuss purchase of a new kind of steel for the factory in Rio. As he is on the road he calls from his hotel room in Sydney. The conference is in the head office in Rio. The local department has invited the two final contenders to have them argue their cases. The two companies are positioned at the different ends of the table. One of the groups is presenting and mentions something about deliveries. A side remark is barely audible, "we can't deliver that quality and that quantity this year !" Who gave this remark?
    Solution: The excellent sound quality together with the stereoscopic sound gives Gustavo the information he needed. It was the other group that gave the remark. The decision was made for him at that point. He gave the order to the presenting group right after they finished a very good presentation that told him everything he wanted to hear. The setup at the head office was done with two synchronized ~~3G phones~~UEs at each end of the table.
    Benefit(s): Stereoscopic sound gives even more information than just hi-fi sound to base judgements on, i.e. emulates real life meetings better.

13. Conference/chat with "private rooms"
    Person(s): A project team at an IT company: Rick, Diana, Ted, Sven and Liu
    They are based in different cities.
    Situation: The project team has one of their weekly reporting meetings using their mobile communicators. In the middle of the meeting, Rick and Diana get lost in a lengthy arguing on some detailed design matters that bores the rest of the team. Ted, the moderator, finds that it is nevertheless necessary to give Rick and Diana some minutes to finish their discussion, so he decides to not interrupt them. At the same time Sven remembers that he need to remind Liu to send a report to him on the latest findings from her research work.
    Solution: The team use a conference/chat service with the new facility "private rooms". This allows Sven to direct a few words in privacy to Liu. Sven activates easily this feature by the GUI of his communicator. Liu is immediately notified by the GUI of her communicator that Sven is now talking privately with her (this is necessary to avoid embarrassing misunderstandings that could occur if Liu would answer Sven in the "common room" instead of in the new "private room" that Sven has created).
    Since the voices of all conference members are synthetically mapped in a stereophonic projection, Liu is able to hear what Sven is saying, even though he speaks simultaneously with the other team members (the communicator

will not automatically adjust the sound volume of the "common room", since it cannot know if Liu is more interested in Sven's comments or in continuing to listen to the other team members).
Benefit(s): This service emulates virtual presence in a conference room in the best possible way without adding more visionary technologies like holographic projections, etc. The synthetic stereophonic sound projection provides good possibilities for a conference member to discriminate unwanted voices even if the meeting situation is informal and spontaneous and everyone are talking at the same time. The flexible possibilities to create one or more "private rooms" make it easy to make private comments to selected colleagues. The easy-to-use and fast responding GUI makes the needed end-user effort to create a new "room" so low, that it feels natural to use the function even for exchanging just a few quick words.
Alternative use: Exchange the IT project team with a gang of teenagers that are planning what to do in the weekend. The service works perfectly well also in that scenario and provides the same benefits.
Additional features: Easy GUI controlled addition of new participants (can be initiated by any of the participants), including addressing, notification/invitation, etc. (cf. "outgoing call" in PSTN). GUI notification of new incoming session invitations (cf. "incoming call" in PSTN) and possibility to choose action as desired (incorporate the "calling party" in the existing conference session, creating a new separate session, rejecting the invitation, diverting it to a messaging system, etc.) Whiteboarding and/or application sharing.

14. Multiplayer mobile gaming with voice channel
Person(s): Joe (age 15), Blenda (age 14), Fredric (age 15) and all their "cyber friends" in the Shoot-n-Shout v.14.0 community
Situation: In the legendary multiplayer game Shoot-n-Shout v.14.0 the most popular game mode is a team competition. The idea is simply to shoot down the members of the concurring teams. There are always a lot of active game sessions in CyberSpace. At a web/WAP service operated by the game application provider, interested potential players can choose a game session and also find other gamers to form a team with. There is a text chat service where potential team-mates can learn to know each other.
Joe, Blenda and Fredric meet on the web/WAP chat and decide to form a team to take up the fight in one of the Shoot-n-Shout sessions. They are preparing a game strategy in advance through the text chat service, but when they have started the battle it takes too long time to type text, so they the will need another way to communicate with each other.
Solution: The game application provider makes use of a conference/chat service with "private rooms" in order to provide a multi-player voice service to the players of Shoot-n-Shout. When a game starts there is one "common room" where all players can talk (or rather shout) to each other and one "private room" for each team. Players in a team can also dynamically create more "private rooms" if they only like to talk to one (or a few) of their friends. (See the conference/chat scenario for details.)
The volume (and stereophonic position) of the players voices when they are using the "common room" is controlled so that it matches the virtual surroundings in the game environment. As an example, players that are behind a wall will only be heard as a vague whisper in the distance.
Benefit(s): A voice channel will enhance the gaming experience for several popular network games.

15. Application sharing with voice commentary
Person(s): Marketing Manager, Rita and Media expert, Jones
Situation: The launch of a new campaign for some customers in London. Last minute feedback is that one of the customers is expecting the latest gadget to be included, even if its only a prototype. Rita knows it's not included in the presentation and she has no information with her.
Solution: Rita calls Jones, the media guru they employed for design of their important presentations. He has the information and some pictorials. He sends them over into Rita's PowerPoint application and they edit the new slide together as they discuss the textual information to be included.
Benefit(s): The process is extremely interactive and the session takes only 5 minutes thanks to the broadband connection and the fact that they don't need to Ping-Pong the pictures and the text back and forth. (Emphasize mobile or fixed access as required). The customer is happy and a Letter of Intent is signed.
Comments: By adding voice and pictures in an interactive session we achieve both effectiveness and interaction, two desired components.

16. Emergency location with voice conversation, navigation and picture transfer
Person(s): Ma Beth, her children and the pet dog Bobby
Situation: The family is out driving in the country side and they take a turn on the slippery country road a bit too fast. They slide down into the ditch. Bobby the dog in the back of the van gets a heavy box of books on top of his left paw. It may be broken, and you can tell it certainly hurts from the loud yelps that come out in a rushed stream. The rest of the family is ok. They were all buckled up.
Solution: Ma Beth reaches for her ~~3G~~ communicator as soon as she has recovered from the initial shock. She calls 112 (911 or similar). The answer comes after 23 seconds and the operator immediately confirms the identity and the location of the van. Ma Beth is a bit taken aback by this quick information and has to think for awhile, then

confirms the location as possibly correct. She then states the problem and she gets connected to a vet that asks a few pertinent questions. She can show a close up picture of the dog's left paw and the vet confirms a possible (95%) broken leg just above the paw. He gives a few quick instructions and sends her a map of the closest emergency animal hospital. The map shows her current position and soon displays the quickest way to get to the hospital. Well there, Bobby is taken care of and things are looking up. Even the kids are smiling now that the dog is calm and free from pains, and he looks so funny with his little cast.
Benefit(s): The initial call transfers emergency information to the operator automatically. This ensures minimum delay to correct action. The Communicator transfers the picture that gives enough information to make a very accurate and fast assessment of the situation. Then the map transfer and display on the terminal together with the current position gives clear information and directions for Ma Beth to drive and make the right turns at every corner. In her still half-shocked state she can drive to the hospital without hesitation about where to go. Very reassuring for all parties including the dog that gets fastest possible help.
Comments: The call is initially just a voice call but evolves with the best of positioning in emergency situations and navigational aid together with picture and graphics transfer.

17. The Real Virtual Theatre and Foyer Chat room – Fixed Network example
Person(s): Theatre going "cultural" group with one member (Bob) in a hospital bed.
Situation: The group is watching the play and are utterly fascinated by the first act. When they come out into the foyer in the break they remember Bob. They really want to share this first act with him since they know Shakespeare's Midsummer Night's Dream is his favorite.
Solution: Bob uses the theatre's online streaming service via the hospital network. (At only half the price of a theatre ticket!). The play displays in color and stereo surround sound on his bedside TV set. In the break his friends call him up from the theatre chat room. The chat room is equipped with 3D sound pick up and local display screens with streaming facilities. They set up the streaming from one of the screens to be synchronized with Bob's bedside equipment. Their voices are also mixed into the sound streams as they talk. Bob now gets both the playbacks from the first act and his friends' voices in 3D surround sound. Bob's voice is projected close to the screen as if he was standing leaning on the bench right there. His voice is very clear and full of emotions as he speaks to the various playbacks. Both parties can control the playbacks and watch their own selection in a second window on the screen.
Benefit(s): Bob can pick up every nuance in the lively discussion, including the whispered comments from Greta in the back. The group is almost feeling Bob's presence because of the emotional clarity and distinct position of his voice. As both parties have control and visibility of the streaming sessions, it is very effective and very interactive.
Comments: Experiential services are sought after. This one can be a bit exclusive because of the equipment requirements, but the uses are many.

18. Mobile synchronized MM container
Person(s): The married couple Bill and Christine and their daughter Linda
Situation: Bill is on a business travel to Spain. He calls his wife Christine every night using his MMM terminal. Often Christine is answering at home using her Screenphone, but this particular evening Christine has arranged a baby-sitter for their children so she could go to a restaurant with some friend. When Bill is calling, she is sitting on the commuter train on her way home. Bill often show some pictures during his calls (both live pictures showing the environment where he is at the moment and pictures that he has been taking during the day with his separate digital camera).
Today, their talk starts off as a common voice conversation. After a while Bill likes to show Christine the lovely sunset view that he can see from his hotel room, so he make some snapshots with the built-in camera of his terminal and sends them in real-time mode to Christine. Christine likes to show one of them to their little daughter Linda when she comes home.
Solution: With a quick gesture on the touchscreen of Christine's MMM terminal, she instantly moves the selected picture from the real-time session window to the "multimedia container" icon. All the contents of the "container" is automatically mirrored between the MMM terminal and her home server. In this way, Christine can easily pick up the picture from her Screenphone at home. If Linda is at sleep when Christine comes home, she can wait until tomorrow.
Benefit(s): The "multimedia container" can be used for every type of MM content that one likes to have available both at home and at another location. This "container paradigm" is very intuitive and stimulates the use of images, video clips etc. for a multitude of purposes. The "container" can be used both for transferring content from the MMM terminal to the home server (as in this scenario) and in the opposite direction.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.226** **CR 002** ⌘ ev **-** ⌘ Current version: **5.1.0** ⌘

Spec Title: **Global Text Telephony; Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

2 References

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

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

[1] 3GPP TS 22.101: "Service Principles".

[2] ETSI ETR333; Text Telephony; User requirements and Recommendations

[3] ITU-T H.248 Annex F Facsimile, Text conversation and call discrimination packages (2000)

[4] ITU-T Recommendation T.140 (1998) – Text conversation protocol for multimedia application. With amendment 1 (2000).

[5] ITU-T Recommendation F.700 (2000) – Framework recommendation for audiovisual/multimedia services.

[6] ITU-T Recommendation V.18 (2000) – Operational and interworking requirements for DCE:s operating in the text telephone mode.

[7] 3GPP TS 22.140: "Multimedia Messaging Service; Stage 1"

[8] 3GPP TS 23.140: "Multimedia Messaging Service; Functional description; Stage 2"

[9] IETF RFC 2793. (2000) RTP Payload for text conversation.

[10] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

3 Definitions and abbreviations

3.1 Definitions

Total Conversation: A service offering standardised simultaneous text, video and voice conversation or a subset thereof.

Host environment : The session environment where the text component is added. E.g. Circuit switched voice, IP Multimedia etc.

Text Conversation: A real time conversation in text with transmission character by character as entered.

Further definitions are listed in 3GPP TR 21.905 [10].

3.2 Abbreviations

For the purposes of this document the following abbreviations apply:

EDT European Deaf Telephone
GTT Global Text Telephony; The feature that adds real time text conversation to any 3GPP conversational environment

GTTFE	Global Text Telephony Feature Environment – The network components and functions forming GTT
TTY	Here used as the term for the text telephone type dominating in USA.
DTMF	Here used as a term for the text telephone type used in Holland, using DTMF tones.
VCO	Voice Carry Over: Alternating (or parallel) sending of Speech and receiving Text
HCO	Hear Carry Over: Alternating (or parallel) receiving Speech and transmission of Text
FCC	Federal Communications Commission (of United States of America)
PER	Printable character Error Rate
MMI	Man Machine Interface
SIM	Subscriber Identification Module
ITU	International Telecom Standardisation Union
GSM	Global System for Mobile communication
~~UMTS~~	~~Universal Mobile Telecommunication System~~
3GPP	Third Generation Partnership Project
CS	Circuit Switched
IP	Internet Protocols

Further abbreviations are listed in TR 21.905 [10].

4 High level Requirements

The following list gives the high level requirements of the GTT. These are requirements which are independent of the user's perception of the feature:-

- Service definition

  Global Text shall provide a real time conversational text feature. A general definition is found in Recommendation ITU-T F.700[5].

- Global Text Telephony host environments

  A standardised method for Global Text Telephony shall at least be specified for each host environment in the mobile networks that can carry voice.

- Standards compliant and forward compatible text conversation

  Global Text Telephone mechanisms shall provide the capability to support current and evolving text telephony and text conversation features by re-using existing standards as far as possible and proposing extensions (as necessary) to existing standards (i.e. the global text telephony feature shall support the evolution of Total Conversation technologies in all networks).

- Consistent text conversation

  Regardless of the selected host environment, the far end terminal, the interworking facilities involved, GTT shall be capable of providing a consistent way of handling the conversation.

- Global Text Telephone access

  Within the capabilities of networks and terminals, the user shall be provided consistent access to the GTT regardless of the access point.

  For example: the user shall be capable of accessing the text conversation features through a number of different access points, including ~~3G and 2G~~ networks based on 3GPP specifications, access through dedicated multimedia terminals, and access through combinations of mobile phones combined with text user interface devices.

- Interoperability

  Global Text Telephony shall support interoperability with existing and emerging text telephone systems and text conversation features.

Global Text Telephony shall support a minimum set of environments where text conversation is supported to ensure full interoperability between different terminals and networks.

- Emergency calls

  The implementation of Global Text Telephony shall enable a user to make emergency calls to, and receive calls from, an emergency call centre via a text telephony device used in conjunction with GTT enabled user equipment.

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

10 Additional services

10.1 Emergency services

It shall be possible to support emergency service calls with text and voice.

If an emergency service centre supports call back to the calling user, then the call-back function shall be available for GTT text calls without modification to the existing emergency service centre text telephony equipment.

GTT emergency calls shall be possible without the SIM/USIM module in the same host environments as such calls are enabled for voice.

All information that follows a voice call to the emergency centre, shall also be provided to the centre if GTT text is used in the call.

The emergency service requirements shall be possible to fulfil for emergency service centres equipped with PSTN text telephones, operated through a relay operator service or an interworking functions.

Support of GTT service for emergency calls shall not jeopardise normal emergency calls.

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

B.2 Man Machine Interface (MMI)

These Requirements and Objectives are to some extent depending on implementation and not on the transmission standard. This list shall by no means restrict the innovation capabilities of vendors, but give guidelines and define a minimum set, against which the transmission standard needs to be checked.

B1: The Text Telephone user must be able to monitor all aspects of call progress (same or more information as provided to voice users) by tones and visualisation (TTY/FCC 2). The transmission standard shall provide the necessary monitor information to the MMI.

B2: There must be an indication, by tones and visualisation, when the call is connected or disconnected (TTY/FCC 3).

B3: Call information such as caller identification, where provided in mobile voice services, should also be provided for Text Telephony calls (TTY/FCC 11 adapted).

B4: The Text Telephone system must be able to send “Text Tones” to a normal telephone user, to indicate that he is using a text telephone, even if the other user has only a normal phone (TTY/FCC 6 adjusted).

B5: The Text Telephone user must have a means of tactile (vibrating) ring signal indication. (TTY/FCC 5), besides an acoustical and optical ring signal indication (new).

B6: Emergency calls (e.g. to 112 or 911 numbers) shall not require any further user interaction than for any normal voice call. (except to connect the possible additional equipment) (new).

B7: Call back from Emergency Call Centres should not require any further user interaction than for any normal voice call (except to connect the possible additional equipment) (new.

B8: Call setup to and from other Text Telephone users of the same type according to the new standard should not require any further user interaction than for any normal voice call (new).

B9: Call setup to and from other Text Telephone users of an other kind (e.g. those defined in ITU V.18) may require some user activity, like

- sending a short additional precode (e.g. 2..3 digits) or
- typing a short digit sequence to invoke the service (e.g. like #55*) or
- (on user´s preference) the permanent subscription to such a service
- a capability signalling by the mobile
- activating a text telephone application
- others

B10: The new standard should allow the usage of ordinary unmodified mobile phones as already available to the user or on the mass market, in order to get the advantage of high volumes price level.

B10: The new standard shall allow to hide the intermediate (with existing phones) necessary user interaction, as described in the items before, in modern equipment (automatic service).

B11: The use of the Text Telephone for emergency calls with unregistered phones or without SIM/USIM ~~card~~ shall be possible as for normal voice calls.

B12: The interface to the possible adapters shall be exactly specified with

- mandatory interfaces (as to allow interaction to existing Text Telephones and the basic access to the mobile phone) and
- optional interfaces (as to connect microphone and loudspeaker, the control port of the mobile phones, …)

B.3 Compatibility

C1: The standard shall be compatible to equipment on the landline side as specified in ITU recommendation V.18 (TTY/FCC 12, extended), including all annexes of V.18 and V.18 with V.61 for voice and text simultaneously

C2: The landline party's Text Telephone equipment shall not need modifications or additions in order to be compatible and to achieve the desired error rate (TTY/FCC 7).

C3: It shall be possible to deploy the Text Telephone standard world wide in all systems based on 3GPP specifications ~~GSM and UMTS networks~~ (new).

C4: The wireless Text Telephone (i.e. on the Mobile user side) may require modifications or additions or the development of new equipment (TTY/FCC 8). The smaller the modifications or additions the better.

C5: Roaming between networks of different operators of the same kind of wireless technology shall be possible, provided the operators has installed the service.

C6: Is should be possible to connect equipment implementing the standard to any existing mobile phone of any existing wireless standard.

C7: Communication between Text Telephones in different kinds of wireless technologies shall be possible.

C8: Communication with text between mobile text telephones and multimedia devices with text shall be possible.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.146** **CR 030** ⌘ ev **-** ⌘ Current version: **5.1.0** ⌘

Spec Title: **Multimedia Broadcast/Multicast Service; Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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

2 References

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- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: " Vocabulary for 3GPP Specifications ".

[2] RFC 1112: "Host extensions for IP multicasting", RFC 1920:" Internet official protocol standards", RFC 1458: "Requirements for multicast protocols", RFC 1301: "Multicast transport protocol"

[3] ~~3G~~3GPP TS 22.060: "General Packet Radio Service (GPRS); Service description; Stage 1".

[4] ~~3G~~3GPP TS 23.060: “General Packet Radio Service (GPRS); Service description; Stage 2".

[5] ~~3G~~3GPP TS 25.324: “Broadcast/Multicast Control BMC”

[6] ~~3G~~3GPP TS 23.041: “Technical Realization of Cell Broadcast Service (CBS)”

3 Definitions, symbols and abbreviations

TSG-SA WG 1 (Services) meeting #15 **S1-020468**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.140** **CR** **014** ⌘ ev **-** ⌘ Current version: **5.0.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR - Update of references and general requirements
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11 Feb 02
Category:	⌘	**D**
Release:	⌘	*REL-5*

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

Use one of the following releases:

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

Reason for change:	⌘	Update of references in the document, deletion of explicit reference to service capabilities features as a mechanism to support the requirements.
Summary of change:	⌘	- removed the version numbers in the referenced documents - added reference to 21.905 - simplified the last paragraph of section 5 - Removed the definition of Service capability features - changed the word “received” in “retrieved” in 5.5
Consequences if not approved:	⌘	Incorrect reference format, missing references. Superfluous definition.

Clauses affected:	⌘	2, 3.1, 5, 5.5
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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

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

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

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

*** First modified section ***

2 References

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

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[1] 3GPP TS 22.101 ~~(V3.6.0 onwards)~~: "Service Principles".

[2] 3GPP TS 22.121 ~~(V3.0.0 onwards)~~: "The Virtual home Environment".

[3] 3GPP TS 21.133 ~~(V3.0.0 onwards)~~: "3G Security; Security Threats and Requirements".

[4] 3GPP TS 21.905: “Vocabulary” ~~3GPP TS 22.975 (V3.0.0 onwards): "Advanced Addressing".~~

*** Next modified section ***

3.1 Definitions

Recipient : the recipient is the entity to which a MM has been sent.

Sender: the sender is the entity that sent a MM.

User: the user is the MM sender or the MM recipient.

message element: a message element is a part of a MM consisting of only one media type.

multimedia message: a multimedia message is a message composed of one or more message elements.

multimedia message service: A multimedia message service allows transfer of multimedia messages between users without the requirement for the multimedia messages to be transferred in real-time.

media types: a media type refers to one form of presenting information to a user, e.g. voice or fax.

media formats: within one media type different media formats are applicable for the media presentation, e.g. a picture can be GIF or JPEG format.

network: for the purposes of supporting multimedia messaging, the term network shall be considered to include the mobile operator's network and any functionality which may exist outside the mobile operator's network (i.e.fixed, internet and multimedia technologies etc.), and the support provided by that functionality for multimedia messaging.

~~**service capabilities features:** see Reference [2].~~

Value Added Service Provider: ~~Provides services other than basic telecommunications service for which additional charges may be incurred~~see Reference [2].

*** Next modified section ***

5 General Requirements

Network operators have many differing requirements, and MMS shall be supported in the network in a manner which allows network operators to consider different configurations depending on their network and commercial requirements. Thus, an identified set of functionalities and formats shall be standardised to ensure interoperability across networks and terminals to support MMS.

However, some network operators may wish to design and configure networks in different ways, and the subsequent requirements are identified to allow flexibility in how the MMS functionality is supported. For example in some networks the network operators may wish to implement the MMS functionality within the core network, whereas other may wish to place the MMS functionality on the periphery of the core network (e.g. a centralised network model instead of a distributed architecture). Further, some network operators may wish to support a limited set of MMS functionality, while others may require extensive and elaborate MMS support according to their business models (e.g. basic MMS instead of advanced MMS). Interoperability shall always be maintained within this flexible architecture.

The following sub-clauses use the term "*The MMS shall be able to support a request for …*" and similar phrases to allow network operators to consider these different network models and business requirements, to permit flexible architectures and ensure MMS interoperability.

The following sub-clauses use the term *"This requirement shall be supported at the application layer in the terminal (and/or the network), and will not be further elaborated."* and similar phrases to identify those service requirements that shall be supported by MMS but do not require standardisation.

The criterion for identifying these types of requirements is as follows:

If the requirement corresponds to an interaction and/or command between the terminal and the network applications from the same Service Provider (e.g. between the recipient's terminal resident messaging application and the recipient's network resident application. The same applies for the sender), then this requirement shall be supported by MMS but does not require standardisation.

The following general requirements shall be supported ~~via the use of service capability features~~.

***

5.5 Management and Control of a Network Based Repository

Network based repository is optional. If supported, MMS shall be able to support following functionalities:-

- The MMS shall allow an MMS service provider to configure MMS in such a way that one, several or all incoming MMs of a particular user be stored persistently in a network based repository
- The MMS shall allow an MMS service provider to configure MMS in such a way that one, several or all submitted MMs of a particular user be stored persistently in a network based repository
- The MMS shall be able to support a request from a sender to persistently store a sent MM in a network based repository at the time of sending
- The MMS shall be able to support a request from a user to persistently store a MM for which he received a notification in a network based repository
- The MMS shall be able to support a request from a user to upload one or more MMs into a network based repository for persistent storage
- The MMS shall be able to support a request from a user to ~~receive~~ retrieve one or more MMs that are stored in a network based repository
- The MMS shall be able to support a request from a user to delete one or more MMs that are stored in a network based repository
- The MMS shall be able to support a request from a user to forward one or more MMs that are stored in a network based repository to another destination without being delivered first to that user.

- The MMS shall be able to support a request from a user to view the list of MMs and MM related attributes, such as sender, recipient, subject and date/time, in a network based repository

CR-Form-v4

CHANGE REQUEST

⌘ **22.140** **CR** **012** ⌘ ev **-** ⌘ Current version: **5.0.0** ⌘

Spec Title: **Stage 1 Multimedia Messaging Service** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title: ⌘	Editorial CR to correct terms and references	
Source: ⌘	SA1	
Work item code: ⌘	CORRECT	***Date:*** ⌘ 11/02/02
Category: ⌘	**A**	***Release:*** ⌘ Rel-4

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

Use one of the following releases:

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

Reason for change: ⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change: ⌘	References have been changed where necessary.
Consequences if not approved: ⌘	Illegal references will exist in the specification set.

Clauses affected: ⌘	Various		
Other specs affected: ⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments: ⌘			

4 High level Requirements

The following list gives the high level requirements of the MMS. These are requirements which are independent of the user's perception of the service:

- **Forward compatible multimedia messaging**

  Multimedia messaging mechanisms shall provide the capability to support current and evolving multimedia messaging by re-using existing standards as far as possible and proposing extensions (as necessary) to existing standards (i.e. the multimedia messaging service shall support the evolution of multimedia messaging technologies).

- **Consistent messaging**

  Regardless of the message type / format, MMS shall be capable of supporting integration of all types of messaging (e.g. fax, SMS, Multimedia , voicemail, e-mail etc.) in a consistent manner.

- **Universal messaging access**

  Within the capabilities of networks and terminals, the user shall be able to experience consistent access to the MMS regardless of the access point.

  For example the user should be capable of accessing her multimedia messages through a number of different access points, which should include 3GPP systems ~~and 2G networks~~, fixed networks, the Internet, etc.

- **Interoperability**

  The MMS shall support a minimum set of functionality and message formats to ensure interoperability. (e.g. deletion of MM, identified standardised message notification, message media types and message content formats).

  The MMS shall provide a minimum set of supported formats to ensure full interoperability between different terminals and networks from the very beginning of service provisioning (e.g. JPEG for pictures, MP3 for audio, MPEG for motion pictures, etc.).

  The MMS shall support version management by indicating a version number in the MM for interoperability purpose.

- **The MMS shall comply with the Virtual Home Environment specified in 22.121[2]**

  The non-real-time multimedia messaging service shall be supported using the standardised set of service capabilities features.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.140** **CR** **011** ⌘ ev **-** ⌘ Current version: **4.1.0** ⌘

Spec Title: **Stage 1 Multimedia Messaging Service** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.135** **CR 009** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **Multicall; Service description; Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
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Other comments:	⌘	

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

3GPP TS 22.135 V4.~~0~~1.0 (200~~2~~1-03)

Technical Specification

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Technical Specification Group Services and System Aspects;
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Contents

Foreword

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

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

Version x.y.z

where:

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

1 Scope

The present document presents describes Multicall supplementary service ~~for UMTS phase 1 release '99~~.

The general aspects, including definitions and recommended provision, of the description of the 3GPP Supplementary Services are given in 3GPP TS 22.004.

2 References

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

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

[1] 3GPP TS 22.001: "Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLMN)".

[2] 3GPP TS 22.004: "General on Supplementary Services".

[3] 3GPP TS 22.024: "Description of Charge Advice Information (CAI)".

[4] 3GPP TS 22.030: "Man-Machine Interface (MMI) of the Mobile Station (MS)".

[5] 3GPP TS 22.100: "UMTS Phase 1 Release 99".

[6] 3GPP TS 22.129: "Handover Requirement between UTRAN~~UMTS~~ and GERAN~~SM~~ or other Radio Systems".

[7] 3GPP TS 22.097: "Multiple Subscriber Profile (MSP) ".

3 Definitions, symbols and abbreviations

3.1 Definitions

CS Call: Circuit switched call. A call routed through CS domain. CS call can be for example a speech call, fax call or data call. One call shall only use one bearer at the time

Multiparty: Supplementary Service for speech conference service

N_{cs} MO: maximum number of simultaneous mobile originating CS calls. The value of The Value of N_{cs}**_MO**is 7. If N_{cs}**_MO** has been reached, no more MO calls can be set–up

N_{CS}_MT: Maximum number of simultaneous mobile terminating CS calls. The value of N_{CS}_MT is 7. If N_{CS}_MT has been reached, additional MT call attempts shall fail without any indication to the called subscriber

N_{br}: Maximum number of simultaneous CS bearers. The value of N_{br} is the smallest value within the N_{br}_User, N_{br}_UE, and N_{br}_SN

N_{br}_User: Maximum number of simultaneous CS bearers allowed, as defined by the user within the limits given by N_{br}_SB

N_{br}_SB: Maximum number of simultaneous CS bearers allowed, defined by the service provider in the Multicall subscription

N_{br}_UE: Maximum number of simultaneous CS bearers supported by the UE

N_{br}_SN: Maximum number of simultaneous CS bearers supported by the serving network

4 Description

4.1 Description of multicall

The Multicall supplementary service enables a mobile subscriber to have several simultaneous CS calls, each call using its own dedicated bearer.

Only one CS bearer can used for speech at any one times.

A speech call is one of TS11 (Telephony), TS12 (Emergency Calls), and TS61 (Alternate speech/fax). If the bearer capability information is not available, e.g. the call is originated/transited by a PSTN, the basic service cannot be deduced and the network shall, for multicall purposes, handle the call as telephony.

A held call shall be regarded as using the bearer used while the call was active.

NOTE: The 3GPP protocol architecture ~~in GSM~~ allows several parallel CS calls, the limitation being that there is only one traffic channel in GERAN, which the different CS calls share. This is facilitated by e.g. the Call Waiting, Call Hold, Call Transfer and Multiparty Supplementary Services. Call configurations related to ~~GSM~~ supplementary services are not considered as Multicall. See clause 7 for interaction.

It shall be possible for each CS call to use a dedicated bearer of independent traffic and performance characteristics. It shall be possible to release each active CS call independently of any other CS call.

4.2 Applicability to telecommunication services

The applicability of this Supplementary Service is defined in 3GPP TS 22.004.

5 Functional requirements

5.1 Provision

Multicall is provided by prior arrangement with the service provider.

Multicall shall be provisioned for all Basic Services (BS) subscribed to and to which it is applicable, i.e. not to any subset of these BS.

When the Multicall supplementary service is provisioned the maximum number of simultaneous CS beares available to the subscriber (N_{br}_SB) shall be defined as part of the subscription. The value for N_{br}_SB shall in the range from 2 up to 7.

5.2 Withdrawal

It shall be possible to withdraw the Multicall supplementary service subscription on request of the subscriber or for administrative reasons.

5.3 Registration

The user shall be able to modify the maximum number of CS bearers available (N_{br}_User) within the limitations set by the service provider. (N_{br}_SB).

If the subscriber attempts to register a value for N_{br}_User that is higher than the value of N_{br}_SB, the request shall be rejected and the subscriber shall be informed on the unsuccessful outcome on the request.

5.4 Erasure

Data related to the Multicall supplementary service shall be erased by the service provider as a result of withdrawal.

5.5 Activation

The Multicall supplementary service shall be activated by the service provider as a result of provision.

5.6 Deactivation

The Multicall supplementary service shall be deactivated by the service provider as a result of withdrawal.

5.7 Invocation

The Multicall supplementary service shall be invoked by the system when at least one call is in progress and another call with a dedicated bearer is to be set up. The Multicall service applies to mobile originating and mobile terminating calls.

5.8 Interrogation

The user shall be able to interrogate the network for the values of N_{br}_User, N_{br}_SB and N_{br}_SN.

5.9 Call related procedures

5.9.1 Terminating CS call

The indication of a terminating CS call to the mobile terminal will be done by the Multicall supplementary service until either the maximum number of bearer (N_{br}) or the maximum number of CS mobile terminating calls (N_{cs}_**MT**) has been reached.

If the maximum number of terminating calls (N_{cs}_MT) has been reached, and additional terminating call shall be reject without any indication to the subscriber.

If the maximum number of bearers (N_{br}) has been reached an additional terminating call will be only indicated to the user if the user has the Call Waiting supplementary service active, see chapter 7.4.2 for interactions with Call Waiting.

If N_{br} and N_{cs}_MT havenot been reached, a terminating call is indicated to the user and she may react in the following way:

a) Accept the terminating call:

- The user/user applications shall have the possibility to allocate a new bearer for the terminating call.
- If the user has the Call Hold SS active, the user shall have the possibility to reuse/share an already established bearer (e.g. release existing calls or put an speech on hold and accept the terminating call).

b) Rejecting the terminating call:

- If the user rejects the terminating call the call shall be released in a normal way.

c) Ignore the incoming call:

- If the user ignores the indication of the terminating call (i.e. neither accepts nor rejects it), the normal call handling shall apply, e.g. after the Alerting Timer expires the call will be released.

If there is a terminating speech call attempt and an ongoing speech call (active or held), the terminating call shall not be indicated to user by the Multicall service. The Call waiting call SS shall be invoked if applicable, see chapter 7.4.2 for interactions with Call Waiting SS.

The user can have possibility to reuse/share a bearer only when she is provisioned for Call Hold SS. See subclause 7.4.1 for interaction with Call Hold SS.

5.9.2 Originating CS call

If neither N_{br} nor N_{cs_MO} have not been reached and the user wants to establish a new originating CS call she may act in the following way:

a) allocate a new bearer for the originating call;

b) reuse/share an already established bearer (e.g. to put an speech on hold and set-up a new call).

The user can have possibility to reuse/share a bearer only when she is provisioned for Call Hold SS. See subclause 7.4.1 for interaction with Call Hold SS. The mobile terminal shall not originate a speech call requesting a new bearer when there is already an active speech call.

5.10 Charging requirements

Each of the calls using a dedicated bearer shall be charged individually.

Allocation of a dedicated bearer shall be visible in the charging data.

6 Exceptional procedures or unsuccessful outcome

6.1 Exceptional operation or unsuccessful outcome

The number of simultaneous CS bearers supported by the system may vary in different regions. For instance, after handover the number of simultaneous bearers available to the served subscriber may be lower than the number of already established bearers. Such events shall trigger changes to individual calls in any multicall scenario.

The handover requirements for multicall are specified in 3GPP TS 22.129 [6].

6.2 Registration

If the system cannot accept a registration request, the served mobile subscriber shall receive a notification that Multicall registration was not successful. Possible causes are:

- service not subscribed to;
- $N_{br\_User} > N_{br\_SB}$;
- insufficient information.

6.3 Erasure

No exceptional operation identified.

6.4 Activation

No exceptional operation identified.

6.5 Deactivation

No exceptional operation identified.

6.6 Invocation

If the served subscriber attempts to set up a new call with a dedicated bearer while the maximum number of bearers available to the subscriber (N_{br}) has been reached, the call attempt shall be rejected by normal procedures, indicating that no more bearers are available.

6.7 Interrogation

When a mobile subscriber who is not provided with the Multicall supplementary service interrogates the service data of the Multicall supplementary service, she shall be notified that she is not subscribed to the service.

6.8 Roaming in non-supporting networks

Roaming into networks not supporting the Multicall supplementary service shall be possible. The served subscriber will not have any access to the Multicall supplementary service and the system should behave accordingly.

When the served subscriber performs any procedure related to Multicall service as described in the clauses above while roaming in a non-supporting network, she shall be notified that the service is not available.

7 Interaction with other services

7.1 Line Identification

7.1.1 Calling Line Identification Presentation (CLIP)

No impact, i.e. CLIP shall be provided with all calls.

7.1.2 Calling Line Identification Restriction (CLIR)

No impact, i.e. CLIR shall be provided with all calls.

7.1.3 Connected Line Identification Presentation (COLP)

No impact, i.e. COLP shall be provided with all calls.

7.1.4 Connected Line Identification Restriction (COLR)

No impact, i.e. COLR shall be provided with all calls.

7.2 Call Forwarding

7.2.1 Call Forwarding Unconditional (CFU)

No impact.

7.2.2 Call Forwarding on Busy (CFB)

No impact.

NOTE: CFB shall be invoked when the network detects a NDUB condition. The maximum number of bearers available to the subscriber (N_{br}) affects the NDUB condition. For the NDUB definition specific for Multicall, see annex A.

This means that for the case of $N_{br} = 1$, the system behaviour shall be the same as for a subscriber who is not provided with the Multicall service.

7.2.3 Call Forwarding on No Reply (CFNRy)

No impact.

7.2.4 Call Forwarding on Not Reachable (CFNRc)

No impact.

7.3 Call Completion

7.3.1 Call Hold (CH)

No impact, i.e. it shall be possible to put an established speech call on hold.

Irrespective of whether the maximum number of CS bearers (N_{br}) is reached or not, and a terminating call is indicated to the user, she shall be able to accept the terminating call by applying the Call Hold service to an active speech call. By that she makes the bearer of the held call available to the new call.

NOTE 1: This means that for the case of $N_{br} = 1$, the system behaviour shall be the same as for a subscriber who is not provided with the Multicall service.

NOTE 2: There is no change to the maximum number of held calls allowed for the Multicall supplementary service. The maximum number of held calls is still 1 per a subscriber.

7.3.2 Call Waiting (CW)

When the subscriber has at least one ongoing call and a new terminating call is speech; then Call Waiting shall be invoked if:

1) there is an active speech call and Call Waiting is active and operative for speech or;

2) there is a held speech call, with no active call on the same bearer, and Call Waiting is active and operative for speech or;

3) there is a held speech call, with an active non-speech call on the same bearer, and Call Waiting is active and operative for that non-speech basic service or;

4) there are no speech calls (including a call on hold), the maximum number of bearers (N_{br}) has been reached and Call Waiting is active and operative for at least one of the basic services currently in use.

When the subscriber has at least one ongoing call and a new terminating call is not speech; then Call Waiting shall be invoked if the maximum number of bearers (N_{br}) has been reached and Call Waiting is active and operative for at least one of the basic services currently in use.

NOTE: There is no change to the maximum number of waiting calls allowed for the Multicall service. The maximum number of waiting calls is still 1 per a subscriber.

7.4 Multi Party (MPTY)

No Impact.

The number of MPTY member may be limited by N_{cs}_MO, N_{cs}_MT and N_{cs}.

7.5 Closed User Group (CUG)

No impact.

7.6 Advice of Charge (AoC)

The subscriber shall receive the AoC indication individually for each CS call.

For the AoCC service, the ACM (Accumulated Call Meter as defined in TS 22.024) shall reckon the sum of the charge generated by all simultaneous CS calls.

7.7 Call Barring

No impact.

7.7.1 Barring of all outgoing calls

No impact.

7.7.2 Barring of outgoing international calls

No impact.

7.7.3 Barring of outgoing international calls except those directed to the HPLMN country

No impact.

7.7.4 Barring of all incoming calls

No impact.

7.7.5 Barring of incoming calls when roaming

No impact.

7.8 Explicit Call Transfer (ECT)

No impact.

7.9 Completion of Call to Busy Subscriber (CCBS)

The definition of the IDLE state of subscriber A and destination B is not modified, i.e. a subscriber is considered to be IDLE when all the bearers (calls) for her have been released.

A subscriber to whom CCBS can be invoked shall be regarded as NDUB under the specific NDUB condition for Multicall (See Annex A).

7.10 Multiple Subscriber Profile (MSP)

No impact. The Multicall supplementary service shall be provisioned on a per subscriber basis. Nbr_SN, Nbr_SB, and Nbr_user shall apply over all profiles.

7.11 Calling Name Presentation (CNAP)

No impact.

7.12 User-to-User Signalling (UUS)

No Impact

7.13 enhanced Multi-Level Precedence and Pre-emption service (eMLPP)

No impact.

7.14 Call Deflection (CD)

No impact.

8 Interaction with other network features and services

8.1 CAMEL

No impact.

8.2 IST

No impact.

8.3 ODB

No impact.

8.4 Emergency Calls

The network shall handle emergency call at first priority. When a user originates an emergency call, the ~~UMTS~~ network shall behave as follows:

- The ~~UMTS~~ network, which supports Multicall, shall accept the emergency call within the serving network capability regardless of Multicall subscription limitation to the user.

- The MS shall ensure that an emergency call setup request is acceptable to a serving network which does not support multicall, if necessary by releasing one or more existing call.

Annex A (normative): Busy definition

NDUB (Network Determined User Busy) occurs when:

1. The maximum number of mobile terminating calls (N_{cs}**_MT**) has been reached (NOTE 1).

2. The maximum number of bearers (N_{br}) has been reached and the maximum number of waiting calls has been reached (NOTE 2, NOTE3).

NOTE 1: This can occur even if bearers are still available, e.g. when the MS is engaged in MPTY SS. If the maximum number of mobile terminating calls (N_{cs}_MT) has been reached, the Call Waiting SS cannot be invoked.

NOTE 2: If Call Waiting is provisioned and activated, and when the maximum number of bearers has been reached the Call Waiting SS can be invoked. This case is not regarded as NDUB. See subclause 7.3.2 for interaction with Call Waiting SS.

NOTE 3: According to the speech bearer number limitation, the incoming speech call shall be regarded as encountering NDUB when the MS is engaged in a speech call (including a held call) and Call Waiting SS is not provisioned and activated for the user, irrespective of the further availability of bearers for the user. For the condition under which Call Waiting SS shall be invoked in this case, see subclause 7.3.2.

For User Determined User Busy (UDUB) condition see TS 22.001 Annex C.

Annex B (informative): Cross Phase Compatibility ~~for R99~~

This section details the cross phase compatibility requirements relating to the service requirements in this document.

NOTE: When a change is introduced which affects the 3GPP specifications, it is said to be 'backward compatible' if existing equipment can continue to operate and perform correctly with equipment that conforms to the new implementation.

B.1 Compatibility With Existing Standards

Where the service and operational requirements in this document relate to core network functionality, compatibility is required.

Multicall mechanisms are not applicable for GERAN~~SM BSS~~.

B.2 Compatibility With Future Releases

It is envisaged that 3GPP standards will evolve ~~beyond R99~~in future releleases, for example with the addition of new service requirements. The standards which define the technical implementation ~~of R99~~ should be developed in such a way that it is practical to add the requirements in this section in a backward compatible manner.

Following chapters include requirements that are foreseen for future release.

B.2.1 Multicall configuration

When having one active CS call and one held call on the same bearer. It shall be possible to create a new CS bearer and to move one of the calls to the new bearer, resulting both calls being active within the limits set by the operator/user and within the capability of the terminal. See figure 2: Split of bearer.

When having two calls (multicall) on the separate bearers. It shall be possible to join both calls to one of the two bearers, put the one of the calls to hold and to release unused CS bearer. It shall be possible to select which call to put on hold. See figure 2: Combination of bearers. *(Note: there is no clear end-user service requirement for this feature at time being).*

NOTE: Due to that only speech calls can be put on hold, so one of the two active Cs calls has to be a speech call.

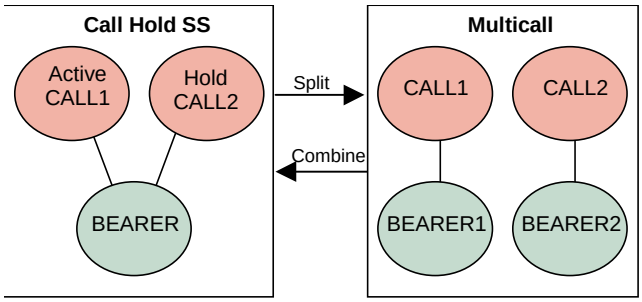


Figure 2: Illustration for split of bearer and combination of bearers

B.2.2 Several simultaneous speech calls / bearers

A Key requirements for multicall is to allow several simultaneous CS calls with dedicated bearers. The most important usage scenario is to allow several CS data bearers to be bind at application level resulting to higher than 64kbits/s data rates. Another important feature is to allow simultaneous speech and data calls.

It's been proposed that the multicall feature could be introduced in a phased manner; meaning that in the first phase, i.e. ~~UMTS~~ 3GPP release 99 does only support one active speech call at a time. However, Call control should not prohibit a complete set of multiple speech bearer services in future releases and UTRAN shall be designed in a flexible way to support multiple speech bearers. The specific NDUB definition for speech call shall be removed when multiple speech call is supported. At this~~In~~ release ~~99~~, Supplementary Services Call Waiting, Multiparty and Call Hold are used to offer simultaneous speech calls to user.

N_{cs} may be extended in ~~R00 or~~ further releases.

If multiple simultaneous speech calls are supported in the future then the Call Hold service may be used to reconfigure the number of bearers supporting speech calls if required during handover. e.g. in the case of handover to ~~GSM~~ GERAN where only one speech call can be active at a time. This requirement is dependent on the user subscribing to Call Hold.

B.2.3 CCBS

At this release ~~1999~~ CCBS no enhancements for CCBS is required.

In the future releases the definition of IDLE state of subscriber A and destination B should be modified in away that the IDLE state is reach even if there are active CS calls but the maximum limit of CS calls is not reached.

Annex C (informative): Change history

Date	Version	Comment
19 Mar. 1999	0.0.1	First draft by the editor (Tommi Kokkola / Nokia)
30 Mar. 1999	0.1.0	Output from S1 Multicall ad hoc
6 Apr. 1999	0.1.0	Minor modifications by the editor. Proposed version 1.0.0
19 Apr. 1999	1.0.0	For information to 3GPP TSG SA#3
10. Jun. 1999	1.1.0	Draft from editor for the email meeting.
18. Jun. 1999	1.1.1	Draft during the email meeting.
24. Jun .1999	1.2.0	Result of email discussions. For some issues status still unstable.
1. Jul .1999	1.2.1	Comments from TSGN & TSGS Multimedia and Multicall joint meeting included. (Revisions included from version 1.1.0)
8. Jul. 1999	1.3.0	Results from S1 Plenary. Drafting continues at S1_Multicall mailing lists. Contributions expected on: -Busy, Idle, Active states –Busy definition –Supplementary service interactions incl. related CR to appropriate SS when needed. (Specifically 02.83 need to be studied.) – all topics marked with FFS…
28. Sep. 1999	1.4.0	Output from S1 Multicall ad hoc, Germany.
1.Oct. 1999	1.6.0	Proposed version 2.0.0
10. Oct 1999	2.0.0	Version 2.0.0

Change history											
TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	Work Item
SP-05	SP99-433		22.135					Version 3.0.0 approved		3.0.0	
SP-06	SP-99523	S1-991020	22.135	001		R99	D	Transfer of Handover chapter to 22.129	3.0.0	3.1.0	
SP-06	SP-99523	S1-991065	22.135	002		R99	D	Clarification on handling of multiple bearers	3.0.0	3.1.0	
SP-06	SP-99554	S1-99963	22.135	003		R99	C	Registration, Interrogation and Restriction of Packet Domain	3.0.0	3.1.0	
SP-07	SP-000068	S1-000168	22.135	004		R99	F	Clarification of requirement for Multicall	3.1.0	3.2.0	
SP-08	SP-000205	S1-000349	22.129	012		R99	F	Alignment of handover requirements for Multicall	3.2.0	3.3.0	
SP-09	SP-000375	S1-000585	22.135	006		R99	F	Interaction with MSP	3.3.0	3.4.0	
SP-09	SP-000406	S1-000656	22.135	007		R99	F	Removal of the Requirement on Network to Tear Down Calls to Accept EC in Multicall	3.3.0	3.4.0	
SP-09	SP-000406	S1-000657	22.135	008		R99	F	Addition of Ncs_MT limitation to number of MPTY members	3.3.0	3.4.0	
SP-11	SP-010065	S1-010258	22.135			Rel-4		Transferred to 3GPP Release 4	3.4.0	4.0.0	

CR-Form-v4

CHANGE REQUEST

⌘ **22.127** **CR** **043** ⌘ ev **-** ⌘ Current version: **5.2.0** ⌘

Spec Title: **Stage 1 Service Requirement for the Open Service Access (OSA)** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**A**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

5 The role of OSA within the VHE framework for services

The goal of standardisation in 3GPP with respect to services is to provide a framework within which services can be created based on standardised service capability features (c.f. [1]). 3GPP services will generally not rely on the traditional detailed service engineering (evident for supplementary services in second-generation systems), but instead provides services using generic toolkits.

OSA is one of these toolkits, standardised within 3GPP, for the support of services within 3GPP system (see chapter 5.1).

Services can be implemented by applications using service capability features [1], which are accessible via the OSA interface towards these SCFs in the network.

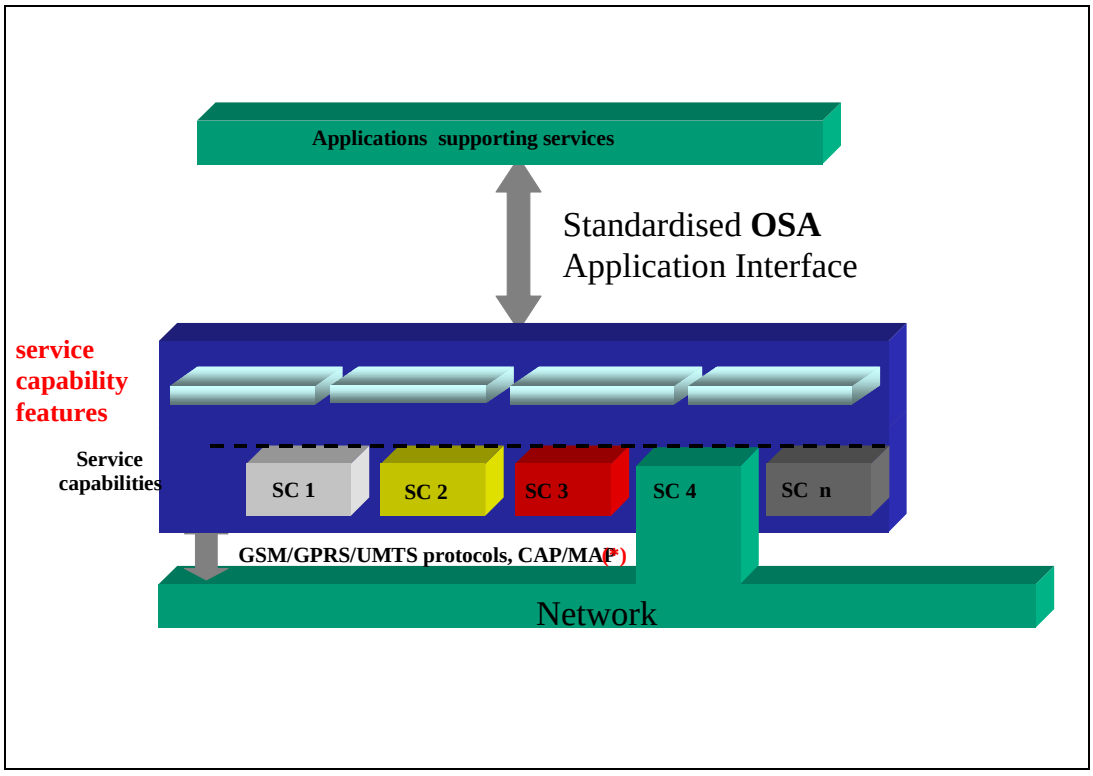


Figure 3: Applications access Service Capability Features via the standardised OSA Application Interface

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

7 Requirements for user data management

The User Profile logically is a set of information relevant for a given user. The set of information is provided by Service Capability Servers and – if permitted – from Value Added Services. The amount of User Profile information might be distributed over various physically separated entities. The concept of distributed information is not within the scope of this specification. The detailed content of the User Profile is not subject herein.

However, subscribers are able to subscribe or use services provided from Value Added Service Providers. Subscriber may customise these VAS according to their needs equally as the subscriber customise her ~~GSM/UMTS~~ services provided by the network operator. To avoid malicious or conflicting situations it is needed to allow VAS to access the users USER Profile. The co-existence of several services and the correct inter-working between them are founded on sufficient information about other services subscribed to.

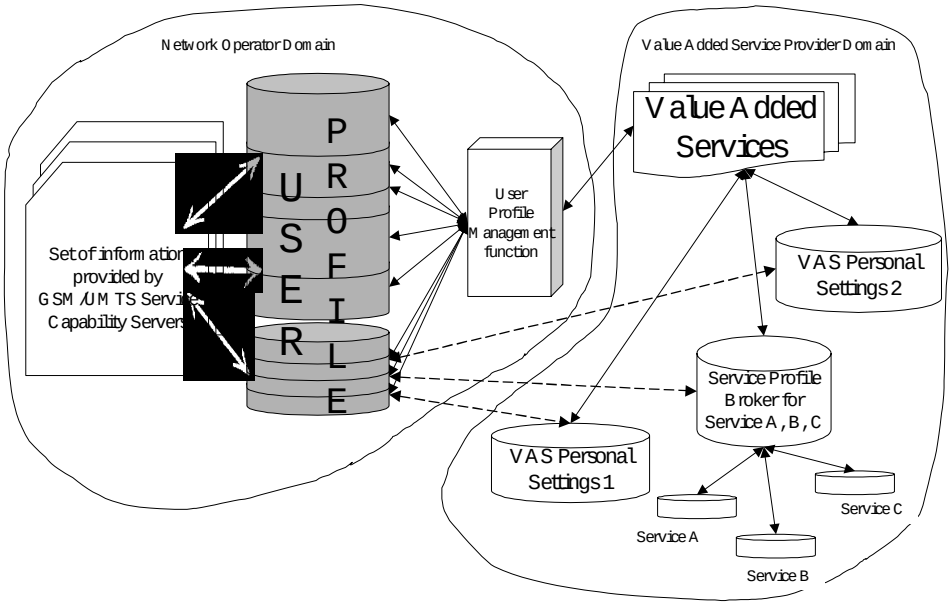
VAS shall not be allowed to access the User Profile without permission. It is important to prevent the User Profile from malicious attacks. The OSA Framework functions restrict the applications' access to the User Profile Management (UPM) functions.

UPM functions check the application's rights to make these actions regarding each separate part of the user profile. Depending on the authorisation, the User Profile Management functions may permit the VAS to read from and/or to add to and/or to modify the User Profile or parts of it. This decision is based on:

- Subscriber identity
- Access information in the User Profile of the subscriber
- Application identity
- Access type (read, add or modify)

Access information shall contain the user specific access rights per application. These may be given either for individual parts of the User Profile or for a group of data or even all data in the User Profile.

The figure below gives a logical overview of the relation between VAS, User Profile Management function and the User Profile itself.

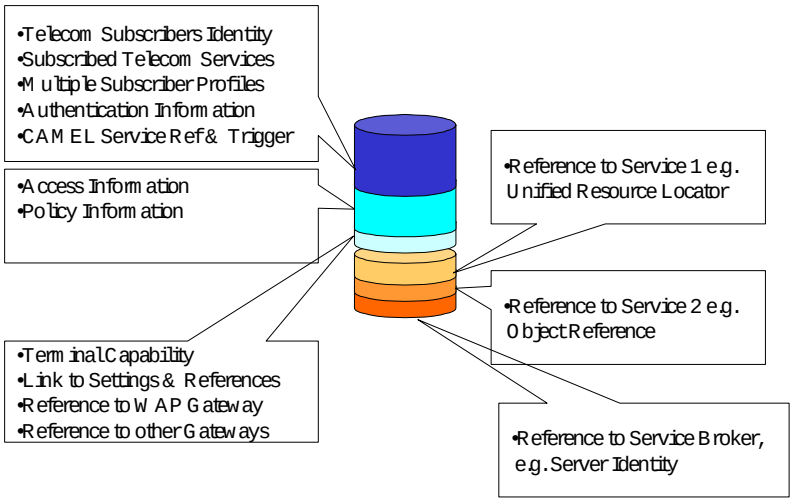


Note: the dotted line refers to additional Personal Settings. The reference itself shall unambiguously identify the location of the additional personal settings.

User specific information from the e.g. HLR and/or HSS are equally part of the User Profile as terminal settings and VAS specific preferences. The User Profile in principle is the summary and collection of information with a relevance for the services supported for a given subscriber.

The figure above shows User and Network Service and VAS specific information, customised by the user. It is assumed that the user profile consists of several parts. The User Profile elements shall at least be capable to store a reference to additional information stored else where. The User Profile shall act as a root towards all user specific information.

Even when the content of the User Profile is outside this specification, the following figure shows how a content could look like.



On the left side of the figure above, typical 3GPP system related~~GSM/UMTS~~ information are listed (this is not an exhaustive list).

The right side depict references to VAS specific information. The representation of references to VAS specific information above, is an example and does not insist to be complete.

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

13.2.3 Information Transfer function

The Information Transfer function shall enable an application to indicate to a user respectively an application in the UE or USIM about the presence of existing information for her. Physically, this indication may be sent by the underlying network e.g. as a SMS or USSD message to the terminal. The Information Transfer function provides the means to inform the underlying network that an indication shall be sent to the user.

NOTE: For 3GPP ~~release 99~~ mechanisms like USSD or SMS may be employed to transfer the indication to the users terminal.

The following functions shall be supported:

- **send information notification:**
  - the Send information notification function provides the means to inform the underlying network that an indication shall be sent to a user respectively an application in the UE or USIM about the presence of existing information for her;
- **request message receipt notification:**
  - the application can request to receive a notification every time a message is received in the mailbox for the user. This allows the application to take the appropriate action, e.g. informing the user.

TSG-SA WG 1 (Services) meeting #15 **S1-020357**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.127** **CR** **042** ⌘ ev **-** ⌘ Current version: **4.3.0** ⌘

Spec Title: **Stage 1 Service Requirement for the Open Service Access (OSA)** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:
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R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

5 The role of OSA within the VHE framework for services

The goal of standardisation in 3GPP with respect to services is to provide a framework within which services can be created based on standardised service capability features (c.f. [1]). 3GPP services will generally not rely on the traditional detailed service engineering (evident for supplementary services in second-generation systems), but instead provides services using generic toolkits.

OSA is one of these toolkits, standardised within 3GPP, for the support of services within 3GPP system (see chapter 5.1).

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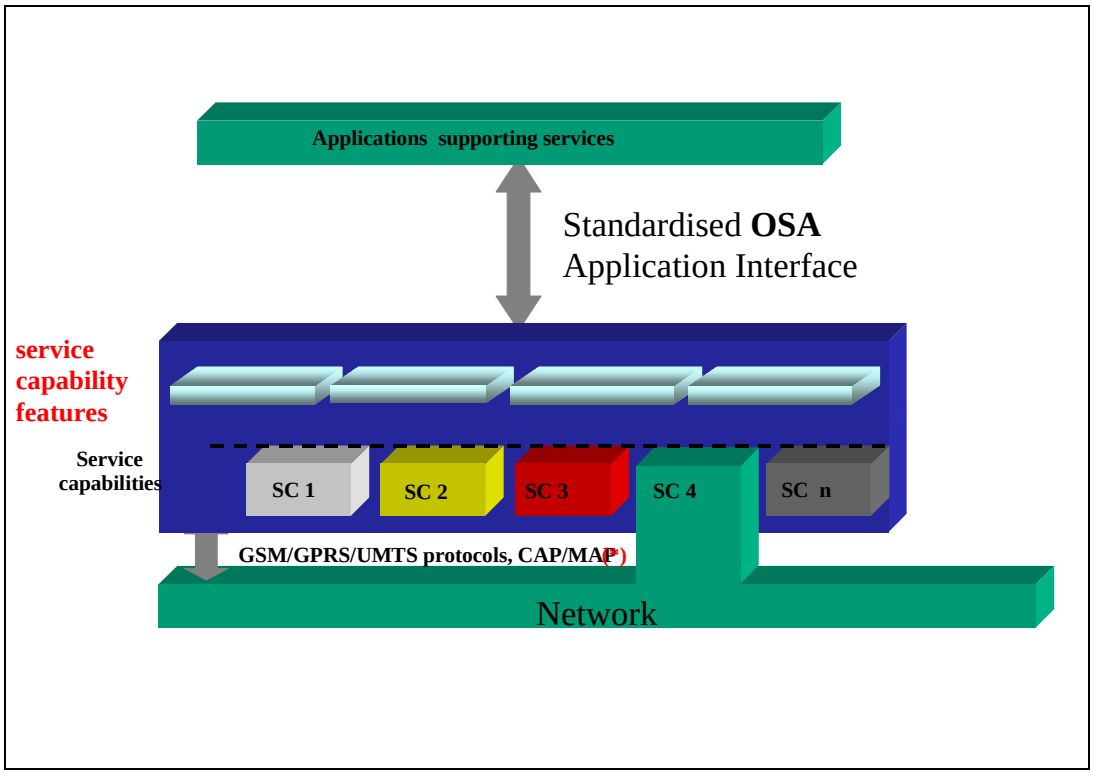

Figure 3: Applications access Service Capability Features via the standardised OSA Application Interface

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

12.2.3 Information Transfer function

The Information Transfer function shall enable an application to indicate to a user respectively an application in the UE or USIM about the presence of existing information for her. Physically, this indication may be sent by the underlying network e.g. as a SMS or USSD message to the terminal. The Information Transfer function provides the means to inform the underlying network that an indication shall be sent to the user.

NOTE: For 3G ~~release 99~~PP mechanisms like USSD or SMS may be employed to transfer the indication to the users terminal.

The following functions shall be supported:

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- **request message receipt notification:**

  - the application can request to receive a notification every time a message is received in the mailbox for the user. This allows the application to take the appropriate action, e.g. informing the user.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

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CHANGE REQUEST

⌘ **22.121** **CR 023** ⌘ ev **-** ⌘ Current version: **5.2.0** ⌘

Spec Title: **The Virtual Home Environment** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
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B *(addition of feature),*
C *(functional modification of feature)*
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Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
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Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

2.1 Normative references

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications"

[2] 3GPP TS 22.057 Mobile Execution Environment (MExE); Service description".

[3] 3GPP TS 22.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL); Service definition - Stage 1".

[4] 3GPP TS 22.038: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; USIM/SIM Application Toolkit (USAT/SAT); Service description; Stage 1".

[5] 3GPP TS 22.101: "Service Aspects; Service Principles".

[6] 3GPP TS 22.105: "Services and Service Capabilities".

[7] ITU-T Recommendation Q.1701: "Framework for IMT-2000 networks".

[8] ITU-T Recommendation Q.1711: "Network Functional Model for IMT-2000".

~~[9] 3GPP TS 22.100: "UMTS phase 1".~~

[9~~10~~] 3GPP TS 23.127: "Virtual Home Environment/Open Service Architecture".

[10~~1~~] 3GPP TS 22.127: "Open Services Access (OSA) ".

2.2 Informative references

[11~~2~~] World Wide Web Consortium Composite Capability/Preference Profiles (CC/PP): A user side framework for content negotiation (www.w3.org).

[12~~3~~] ~~3G~~3GPP TS 22.115 "Charging and Billing"

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

HE Services: services, which are provided by the home environment

HE-VASP: Home Environment Value Added Service Provider. This is a VASP that has an agreement with the Home Environment to provide services. The Home Environment provides services to the user in a managed way, possibly by collaborating with HE-VASPs, but this is transparent to the user. The same service could be provided by more than one HE-VASP and each HE-VASP can provide more than one service.

Home Environment: responsible for overall provision and control of the Personal Service Environment of its subscribers.

Local Service: See definition in [1].

OPERATOR SPECIFIC SERVICES (OSS) are not standardised and could be implemented at the PLMN entities (e.g. HLR) on a vendor specific basis or using ~~GSM ph 2+ mechanisms~~toolkits (CAMEL, USAT, MExE). These tool-kits use standardised interfaces to the underlying network (e.g. CAP, MAP) or use ~~GSM~~ Bearers to transport data, for example, from the MExE service environment of USAT server to the UE/USIM. The implementation of these operator specific services on the different platforms (CSE, MExE service environment or USAT Server, UEs) is done in a completely vendor specific way and uses only proprietary interfaces.

Personal Service Environment: contains personalised information defining how subscribed services are provided and presented towards the user. Each subscriber of the Home Environment has her own Personal Service Environment. The Personal Service Environment is defined in terms of one or more **User Profile**s.

Services: set of functions offered to a user by an organisation.

Service Toolkits : bearers defined by parameters, and/or mechanisms needed to realise services.

Standardised services: standardised services (Supplementary Services, Tele-Services, etc.) are implemented on existing PLMN entities (e.g. HLR , MSC/VLR and terminal) on a vendor specific basis, using standardised interfaces (MAP, etc.) for service communication (e.g. downloading of service data). Availability and maintenance of these Services is also vendor dependent.

User: is a logical entity, which uses PLMN services.

User Services Profile: contains identification of subscriber services, their status and reference to service preferences. This is part of the User profile information.

User Profile: A set of information necessary to provide a user with a consistent, personalised service environment, irrespective of the user location or the terminal used (within the limitations of the terminal and the serving network). The user can define one or more User Profiles according to the user's needs. The user's Home Environment manages the User Profile(s).

Value Added Service Provider: provides services other than basic telecommunications service for which additional charges may be incurred. The user may access services directly from Value Added Service Providers and the serving network. The Home Environment does not support services obtained directly from VASPs or serving network outside home network. VASP has no service agreement with the Home Environment.

Virtual Home Environment: concept for personal service environment portability across network boundaries and between terminals.

Further definitions are given in [5]

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

5 Support of services within the VHE

VHE shall support VHE services from previous releases and new services built on Service Toolkits. Later 3GPP developments will provide support for a wider range of services in later releases.

3GPP services will generally not rely on the traditional detailed service engineering (evident for supplementary services in second-generation systems), but instead provides services using generic toolkits.

Services can be built using network and/or terminal functions offered via Service Toolkits ([2], [3], [4]~~, [9]~~, [9~~10~~], [10~~1~~]). The set of services available to a user within the VHE is personalised by a set of **User Profile**s unique to that user.

The following are examples of services offered through VHE:

- standardised services;
- operator specific services;
- other services.

Other services like OSS, are not standardised. These services s will be implemented using Service Toolkits (Bearers, Mechanisms). The functionality offered by the different Service Toolkits is defined by them directly, and can be used by the service designers to build their services .

Within the network Service Toolkits are accessible via standardised APIs, for example, OSA APIs.

Within the terminals functionality is accessible via APIs, for example, MExE and USAT APIs.

The terminal can communicate, using bearers services, with services in the network via functionality optionally realised for MExE service environment and USAT-servers.

The above example list of services is not exhaustive.

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

7.4 Location, distribution and recovery of User Profiles

Location and distribution of the User Profile shall be supported between the following entities:-

- (U)SIM;
- Mobile Equipment (ME);
- Entities of the Home Environment (e.g. network databases (like HSS), location servers etc.);
- Entities of HE-VASPs (e.g. WAP-gateways, MExE servers).

NOTE: To ensure that User Profiles are applicable to as wide a community of terminal and network types as possible, existing work on this topic in other standards fora should be considered. One possibility is the work of the World Wide Web Consortium on the Composite Capability/Preference Profile [~~12~~11].

The HE must be able to recreate all parts of the User Profile at all times. This may be done in collaboration with its HE-VASPs but this is outside the scope of standardisation. In particular if parts of the User Profile are located within entities of HE-VASPs the responsibility to recreate these parts of the User Profile lie with the respective HE-VASPs

In the event of loss/damage of the UE (USIM or ME), the User Profiles must be fully recoverable and may be used to reconfigure a new UE.

There may be some User information stored outside the User Profile e.g. with VASP or in the UE however this is outside the scope of standardisation. There is no requirement for backup and recovery of this data by the Home Environment.

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

8 Components of VHE

The user's services in the Virtual Home Environment shall be enabled by support of: -

- the User Profile;

together with any combination of:-

- the generic bearers (defined by QoS);
- call control (e.g. IP multimedia or circuit switched);
- and any combination of the Service Toolkits (i.e. MExE[2], CAMEL[3], USAT [4], OSA[10~~1~~]) on which the services are built .

Additionally, non-3GPP standardised Service Toolkits from the IT and IP world may be used to enhance VHE services.

9 Usage of existing toolkits

Improvements for VHE to support IP multimedia services shall be supported, e.g. improvements to service toolkits, service capability servers and User Profile etc. This will give operators and 3rd party service developers the opportunity to create IP multimedia services and services for networks supporting IP services.

Existing 3GPP toolkits (such as CAMEL, MExE, USAT and OSA), and non-3GPP toolkits shall be used when available.

VHE shall include new (if required) and enhanced service toolkits to support IP multimedia services.

9.1 CAMEL

Release 5 shall be able to use CAMEL plus any improvements for CAMEL [3].

VHE shall be able to use CAMEL improvements on previous CAMEL releases (e.g. Phase 4) of TS 22.078.

The VHE requirements on CAMEL are FFS:

- Users shall be able to use their existing CAMEL services in a consistent manner with both CS services and IP multimedia services. This shall occur in a transparent fashion and the user need not be aware of whether the service is either circuit switched or packet switched. The same look and feel of the service shall be maintained.

9.2 MExE

Release 5 shall be able to use MExE improvements on previous MExE releases [2].

- There needs to be harmonisation between the MExE user profile and **User Profile**. This could also require a mechanism to interrogate the terminal about its user terminal profile.

9.3 USAT

Release 5 shall be able to use USAT improvements on previous USAT releases [4]

- There needs to be harmonisation between the USAT user profile and **User Profile**.
- USAT terminals interact with the USIM using capability negotiation, and it shall be possible to continue usage of the capability negotiation for IP multimedia services.

9.4 Open Service Access (OSA)

Release 5 shall be able to use OSA improvements on previous OSA releases [10~~9~~].

10 Charging requirements

Services, which are provided as part of the VHE, may be subject to charge at the discretion of the home environment

There are several forms of charging which shall be available to the Home Environment. It shall be possible for the Home Environment to charge in the following instances:

- subscription:
  - the user's registration to use services may be subject to charge.
- service transfer:
  - the transfer of services and/or information to the user UE or USIM may be subject to charge.

- service upgrading:
  - the upgrading of previously transferred services to the user's UE or USIM may be subject to charge (automated upgrading of services may be subject to a different charge).
- service usage:
  - the usage of services by a user may be subject to a charge.
- roaming:
  - the usage of VHE services when roaming may be subject to additional charges.
- inform the serving network of the type of charging (i.e. prepaid or/and postpaid) for any required service;
- inform the serving network of the threshold set for a given service required by the user and charged on a prepaid account;
- inform the serving network how to manage a service for which the threshold has been reached;
- manage the prepaid accounts (e.g. increase, decrease the credit, or pass the information to any services which manages the credit);
- access of the **User Profile**.

Refer to [123].

Other charging requirements may be identified and are FFS.

CR-Form-v4

CHANGE REQUEST

⌘ **22.105** **CR 035** ⌘ ev **-** ⌘ Current version: **5.0.0** ⌘

Spec Title: **Service aspects; Services and Service Capabilities** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title: ⌘	Editorial CR to correct terms and references	
Source: ⌘	SA1	
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Category: ⌘	**A**	***Release:*** ⌘ Rel-4

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Clauses affected: ⌘	Various		
Other specs affected: ⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments: ⌘			

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

3GPP TS 22.105 V5.0.0 (2002-03)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects
Service aspects;
Services and Service Capabilities
(Release 5)

Keywords
UMTS, service

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

Foreword

This Technical Specification has been produced by the 3GPP.

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

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

z the third digit is incremented when editorial only changes have been incorporated in the specification.

1 Scope

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Quality of Service is the quality of a requested service (Teleservice or Bearer Service or any other service, e.g. customer care) as perceived by the customer (ITU-T M.xxxx). QoS is always meant end-to-end. Network Performance of several network elements of the originating and terminating network(s) contribute to the QoS as perceived by the customer including terminals and terminal attachments. In order to offer the customer a certain QoS the serving network need to take into account network performance components of their network, reflect the performance of the terminal and ad sufficient margin for the terminating networks in case network performance requirements cannot be negotiated.

As far as the QoS to the subscriber is concerned network elements have to provide sufficient performance (reflecting possible performance constraints in terminating networks) so that the PLMN cannot be considered as a bottleneck.

This section outlines the requirements on bearer services in two main groups;

- Requirements on information transfer, which characterise the networks transfer capabilities for transferring user data between two or more access points.
- Information quality characteristics, which describe the quality of the user information transferred between two or more access points.

It shall be possible to negotiate / re negotiate the characteristics of a bearer service at session / connection establishment and during an on going session / connection.

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

5.6 Radio Interface optimisation

The following requirements shall lead the radio interface optimisation process;

- support of high bit rate (around the Peak Bit Rate), bursty, asymmetric, non-real time bearer capabilities;
- support of high bit rate (around the Peak Bit Rate), bursty, asymmetric, real time bearer capabilities;
- the ability to extend or reduce the bandwidth associated with a bearer capability in order to adapt to bit rate or radio condition variations, and to add or drop service components.

However, the services provided by existing systems (speech in particular) shall be supported in a spectrally efficient manner (at least as efficiently as in~~cluded in~~ ~~GSM~~ specifications) for the same quality of service.

In order to allow the support of flexible, bandwidth on demand services, bearer services should be provided with the finest possible granularity that can be efficiently supported.

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

6.3 Support of teleservices

The realisation of teleservices requires the association of terminal and network capabilities. In the terminals and in the network, both upper layer capabilities and lower layer capabilities are necessary. The term upper layer capabilities is used because it relates to the OSI upper layers. Decoupling between upper layers and lower layers (transfer) is required. Even if this de-coupling may impact radio interface optimisation, it is nevertheless the only way of designing a system that is not outdated;

- Each time the information rate associated with an already supported teleservice is decreased by more efficient source coding techniques.
- Each time a new service is introduced that requires transfer capabilities not used by currently available teleservices.

Taking the example of two application that exchange information through a teleservice, the upper layer capabilities can be located in various places;

- In the two terminals if the two applications are connected to a PLMN.

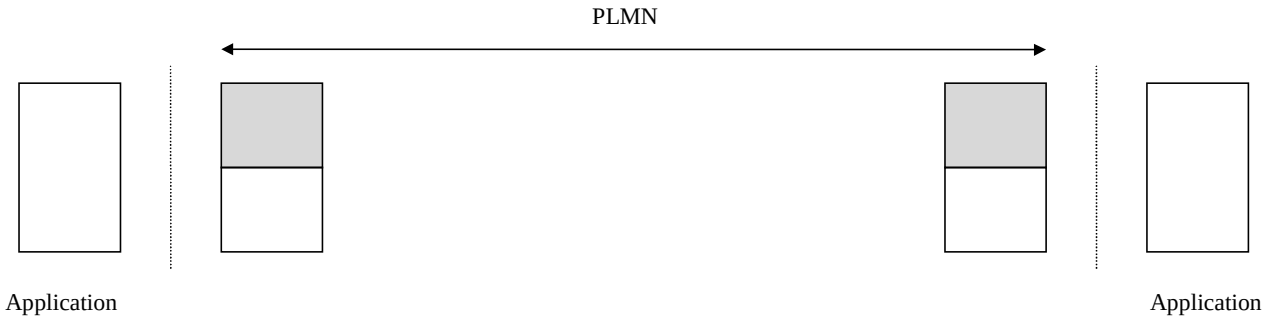

Figure 2: PLMN teleservice

In the terminal of the application connected to a PLMN and in the upper layer interworking unit that is at the border of the PLMN and the target network if one application is connected to a PLMN and the other one is connected to another type of system. The upper layer interworking unit makes the adaptation between the PLMN and the target network at a service level.

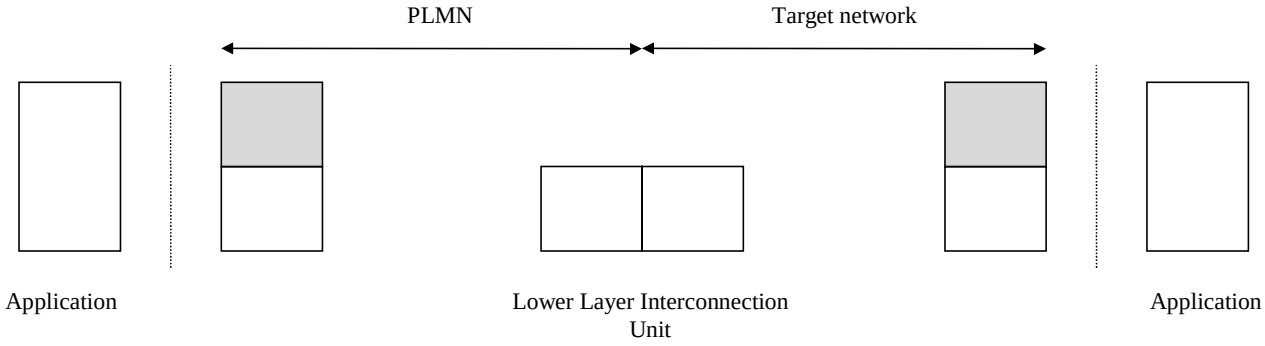

Figure 3; Teleservice with upper layer interworking

In the terminal of the application connected to a PLMN ~~UMTS network~~ and in the terminal of the application connected to a target network if one application is connected to a PLMN~~UMTS network~~ and the other one is connected to another type of system, but only lower layer interconnecting unit is used at the border of the two networks. In this case, the interconnecting unit makes the adaptation between the PLMN~~UMTS network~~ and the target network at the transmission level.

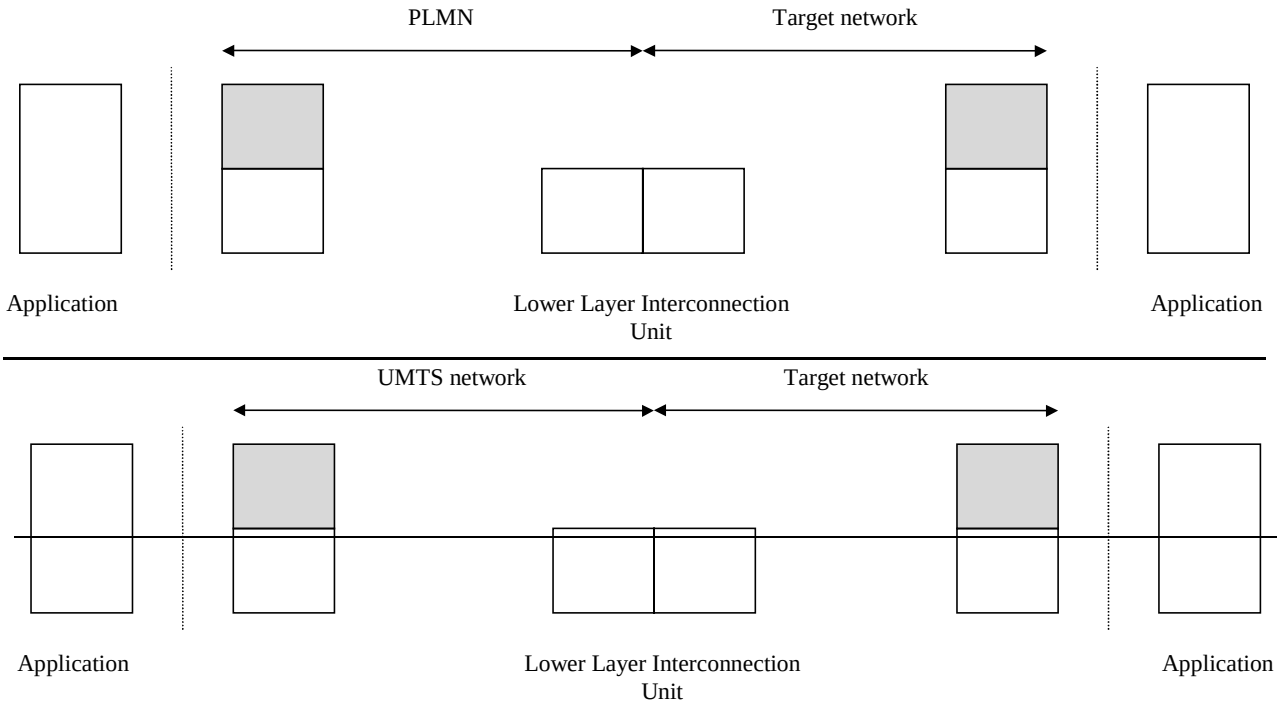

Figure 4; Teleservice with lower layer interworking

6.4 Existing Teleservices supported by PLMN

The subset of standardised teleservices shall be supported for interworking with teleservices provided on other networks. The means to support the following set of teleservices will be standardised:

- Speech;
- Emergency call;
- Short message service;

TS 22.003 [3] describes the circuit teleservices.

6.4.1 Speech

The speech service as defined in international standards should be supported. The international reference for the speech is ITU E.105 recommendation. Networks should contain interworking units which allow calls to be received from or destined to users of existing networks like PSTN or ISDN. This will include interworking units for generation of DTMF or other tones (the entire DTMF tone set would at minimum be available) and detection of DTMF tones.

A default speech codec shall be specified to provide speech service. The selected speech codec shall be capable of operating with minimum discernible loss of speech on handover between the GERAN~~SM access network~~ and UTRAN.

6.4.2 Emergency Call

This service will use a speech component. There are however compared to telephony reduced authentication requirements and a requirement for specific routing. Additionally Emergency Calls may have higher priority than normal calls. See TS 22.101[9] for further details.

6.4.3 Short Message Service - Point to Point (SMS-PP)

A short message service point to point shall be supported. The short message service shall be provided seamlessly (as far as the user or the users terminal equipment is concerned) across the UTRAN and GERAN~~SM access network~~.

6.4.4 Short Message Service - Cell Broadcast (SMS-CB)

A short message service cell broadcast shall be provided seamlessly (as far as the user or the users terminal equipment is concerned) across the UTRAN and GERAN~~SM network~~.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.105** **CR 034** ⌘ ev **-** ⌘ Current version: **4.2.0** ⌘

Spec Title: **Service aspects; Services and Service Capabilities** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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

3GPP TS 22.105 V4.2.0 (2002-03)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects
Service aspects;
Services and Service Capabilities
(Release 4)

Keywords
UMTS, service

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

Foreword

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The contents of the present document are subject to continuing work within the TSG and may change following formal

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3GPP support office address
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TSG approval. Should the TSG modify the contents of this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

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3 or greater indicates TSG approved document under change control.

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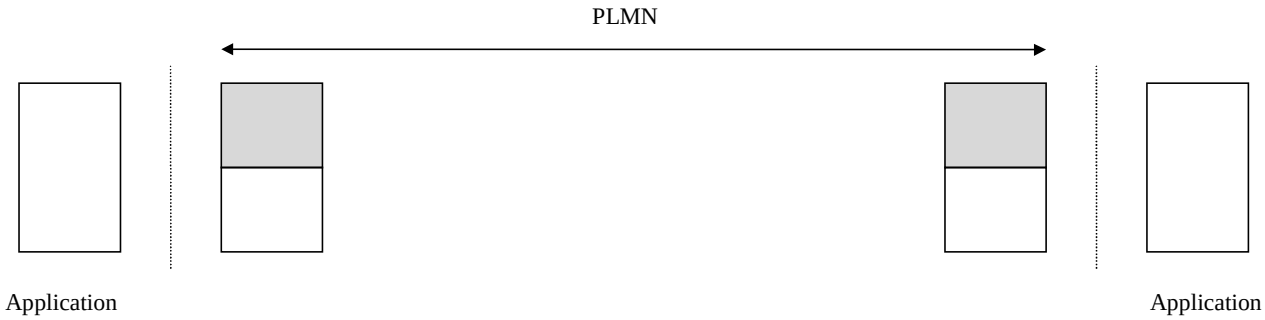

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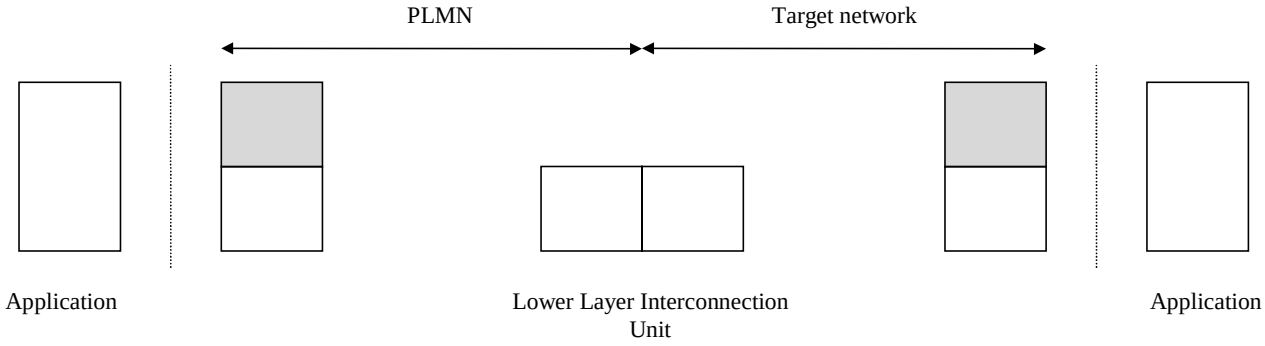

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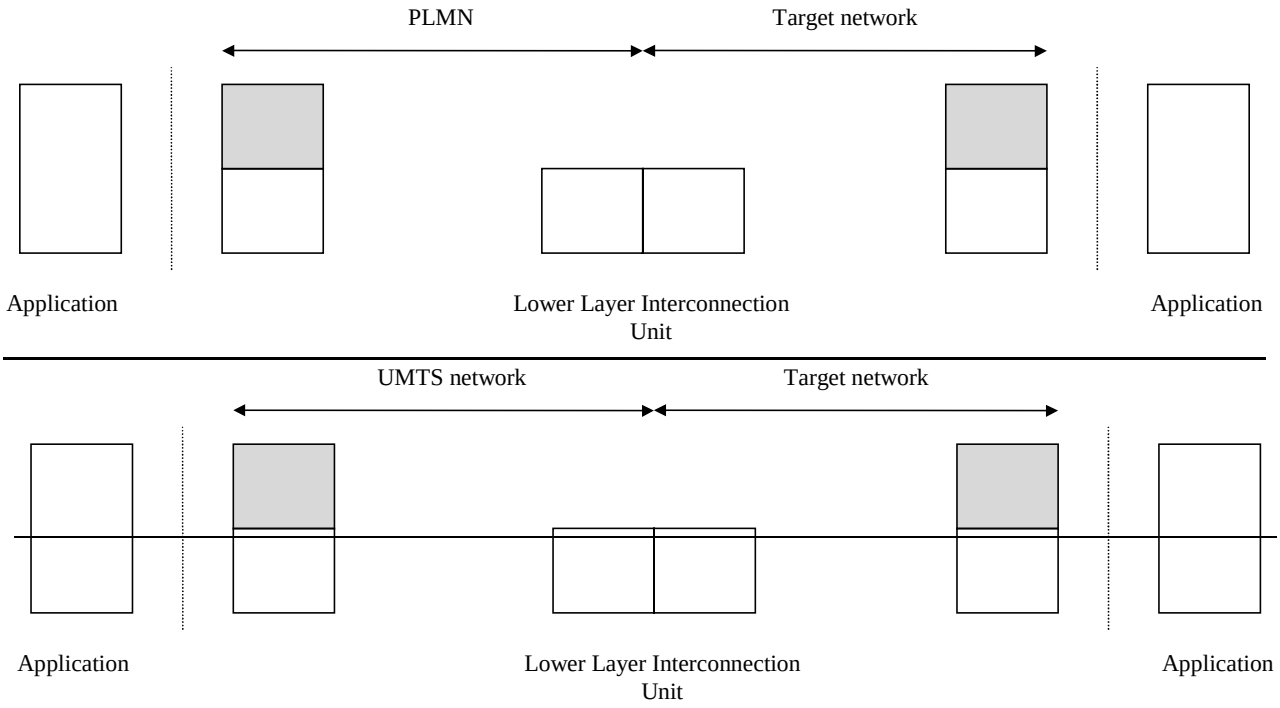

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TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.101** **CR 092** ⌘ ev **-** ⌘ Current version: **5.4.0** ⌘

Spec Title: **Service aspects; Service principles** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**A**
Release:	⌘	Rel-5

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Consequences if not approved:	⌘	Illegal references will exist in the specification set.

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Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

3GPP TS 22.101 5.4.0 (2001-10)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects
Service aspects;
Service principles
(Release 5)

Keywords
UMTS, service, stage 1

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- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

This Technical Specification (TS) describes the Service Principles for PLMNs specified by 3GPP.

3GPP specifications provide integrated personal communications services. The system will support different applications ranging from narrow-band to wide-band communications capability with integrated personal and terminal mobility to meet the user and service requirements of the 21st century.

3GPP specifications allow the realisation of a new generation of mobile communications technology for a world in which personal communications services should allow person-to-person calling, independent of location, the terminal used, the means of transmission (wired or wireless) and the choice of technology. Personal communication services should be based on a combination of fixed and wireless/mobile services to form a seamless end-to-end service for the user.

3GPP specifications should be in compliance with the following objectives:

a) to provide a single integrated system in which the user can access services in an easy to use and uniform way in all environments;

b) to allow differentiation between service offerings of various serving networks and home environments;

c) to provide a wide range of telecommunications services including those provided by fixed networks and requiring user bit rates of up to 2 Mbits/s as well as services special to mobile communications. These services should be supported in residential, public and office environments and in areas of diverse population densities. These services are provided with a quality comparable with that provided by fixed networks such as ISDN;

d) to provide services via hand held, portable, vehicular mounted, movable and fixed terminals (including those which normally operate connected to fixed networks), in all environments (in different service environments - residential, private domestic and different radio environments) provided that the terminal has the necessary capabilities;

e) to provide support of roaming users by enabling users to access services provided by their home environment in the same way even when roaming.

f) to provide audio, data, video and particularly multimedia services;

g) to provide for the flexible introduction of telecommunication services;

h) to provide within the residential environment the capability to enable a pedestrian user to access all services normally provided by fixed networks;

i) to provide within the office environment the capability to enable a pedestrian user to access all services normally provided by PBXs and LANs;

j) to provide a substitute for fixed networks in areas of diverse population densities, under conditions approved by the appropriate national or regional regulatory authority.

k) to provide support for interfaces which allow the use of terminals normally connected to fixed networks.

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[3] 3GPP TS 22.038: "SIM application toolkit, stage 1"

[4] 3GPP TS 22.001: " Principles of Circuit telecommunication services supported by a Public Land Mobile Network (PLMN)".

[5] 3GPP TS 22.004: General on supplementary services"

[6] 3GPP TS 22.030: "Man-Machine Interface (MMI) of the User Equipment (UE)"

[7] 3GPP TS 22.066: "Support of Mobile Number Portability (MNP); Service description; Stage 1"

[8] 3GPP TS 22.079: " Support of Optimal Routing; Stage 1"

[9] 3GPP TS 22.129: "Handover Requirements between ~~UMTS~~ UTRAN and ~~GSM~~ GERAN or other Radio Systems"

[10] 3GPP TS 33.102: "Security Architecture"

[11] 3GPP TS 22.011: "Service Accessibility"

[12] 3GPP TS 22.016: "International mobile Station Equipment Identities (IMEI)"

[13] 3GPP TS 24.008: " Mobile Radio Interface Layer 3 Specification"

[14] 3GPP TS 22.003: "Circuit Teleservices supported by a Public Land Mobile Network (PLMN)"

[15] 3GPP TS 21.133: "Security Threats and Requirements"

[16] 3GPP TS 33.120: "Security Principles"

[17] 3GPP TS 22.042: "Network Identity and Time Zone, Service Description, Stage 1"

[18] 3GPP TS~~GSM~~ 02~~42~~.009: "~~Digital cellular telecommunications system (Phase 2+);~~ Security Aspects"

[19] 3GPP TS 31.102: "USIM Application Characteristics"

[20] 3GPP TS 23.221 “Architectural Requirements”

[21] 3GPP TS 22.002: “Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)”

[22] 3GPP TS 22.060: “General Packet Radio Service (GPRS)”

[23] 3GPP TS 29.002: “Mobile Application Part (MAP) specification ”

[24] 3GPP TR 23.972: "Circuit Switched Multimedia Telephony".

[25] 3GPP TS 22.140: "Multimedia messaging service; Stage 1".

[26] 3GPP TS 22.226: “Global Text Telephony, Stage 1.”

[27] 3GPP TS 22.IM: "IP multimedia (IM) CN subsystem, stage 1"

[28] RFC2543: "SIP: Session Initiation Protocol"

[29] 3GPP TR 21.905: “ Vocabulary for 3GPP Specifications”

[30] 3GPP TS 26.233: "Packet Switched Streaming Service (PSS) ; General Description"

[31] 3GPP TS 26.234: "Packet Switched Streaming Service (PSS) ; Protocols and Codecs"

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of this TS, the following definitions apply:

Authentication: a property by which the correct identity of an entity or party is established with a required assurance. The party being authenticated could be a user, subscriber, home environment or serving network.

Bearer: a bearer capability of defined capacity, delay and bit error rate, etc.

Bearer capability: a transmission function which the user equipment requests to the network.

Confidentiality: the avoidance of disclosure of information without the permission of its owner.

Home Environment: see definition in [29].

IC Card: a card holding an Integrated Circuit containing subscriber, end user, authentication and/or application data for one or more applications.

Integrity: (in the context of security) is the avoidance of unauthorised modification of information.

Mobility: the ability for the user to communicate whilst moving independent of location.

Multimedia service: Multimedia services are services that handle several types of media such as audio and video in a synchronised way from the user's point of view. A multimedia service may involve multiple parties, multiple connections, and the addition or deletion of resources and users within a single communication session.

Number: A string of decimal digits that uniquely indicates the public network termination point. The number contains the information necessary to route the call to this termination point.

A number can be in a format determined nationally or in an international format. The international format is known as the International Public Telecommunication Number which includes the country code and subsequent digits, but not the international prefix.

Number portability: where the provision of directory numbers is independent of home environment and/or serving network.

One Stop Billing: one bill for all charges incurred using PLMN services.

Quality of Service: the collective effect of service performances, which determine the degree of satisfaction of a user of a service. It is characterised by the combined aspects of performance factors applicable to all services, such as:

- service operability performance;
- service accessibility performance;
- service retention performance;
- service integrity performance;
- and other factors specific to each service.

Roaming: the ability for a user to function in a serving network.

Security: the ability to prevent fraud as well as the protection of information availability, integrity and confidentiality.

Service: is set of functions offered to a user by an organisation.

Service Control: is the ability of the user, home environment or serving environment to determine what a particular service does, for a specific invocation of that service, within the limitations of that service.

Service Provider: A Service Provider is either a network operator or an other entity that provides services to a subscriber (e.g. a MVNO)

Serving Network: the serving network provides the user with access to the services of home environment.

Subscriber: A Subscriber is an entity (e.g. a user) that is engaged in a Subscription with a service provider.

Supplementary service: is a service which modifies or supplements a basic telecommunication service. Consequently, it cannot be offered to a customer as a standalone service. It must be offered together with or in association with a basic telecommunication service. The same supplementary service may be common to a number of telecommunication services.

Teleservice: is a type of telecommunication service that provides the complete capability, including terminal equipment functions, for communication between users according to standardised protocols and transmission capabilities established by agreement between operators.

User: is a logical, identifiable entity which uses services.

User Profile: is the set of information necessary to provide a user with a consistent, personalised service environment, irrespective of the user's location or the terminal used (within the limitations of the terminal and the serving network).

User Equipment: is a combination of mobile equipment (ME) and SIM/USIM.

USIM: User Service Identity Module is an application residing on the IC-Card used for accessing services with appropriate security.

Virtual Home Environment: the virtual home environment is a system concept for personalised service portability between serving networks and between terminals.

Further definitions are given in ~~3G~~3GPP TR 21.905 [29].

3.2 Abbreviations

For the purposes of this TS, the following abbreviations apply:

BER	Bit Error Rate
CN	Core Network
DTMF	Dual Tone Multiple Frequency
ETSI	European Telecommunications Standards Institute
FDD	Frequency Division Duplex
GSM	Global System for Mobile Communications
IMT-2000	International Mobile Telecommunications 2000
IN	Intelligent Network
ISDN	Integrated Services Digital Network
ITU	International Telecommunication Union
LAN	Local Area Network
ME	Mobile Equipment
MMI	Man Machine Interface
MO	Mobile Origination
MT	Mobile Termination
O&M	Operations and Maintenance
PBX	Private Branch eXchange
PC	Personal Computer
PCMCIA	Personal Computer Memory Card International Association
PIN	Personal Identity Number
PNP	Private Numbering Plan
POTS	Plain Old Telephony Service
QoS	Quality of Service
SIM	Subscriber Identity Module
SMS	Short Message Service
TDD	Time Division Duplex
UICC	UMTS IC Card
UE	User Equipment
USIM	User Service Identity Module
UMTS	Universal Mobile Telecommunications System
VHE	Virtual Home Environment

Further abbreviations are given in ~~3G~~3GPP TR 21.905 [29].

4 General

4.1 Aims of 3GPP specifications

It shall be capable of delivering audio, text, video and graphics direct to people and provide them with access to the next generation of information based services. It moves mobile and personal communications forward from existing systems, delivering massmarket low-cost digital telecommunication services.

The aims are:

- to enable users to access a wide range of telecommunications services, including many that are today undefined as well as multi-media and high data rates.
- to facilitate the provision of a high quality of service (particularly speech quality) similar to that provided by fixed networks;
- to facilitate the provision of small, easy to use, low cost terminals with long talk time and long standby operation;
- to provide an efficient means of using network resources (particularly radio spectrum).

4.2 Standardisation of Service Capabilities

Existing systems have largely standardised the complete sets of teleservices, applications and supplementary services which they provide. As a consequence, substantial re-engineering is often required to enable new services to be provided and the market for services is largely determined by operators and standardisation. This makes it more difficult for operators to differentiate their services.

3GPP shall therefore standardise service capabilities and not the services themselves. Service capabilities consist of bearers defined by QoS parameters and the mechanisms needed to realise services. These mechanisms include the functionality provided by various network elements, the communication between them and the storage of associated data. This TS provides a conceptual description of a service architecture and architecture requirements which aim to provide service capabilities. It is intended that these standardised capabilities should provide a defined platform which will enable the support of speech, video, multi-media, messaging, data, other teleservices, user applications and supplementary services and enable the market for services to be determined by users and home environments.

4.3 Efficient Use of Network Resources

Service capabilities shall take account of the discontinuous and asymmetric nature of most teleservices and user applications in order to make efficient use of network resources (particularly radio resources).

Service capabilities shall be provided in a wide range of radio operating environments (where a radio environment is characterised in terms of propagation environment, mobile equipment relative speeds and traffic characteristics - see [2]). Although 3GPP aims to minimise the number of radio interfaces and to maximise commonality between them, it may utilise several radio interfaces, each optimised for different environments. Each radio interface might provide differing service capabilities. 3GPP specifications include UTRAN radio interface supporting two modes (TDD and FDD)and GERAN radio interface.

3GPP specifications shall provide a mechanism which will enable a piece of user equipment (UE) to adapt to different radio interfaces as necessary and to determine the service capabilities available. The specifications shall also provide a mechanism which will enable a UE to select radio interfaces capable of providing appropriate service capabilities.

4.4 Compatibility with Global Standards

3GPP specifications aim to be compatible with IMT-2000 and to provide global terminal mobility (roaming), enabling the user to take his/her terminal to different regions of the world and to be provided with services. It is probable that

different regions of the world will adopt different radio interface technologies. IMT-2000, as a global standard, should therefore enable a IMT-2000 terminal to determine the radio interface technology and the radio interface standard used in a region. Global terminal roaming also requires the global standardisation of service capabilities. As far as possible the method of indication of the radio interface standard and available service capabilities shall be aligned with IMT-2000.

3GPP specifications shall enable users to access the services provided by their home environment in the same way via any serving network provided the necessary service capabilities are available in the serving network.

The 3GPP specifications will be available for the partner organisations to adopt as their regional standards. For example in Europe, ETSI may adopt them as standards for both GSM and UMTS.

4.5 Virtual Home Environment

The 3GPP specifications aim to provide the user with a comprehensive set of services and features, which have the "same look and feel" wherever they are used. For further information see 3GPP 22.121 [2]. Especially the VHE shall provide for:

- a generic set of services / features and access capabilities, if the required service capabilities are available in the visited network;
- the means for serving network, home environments and user to re-use existing system capabilities to define their own specific features / services;
- user personalisation of features / services;
- a personalised service set being used via all access and transport networks, subject to physical limitations;
- the ability for the user to have access to personalised services from any suitable UE;
- regional or network based variations, enhancements to the basic services;
- future evolution of 3GPP specification itself.

4.6 Functionality of Serving Network and Home Environment

The following functionality shall be the responsibility of the home environment:

- User Authentication.
- SIM/USIM Issue.
- Billing.
- User Profile/VHE Management.

The following functionality shall be the responsibility of the serving network:

- Radio or other means of access.
- Transport and signalling.

The following functionality may be the responsibility of either the serving network, the home environment or an appropriate combination of both

- Service Control.
- QoS negotiation.
- Mobility management, including roaming.
- Automatic establishment of roaming agreements.

4.7 PLMN Architecture

The network is logically divided into a radio access network and a core network, connected via an open interface. From a functional point of view the core network is divided into a Packet Switched CN Domain, IP Multimedia (IM) CN subsystem and a Circuit Switched CN Domain. IM CN subsystem utilises PS CN domain (GPRS) bearer services.

CS CN domain supports bearer independent transport. There is no difference in service offering or UE functionality due to different transport.

For further information see TS 23.221 [20].

5 Evolution

5.1 Support of 2G services

The 3GPP specifications shall be capable of supporting existing 2G services in a manner which is transparent to the users of these services.

5.2 Provision and evolution of services

Since a phased approach has been adopted, the same general service principles shall apply to each phase. Support of services from an end user perspective is understood to be an important driver for established mobile users to stay with their existing operator while taking the new services into use. It is therefore important to enable operators to offer continued support of legacy services in future releases. Previous release services shall as a principle also be supported in the following releases.

Networks shall be capable of providing a specified core set of capabilities.

The core set of capabilities should permit home environment to offer a range of distinctive services including those which cannot be implemented on systems based on previous release specifications.

It shall be possible for the home environment to develop services with full roaming capability.

The radio interface should not unnecessarily restrict the development of new services (within physical limitations).

The standard shall provide a mechanism which allows a terminal to be easily upgraded so that it can access new services which are within the physical limitations of the terminal.

6 Classification of services

In the CS CN domain, the basic services are divided into circuit teleservices (TS 22.003 [14]) and bearer services (TS 22.002 [21]) and they can utilise standardised supplementary services (TS 22.004 [5]).

GPRS (22.060 [22]) provides IP bearer services. SMS, USSD and UUS can also be considered as bearer services for some applications.

IP multimedia services are the IP based session related services, including voice communications. IP multimedia sessions use GPRS as a bearer.

Value added non-call related services include a large variety of different operator specific services/applications. They are usually not specified by 3GPP. The services can be based on fully proprietary protocols or standardised protocols outside 3GPP.

In order to create or modify the above services (both call and non-call related services) operators may utilise toolkits standardised by 3GPP (such as CAMEL or LCS) or external solutions (e.g. Internet mechanisms). Pre-paid is an example of an application created with toolkits that may apply to all of the above services categories.

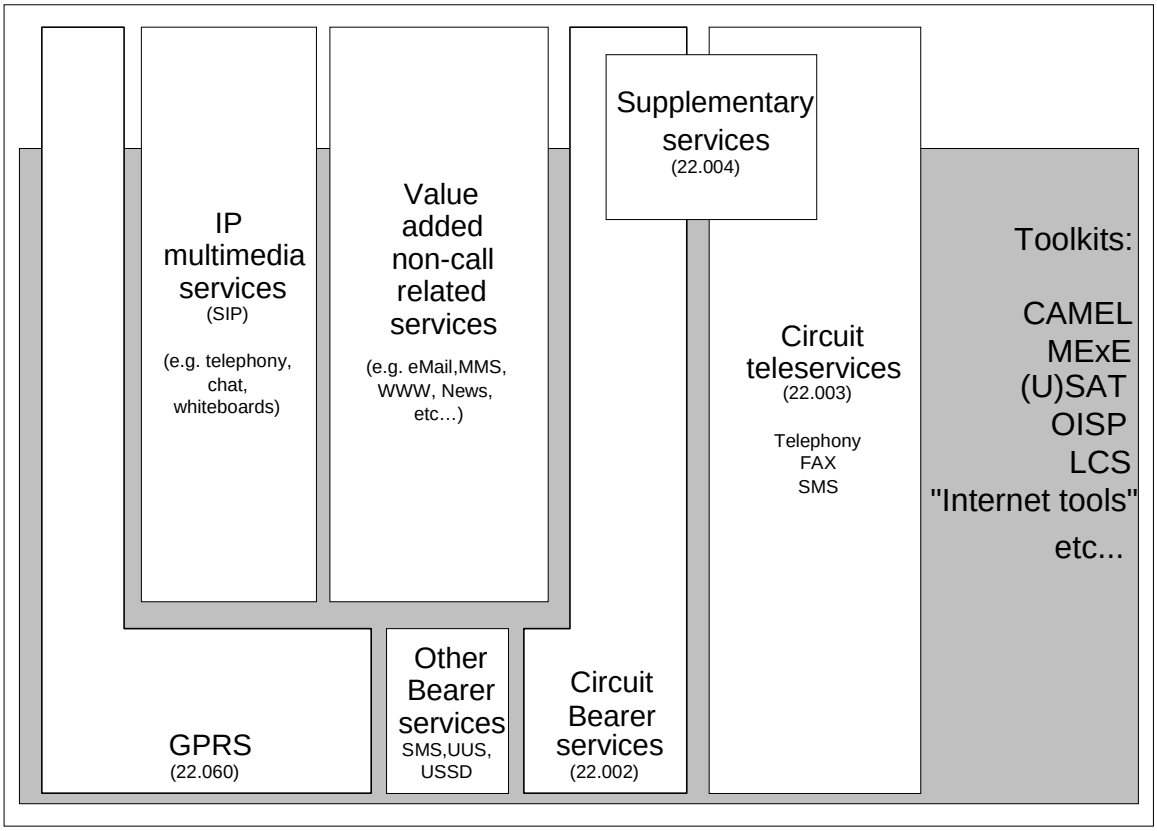


Figure 1: Service classification

7 Principles for new service capabilities

7.1 General

3GPP specifications shall enable the user of a single terminal to establish and maintain several connections simultaneously. It shall efficiently cater for applications which have variable requirements relating to specific QoS parameters (e.g. throughput) whilst meeting other QoS targets. It shall also cater for applications which are able to take adapt to a range of variations in QoS.

7.2 Multimedia

3GPP specifications shall support development of multimedia services and provide the necessary capabilities.

Multimedia services combine two or more media components (e.g. voice, audio, data, video, pictures) within one call. A multimedia service may involve several parties and connections (different parties may provide different media components) and therefore flexibility is required in order to add and delete both resources and parties.

Multimedia services are typically classified as interactive or distribution services.

Interactive services are typically subdivided into conversational, messaging and retrieval services:

Conversational services are real time (no store and forward), usually bi-directional where low end to end delays (< 100 ms) and a high degree of synchronisation between media components (implying low delay variation) are required. Video telephony and video conferencing are typical conversational services."

Messaging services offer user to user communication via store and forward units (mailbox or message handling devices). Messaging services might typically provide combined voice and text, audio and high-resolution images.

Retrieval services enable a user to retrieve information stored in one or many information centres. The start at which an information sequence is sent by an information centre to the user is under control of the user. Each information centre accessed may provide a different media component, e.g. high resolution images, audio and general archival information.

Distribution services are typically subdivided into those providing user presentation control and those without user presentation control.

Distribution services without user control are broadcast services where information is supplied by a central source and where the user can access the flow of information without any ability to control the start or order of presentation e.g. television or audio broadcast services.

Distribution services with user control are broadcast services where information is broadcast as a repetitive sequence and the ability to access sequence numbering allocated to frames of information enables the user (or the user's terminal) to control the start and order of presentation of information.

7.2.1 Circuit Switched (CS) multimedia calls

The following basic requirements are be supported for CS multimedia [24]:

- CS multimedia shall be based on a 3GPP specific subset of H.324M.
- All call scenarios shall be supported, i.e. Mobile Originating and Mobile Terminating call against Mobile, ISDN and PSTN call party.
- Single and multiple numbering schemes shall be supported.
- Fallback to speech (TS 11 [14]) shall be supported from 3.1kHz Ext. PLMN multimedia bearer, i.e. if setup of the multimedia call fails the call will be set up as a speech call.
- CS Multimedia call is a Bearer Service, which utilises Synchronous Transparent Data service.
- Different bitrates as specified at 22.002 [21] shall be supported.
- Supplementary services apply to multimedia calls as for Synchronous Transparent Data service according to 22.004[5].

7.2.2 IP multimedia (IM) sessions

IP multimedia services are not the evolution of the circuit switched services but represent a new category of services, mobile terminals, services capabilities, and user expectations. Any new multimedia service, which may have a similar name or functionality to a comparable standardised service, does not necessarily have to have the same look and feel from the user's perspective of the standardised service. Voice communications (IP telephony) is one example of real-time service that would be provided as an IP multimedia application.

The following basic requirements are be supported for IP multimedia [27]:

- IP multimedia session control shall be based on SIP [28].
- All session scenarios shall be supported, i.e. Mobile Originating and Mobile Terminating sessions against Internet/Intranet, CS or IM Mobile, ISDN, PSTN call party.
- MSISDN and SIP URL numbering and addressing schemes shall be supported.
- IP multimedia applications shall as a principle, not be standardised, allowing service provider specific variations.

7.2.3 Multimedia Messaging Service (MMS)

The following basic requirements are be supported for MMS:

- Store-and-forward multimedia messaging service with mobile and non-mobile users [25].
- MMS shall be capable of supporting integration of different types of messaging (e.g. fax, SMS, Multimedia, voicemail, e-mail etc.) in a consistent manner.

- Streamed and batch delivery for both message download from the network to the terminal, and messages upload from the terminal to the network.

7.2.4 Text Conversation

Global Text Telephony (GTT) is a feature that enables real-time text conversation [28].

- GTT enables real time, character by character, text conversation to be included in any conversational service, Circuit Switched as well as IP based.
- It is possible to use the text component in a session together with other media components, especially video and voice.
- Interworking with existing text telephony in PSTN as well as emerging forms of standardised text conversation in all networks is within the scope of this feature.
- The text media component can be included initially in the session, or added at any stage during the session.
- The text component is intended for human input and reading, and therefore supports human capabilities in text input speed. The character set support is suitable for the languages the users communicate in.
- GTT specifies limited interoperation with Multimedia Messaging Services including a possibility to divert to messaging in case of call failure and sharing user interface equipment and external UE interfaces.

7.2.5 Packet Switched Streaming Service

The following basic requirements are to be supported for streaming :

- The streaming service uses a client / server model which is transparent to the PLMN. The client controls the initiation and execution of the service.
- The streaming service [29] shall use existing standards (codecs and protocols [30]) where these are available.
- The streaming service utilises the PS Domain with the QoS requirements as specified in TS 22.105 [1].

7.3 Service Management Requirements

3GPP specifications shall include standardised protocols enabling service management. It shall enable control, creation and subscription of service capabilities and services, and the management of user profiles.

8 Service architecture

In order to provide standardisation of service capabilities a service architecture shown by Figure 2 is envisaged

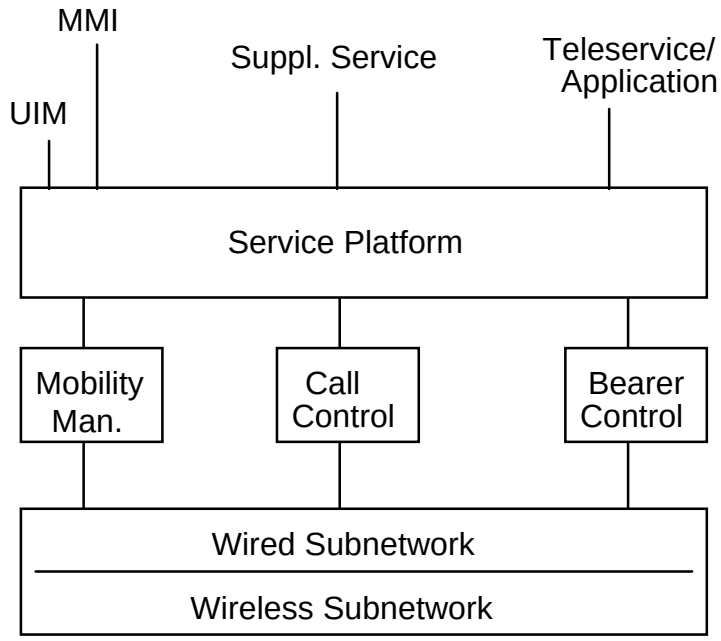


Figure 2: Service Architecture

A number of bearers shall be provided that can differ in flexibility and offer different capabilities. Bearers may be characterised by parameters such as “throughput”, “delay tolerance”, “maximum bit error rate”, “symmetry” etc. These bearers enable information to be transferred appropriate to the provision of teleservices, and end user applications generally, via subnetworks which typically provide different specified qualities of service.

The assignment and release of bearers is provided by the bearer control function. Provision should be made for several bearers to be associated with a call and for bearers to be added to a call and/or to be released from a call following call establishment. The bearers should be independent of radio environments, radio interface technology and fixed wire transmission systems.

Adaptation/Interworking functions are required in order to take account of the differences between the bearers used for the provision of a teleservice/application in the fixed network and the bearers. Adaptation/Interworking functions are required which take account of the discontinuous and/or asymmetrical nature of most teleservices/applications.

The service platform shall provide interfaces (to serving networks and home environments) appropriate to the support, creation and control of supplementary services, teleservices and user applications. The service platform will also provide interfaces enabling subscribers to control supplementary services, teleservices and user applications.

Supplementary service provision and control will be independent of radio operating environment, radio interface technology and fixed wire transmission systems.

As far as possible, the service platform is required to enable new supplementary services, teleservices and/or end user applications to be supported at minimum cost, with minimum disruption of service and within the shortest possible time.

9 Quality of Service (QoS)

The Quality of Service (QoS) parameters should be identified together with appropriate parameter values which set targets to be reached when designing 3GPP specifications, and which also will serve as guidelines for network design and service provision.

The QoS for call set-up time, as an example, can be defined in terms of a mean value and as a percentage of cases which should not exceed a certain time limit. Further information can be found in 3GPP TS 22.105[1].

10 Emergency Calls

10.1 General requirements

It shall be possible to establish an emergency speech call. Emergency calls will be routed to the emergency services in accordance with national regulations for where the subscriber is located. This may be based upon one or more default numbers stored in the ME. It shall be allowed to establish an emergency call without the need to dial a dedicated number to avoid the mis-connection in roaming case, such as menu, by use of a 'red button', or a linkage to a car air bag control. Emergency Calls shall be supported by the UE without a SIM/USIM being present. No other type than Emergency calls shall be accepted without a SIM/USIM.

The Emergency service is required only if the UE supports voice.

Note: It will be left to the national authorities to decide whether the network should accept emergency calls without the SIM/USIM.

It shall be possible to initiate emergency calls to different emergency call centers, depending on the type of emergency. The following types of emergency calls shall be possible:

- Police
- Ambulance
- Fire Brigade
- Marine Guard
- Mountain Rescue
- Spare, at least [three] different types

When a SIM/USIM is present, subscriber specific emergency call set-up MMI shall be provided. The Home Environment operator shall specify preferred emergency call MMI(s) (e.g. 911 for US citizens or 110, 118 and 119 for Japanese citizens). This shall be stored in the SIM/USIM and the ME shall read this and use any entry of these digits to set up an emergency call. It shall be possible to store more than one instance of this field.

Note: Release '98 and earlier SIM cards have the capability to store additional emergency call set-up MMI. However in many cases this has not been used.

It shall be possible to tie any emergency call number, specified in the preferred emergency call MMI(s) above, to any single emergency call type or to any combination of emergency types. The association between emergency numbers and emergency call type shall be able to be programmed by the Home Environment operator into the SIM/USIM.

Example:

19	Police (Albania)
100	Police and Fire Brigade (Greek cities)
100	Ambulance and Fire Brigade (Belgium)
112	Police and Ambulance (Italy)
112	General emergency call, all categories (Sweden)
115	Fire Brigade (Italy)
114	Ambulance (Austria)

Note: if the UE does not recognise the emergency call MMI(s) (i.e. the dialled number is not stored in SIM/USIM) but the serving network recognises the dialled number as an emergency call number used in the country, a normal call set up takes place over the radio interface and after the serving network has recognised the emergency number the call is routed as an emergency call.

When a SIM/USIM containing stored emergency numbers is present, only those numbers are identified as emergency numbers, i.e. default emergency numbers stored in the ME are ignored.

The following emergency numbers shall be stored in the ME for use when no emergency numbers are stored in the SIM: 000, 08, 112, 110, 911 and 999.

Note: Emergency numbers stored in the ME, for use when no emergency numbers are stored in the SIM, should not overlap with existing service numbers used by any operator.

The user friendly MMI which specifies the type of emergency directly (e.g. menu) should be supported for use in any (i.e. home or visited) PLMN to avoid the mis-connection in roaming case. This shall be allowed to both with and without SIM/USIM being present.

The following emergency numbers shall be stored in the ME for use without SIM/USIM: 000, 08, 112, 110, 118, 119, 911 and 999.

10.2 Emergency calls when attached to a CS CN Domain

PLMNs shall support an emergency call teleservice as defined in TS 22.003 [14] (TS12).

10.3 Emergency Calls when Attached to a Data Only Network

If an UE with voice capability attempts to make an emergency call while camping on a PLMN that does not support voice service to the UE, a new PLMN selection shall immediately take place, and the UE shall select the first available PLMN that supports emergency calls to the UE.

10.4 Emergency Calls when Attached to a IM CN subsystem

Emergency calls shall be supported when attached to a IM CN subsystem as specified at chapter 10.1.

If UE is attached simultaneously to both CS domain and IM CN subsystem, the operator shall be able to specify, which domain is used by default for emergency calls.

For further information see [27].

Note 1: It shall be possible to enable compliance with regional regulatory requirements related to emergency calls.

Note 2: Other forms than speech for emergency services are for further study.

11 Numbering principles

The following network addressing schemes listed below shall be supported at the relevant domains:

- E.164,
- E.168,
- E.212,
- X.121
- Internet (including e.g. IP address).

11.1 Number portability

11.1.1 Requirements for CS CN domain

Some numbering schemes shall be fully independent of the supporting serving network and the home environment, allowing users to transfer this number to another home environment. For further information see TS 22.066 [7].

An MSISDN shall be allocated to each new user at the start of a subscription. This number may be allocated from one of several numbering domains. For example:

- home / serving environment numbering scheme;
- national numbering scheme;
- regional numbering scheme;
- global numbering scheme.

A user shall be able to move subscription from one home environment to another without changing the MSISDN provided that the new home environment offers service in the same geographic domain. It is envisaged that home environment s will be able to allocate MSISDNs from each of these domains as required.

11.1.2 Requirements for PS CN domain

None identified.

11.1.3 Requirements for IM CN subsystem

None identified.

Note: Portability of E.164 numbers within IM subsystem is envisaged and under further study.

11.2 Evolution path

Since 3GPP specifications aim to be aligned with IMT-2000, a primary goal in numbering is the provision of global user numbering in line with steps taken by the ITU - SG2.

The numbering scheme and network implementation chosen shall allow for international/global evolution.

11.3 User / USIM Identification

It is a requirement that the user can be uniquely identified by the home environment from which the service is being obtained. This identification may be unknown to the serving network on which the user is roaming.

Serving networks need to be able to communicate with, authenticate and commercially deal with the home environment associated with any SIM/USIM being registered on their network. This shall require a SIM/USIM identity scheme which uniquely identifies each SIM/USIM, and a mapping scheme which allows the USIM identity to be used as a identifier with the "owning" home environment.

Serving networks also require to be able to route efficiently any communication to and from SIM/USIMs (or rather the devices on which they are registered). An address scheme is therefore required for operators to access and map any outgoing or incoming communication to SIM/USIMs and thus devices on their networks

It shall be possible for several numbers to be associated with a single subscription on a single UICC.

11.4 Terminal Identification

It is a requirement that the terminal can be uniquely identified by the home environment and serving network. This shall require a terminal identity scheme which uniquely identifies each terminal, see TS 22.016[12].

11.5 Home Environment / Serving Network Identification

Serving networks need to be able to communicate with, authenticate and commercially deal with the home environment associated with any SIM/USIM being registered on their network. This shall require a SIM/USIM identity scheme which uniquely identifies each SIM/USIM, and a mapping scheme which allows the SIM/USIM identity to be used as a identifier with the "owning" home environment.

Home / serving environments need to route communication to the current location of the user. This shall require a identity scheme which uniquely identifies the serving environment and shall be used for routing purposes.

11.6 Private numbering

A user may wish to use private numbers for the purposes of calling frequent numbers. Therefore there is a requirement for the use, by the user, of Private Numbering Plans (PNPs). These schemes may belong to the user himself, to a home environment or a third party.

11.7 Numbering schemes

11.7.1 Multiple numbering scheme

The standards shall support the possiblity of allowing the bearer service associated with an MT call to be implicitly defined by the destination MSISDN, for example to use a different MSISDN to establish voice, fax or data . It will be possible for multiple MSISDNs to be associated with a single subscription.

11.7.2 Single numbering scheme

The standards shall support the possibility of allowing MT calls of different bearer types (eg voice, fax, data) to be routed to a single MSISDN. It is recognised that the implementation of this may depend on the availability of bearer information associated with an incoming call from the adjoining transit network. In particular the standards will support this possibility in the case of an adjoining ISDN transit network.

11.8 Optimal routing for CS CN domain

The implementation of the numbering scheme used shall allow for optimal routing; i.e. routing shall not take place simply on the number dialled. See TS 22.079 [8] for some scenarios.

12 Human Factors and user procedures

The User Interface (MMI) from the end-user's point of view should be as flexible as possible while still meeting the general service requirements. In addition it should be capable of being updated so as to meet new services which are still to be envisaged.

In general the following principles should be encompassed:

- activation of services should be as simple as possible with minimum input expected from the user;
- feedback, to the user from the various services, should be meaningful;
- any error recovery procedures provided should be simple to understand and execute.
- input from the user and information to the user should be provided in alternative selectable modes in order to match user capabilities, preferences and situation.

However, a detailed specification for the User Interface shall not be defined. In particular given the global nature of the third generation systems, for different regions of the world, different criteria will determine the implementation of the User Interface. Also it is unlikely that there will be a single common handset which will meet all the service requirements and therefore a common User Interface would be impractical.

Given the flexibility of the services, there should be a wide range of User Interface possibilities. These possibilities include simple terminals with a single on/off button through to complex terminals providing support to hearing/visually impaired users.

Control of supplementary services (TS 22.004 [5]), may use MMI procedures specified in TS 22.030 [6] and existing ~~GSM~~ MMI related UE features (Annex A) may also be used. In particular the following features are highly desirable for uniform UE implementation where appropriate:

- Mapping of numeric keys to European alphabetic keys to ensure compatible mnemonic dialing as defined in TS 22.030 [6],
- "+" key function to enable one key international access as defined in Annex A
- Structure of the MMI as described in TS 22.030 [6]
- Presentation of IMEI (International Mobile Equipment Identity) as defined in TS 22.030 [6]

13 UICC, USIM and Terminal

This clause defines the functional characteristics and requirements of the User Service Identity Module (USIM). The USIM is an application residing on a UICC.

13.1 The USIM and User Profiles

13.1.1 The SIM/USIM

Every SIM/USIM shall have a unique identity and shall be associated with one and only one home environment.

It shall be possible for a home environment to uniquely identify a user by the SIM/USIM.

The SIM/USIM shall be used to provide security features.

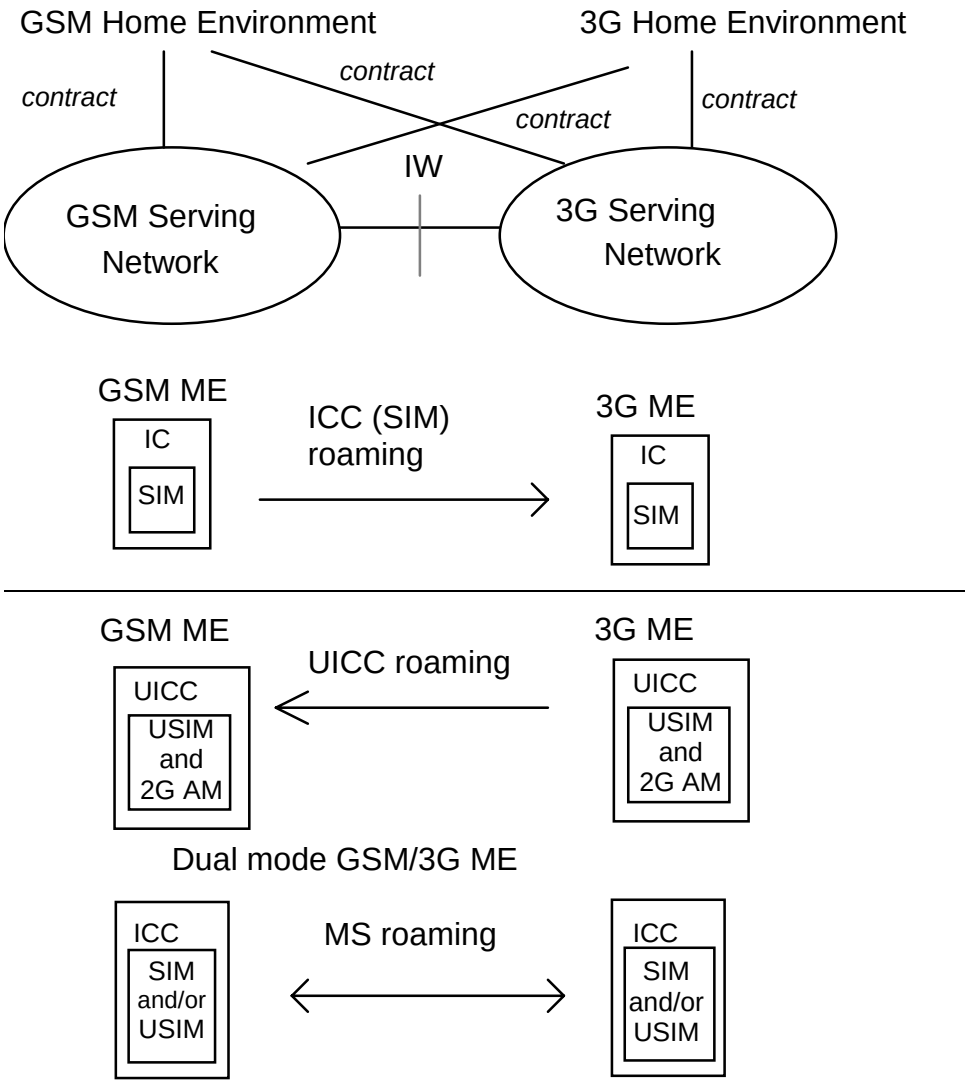
For access to services, provided by PS or CS CN domains, a valid SIM/USIM shall be required.

The SIM/USIM shall be able to support SIM Application Toolkit as specified in 3GPP TS 22.038 [3].

The SIM/USIM shall reside on a UICC, 3GPP specifications shall adopt both of the GSM SIM card physical formats. Other formats may also be supported. SIM/USIM specific information shall be protected against unauthorised access or alteration.

It shall be possible to update SIM/USIM specific information via the air interface, in a secure manner.

~~Figure 4 shows as an example the support of roaming users between GSM and 3G home environment.~~



2G AM: 2G Access Module

~~Figure 4 UICC roaming scenarios~~

13.1.2 User Profiles

It shall be possible for a user to be associated with one or a number of user profiles, which the user can select and activate on a per call basis. The user profile contains information which may be used to personalise services for the user.

It shall be possible for one or more user profiles associated with the same user to be active simultaneously so that the user may make or receive calls associated with different profiles simultaneously. Activation of profiles shall be done in a secure manner, for example with the use of a PIN.

For terminating calls the correct profile shall be indicated by the user address used (e.g. MSISDN), each profile will have at least one unique user address associated with it. For originating calls the user shall be able to choose from the available profiles, the appropriate one for the call. A profile identity will need to be associated with the call for accounting and billing purposes. User profile identities need not be standardised but a standardised means is required for indicating that a particular profile is being used.

Simultaneous use of the same user profile on multiple terminals for the same type of service shall not be allowed.

User profiles associated with different home environments shall not share the same user address.

13.1.3 UICC usage in 2G Terminals

It shall be possible to use the UICC in 2G terminals to provide access to ~~GSM~~ networks supporting GERAN (including networks based on earlier GSM specifications). In order to achieve that option, it shall be possible to store a module containing 2G access functionalities on the UICC, which shall be accessed via the standard ~~GSM~~ SIM-terminal interface.

13.1.4 Multiple USIMs per UICC

The standard shall support more than one USIM per UICC even when those USIMs are associated with different home environments. Only one of the USIMs or the SIM shall be active at a given time. While the UE is in idle mode, it shall be possible for the user to select/reselect one USIM application amongst those available on the UICC. At switch on, the Last Active USIM shall be automatically selected. The Last Active USIM shall be stored on the UICC. By default if there is no Last Active USIM defined in the UICC, the user shall be able to select the active USIM amongst those available on the UICC.

The standard must not prevent the coexistence of USIM applications, each associated with different home environments on the same UICC, so long as the security problems which arise from such a coexistence are solved.

13.2 The UICC

Access to services via ~~GSM and 3G networks~~3GPP system with a single UICC shall be possible.

13.2.1 The UICC and Applications other than the USIM

It shall be possible for the UICC to host other applications in addition to the USIM, see figure 3. Service providers, subscribers or users may need to establish additional data or processes on the UICC. Each application on an UICC shall reside in its own domain (physical or logical). It shall be possible to manage each application on the card separately. The security and operation of an application in any domain shall not be compromised by an application running in a different domain. Applications may need to use their own security mechanisms which are separate to those specified by 3GPP e.g. electronic commerce applications.

Examples of other UICC applications are: USIM, Phase 2+ SIM, off-line user applications like UPT, electronic banking, credit service, etc.

Applications should be able to share some information such as a common address book.

It shall be possible to address applications, which reside on the UICC, via the air interface.

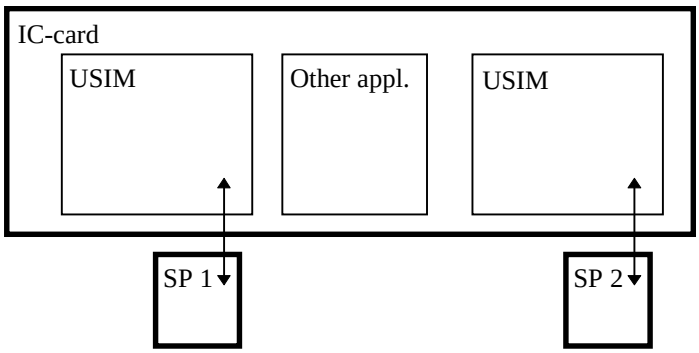


Figure 3 Example of a Multifunction UICC

13.3 Terminals and Multiple UICCs

A single terminal may support the use of multiple UICC (e.g with applications like USIM, SIM and/or banking, credit card,...). Only one UICC shall be active at a time to access a PLMN. In case the active UICC contains more than one USIM or SIM, the requirements of 11.1.4 shall apply.

If the UICC with the active USIM or SIM is removed from the mobile terminal during a call (except for emergency calls), the call shall be terminated immediately.

14 Types of features of UEs

3GPP specifications should support a wide variety of user equipment, i.e. setting any limitations on terminals should be avoided as much as possible. For example user equipment like hand-portable phones, personal digital assistants and laptop computers can clearly be seen as likely terminals.

In order not to limit the possible types of user equipment they are not standardised. The UE types could be categorised by their service capabilities rather than by their physical characteristics. Typical examples are speech only UE, narrowband data UE, wideband data UE, data and speech UE, etc..

In order to enhance functionality split and modularity inside the user equipment the interfaces of UE should be identified. Interfaces like UICC-interface, PCMCIA-interface and other PC-interfaces, including software interfaces, should be covered by references to the applicable interface standards.

UEs have to be capable of supporting a wide variety of teleservices and applications provided in PLMN environment. Limitations may exist on UEs capability to support all possible teleservices and information types (speech, narrowband data, wideband data, video, etc.) and therefore functionality to indicate capabilities of a UE shall be specified.

The basic mandatory UE requirements are:

- Support for GSM phase 2 and 2+ SIM cards, phase 1.5V SIM cards shall not be supported;
- Home environment and serving network registration and deregistration;
- Location update;
- Originating or receiving a connection oriented or a connectionless service;
- An unalterable equipment identification; IMEI, see TS 22.016 [12];
- Basic identification of the terminal capabilities related to services such as; the support for software downloading, application execution environment/interface, MExE terminal class, supported bearer services.
- Terminals capable for emergency calls shall support emergency call without a SIM/USIM.
- Support for the execution of algorithms required for encryption, for CS and PS services. Support for non encrypted mode is required;
- Support for the method of handling automatic calling repeat attempt restrictions as specified in TS 22.001 [4];
- At least one capability type shall be standardised for mobile terminals supporting the GERAN and UTRAN radio interfaces.
- Under emergency situations, it may be desirable for the operator to prevent UE users from making access attempts (including emergency call attempts) or responding to pages in specified areas of a network, see TS 22.011 [11];
- Ciphering Indicator for terminals with a suitable display;

  The ciphering indicator feature allows the ME to detect that ciphering is not switched on and to indicate this to the user. The ciphering indicator feature may be disabled by the home network operator setting data in the SIM/USIM. If this feature is not disabled by the SIM, then whenever a connection is in place, which is, or becomes unenciphered, an indication shall be given to the user. Ciphering itself is unaffected by this feature, and the user can choose how to proceed;
- Support for PLMN selection.
- Support for handling of interactions between toolkits concerning the access to UE MMI input/output capabilities;

  Whenever an application (e.g. a SAT/MExE/WAP application) requires the access to the UE MMI input/output capabilities (e.g. display, keyboard,…), the UE shall grant this access subject to the capabilities of the UE. This

shall not cause the termination of any other applications (e.g. WAP browser or MExE/SAT application) which were previously using these UE resources. The UE shall give the user the ability to accept or reject the new application. In the case that the application request is rejected, the access to the UE MMI input/output capabilities is returned to the applications which were previously using these UE resources. If the user decides to continue with the new application, then when this new application is terminated, the access to the UE MMI input/output capabilities shall be returned to the UE to be re-allocated to applications (e.g. the preceding application which was interrupted). Subject to the capabilities of the UE, the user shall have the ability to switch the MMI input/output capabilities between applications.

Note: Rejecting a request to access the UE MMI input/output capabilities by an application does not necessarily mean that it is terminated, but only that the access to the UE MMI input/output capabilities are not granted to this application. Handling of rejection (termination, put on hold,…) is the responsibility of the application.

Annex A describes a number of features which may optionally be supported by the ME.

15 Relationship between subscription and service delivery

15.1 Subscription

A subscription describes the commercial relationship between the subscriber and the service provider.

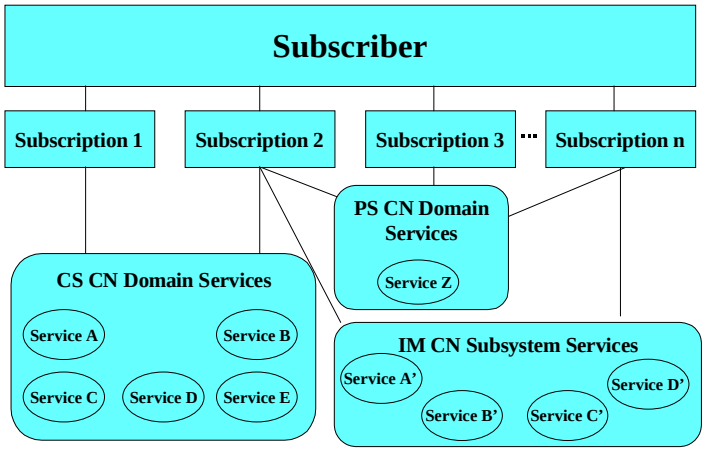


Figure 4~~3~~: Subscriber, subscription and services relationship

A subscription to a network operator may provide the user with access to one or more domains. A Subscription shall identify the set of services, within particular domains, to which the user has access (see figure 3); each subscription may specify a different set of services. These services may be provided by the CS CN Domain and/or a PS CN Domain and/or an IM CN subsystem. Subscriptions relate to services such as Basic Services (e.g. Teleservices, Bearer services), GPRS services and IM-Services (IP-based multimedia services), which are typically provided by network operators, and to value added services which typically are provided by network operators and/or other entities that provide services to a subscriber

The subscription identifies:

- the services and related services information that are made available to the subscriber by the service provider ;

In addition a subscription to a network operator may identify:

- the domains to which the user has been granted access by the network operator. In particular, the GPRS service profile and information on the allowed QoS parameter ranges shall be contained in the subscription.

- the identity of the subscriber within these domains.
  Note: The identity of a subscriber in the CS CN domain and PS CN domain (e.g. her IMSI) may potentially be different to her identity in the IM CN subsystem

15.2 Other concepts associated with services

Provision of services:
An action to make a service available to a subscriber. The provision may be:

- general: where the service is made available to all subscribers (subject to compatibility restrictions enforced) without prior arrangements being made with the service provider;

- pre-arranged: where the service is made available to an individual subscriber only after the necessary arrangements have been made with the service provider.

Withdrawal:
An action taken by the service provider to remove an available service from a subscriber's access. The withdrawal may be:

- general: where the service is removed from all subscribers provided with the service;

- specific: where the service is removed on an individual basis from subscribers provided with the service.

NOTE: Access to the IM subsystem requires IP connectivity provided, for example, through provision of the PS CN domain.

15.3 Requirements concerning service delivery

In general it is a requirement to allow the use of independent services simultaneously (i.e. Basic, GPRS, IP multimedia and operator specific).

1. The network usage shall be based on the services identified within the subscription, the terminal capabilities and, where applicable, roaming agreements between operators.

2. The Home environment shall be able to decide on the service delivery in a roaming scenario. I.e. it shall control how services are delivered in line with the subscription.

3. If an offered or required service (e.g. voice) could be provided with different technologies within the serving network, the decision on service delivery shall be based on preferences identified in the user profile and serving network capabilities and conditions (e.g. load).

4. If the user profile does not allow an alternative service delivery method and the requested delivery method is not available in the serving network the service shall not be provided to the subscriber. This applies also to data bearer services with defined QoS parameters (or parameter ranges).

Examples:

- A terminating voice call for a subscriber with a dual/multi mode terminal (e.g.UTRAN/GERAN) could be delivered in a hybrid network as IM service or CS voice call (TS11). The delivery decision is based on the preferences of service delivery within the user profile and the network conditions. If there is no preference information of the Home environment available the decision is made only on the network conditions from the serving network.

- A terminating data service (e.g. GPRS with QoS for real time audio) where the network cannot provide the QoS at call setup. Both the originating and terminating application shall be informed about the possible QoS configuration for that call. The further handling (setup continuation, termination) depends on the decisions of the applications.

16 Charging principles

The cost of the call may cover the cost of sending, transporting, delivery and storage. The cost of call related signalling may also be included. Provision shall be made for charging based on time, destination, location, volume, bandwidth and quality. Charges may also be levied as a result of the use of value added services.

It shall be possible for information relating to chargeable events to be made available to the home environment at short notice. The requirements shall include:

- Immediately after a chargeable event is completed;
- At regular intervals of time, volume or charge during a chargeable event.

Standardised mechanisms of transferring charging information are required to make these requirements possible.

It should be possible for multiple leg calls (e.g. forwarded, conference or roamed) to be charged to each party as if each leg was separately initiated. However, in certain types of call, the originating party may wish/be obliged to pay for other legs (e.g. SMS MO may also pay for the MT leg.).

Provision shall be made for the chargeable party to be changed during the life of the call. There shall be a flexible billing mechanism which may include the use of stored value cards, credit cards or similar devices.

The chargeable party (normally the calling party) shall be provided with an indication of the charges to be levied (e.g. via the called number automatically or the Advice of Charge supplementary service) for the duration of the call (even though the user may change service environment)The user shall be able to make decisions about the acceptable level of accumulated charge dynamically or through their service profile.

If a user is to be charged for accepting a call then their consent should be obtained. This may be done dynamically or through their service profile.

17 Roaming

17.1 Assumptions

In order to roam, the following applies:

- Mobile terminal can connect to the radio access network.
- Authentication (charging/billing network) must occur in order to get access to services (except for emergency calls).
- The services offered to a roaming subscriber may be restricted by the capabilities of the visited network, and the roaming agreement between the visited and the home environment.

17.2 Principle

Long term evolution of the IM CN subsystem shall not be restricted by the short/mid term inter-domain roaming requirements.

17.3 Requirements

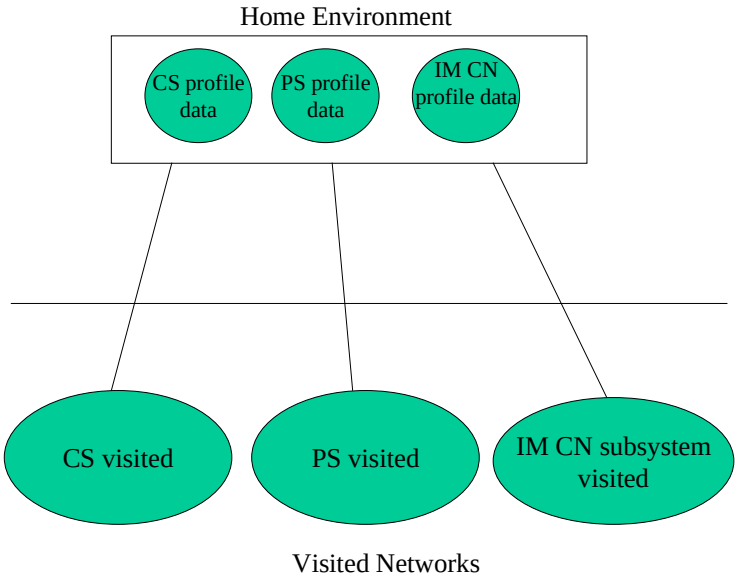


Figure 5: Roaming requiremetns

- The personalised services & capabilities available in a visited network are dependent upon the subscription options in the home environment. This does not preclude the visited network offering additional services, or access to content providers.
- Roaming from this release's home environment to CS (this release or earlier) visited network is required
- Roaming from this release's home environment to IM CN subsystem visited network is required
- Roaming from this release's home environment to PS (this release or earlier) visited network is required
- Roaming from previous releases' home environment (or earlier) to this release CS visited network is required
- Roaming from previous releases' home environment (or earlier) to this release PS visited network is required
- The support of access to wired IP networks with a mobile terminal, using a variety of access technologies (e.g. Bluetooth and Hiperlan) shall not be precluded in future releases.

Note: When an operator allows a subscriber to roam to different domains, the home environment needs to provide subscription data to the visited network . The mapping between service data of the different domains is not standardised; it is determined by the home environement and may be influenced by roaming agreements.

18 Handover Requirements

Any handover required to maintain an active service while a user is mobile within the coverage area of a given network, shall be seamless from the user's perspective. However handovers that occur between different radio environments may result in a change of the quality of service experienced by the user.

It shall be possible for users to be handed over between different networks subject to appropriate roaming/commercial agreements.

For further information see TS 22.129 [9].

19 Network Selection

Network selection procedures are defined in TS 22.011 [11].

Other procedures may be offered by the UE.

20 Security

Security matters are considered in TS 21.133 [15] and TS 33.120 [16].

Annex A (normative): Description of optional user equipment features

A.1 Display of called number

This feature enables the caller to check before call setup whether the selected number is correct.

A.2 Indication of call progress signals

Indications shall be given such as tones, recorded messages or visual display based on signalling information returned from the PLMN. On data calls, this information may be signalled to the DTE.

Call progress indicators are described in 3GPP TS 22.001 [4].

A.3 Country/PLMN indication

The country/PLMN indicator shows in which PLMN the UE is currently registered. This indicator is necessary so that the user knows when "roaming" is taking place and that the choice of PLMN is correct. Both the country and PLMN will be indicated. When more than one visited PLMN is available in a given area such information will be indicated.

The PLMN name is either:

- Stored in the ME and associated with the MCC+MNC combination received on the broadcast channel;
- NITZ (see 22.042 [17]) (in which case it overrides the name stored in the UE);
- stored in the USIM and associated with the MCC+MNC combination, and optionally the LAI, received on the broadcast channel (in which case it overrides the name stored in the UE and – if present – the NITZ name).

It shall be possible to store on the SIM/USIM at least 10 PLMN Identifications (MCC+MNC combination and optionally the LAI) for which the same PLMN name shall be displayed.

The PLMN name stored in the USIM has the highest priority, followed by the PLMN name provided by NITZ. The PLMN name stored in the ME has the lowest priority.

A.4 Service Provider Name indication

The service provider name is stored in the SIM/USIM in text and/or optionally graphic format. It shall be possible to associate at least 10 PLMN Identifications (MCC+MNC combination and optionally the LAI) with the same SP Name.

When registered on the HPLMN, or one of the PLMN Identifications used for Service Provider Name display:

(i) The SP Name shall be displayed;

(ii) Display of the PLMN Name is optional (i.e. the Service Provider name shall be displayed either in parallel to the PLMN Name or instead of the PLMN Name).

When registered on neither the HPLMN, nor one of the PLMN Identifications used for Service Provider Name display:

(i) The PLMN name shall be displayed;

(ii) Display of the SP Name is optional.

If the UE is unable to display the full name of the Service Provider the name is cut from the tail end. The storage of Service Provider name and options, and choice of options, shall be under control of the network operator.

A.5 Keypad

A physical means of entering numbers, generally, though not necessarily, in accordance with the layout shown in figure A.1.

See also TS 22.030 [6] (Man-Machine Interface).

Additional keys may provide the means to control the UE (e.g. to initiate and terminate calls).

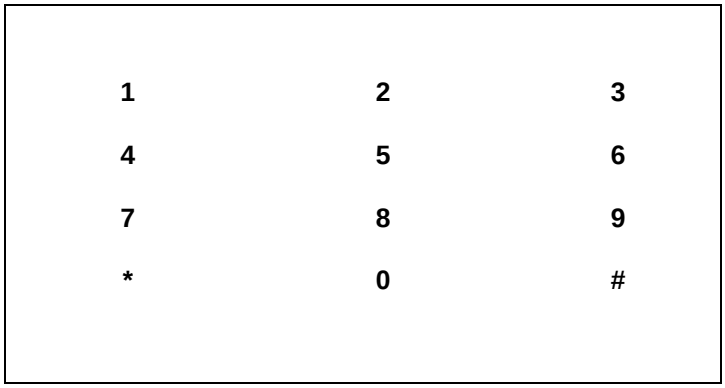


Figure A.1

A.6 Short message indication and acknowledgement

This feature allows the delivery of short messages to a UE from a service centre. Such messages are submitted to the service centre by a telecommunications network user who can also request information of the status of the message by further interrogation of the service centre. The service centre then transmits the message to an active UE user.

The UE must therefore provide an indication to the user that a message has been received from the service centre and must also send an acknowledgement signal to the PLMN to show that this indication has been activated. The PLMN then returns this acknowledgement to the service centre.

The short message service teleservice is described in specification TS 22.003 [14].

A.7 Short message overflow indication

An indication shall be given to the user of the short message service when an incoming message cannot be received due to insufficient available memory.

A.8 International access function

Provision is made for a direct, standard method of gaining international access. For this purpose the UE may have a key whose primary or secondary function is marked "+". This is signalled over the air interface and would have the effect of generating the international access code in the network. It may be used directly when setting up a call, or entered into the memory for abbreviated dialling.

This feature is of benefit since the international access code varies between CEPT countries, which might cause confusion to a user, and prevent the effective use of abbreviated dialling when roaming internationally. Users may still place international calls conventionally, using the appropriate international access code.

A.9 Service Indicator (SI)

An indication is given to the user that there is adequate signal strength (as far as can be judged from the received signal) to allow a call to be made.

A.10 Dual Tone Multi Frequency (DTMF)

The UE shall be capable of initiating DTMF in accordance with specifications TS 22.003 [14]. Optionally, the UE may provide a suppress function which allows the user to switch off the DTMF function.

A.11 On/Off switch

The UE may be provided with a means of switching its power supply on and off. Switch-off shall be "soft", so that on activation, the UE completes the following housekeeping functions: termination of a current call, detach (where applicable) and storing required data in the SIM/USIM before actually switching off. As far as possible, this procedure should also apply on power failure (e.g. remote switch-off or low battery).

A.12 Sub-Address

This feature allows the mobile to append and/or receive a sub-address to a Directory Number, for use in call set-up, and in those supplementary services that use a Directory Number.

A.13 Short Message Service Cell Broadcast

The Short Message Service Cell Broadcast enables the mobile equipment to receive short messages from a message handling system.

The short message service cell broadcast teleservice is described in specification TS 22.003 [14]

A.14 Short Message Service Cell Broadcast DRX

This feature enables a mobile equipment to save on battery utilization, by allowing the mobile equipment to not listen during the broadcast of messages the subscriber is not interested in.

A.15 Support of the extended Short message cell broadcast channel

This feature allows a mobile equipment by supporting of the extended Short message cell broadcast channel to enhance the capacity of the service. The support of the extended channel has low priority, i.e. the UE can interrupt the reading of this channel if idle mode procedures have to be executed.

A.16 Network Identity and Timezone

The feature provides the means for serving PLMNs to transfer current identity, universal time and the local timezone to mobile equipments, and for the mobile equipments to store and use this information. This enhances roaming by permitting accurate indication of PLMN identities that are either newer than the ME or have changed their name since the ME was sold. Additionally time and timezone information can be utilized by MEs as desired.

The network name time and timezone information will normally be transferred from the network to the ME:

1) Upon registering on the network.
2) When the UE geographically relocates to a different Local Time Zone.
3) When the network changes its Local Time Zone, e.g. between summer and winter time.
4) When the network changes its identity.
5) At any time during a signalling connection with mobile equipment.

Further details of this feature are described in TS 22.042 [15].

A.17 Network's indication of alerting in the UE

This feature provides the means for serving PLMNs to transfer to a UE an indication that may be used by the UE to alert the user in a specific manner in the following cases:

- mobile terminating call
- network initiated USSD
- network initiated Mobile Originated (MO) connection, if the ME supports the "network initiated MO connection " feature.

Eight different indications are defined, whether the mobile terminating traffic is a call or USSD or related to the network initiated MO connection procedure. These indications are sent by the network and received by the UE:

- Three of these indications are used as levels, reflecting some kind of urgency: level 0 indicates that the UE shall not alert the user for USSD and remain silent in the case of call, level 2 shall be considered by the UE as more important than level 1 for the purpose of alerting the user.
- The five other indications are used as categories, identifying different types of terminating traffic. The UE shall inform the user in a specific manner for each of these five categories. Nevertheless, the possible forms of the alert (different ringing tones, displayed text, graphical symbols...) is still up to the mobile manufacturer (some forms of alerts can be simultaneously used, e.g. ringing tones and text on the display).

The management of the feature by the UE requires for the handling of categories that :

- the SIM/USIM stores for each category an informative text (maximum 25 characters per category) describing the type of terminating traffic associated with the category. This information could be used by the UE when alerting the user (display on the screen). It is necessary for the network operator to be able to change the meaning of each category.
- The user has the ability to set up his/her own association between the type of terminating traffic (identified by each category) and the different types of alert provided by the UE. To help the user in this choice, the UE uses the informative text associated with each category (as stored in the SIM/USIM). The UE should keep this association when switched off.

  Default settings should also be defined in the ME for the following cases :

  - when the UE receives a call, USSD or a request for a network initiated MO connection with no alerting indication,
  - when the UE receives a call, USSD or a request for a network initiated MO connection with a category of alerting not defined in the SIM/USIM.

  These default settings should be separated per type of mobile terminated traffic received (call, USSD or request for a network initiated MO connection).

A UE supporting the feature shall act according to the following points in case of mobile terminating traffic :

- when a mobile terminating traffic is received without any indication (level or category), the ME shall act as if it was not supporting the feature, i.e. use a default alert (e.g. associated with this type of mobile terminating traffic).
- if a level is indicated, the UE shall use an alert enabling the user to differentiate between the three levels.
- if a category is indicated, then :
  - if the SIM/USIM used in the UE does not store any information on that feature, the UE shall ignore the category received with any mobile terminating traffic and act as if it was not supporting the feature, i.e. use a default alert (e.g. associated with this type of mobile terminating traffic).
  - if the category is not defined in the SIM/USIM, the UE shall act as if it was not supporting the feature, i.e. use a default alert (e.g. associated with this type of mobile terminating traffic).

- if the category is defined in the SIM/USIM, the UE shall use the alert associated with this category. In addition, it would be very useful for the user to be notified of the informative text associated with this category (e.g on the display).

Some interactions between this feature and other services related to alerting are described below :

- the call waiting service has priority on this feature, i.e. the call waiting tone will be played and not the alert derived by this feature. If possible, two different indications should be given to the user (e.g. the call waiting tone and a text on the display indicating call waiting, and in addition a text relative to the type of the new call received).

- the presentation of the calling line identity takes priority on this feature, if it is not possible to display this information and another information related to this feature.

- In case of interaction between this feature and UE specific features to alert the user (e.g. whole silent mode), the user should still be able to differentiate between the different levels or different types of terminating traffic, even if the alert itself may be changed.

A.18 Network initiated Mobile Originated (MO) connection

The "Network Initiated Mobile Originated connection" feature allows the network to ask the mobile equipment to establish a mobile originated connection. The serving PLMN provides the mobile equipment with the necessary information which is used by the mobile equipment to establish the connection.

Currently only the network initiated mobile originated call feature is specified. It is mandatory for a UE supporting CCBS and is used in the case of a CCBS recall.

A.19 Abbreviated dialling

The directory number or part of it is stored in the mobile equipment together with the abbreviated address. After retrieval the directory number may appear on the display.

Abbreviated dialling numbers stored in the UE or SIM/USIM may contain wild characters.

If wild characters are used to indicate missing digits, each wild character shall be replaced for network access or supplementary service operation, by a single digit entered at the keypad. The completed directory number is transmitted on the radio path.

A.20 Barring of Dialled Numbers

This feature provides a mechanism so that by the use of an electronic lock it is possible to place a bar on calling any numbers belonging to a pre-programmed list of numbers in the SIM/USIM.

Barred Dialling Numbers stored in the /USIM may contain wild characters.

Under control of PIN2, "Barred Dialling Mode" may be enabled or disabled. The selected mode is stored in the SIM/USIM.

Under PIN2 control, it shall be possible to add, modify or delete a particular "Barred Dialling Number" (BDN) and to allocate or modify its associated comparison method(s). This BDN may have the function of an abbreviated dialling number / supplementary service control (ADN/SSC), overflow and/or sub-address.

When BDN is inactive, no special controls are specified, and the barred dialling numbers may be read (though not modified or deleted, except under PIN2 control) as if they were normal abbreviated dialling numbers. Access to keyboard and normal abbreviated dialling numbers (including sub-address) is also permitted.

When Barring of Dialled Numbers is active:

- Considering a number dialled by the user, if it exists a BDN for which there is a successful comparison (see below) between that BDN and the dialled number, then the ME shall prevent the call attempt to that number. If there is no BDN to fulfil those conditions, the call attempt is allowed by the ME.

With each BDN is associated one (or a combination of) comparison method(s) used between that BDN and the number dialled by the user. At least three different comparison methods are possible:

- The comparison is made from the first digit of that BDN, from the first digit of the dialled number and for a number of digits corresponding to the length of the BDN.
- The comparison is made from the first digit of that BDN, from any digit of the dialled number and for a number of digits corresponding to the length of the BDN.
- The comparison is made backwards from the last digit of that BDN, from the last digit of the dialled number and for a number of digits corresponding to the length of the BDN.
- If a BDN stored in the SIM/USIM contains one or more wild characters in any position, each wild character shall be replaced by any single digit when the comparison between that BDN and the dialled number is performed.
- If a BDN contains a sub-address, and the same number without any sub-address or with that sub-address is dialled, the ME shall prevent the call attempt to that number.
- Numbers specified as "barred" may only be modified under PIN2 control.
- If the ME does not support barring of dialled numbers, the UE shall not allow the making or receiving calls. However, this feature does not affect the ability to make emergency calls.

If "Fixed Number Dialling" and "Barring of Dialled Numbers" are simultaneously active, the dialled number shall be checked against the two features before the ME allows the call attempt. In that case, a dialled number will only be allowed by the ME if it is in the FDN list and if the comparison between that number and any number from the BDN list is not successful.

The UE may support other selective barrings, e.g. applying to individual services (e.g. telephony, data transmission) or individual call types (e.g. long distance, international calls).

A.21 DTMF control digits separator

Provision has been made to enter DTMF digits with a telephone number, and upon the called party answering the UE shall send the DTMF digits automatically to the network after a delay of 3 seconds (± 20 %). The digits shall be sent according to the procedures and timing specified in TS~~GSM 02~~4.008 [13].

The first occurrence of the "DTMF Control Digits Separator" shall be used by the ME to distinguish between the addressing digits (i.e. the phone number) and the DTMF digits. Upon subsequent occurrences of the separator, the UE shall pause again for 3 seconds (± 20 %) before sending any further DTMF digits.

To enable the separator to be stored in the address field of an Abbreviated Dialling Number record in the SIM/USIM, the separator shall be coded as defined in TS 31.102 [19]. The telephone number shall always precede the DTMF digits when stored in the SIM/USIM.

The way in which the separator is entered and display in the UE, is left to the individual manufacturer's MMI.

MEs which do not support this feature and encounter this separator in an ADN record of the SIM/USIM will treat the character as "corrupt data" and act accordingly.

A.22 Selection of directory number in messages

The Short Message (Point to Point MT or MO, or Cell Broadcast), Network Initiated USSD or Network Response to Mobile Originated USSD message strings may be used to convey a Directory Number which the user may wish to call. This can be indicated by enclosing the directory number in a pair of inverted commas (" ").

If the displayed message contains these characters enclosing a directory number, a call can be set up by user action. Normal (unspecified) or International format (using + symbol) may be used.

The message may contain more than one directory number, in which case it is for the user to select the one required.

A.23 Last Numbers Dialled (LND)

The Last "N" Numbers dialled may be stored in the SIM/USIM and/or the ME. "N" may take the value up to 10 in the SIM/USIM. It may be any value in the ME. The method of presentation of these to the user for setting up a call is the responsibility of the UE but if these numbers are stored in both the SIM/USIM and the UE, those from the SIM/USIM shall take precedence.

A.24 Service Dialling Numbers

The Service Dialling Numbers feature allows for the storage of numbers related to services offered by the network operator/service provider in the SIM/USIM (e.g. customer care). The user can use these telephone numbers to make outgoing calls, but the access for updating of the numbers shall be under the control of the operator.

NOTE: No MMI is envisaged to be specified for these numbers and it is left to mobile manufacturer implementations.

A specific example of Service Dialling Numbers is the storage of mailbox dialling numbers on the SIM/USIM for access to mailboxes associated with Voicemail, Fax, Electronic Mail and Other messages.

A.25 Fixed number dialling

This feature provides a mechanism so that by the use of an electronic lock it is possible to place a bar on calling any numbers other than those pre-programmed in the SIM/USIM.

Under control of PIN 2, "Fixed Dialling Mode" may be enabled or disabled. The mode selected is stored in the SIM/USIM.

Fixed Dialling Numbers (FDNs) are stored in the SIM/USIM in the Fixed Dialling Number field. FDN entries are composed of a destination address/Supplementary Service Control. Destination addresses may have the format relevant to the bearer services/teleservices defined in [21] and [14]. FDN entries may take the function of an Abbreviated Dialling Number/Supplementary Service Control (ADN/SSC), Overflow and/or sub-address. Fixed Dialling Numbers stored in the SIM/USIM may contain wild card characters.

The Fixed Dialling feature is optional, however when Fixed Dialling Mode is enabled, an ME supporting the feature shall;

- Prevent the establishment of bearer services/teleservices to destination addresses which are not in FDN entries on a per bearer service/teleservice basis. The list of bearer services/teleservices excluded from the FDN check shall be stored in the SIM/USIM. Those bearer services/teleservices are characterised by their service code as described in [23]. For instance if the SMS teleservices is indicated in this list, SMS can be sent to any destination. By default, the ME shall prevent the establishment of any bearer service/teleservice to destination addresses which are not in FDN entries.
- Only allow modification, addition or deletion of Fixed Number Dialling entries under control of PIN2.
- Allow the establishment of bearer services/teleservice to destination addresses stored in FDN entries. For SMS, the Service Center address and the end-destination address shall be checked.
- Support the reading and substitution of wildcards in any position of an FDN entry, via the ME MMI.
- Allow the user to replace each wildcard of an FDN entry by a single digit, on a per call basis without using PIN2. The digit replacing the wildcard may be used for network access or supplementary service operation.
- Only allow Supplementary Service (SS) Control (in Dedicated or Idle mode) if the SS control string is stored as an FDN entry.
- Allow the extension of an FDN entry by adding digits to the Fixed Dialling number on a per call basis.
- Allow the emergency numbers (see Section 8.4) to be called, even if it is not an FDN entry.
- Allow normal access to ADN fields (i.e. allow ADN entries to be modified, added or deleted) and the keyboard.
- Allow use of ADNs subject to the FDN filter.

When FDN is disabled, an ME supporting FDN shall;

- Allow FDN entries to be read as though they were normal ADN entries.
- Only allow modification, addition or deletion of Fixed Number Dialling entries under control of PIN2.
- Allow normal access to ADN fields and the keyboard.

If the ME does not support FDN, the UE shall not allow the making or receiving of calls when Fixed Dialling is enabled. However, emergency calls (112 and other user defined emergency numbers) shall still be possible.

NOTE: Wildcards are stored on the SIM/USIM. The wildcard coding is given in TS 31.102 [19].

A.26 Message Waiting Indication

A short message may be used to provide and indication to the user about the status and number of types of messages waiting on systems connected to the PLMN. The ME shall present this indication as an icon on the screen, or other MMI indication, and store the indication status on the SIM/USIM to allow the status to be retained through power off/on, SIM/USIM movement between UEs etc..

The ME shall be able to accept and acknowledge these message waiting status short messages irrespective of the memory available in the SIM/USIM.

Annex B (informative): Change history

Change history					
SMG No.	**TDoc. No.**	**CR. No.**	**Section affected**	**New version**	**Subject/Comments**
SMG#22	302/97	001	4.6 (Role Model)	3.1.0	SMG3 queried the separation of network operator into core and access, which, on examination, SMG1 find unhelpful
SMG#22	319/97 (SMG1 WPC 125/97)	002		3.1.0	Editorial Changes: FLMPTS was replaced by IMT 2000, 2 new references given, additional clarifications.
SMG#22	320/97	003	8.5, 9.3, 9.5, 17	3.1.0	Changes on Emergency Calls, User identification, Multiple profiles and additional handover requirements.
After SMG#23	SMG1 433u/97 965/97	004		Draft 3.2.0	Based on Approved Changes at SMG#22 Distributed at SMG1 in Dresden Nov 3-7, 97 to be Approved at SMG#24
SMG#24	966/97	005	Sections 8, 9, 11	3.2.1	Restructuring of sections 8,9 and 11 to gather all requirements relating to multiple subscriptions into one section and to improve the clarity.
SMG#24	967/97	006	Section 8.1	3.2.1	To improve the accuracy of text on numbering principles and minor editorial change to section 8.1
SMG#27	98-0551	007	Section 4.6 and misc.	3.3.0	Removal of commercial role model from the specification in order to improve clarity
SMG#27	*98-0552 (Not Approved)*	*008*	*New Section 18 (Not Applied)*	*3.3.0*	*To include requirements for network selection in service principles: NOT APPROVED > NOT APPLIED*
Pre- SMG#28	*(SMG1 Tdoc 98-0893)* 99-040	008 r4 Rejected	New Section 18 Applied	[Draft 3.4.0]	Added Network Selection section - Agreed by correspondence - Jan 13, 1999 - Prepared with CRs applied with revision marks
SMG#27	98-0553	009	Section 4.3	3.3.0	To remove unnecessary reference to IN and B-ISDN
SMG#27	98-0682	010	Section 11	3.3.0	To improve the clarity of service requirements for multiple user profiles
Pre-SMG#28	*(SMG1 Tdoc 98-0869)* 99-040	011	Sections 1, 2, 3, 4, 9, 10, 12, 17	Draft 3.4.0	Clean up for UMTS phase 1 Agreed at SMG1 Rome
Pre-SMG#28	*(SMG1 Tdoc 98-852)* 99-040	012	Sections 3,8,9,11,14,15	Draft 3.4.0	Changes in IC card and terminal service requirements Agreed at SMG1 Rome
Pre-SMG#28	*(SMG1 Tdoc 98-0894)* 99-040	013r1	Section 3.2 & 4.3	Draft 3.4.0	Clarification of general requirements for efficient use of radio resources Agreed by correspondence - Jan 13, 1999 - Prepared with CRs applied with revision marks
NOTE				Draft 3.4.0	SMG1 agreed only
pre-SMG#28	99-040	015 Rejected	17	Draft 3.4.0	According to the outcome of the SMG 1 ad-hoc meeting on handover issues it is proposed that inter-operator handover is not required for UMTS phase 1.(rejected by smg#28)
SMG#28	99-305	008r5	Revised Section 18	3.4.0	Network Selection presented at SMG#28 in 2201_008r4 was further revised and Approved at SMG#28.

Change history					
SMG No.	**TDoc. No.**	**CR. No.**	**Section affected**	**New version**	**Subject/Comments**
NOTE				3.4.0	Removal of Section 12 on UPT with CR 011 causes a skip section from Section 11 to 13.

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**WI**
SP-03	SP-99104	S1-99202	22.101	A016		R99	B	Control of supplementary services (GSM 02.04), may use MMI procedures specified in GSM 02.30 and existing GSM MMI related MS features (GSM 02.07) may also be used.	3.4.0		
Post-SA#3			22.101			R99		Updated Logo, …	3.5.0	3.5.1	
SP-04	SP-99229	S1-99387	22.101	021		R99	B	MultiNumbering: It will be possible for multiple MSISDNs to be associated with a single subscription.	3.5.0	3.6.0	
SP-04	SP-99226	S1-99395	22.101	020	7	R99	B	Emergency: To route the call to the appropriate emergency service if more than one emergency number is supported in a country.	3.5.0	3.6.0	
SP-05	SP-99439	S1-99737	22.101	025		R99	B	Support of SAT by USIM	3.6.0	3.7.0	
SP-05	SP-99439	S1-99816	22.101	024		R99	B	Clarification on the usage on 2G SIM and 3G USIM	3.6.0	3.7.0	
SP-05	SP-99435	S1-99851	22.101	022		R99	C	Clarification of Emergency Call requirements	3.6.0	3.7.0	
SP-06	SP-99524	S1-991031	22.101	029		R99	B	Emergency Call	3.7.0	3.8.0	
SP-06	SP-99527	S1-991038	22.101	028		R99	C	FDN	3.7.0	3.8.0	
SP-06	SP-99519	S1-991026	22.101	026		R99	D	Mainly editorial update for GSM/3GPP use.	3.7.0	3.8.0	
SP-07	SP-000060	S1-000112	22.101	030		R99	A	Support of encryption in GPRS mobile stations	3.8.0	3.9.0	
SP-07	SP-000070	S1-000137	22.101	031		R99	F	Fixed Dialing Number (FDN)	3.8.0	3.9.0	
SP-08	SP-000210	S1-000271	22.101	033		R99	D	Network selection procedures removed from section 16, reference to 22.011 added	3.9.0	3.10.0	
SP-08	SP-000200	S1-000350	22.101	035		R99	B	Emergency Calls and numbers used	3.9.0	3.10.0	
SP-08	SP-000201	S1-000362	22.101	038		R99	F	CS multimedia support	3.9.0	3.10.0	
SP-08	SP-000202	S1-000326	22.101	039		R99	F	Clarification for USIM Application selection	3.9.0	3.10.0	
SP-08	SP-000210	S1-000270	22.101	034		R00	D	Network selection procedures removed from section 16, reference to 22.011 added	3.9.0	4.0.0	
SP-08	SP-000200	S1-000351	22.101	036		R00	B	Emergency Calls and numbers used	3.9.0	4.0.0	
SP-08	SP-000213	S1-000352	22.101	037		R00	B	Emergency Call enhancements	3.9.0	4.0.0	
SP-09	SP-000383	S1-000603	22.101	040		R4	B	Multimedia messaging	4.0.0	4.1.0	
SP-09	SP-000383	S1-000605	22.101	041		R4	C	Service Management requirements	4.0.0	4.1.0	
SP-09	SP-000430	S1-000700	22.101	042	1	R4	F	General corrections and clarifications to 22.101 for Release 2000	4.0.0	4.1.0	
SP-09	SP-000383	S1-000598	22.101	046		R4	D	Editorial changes to 22.101 for Release 2000	4.0.0	4.1.0	
SP-09	SP-000430	S1-000698	22.101	047	1	R4	C	Numbering Principles	4.0.0	4.1.0	
SP-09	SP-000383	S1-000620	22.101	048		R4	C	Service evolution	4.0.0	4.1.0	
SP-09	SP-000391	S1-000573	22.101	049		R4	D	Emergency Call	4.0.0	4.1.0	
SP-09	SP-000405	S1-000649	22.101	050		R4	B	Text Conversation	4.0.0	4.1.0	
SP-09	SP-000383	S1-000625	22.101	043		R5	F	Classification of services	4.0.0	5.0.0	
SP-09	SP-000383	S1-000622	22.101	044		R5	B	IP multimedia services	4.0.0	5.0.0	
SP-09	SP-000383	S1-000621	22.101	045		R5	B	IP multimedia session for	4.0.0	5.0.0	
SP-09	SP-000430	S1-000699	22.101	051		R5	C	IM Number portability	4.0.0	5.0.0	
SP-09	SP-000430	S1-000701	22.101	052		R5	F	Introduction of IM CN	4.0.0	5.0.0	
SP-09	SP-000383	S1-000704	22.101	053		R5	F	Subscription	4.0.0	5.0.0	

Change history											
TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	WI
SP-09	SP-000383	S1-000705	22.101	054		R5	F	Roaming	4.0.0	5.0.0	
SP-10	SP-000533	S1-000799	22.101	059		Rel-5	A	Deleting Encrypted USIM-ME interface	5.0.0	5.1.0	TEI4
SP-11	SP-010053	S1-010072	22.101	063		Rel-5	A	Handling of interactions between applications requiring the access to UE resources	5.1.0	5.2.0	Service Clean up R99
SP-11	SP-010054	S1-010208	22.101	065		Rel-5	A	PLMN name indication	5.1.0	5.2.0	TEI4
SP-11	SP-010055	S1-010179	22.101	067		Rel-5	A	CR to 22.101 on Introduction of CPHS features	5.1.0	5.2.0	UICC1-CPHS
SP-11	SP-010056	S1-010210	22.101	069		Rel-5	A	Display of service provider name in the UE	5.1.0	5.2.0	TEI4
SP-11	SP-010057	S1-010250	22.101	070		Rel-5	C	CR to 22.101 on Clarifications on IMS emergency call support	5.1.0	5.2.0	EMC1-PS
SP-12	SP-010262	S1-010505	22.101	072		Rel-5	A	Replacement of references to 23.121 for R4 onwards	5.2.0	5.3.0	TEI4
SP-12	SP-010258	S1-010574	22.101	073		Rel-5	C	Subscription and Provisioning	5.2.0	5.3.0	TEI5
SP-12	SP-010255	S1-010577	22.101	075		Rel-5	A	Addition of a Streaming paragraph	5.2.0	5.3.0	PSTREAM
SP-12	SP-010263	S1-010351	22.101	077		Rel-5	A	CS Multimedia fallback to speech	5.2.0	5.3.0	TEI4
SP-12	SP-010253	S1-010595	22.101	080		Rel-5	A	Clarification of PLMN Name Indication and Service Provider Name Indication feature.	5.2.0	5.3.0	SPANME
SP-13	SP-010441	S1-010832	22.101	084		Rel-5	A	Addition of a statement on parameter storage on the SIM/USIM.	5.3.0	5.4.0	TEI4
SP-13	SP-010436	S1-010889	22.101	086	1	Rel-5	F	Definition of Home Environment	5.3.0	5.4.0	VHE1

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.101** **CR** **091** ⌘ ev **-** ⌘ Current version: **4.5.0** ⌘

Spec Title: **Service aspects; Service principles** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

3GPP TS 22.101 4.5.0 (2001-10)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects
Service aspects;
Service principles
(Release 4)

Keywords
UMTS, service

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Contents

Foreword

This Technical Specification has been produced by the 3GPP.

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

Version 3.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

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

z the third digit is incremented when editorial only changes have been incorporated in the specification;

1 Scope

This Technical Specification (TS) describes the Service Principles for PLMNs specified by 3GPP.

3GPP specifications provide integrated personal communications services. The system will support different applications ranging from narrow-band to wide-band communications capability with integrated personal and terminal mobility to meet the user and service requirements of the 21st century.

3GPP specifications allow the realisation of a new generation of mobile communications technology for a world in which personal communications services should allow person-to-person calling, independent of location, the terminal used, the means of transmission (wired or wireless) and the choice of technology. Personal communication services should be based on a combination of fixed and wireless/mobile services to form a seamless end-to-end service for the user.

3GPP specifications should be in compliance with the following objectives:

to provide a single integrated system in which the user can access services in an easy to use and uniform way in all environments;

to allow differentiation between service offerings of various serving networks and home environments;

to provide a wide range of telecommunications services including those provided by fixed networks and requiring user bit rates of up to 2 Mbits/s as well as services special to mobile communications. These services should be supported in residential, public and office environments and in areas of diverse population densities. These services are provided with a quality comparable with that provided by fixed networks such as ISDN;

to provide services via hand held, portable, vehicular mounted, movable and fixed terminals (including those which normally operate connected to fixed networks), in all environments (in different service environments – residential, private domestic and different radio environments) provided that the terminal has the necessary capabilities;

to provide support of roaming users by enabling users to access services provided by their home environment in the same way even when roaming.

to provide audio, data, video and particularly multimedia services;

to provide for the flexible introduction of telecommunication services;

to provide within the residential environment the capability to enable a pedestrian user to access all services normally provided by fixed networks;

to provide within the office environment the capability to enable a pedestrian user to access all services normally provided by PBXs and LANs;

to provide a substitute for fixed networks in areas of diverse population densities, under conditions approved by the appropriate national or regional regulatory authority.

to provide support for interfaces which allow the use of terminals normally connected to fixed networks.

2 References

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

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

2.1 Normative References

[1] 3GPP TS 22.105 “Services and Service Capabilities”

[2] 3GPP TS 22.121: “Virtual Home Environment (VHE), Stage 1”

[3] 3GPP TS 22.038: “SIM application toolkit, stage 1”

[4] 3GPP TS 22.001: “ Principles of Circuit telecommunication services supported by a Public Land Mobile Network (PLMN)”.

[5] 3GPP TS 22.004: General on supplementary services”

[6] 3GPP TS 22.030: “Man-Machine Interface (MMI) of the User Equipment (UE)”

[7] 3GPP TS 22.066: “Support of Mobile Number Portability (MNP); Service description; Stage 1”

[8] 3GPP TS 22.079: “ Support of Optimal Routing; Stage 1”

[9] 3GPP TS 22.129: “Handover Requirements between UTRAN~~TS~~ and GERAN~~SM~~ or other Radio Systems”

[10] 3GPP TS 33.102: “Security Architecture”

[11] 3GPP TS 22.011: “Service Accessibility”

[12] 3GPP TS 22.016: “International mobile Station Equipment Identities (IMEI)”

[13] 24.008: “ Mobile Radio Interface Layer 3 Specification”

[14] 3GPP TS 22.003: “Circuit Teleservices supported by a Public Land Mobile Network (PLMN)”

[15] 3GPP TS 21.133: “Security Threats and Requirements”

[16] 3GPP TS 33.120: “Security Principles”

[17] 3GPP TS 22.042: “Network Identity and Time Zone, Service Description, Stage 1”

[18] TS~~GSM 0~~42.009: “~~Digital cellular telecommunications system (Phase 2+);~~ Security Aspects”

[19] 3GPP TS 31.102: “USIM Application Characteristics”

[20] 3GPP TS 22.121: “Architectural Requirements for Release 99”

[21] 3GPP TS 22.002: “Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)”

[22] 3GPP TS 22.060: “General Packet Radio Service (GPRS)”

[23] 3GPP TS 29.002: “Mobile Application Part (MAP) specification ”

[24] TR 23.972: “Circuit Switched Multimedia Telephony”.

[25] 3GPP TS 22.140: “Multimedia messaging service; Stage 1”.

[26] 3GPP TS 22.226: “Global Text Telephony, Stage 1.”

[27] 3GPP TS 26.233: "Packet Switched Streaming Service (PSS) ; General Description"

[28] 3GPP TS 26.234: "Packet Switched Streaming Service (PSS) ; Protocols and Codecs"

3 Definitions, symbols and abbreviations

3.2 Definitions

For the purposes of this TS, the following definitions apply:

Authentication: a property by which the correct identity of an entity or party is established with a required assurance. The party being authenticated could be a user, subscriber, home environment or serving network.

Bearer: a bearer capability of defined capacity, delay and bit error rate, etc.

Bearer capability: a transmission function which the user equipment requests to the network.

Confidentiality: the avoidance of disclosure of information without the permission of its owner.

Home Environment: the home environment is responsible for enabling a user to obtain services in a consistent manner regardless of the user's location or terminal used (within the limitations of the serving network and current terminal).

IC Card: a card holding an Integrated Circuit containing subscriber, end user, authentication and/or application data for one or more applications.

Integrity: (in the context of security) is the avoidance of unauthorised modification of information.

Mobility: the ability for the user to communicate whilst moving independent of location.

Multimedia service: Multimedia services are services that handle several types of media such as audio and video in a synchronised way from the user's point of view. A multimedia service may involve multiple parties, multiple connections, and the addition or deletion of resources and users within a single communication session.

Number: A string of decimal digits that uniquely indicates the public network termination point. The number contains the information necessary to route the call to this termination point.

A number can be in a format determined nationally or in an international format. The international format is known as the International Public Telecommunication Number which includes the country code and subsequent digits, but not the international prefix.

Number portability: where the provision of directory numbers is independent of home environment and/or serving network.

One Stop Billing: one bill for all charges incurred using PLMN services.

Quality of Service: the collective effect of service performances, which determine the degree of satisfaction of a user of a service. It is characterised by the combined aspects of performance factors applicable to all services, such as:

service operability performance;

service accessibility performance;

service retention performance;

service integrity performance;

and other factors specific to each service.

Roaming: the ability for a user to function in a serving network.

Security: the ability to prevent fraud as well as the protection of information availability, integrity and confidentiality.

Service: is set of functions offered to a user by an organisation.

Service Control: is the ability of the user, home environment or serving environment to determine what a particular service does, for a specific invocation of that service, within the limitations of that service.

Serving Network: the serving network provides the user with access to the services of home environment.

Subscriber: the responsibility for payment of charges incurred by one or more users may be undertaken by another entity designated as a subscriber. This division between use of and payment for services has no impact on standardisation.

Supplementary service: is a service which modifies or supplements a basic telecommunication service. Consequently, it cannot be offered to a customer as a standalone service. It must be offered together with or in association with a basic telecommunication service. The same supplementary service may be common to a number of telecommunication services.

Teleservice: is a type of telecommunication service that provides the complete capability, including terminal equipment functions, for communication between users according to standardised protocols and transmission capabilities established by agreement between operators.

User: is a logical, identifiable entity which uses services.

User Profile: is the set of information necessary to provide a user with a consistent, personalised service environment, irrespective of the user's location or the terminal used (within the limitations of the terminal and the serving network).

User Equipment: is a combination of mobile equipment (ME) and SIM/USIM.

USIM: User Service Identity Module is an application residing on the IC-Card used for accessing services with appropriate security.

Virtual Home Environment: the virtual home environment is a system concept for personalised service portability between serving networks and between terminals.

3.2 Abbreviations

For the purposes of this TS, the following abbreviations apply:

BER	Bit Error Rate
CN	Core Network
DTMF	Dual Tone Multiple Frequency
ETSI	European Telecommunications Standards Institute
FDD	Frequency Division Duplex
GSM	Global System for Mobile Communications
IMT-2000	International Mobile Telecommunications 2000
IN	Intelligent Network
ISDN	Integrated Services Digital Network
ITU	International Telecommunication Union
LAN	Local Area Network
ME	Mobile Equipment
MMI	Man Machine Interface
MO	Mobile Origination
MT	Mobile Termination
O&M	Operations and Maintenance
PBX	Private Branch eXchange
PC	Personal Computer
PCMCIA	Personal Computer Memory Card International Association
PIN	Personal Identity Number
PNP	Private Numbering Plan
POTS	Plain Old Telephony Service
QoS	Quality of Service
SIM	Subscriber Identity Module
SMS	Short Message Service
TDD	Time Division Duplex
UICC	TS IC Card
UE	User Equipment
USIM	User Service Identity Module
UMTS	Universal Mobile Telecommunications System
VHE	Virtual Home Environment

4 General

4.1 Aims of 3GPP specifications

It shall be capable of delivering audio, text, video and graphics direct to people and provide them with access to the next generation of information based services. It moves mobile and personal communications forward from existing systems, delivering massmarket low-cost digital telecommunication services.

The aims are:

to enable users to access a wide range of telecommunications services, including many that are today undefined as well as multi-media and high data rates.

to facilitate the provision of a high quality of service (particularly speech quality) similar to that provided by fixed networks;

to facilitate the provision of small, easy to use, low cost terminals with long talk time and long standby operation;

to provide an efficient means of using network resources (particularly radio spectrum).

4.2 Standardisation of Service Capabilities

Existing systems have largely standardised the complete sets of teleservices, applications and supplementary services which they provide. As a consequence, substantial re-engineering is often required to enable new services to be provided and the market for services is largely determined by operators and standardisation. This makes it more difficult for operators to differentiate their services.

3GPP shall therefore standardise service capabilities and not the services themselves. Service capabilities consist of bearers defined by QoS parameters and the mechanisms needed to realise services. These mechanisms include the functionality provided by various network elements, the communication between them and the storage of associated data. This 3GPP TS provides a conceptual description of a service architecture and architecture requirements which aim to provide service capabilities. It is intended that these standardised capabilities should provide a defined platform which will enable the support of speech, video, multi-media, messaging, data, other teleservices, user applications and supplementary services and enable the market for services to be determined by users and home environments.

4.3 Efficient Use of Network Resources

Service capabilities shall take account of the discontinuous and asymmetric nature of most teleservices and user applications in order to make efficient use of network resources (particularly radio resources).

Service capabilities shall be provided in a wide range of radio operating environments (where a radio environment is characterised in terms of propagation environment, mobile equipment relative speeds and traffic characteristics – see [2]). Although 3GPP aims to minimise the number of radio interfaces and to maximise commonality between them, it may utilise several radio interfaces, each optimised for different environments. Each radio interface might provide differing service capabilities. 3GPP specifications include UTRAN radio interface supporting two modes (TDD and FDD)and GERAN radio interface.

3GPP specifications shall provide a mechanism which will enable a piece of user equipment (UE) to adapt to different radio interfaces as necessary and to determine the service capabilities available. The specifications shall also provide a mechanism which will enable a UE to select radio interfaces capable of providing appropriate service capabilities.

4.4 Compatibility with Global Standards

3GPP specifications aim to be compatible with IMT-2000 and to provide global terminal mobility (roaming), enabling the user to take his/her terminal to different regions of the world and to be provided with services. It is probable that different regions of the world will adopt different radio interface technologies. IMT-2000, as a global standard, should therefore enable a IMT-2000 terminal to determine the radio interface technology and the radio interface standard used in a region. Global terminal roaming also requires the global standardisation of service capabilities. As far as possible

the method of indication of the radio interface standard and available service capabilities shall be aligned with IMT-2000.

3GPP specifications shall enable users to access the services provided by their home environment in the same way via any serving network provided the necessary service capabilities are available in the serving network.

The 3GPP specifications will be available for the partner organisations to adopt as their regional standards. For example in Europe, ETSI may adopt them as standards for both GSM and UMTS.

4.5 Virtual Home Environment

The 3GPP specifications aim to provide the user with a comprehensive set of services and features, which have the "same look and feel" wherever they are used. For further information see 3GPP 22.121 [2]. Especially the VHE shall provide for:

a generic set of services / features and access capabilities, if the required service capabilities are available in the visited network;

the means for serving network, home environments and user to re-use existing system capabilities to define their own specific features / services;

user personalisation of features / services;

a personalised service set being used via all access and transport networks, subject to physical limitations;

the ability for the user to have access to personalised services from any suitable UE;

regional or network based variations, enhancements to the basic services;

future evolution of 3GPP specification itself.

4.6 Functionality of Serving Network and Home Environment

The following functionality shall be the responsibility of the home environment:

User Authentication.

SIM/USIM Issue.

Billing.

User Profile/VHE Management.

The following functionality shall be the responsibility of the serving network:

Radio or other means of access.

Transport and signalling.

The following functionality may be the responsibility of either the serving network, the home environment or an appropriate combination of both

Service Control.

QoS negotiation.

Mobility management, including roaming.

Automatic establishment of roaming agreements.

4.7 PLMN Architecture

The network is logically divided into a radio access network and a core network, connected via an open interface. From a functional point of view the core network is divided into a Packet Switched Domain, and a Circuit Switched Domain.

CS CN domain supports bearer independent transport. There is no difference in service offering or UE functionality due to different transport.

For further information see 3GPP TS 23.121 [20].

5 Evolution

5.1 Support of 2G services

The 3GPP specifications shall be capable of supporting existing 2G services in a manner which is transparent to the users of these services.

3GPP specifications shall provide some mechanisms which permit 2G users to roam easily onto 3G networks and access at least a minimum set of services. See Figure 4 for clarification.

3GPP specifications shall provide some mechanisms which permit 3G users to roam easily onto 2G systems and access at least a minimum set of services.

5.2 Provision and evolution of services

Since a phased approach has been adopted, the same general service principles shall apply to each phase. Support of services from an end user perspective is understood to be an important driver for established mobile users to stay with their existing operator while taking the new services into use. It is therefore important to enable operators to offer continued support of legacy services in future releases. Previous release services shall as a principle also be supported in the following releases.

Networks shall be capable of providing a specified core set of capabilities.

The core set of capabilities should permit home environment to offer a range of distinctive services including those which cannot be implemented on systems based on previous release specifications.

It shall be possible for the home environment to develop services with full roaming capability.

The radio interface should not unnecessarily restrict the development of new services (within physical limitations).

The standard shall provide a mechanism, which allows a terminal to be easily upgraded so that it can access new services, which are within the physical limitations of the terminal.

6 Principles for new service capabilities

6.1 General

3GPP specifications shall enable the user of a single terminal to establish and maintain several connections simultaneously. It shall efficiently cater for applications which have variable requirements relating to specific QoS parameters (e.g. throughput) whilst meeting other QoS targets. It shall also cater for applications which are able to take adapt to a range of variations in QoS.

6.2 Multimedia

3GPP specifications shall support development of multimedia services and provide the necessary capabilities.

Multimedia services combine two or more media components (e.g. voice, audio, data, video, pictures) within one call. A multimedia service may involve several parties and connections (different parties may provide different media components) and therefore flexibility is required in order to add and delete both resources and parties.

Multimedia services are typically classified as interactive or distribution services.

Interactive services are typically subdivided into conversational, messaging and retrieval services:

Conversational services are real time (no store and forward), usually bi-directional where low end to end delays (< 100 ms) and a high degree of synchronisation between media components (implying low delay variation) are required. Video telephony and video conferencing are typical conversational services."

Messaging services offer user to user communication via store and forward units (mailbox or message handling devices). Messaging services might typically provide combined voice and text, audio and high-resolution images.

Retrieval services enable a user to retrieve information stored in one or many information centres. The start at which an information sequence is sent by an information centre to the user is under control of the user. Each information centre accessed may provide a different media component, e.g. high resolution images, audio and general archival information.

Distribution services are typically subdivided into those providing user presentation control and those without user presentation control.

Distribution services without user control are broadcast services where information is supplied by a central source and where the user can access the flow of information without any ability to control the start or order of presentation e.g. television or audio broadcast services.

Distribution services with user control are broadcast services where information is broadcast as a repetitive sequence and the ability to access sequence numbering allocated to frames of information enables the user (or the user's terminal) to control the start and order of presentation of information.

6.2.1 Circuit Switched (CS) multimedia calls

The following basic requirements are be supported for CS multimedia [24]:

- CS multimedia shall be based on a 3GPP specific subset of H.324M.
- All call scenarios shall be supported, i.e. Mobile Originating and Mobile Terminating call against Mobile, ISDN and PSTN call party.
- Single and multiple numbering schemes shall be supported.
- Fallback to speech (TS 11 [14]) shall be supported from 3.1kHz Ext. PLMN multimedia bearer, i.e. if setup of the multimedia call fails the call will be set up as a speech call.
- CS Multimedia call is a Bearer Service, which utilises Synchronous Transparent Data service.
- Different bitrates as specified at 22.002 [21] shall be supported.
- Supplementary services apply to multimedia calls as for Synchronous Transparent Data service according to 22.004[5].

6.2.2 Multimedia Messaging Service (MMS)

The following basic requirements are be supported for MMS:

- Store-and-forward multimedia messaging service with mobile and non-mobile users [25].
- MMS shall be capable of supporting integration of different types of messaging (e.g. fax, SMS, Multimedia, voicemail, e-mail etc.) in a consistent manner.
- Streamed (download only) and batch delivery of messages.

6.2.3 Text Conversation

Global Text Telephony (GTT) is a feature that enables real-time text conversation [28].

- GTT enables real time, character by character, text conversation to be included in any conversational service, Circuit Switched as well as IP based.
- It is possible to use the text component in a session together with other media components, especially video and voice.
- Interworking with existing text telephony in PSTN as well as emerging forms of standardised text conversation in all networks is within the scope of this feature.
- The text media component can be included initially in the session, or added at any stage during the session.
- The text component is intended for human input and reading, and therefore supports human capabilities in text input speed. The character set support is suitable for the languages the users communicate in.
- GTT specifies limited interoperation with Multimedia Messaging Services including a possibility to divert to messaging in case of call failure and sharing user interface equipment and external UE interfaces.

6.2.4 Packet Switched Streaming Service

The following basic requirements are to be supported for streaming :

- The streaming service uses a client / server model which is transparent to the PLMN. The client controls the initiation and execution of the service.
- The streaming service [27] shall use existing standards (codecs and protocols [28]) where these are available.
- The streaming service utilises the PS Domain with the QoS requirements as specified in TS 22.105 [1].

6.3 Service Management Requirements

3GPP specifications shall include standardised protocols enabling service management. It shall enable control, creation and subscription of service capabilities and services, and the management of user profiles.

7 Service architecture

In order to provide standardisation of service capabilities a service architecture shown by Figure 1~~2~~ is envisaged

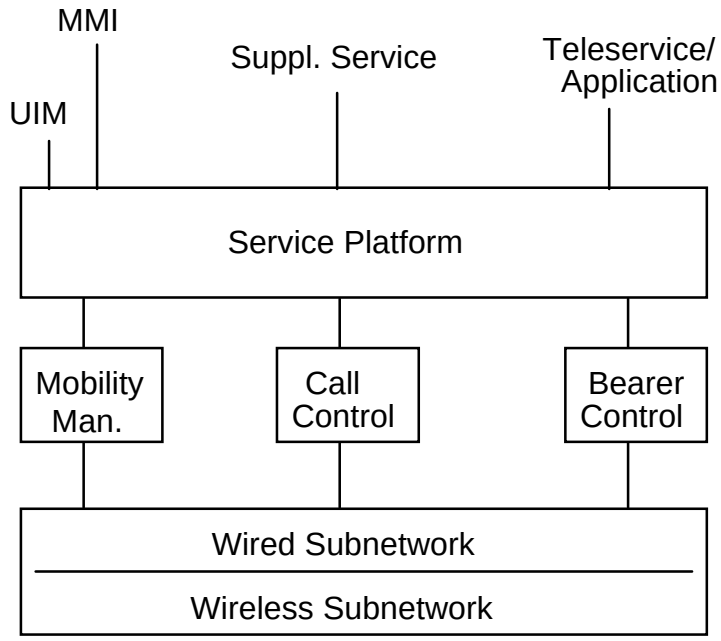


Figure 1~~2~~: Service Architecture

A number of bearers shall be provided that can differ in flexibility and offer different capabilities. Bearers may be characterised by parameters such as “throughput”, “delay tolerance”, “maximum bit error rate”, “symmetry” etc. These bearers enable information to be transferred appropriate to the provision of teleservices, and end user applications generally, via subnetworks which typically provide different specified qualities of service.

The assignment and release of bearers is provided by the bearer control function. Provision should be made for several bearers to be associated with a call and for bearers to be added to a call and/or to be released from a call following call establishment. The bearers should be independent of radio environments, radio interface technology and fixed wire transmission systems.

Adaptation/Interworking functions are required in order to take account of the differences between the bearers used for the provision of a teleservice/application in the fixed network and the bearers. Adaptation/Interworking functions are required which take account of the discontinuous and/or asymmetrical nature of most teleservices/applications.

The service platform shall provide interfaces (to serving networks and home environments) appropriate to the support, creation and control of supplementary services, teleservices and user applications. The service platform will also provide interfaces enabling subscribers to control supplementary services, teleservices and user applications.

Supplementary service provision and control will be independent of radio operating environment, radio interface technology and fixed wire transmission systems.

As far as possible, the service platform is required to enable new supplementary services, teleservices and/or end user applications to be supported at minimum cost, with minimum disruption of service and within the shortest possible time.

8 Quality of Service (QoS)

The Quality of Service (QoS) parameters should be identified together with appropriate parameter values which set targets to be reached when designing 3GPP specifications, and which also will serve as guidelines for network design and service provision.

The QoS for call set-up time, as an example, can be defined in terms of a mean value and as a percentage of cases which should not exceed a certain time limit. Further information can be found in 3GPP TS 22.105[1].

9 Emergency Calls

9.1 General requirements

It shall be possible to establish an emergency speech call. Emergency calls will be routed to the emergency services in accordance with national regulations for where the subscriber is located. This may be based upon one or more default numbers stored in the ME. It shall be allowed to establish an emergency call without the need to dial a dedicated number to avoid the mis-connection in roaming case, such as menu, by use of a 'red button', or a linkage to a car air bag control. Emergency Calls shall be supported by the UE without a SIM/USIM being present. No other type than Emergency calls shall be accepted without a SIM/USIM.

The Emergency call teleservice is required only if the UE supports telephony.

Note: It will be left to the national authorities to decide whether the network should accept emergency calls without the SIM/USIM.

It shall be possible to initiate emergency calls to different emergency call centers, depending on the type of emergency. The following types of emergency calls shall be possible:

- Police
- Ambulance
- Fire Brigade
- Marine Guard
- Mountain Rescue
- Spare, at least [three] different types

When a SIM/USIM is present, subscriber specific emergency call set-up MMI shall be provided. The Home Environment operator shall specify preferred emergency call MMI(s) (e.g. 911 for US citizens or 110, 118 and 119 for Japanese citizens). This shall be stored in the SIM/USIM and the ME shall read this and use any entry of these digits to set up an emergency call. It shall be possible to store more than one instance of this field.

Note: Release '98 and earlier SIM cards have the capability to store additional emergency call set-up MMI. However in many cases this has not been used.

It shall be possible to tie any emergency call number, specified in the preferred emergency call MMI(s) above, to any single emergency call type or to any combination of emergency types. The association between emergency numbers and emergency call type shall be able to be programmed by the Home Environment operator into the SIM/USIM.

Example:

Police (Albania)

Police and Fire Brigade (Greek cities)

Ambulance and Fire Brigade (Belgium)

Police and Ambulance (Italy)

General emergency call, all categories (Sweden)

Fire Brigade (Italy)

Ambulance (Austria)

Note: if the UE does not recognise the emergency call MMI(s) (i.e. the dialled number is not stored in SIM/USIM) but the serving network recognises the dialled number as an emergency call number used in the country, a normal call set up takes place over the radio interface and after the serving network has recognised the emergency number the call is routed as an emergency call.

When a SIM/USIM containing stored emergency numbers is present, only those numbers are identified as emergency numbers, i.e. default emergency numbers stored in the ME are ignored.

The following emergency numbers shall be stored in the ME for use when no emergency numbers are stored in the SIM: 000, 08, 112, 110, 911 and 999.

Note: Emergency numbers stored in the ME, for use when no emergency numbers are stored in the SIM, should not overlap with existing service numbers used by any operator.

The user friendly MMI which specifies the type of emergency directly (e.g. menu) should be supported for use in any (i.e. home or visited) PLMN to avoid the mis-connection in roaming case. This shall be allowed to both with and without SIM/USIM being present.

The following emergency numbers shall be stored in the ME for use without SIM/USIM: 000, 08, 112, 110, 118, 119, 911 and 999.

9.2 Emergency calls when attached to a CS CN Domain

PLMNs shall support an emergency call teleservice as defined in 3GPP TS 22.003 [14] (TS12).

9.3 Emergency Calls when Attached to a Data Only Network

If an UE with voice capability attempts to make an emergency call while camping on a PLMN that does not support voice service to the UE, a new PLMN selection shall immediately take place, and the UE shall select the first available PLMN that supports emergency calls to the UE.

10 Numbering principles

The following network addressing schemes listed below shall be supported at the relevant domains:

E.164,

E.168,

E.212,

X.121,

Internet (including e.g. IP address).

10.1 Number portability

10.1.1 Requirements for CS CN domain

Some numbering schemes shall be fully independent of the supporting serving network and the home environment, allowing users to transfer this number to another home environment. For further information see 3GPP TS 22.066 [7].

An MSISDN shall be allocated to each new user at the start of a subscription. This number may be allocated from one of several numbering domains. For example:

home / serving environment numbering scheme;

national numbering scheme;

regional numbering scheme;

global numbering scheme.

A user shall be able to move subscription from one home environment to another without changing the MSISDN provided that the new home environment offers service in the same geographic domain. It is envisaged that home environment s will be able to allocate MSISDNs from each of these domains as required.

10.1.2 Requirements for PS CN domain

None identified.

10.2 Evolution path

Since 3GPP specifications aim to be aligned with IMT-2000, a primary goal in numbering is the provision of global user numbering in line with steps taken by the ITU – SG2.

The numbering scheme and network implementation chosen shall allow for international/global evolution.

10.3 User / USIM Identification

It is a requirement that the user can be uniquely identified by the home environment from which the service is being obtained. This identification may be unknown to the serving network on which the user is roaming.

Serving networks need to be able to communicate with, authenticate and commercially deal with the home environment associated with any SIM/USIM being registered on their network. This shall require a SIM/USIM identity scheme which uniquely identifies each SIM/USIM, and a mapping scheme which allows the USIM identity to be used as a identifier with the “owning” home environment.

Serving networks also require to be able to route efficiently any communication to and from SIM/USIMs (or rather the devices on which they are registered). An address scheme is therefore required for operators to access and map any outgoing or incoming communication to SIM/USIMs and thus devices on their networks

It shall be possible for several numbers to be associated with a single subscription on a single UICC.

10.4 Terminal Identification

It is a requirement that the terminal can be uniquely identified by the home environment and serving network. This shall require a terminal identity scheme which uniquely identifies each terminal, see 3GPP TS 22.016[12].

10.5 Home Environment / Serving Network Identification

Serving networks need to be able to communicate with, authenticate and commercially deal with the home environment associated with any SIM/USIM being registered on their network. This shall require a SIM/USIM identity scheme which uniquely identifies each SIM/USIM, and a mapping scheme which allows the SIM/USIM identity to be used as a identifier with the “owning” home environment.

Home / serving environments need to route communication to the current location of the user. This shall require a identity scheme which uniquely identifies the serving environment and shall be used for routing purposes.

10.6 Private numbering

A user may wish to use private numbers for the purposes of calling frequent numbers. Therefore there is a requirement for the use, by the user, of Private Numbering Plans (PNPs). These schemes may belong to the user himself, to a home environment or a third party.

10.7 Numbering schemes

10.7.1 Multiple numbering scheme

The standards shall support the possiblity of allowing the bearer service associated with an MT call to be implicitly defined by the destination MSISDN, for example to use a different MSISDN to establish voice, fax or data . It will be possible for multiple MSISDNs to be associated with a single subscription.

10.7.2 Single numbering scheme

The standards shall support the possibility of allowing MT calls of different bearer types (eg voice, fax, data) to be routed to a single MSISDN. It is recognised that the implementation of this may depend on the availability of bearer information associated with an incoming call from the adjoining transit network. In particular the standards will support this possibility in the case of an adjoining ISDN transit network.

10.8 Optimal routing for CS CN domain

The implementation of the numbering scheme used shall allow for optimal routing; i.e. routing shall not take place simply on the number dialled. See 3GPP TS 22.079 [8] for some scenarios.

11 Human Factors and user procedures

The User Interface (MMI) from the end-user's point of view should be as flexible as possible while still meeting the general service requirements. In addition it should be capable of being updated so as to meet new services which are still to be envisaged.

In general the following principles should be encompassed:

activation of services should be as simple as possible with minimum input expected from the user;

feedback, to the user from the various services, should be meaningful;

any error recovery procedures provided should be simple to understand and execute.

input from the user and information to the user should be provided in alternative selectable modes in order to match user capabilities, preferences and situation.

However, a detailed specification for the User Interface shall not be defined. In particular given the global nature of the third generation systems, for different regions of the world, different criteria will determine the implementation of the User Interface. Also it is unlikely that there will be a single common handset which will meet all the service requirements and therefore a common User Interface would be impractical.

Given the flexibility of the services, there should be a wide range of User Interface possibilities. These possibilities include simple terminals with a single on/off button through to complex terminals providing support to hearing/visually impaired users.

Control of supplementary services (3GPP TS 22.004 [5]), may use MMI procedures specified in 3GPP TS 22.030 [6] and existing ~~GSM~~ MMI related UE features (Annex A) may also be used. In particular the following features are highly desirable for uniform UE implementation where appropriate:

- Mapping of numeric keys to European alphabetic keys to ensure compatible mnemonic dialing as defined in 3GPP TS 22.030 [6],
- "+" key function to enable one key international access as defined in Annex A
- Structure of the MMI as described in 3GPP TS 22.030 [6]
- Presentation of IMEI (International Mobile Equipment Identity) as defined in 3GPP TS 22.030 [6]

12 UICC, USIM and Terminal

This clause defines the functional characteristics and requirements of the User Service Identity Module (USIM). The USIM is an application residing on a UICC.

12.1 The USIM and User Profiles

12.1.1 The SIM/USIM

Every SIM/USIM shall have a unique identity and shall be associated with one and only one home environment.

It shall be possible for a home environment to uniquely identify a user by the SIM/USIM.

The SIM/USIM shall be used to provide security features.

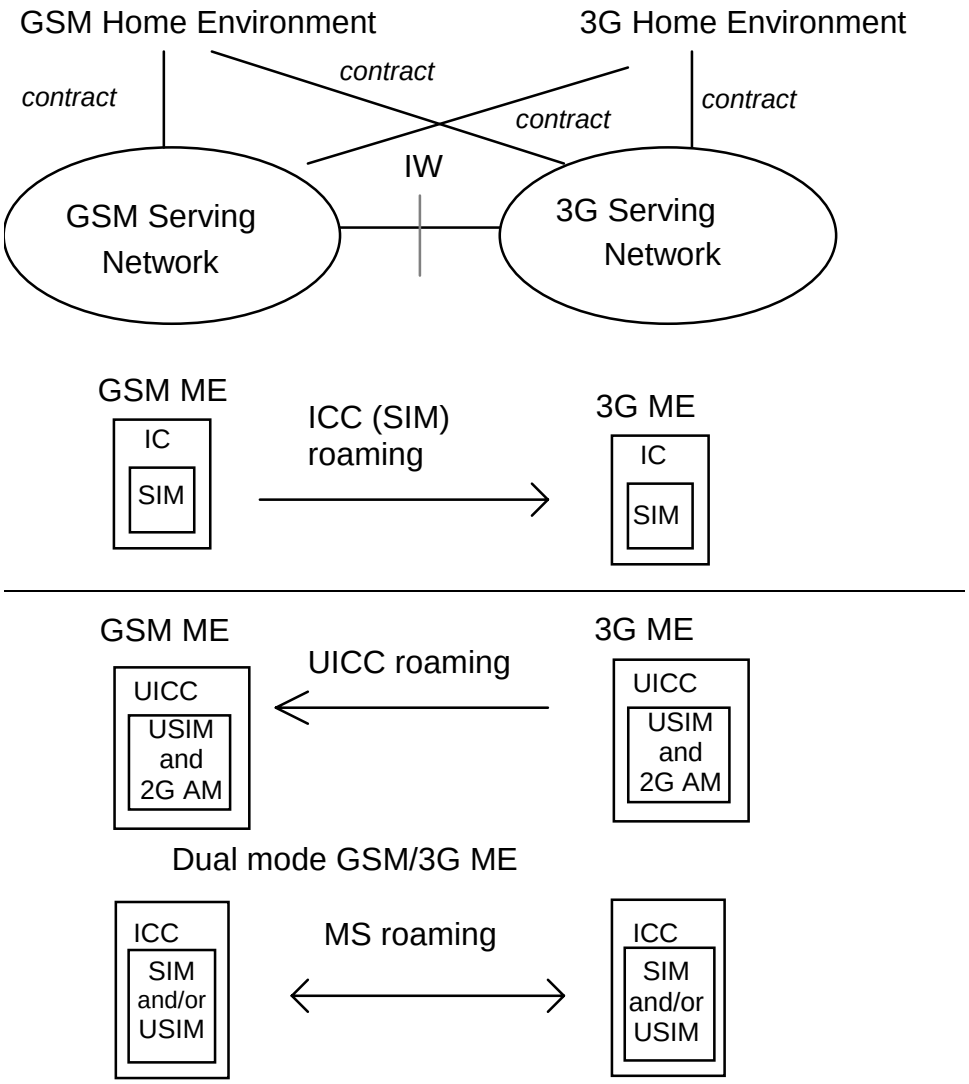
For access to services, provided by PS or CS CN domains, a valid SIM/USIM shall be required.

The SIM/USIM shall be able to support SIM Application Toolkit as specified in 3GPP TS 22.038 [3].

The SIM/USIM shall reside on a UICC, 3GPP specifications shall adopt both of the GSM SIM card physical formats. Other formats may also be supported. SIM/USIM specific information shall be protected against unauthorised access or alteration.

It shall be possible to update SIM/USIM specific information via the air interface, in a secure manner.

~~Figure 4 shows as an example the support of roaming users between GSM and 3G home environment.~~



2G AM: 2G Access Module

~~Figure 4 UICC roaming scenarios~~

12.1.2 User Profiles

It shall be possible for a user to be associated with one or a number of user profiles, which the user can select and activate on a per call basis. The user profile contains information which may be used to personalise services for the user.

It shall be possible for one or more user profiles associated with the same user to be active simultaneously so that the user may make or receive calls associated with different profiles simultaneously. Activation of profiles shall be done in a secure manner, for example with the use of a PIN.

For terminating calls the correct profile shall be indicated by the user address used (e.g. MSISDN), each profile will have at least one unique user address associated with it. For originating calls the user shall be able to choose from the available profiles, the appropriate one for the call. A profile identity will need to be associated with the call for accounting and billing purposes. User profile identities need not be standardised but a standardised means is required for indicating that a particular profile is being used.

Simultaneous use of the same user profile on multiple terminals for the same type of service shall not be allowed.

User profiles associated with different home environments shall not share the same user address.

12.1.3 UICC usage in 2G Terminals

It shall be possible to use the UICC in 2G terminals to provide access to ~~GSM~~ networks supporting GERAN (including networks based on earlier GSM specifications). In order to achieve that option, it shall be possible to store a module containing 2G access functionalities on the UICC, which shall be accessed via the standard ~~GSM~~ SIM-terminal interface.

12.1.4 Multiple USIMs per UICC

The standard shall support more than one USIM per UICC even when those USIMs are associated with different home environments. Only one of the USIMs or the SIM shall be active at a given time. While the UE is in idle mode, it shall be possible for the user to select/reselect one USIM application amongst those available on the UICC. At switch on, the Last Active USIM shall be automatically selected. The Last Active USIM shall be stored on the UICC. By default if there is no Last Active USIM defined in the UICC, the user shall be able to select the active USIM amongst those available on the UICC.

The standard must not prevent the coexistence of USIM applications, each associated with different home environments on the same UICC, so long as the security problems which arise from such a coexistence are solved.

12.2 The UICC

Access to services via ~~GSM and 3G networks~~ 3GPP system with a single UICC shall be possible.

12.2.1 The UICC and Applications other than the USIM

It shall be possible for the UICC to host other applications in addition to the USIM, see figure 3. Service providers, subscribers or users may need to establish additional data or processes on the UICC. Each application on an UICC shall reside in its own domain (physical or logical). It shall be possible to manage each application on the card separately. The security and operation of an application in any domain shall not be compromised by an application running in a different domain. Applications may need to use their own security mechanisms which are separate to those specified by 3GPP e.g. electronic commerce applications.

Examples of other UICC applications are: USIM, Phase 2+ SIM, off-line user applications like UPT, electronic banking, credit service, etc.

Applications should be able to share some information such as a common address book.

It shall be possible to address applications, which reside on the UICC, via the air interface.

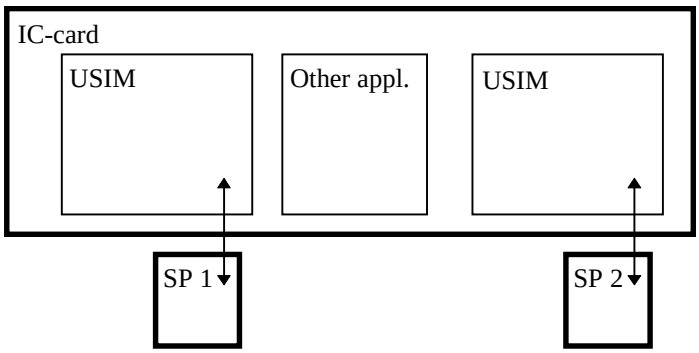


Figure 23 ~~3~~ Example of a Multifunction UICC

12.3 Terminals and Multiple UICCs

A single terminal may support the use of multiple UICC (e.g with applications like USIM, SIM and/or banking, credit card,…). Only one UICC shall be active at a time to access a PLMN. In case the active UICC contains more than one USIM or SIM, the requirements of 11.1.4 shall apply.

If the UICC with the active USIM or SIM is removed from the mobile terminal during a call (except for emergency calls), the call shall be terminated immediately.

13 Types of features of Ues

3GPP specifications should support a wide variety of user equipment, i.e. setting any limitations on terminals should be avoided as much as possible. For example user equipment like hand-portable phones, personal digital assistants and laptop computers can clearly be seen as likely terminals.

In order not to limit the possible types of user equipment they are not standardised. The UE types could be categorised by their service capabilities rather than by their physical characteristics. Typical examples are speech only UE, narrowband data UE, wideband data UE, data and speech UE, etc..

In order to enhance functionality split and modularity inside the user equipment the interfaces of UE should be identified. Interfaces like UICC-interface, PCMCIA-interface and other PC-interfaces, including software interfaces, should be covered by references to the applicable interface standards.

Ues have to be capable of supporting a wide variety of teleservices and applications provided in PLMN environment. Limitations may exist on Ues capability to support all possible teleservices and information types (speech, narrowband data, wideband data, video, etc.) and therefore functionality to indicate capabilities of a UE shall be specified.

The basic mandatory UE requirements are:

- Support for GSM phase 2 and 2+ SIM cards, phase 1 5V SIM cards shall not be supported;
- Home environment and serving network registration and deregistration;
- Location update;
- Originating or receiving a connection oriented or a connectionless service;
- An unalterable equipment identification; IMEI, see 3GPP TS 22.016 [12];
- Basic identification of the terminal capabilities related to services such as; the support for software downloading, application execution environment/interface, MexE terminal class, supported bearer services.
- Terminals capable for emergency calls shall support emergency call without a SIM/USIM.
- Support for the execution of algorithms required for encryption, for CS and PS services. Support for non encrypted mode is required;
- Support for the method of handling automatic calling repeat attempt restrictions as specified in 3GPP TS 22.001 [4];
- At least one capability type shall be standardised for mobile terminals supporting the GERAN and UTRAN radio interfaces.
- Under emergency situations, it may be desirable for the operator to prevent UE users from making access attempts (including emergency call attempts) or responding to pages in specified areas of a network, see 3GPP TS 22.011 [11];
- Ciphering Indicator for terminals with a suitable display;

  The ciphering indicator feature allows the ME to detect that ciphering is not switched on and to indicate this to the user. The ciphering indicator feature may be disabled by the home network operator setting data in the SIM/USIM. If this feature is not disabled by the SIM, then whenever a connection is in place, which is, or becomes unenciphered, an indication shall be given to the user. Ciphering itself is unaffected by this feature, and the user can choose how to proceed;
- Support for PLMN selection.
- Support for handling of interactions between toolkits concerning the access to UE MMI input/output capabilities;

Whenever an application (e.g. a SAT/MExE/WAP application) requires the access to the UE MMI input/output capabilities (e.g. display, keyboard,…), the UE shall grant this access subject to the capabilities of the UE. This shall not cause the termination of any other applications (e.g. WAP browser or MExE/SAT application) which were previously using these UE resources. The UE shall give the user the ability to accept or reject the new application. In the case that the application request is rejected, the access to the UE MMI input/output capabilities is returned to the applications which were previously using these UE resources. If the user decides to continue with the new application, then when this new application is terminated, the access to the UE MMI input/output capabilities shall be returned to the UE to be re-allocated to applications (e.g. the preceding application which was interrupted). Subject to the capabilities of the UE, the user shall have the ability to switch the MMI input/output capabilities between applications.

Note: Rejecting a request to access the UE MMI input/output capabilities by an application does not necessarily mean that it is terminated, but only that the access to the UE MMI input/output capabilities are not granted to this application. Handling of rejection (termination, put on hold,…) is the responsibility of the application.

Annex A describes a number of features, which may optionally be supported by the ME.

14 Charging principles

The cost of the call may cover the cost of sending, transporting, delivery and storage. The cost of call related signalling may also be included. Provision shall be made for charging based on time, destination, location, volume, bandwidth and quality. Charges may also be levied as a result of the use of value added services.

It shall be possible for information relating to chargeable events to be made available to the home environment at short notice. The requirements shall include:

Immediately after a chargeable event is completed;

At regular intervals of time, volume or charge during a chargeable event.

Standardised mechanisms of transferring charging information are required to make these requirements possible.

It should be possible for multiple leg calls (e.g. forwarded, conference or roamed) to be charged to each party as if each leg was separately initiated. However, in certain types of call, the originating party may wish/be obliged to pay for other legs (e.g. SMS MO may also pay for the MT leg.).

Provision shall be made for the chargeable party to be changed during the life of the call. There shall be a flexible billing mechanism which may include the use of stored value cards, credit cards or similar devices.

The chargeable party (normally the calling party) shall be provided with an indication of the charges to be levied (e.g. via the called number automatically or the Advice of Charge supplementary service) for the duration of the call (even though the user may change service environment)The user shall be able to make decisions about the acceptable level of accumulated charge dynamically or through their service profile.

If a user is to be charged for accepting a call then their consent should be obtained. This may be done dynamically or through their service profile.

15 Handover Requirements

Any handover required to maintain an active service while a user is mobile within the coverage area of a given network, shall be seamless from the user's perspective. However handovers that occur between different radio environments may result in a change of the quality of service experienced by the user.

It shall be possible for users to be handed over between different networks subject to appropriate roaming/commercial agreements.

For further information see 3GPP TS 22.129 [9].

16 Network Selection

Network selection procedures are defined in 3GPP TS 22.011 [11].

Other procedures may be offered by the UE.

17 Security

Security matters are considered in 3GPP TS 21.133 [15] and 3GPP TS 33.120 [16].

Annex A (normative): Description of optional user equipment features

A.1 Display of called number

This feature enables the caller to check before call setup whether the selected number is correct.

A.2 Indication of call progress signals

Indications shall be given such as tones, recorded messages or visual display based on signalling information returned from the PLMN. On data calls, this information may be signalled to the DTE.

Call progress indicators are described in 3GPP 3GPP TS 22.001 [4].

A.3 Country/PLMN indication

The country/PLMN indicator shows in which PLMN the UE is currently registered. This indicator is necessary so that the user knows when "roaming" is taking place and that the choice of PLMN is correct. Both the country and PLMN will be indicated. When more than one visited PLMN is available in a given area such information will be indicated.

The PLMN name is either:

- stored in the ME and associated with the MCC+MNC combination received on the broadcast channel;
- NITZ (see 22.042 [17]) (in which case it overrides the name stored in the UE);

It shall be possible to store on the SIM/USIM at least 10 PLMN Identifications (MCC+MNC combination and optionally the LAI) for which the same PLMN name shall be displayed.

The PLMN name stored in the USIM has the highest priority, followed by the PLMN name provided by NITZ. The PLMN name stored in the ME has the lowest priority.

A.4 Service Provider Name indication

The service provider name is stored in the SIM/USIM in text. It shall be possible to associate at least 10 PLMN Identifications (MCC+MNC combination) with the same SP Name.

When registered on the HPLMN, or one of the PLMN Identifications used for Service Provider Name display:

(i) The SP Name shall be displayed;

(ii) Display of the PLMN Name is optional (i.e. the Service Provider name shall be displayed either in parallel to the PLMN Name or instead of the PLMN Name).

When registered on neither the HPLMN, nor one of the PLMN Identifications used for Service Provider Name display:

(i) The PLMN name shall be displayed;

(ii) Display of the SP Name is optional.

If the UE is unable to display the full name of the Service Provider the name is cut from the tail end. The storage of Service Provider name and options, and choice of options, shall be under control of the network operator.

A.5 Keypad

A physical means of entering numbers, generally, though not necessarily, in accordance with the layout shown in figure A.1.

See also 3GPP TS 22.030 [6] (Man-Machine Interface).

Additional keys may provide the means to control the UE (e.g. to initiate and terminate calls).

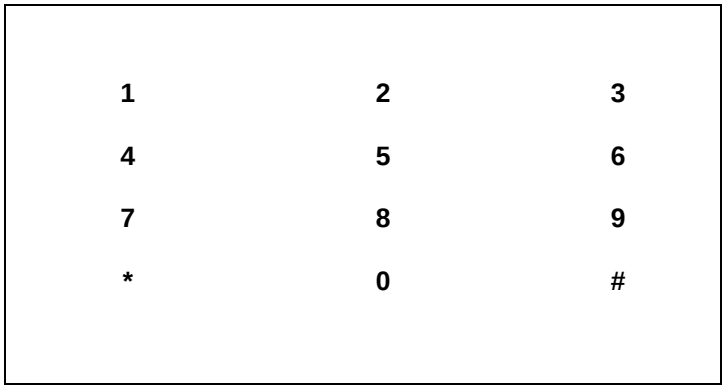


Figure A.1

A.6 Short message indication and acknowledgement

This feature allows the delivery of short messages to a UE from a service centre. Such messages are submitted to the service centre by a telecommunications network user who can also request information of the status of the message by further interrogation of the service centre. The service centre then transmits the message to an active UE user.

The UE must therefore provide an indication to the user that a message has been received from the service centre and must also send an acknowledgement signal to the PLMN to show that this indication has been activated. The PLMN then returns this acknowledgement to the service centre.

The short message service teleservice is described in specification 3GPP TS 22.003 [14].

A.7 Short message overflow indication

An indication shall be given to the user of the short message service when an incoming message cannot be received due to insufficient available memory.

A.8 International access function

Provision is made for a direct, standard method of gaining international access. For this purpose the UE may have a key whose primary or secondary function is marked "+". This is signalled over the air interface and would have the effect of generating the international access code in the network. It may be used directly when setting up a call, or entered into the memory for abbreviated dialling.

This feature is of benefit since the international access code varies between CEPT countries, which might cause confusion to a user, and prevent the effective use of abbreviated dialling when roaming internationally. Users may still place international calls conventionally, using the appropriate international access code.

A.9 Service Indicator (SI)

An indication is given to the user that there is adequate signal strength (as far as can be judged from the received signal) to allow a call to be made.

A.10 Dual Tone Multi Frequency (DTMF)

The UE shall be capable of initiating DTMF in accordance with specifications 3GPP TS 22.003 [14]. Optionally, the UE may provide a suppress function which allows the user to switch off the DTMF function.

A.11 On/Off switch

The UE may be provided with a means of switching its power supply on and off. Switch-off shall be “soft”, so that on activation, the UE completes the following housekeeping functions: termination of a current call, detach (where applicable) and storing required data in the SIM/USIM before actually switching off. As far as possible, this procedure should also apply on power failure (e.g. remote switch-off or low battery).

A.12 Sub-Address

This feature allows the mobile to append and/or receive a sub-address to a Directory Number, for use in call set-up, and in those supplementary services that use a Directory Number.

A.13 Short Message Service Cell Broadcast

The Short Message Service Cell Broadcast enables the mobile equipment to receive short messages from a message handling system.

The short message service cell broadcast teleservice is described in specification 3GPP TS 22.003 [14]

A.14 Short Message Service Cell Broadcast DRX

This feature enables a mobile equipment to save on battery utilization, by allowing the mobile equipment to not listen during the broadcast of messages the subscriber is not interested in.

A.15 Support of the extended Short message cell broadcast channel

This feature allows a mobile equipment by supporting of the extended Short message cell broadcast channel to enhance the capacity of the service. The support of the extended channel has low priority, i.e. the UE can interrupt the reading of this channel if idle mode procedures have to be executed.

A.16 Network Identity and Timezone

The feature provides the means for serving PLMNs to transfer current identity, universal time and the local timezone to mobile equipments, and for the mobile equipments to store and use this information. This enhances roaming by permitting accurate indication of PLMN identities that are either newer than the ME or have changed their name since the ME was sold. Additionally time and timezone information can be utilized by Mes as desired.

The network name time and timezone information will normally be transferred from the network to the ME:

1) Upon registering on the network.
2) When the UE geographically relocates to a different Local Time Zone.
3) When the network changes its Local Time Zone, e.g. between summer and winter time.
4) When the network changes its identity.
5) At any time during a signalling connection with mobile equipment.

Further details of this feature are described in 3GPP TS 22.042 [15].

A.17 Network’s indication of alerting in the UE

This feature provides the means for serving PLMNs to transfer to a UE an indication that may be used by the UE to alert the user in a specific manner in the following cases:

- mobile terminating call
- network initiated USSD
- network initiated Mobile Originated (MO) connection, if the ME supports the “network initiated MO connection “ feature.

Eight different indications are defined, whether the mobile terminating traffic is a call or USSD or related to the network initiated MO connection procedure. These indications are sent by the network and received by the UE:

- Three of these indications are used as levels, reflecting some kind of urgency: level 0 indicates that the UE shall not alert the user for USSD and remain silent in the case of call, level 2 shall be considered by the UE as more important than level 1 for the purpose of alerting the user.
- The five other indications are used as categories, identifying different types of terminating traffic. The UE shall inform the user in a specific manner for each of these five categories. Nevertheless, the possible forms of the alert (different ringing tones, displayed text, graphical symbols…) is still up to the mobile manufacturer (some forms of alerts can be simultaneously used, e.g. ringing tones and text on the display).

The management of the feature by the UE requires for the handling of categories that :

- The SIM/USIM stores for each category an informative text (maximum 25 characters per category) describing the type of terminating traffic associated with the category. This information could be used by the UE when alerting the user (display on the screen). It is necessary for the network operator to be able to change the meaning of each category.
- The user has the ability to set up his/her own association between the type of terminating traffic (identified by each category) and the different types of alert provided by the UE. To help the user in this choice, the UE uses the informative text associated with each category (as stored in the SIM/USIM). The UE should keep this association when switched off.

  Default settings should also be defined in the ME for the following cases :

  - when the UE receives a call, USSD or a request for a network initiated MO connection with no alerting indication,
  - when the UE receives a call, USSD or a request for a network initiated MO connection with a category of alerting not defined in the SIM/USIM.

  These default settings should be separated per type of mobile terminated traffic received (call, USSD or request for a network initiated MO connection).

A UE supporting the feature shall act according to the following points in case of mobile terminating traffic :

- when a mobile terminating traffic is received without any indication (level or category), the ME shall act as if it was not supporting the feature, i.e. use a default alert (e.g. associated with this type of mobile terminating traffic).
- if a level is indicated, the UE shall use an alert enabling the user to differentiate between the three levels.
- if a category is indicated, then :
  - if the SIM/USIM used in the UE does not store any information on that feature, the UE shall ignore the category received with any mobile terminating traffic and act as if it was not supporting the feature, i.e. use a default alert (e.g. associated with this type of mobile terminating traffic).
  - if the category is not defined in the SIM/USIM, the UE shall act as if it was not supporting the feature, i.e. use a default alert (e.g. associated with this type of mobile terminating traffic).
  - if the category is defined in the SIM/USIM, the UE shall use the alert associated with this category. In addition, it would be very useful for the user to be notified of the informative text associated with this category (e.g on the display).

Some interactions between this feature and other services related to alerting are described below :

- the call waiting service has priority on this feature, i.e. the call waiting tone will be played and not the alert derived by this feature. If possible, two different indications should be given to the user (e.g. the call waiting tone and a text on the display indicating call waiting, and in addition a text relative to the type of the new call received).

- the presentation of the calling line identity takes priority on this feature, if it is not possible to display this information and another information related to this feature.

- In case of interaction between this feature and UE specific features to alert the user (e.g. whole silent mode), the user should still be able to differentiate between the different levels or different types of terminating traffic, even if the alert itself may be changed.

A.18 Network initiated Mobile Originated (MO) connection

The “Network Initiated Mobile Originated connection” feature allows the network to ask the mobile equipment to establish a mobile originated connection. The serving PLMN provides the mobile equipment with the necessary information which is used by the mobile equipment to establish the connection.

Currently only the network initiated mobile originated call feature is specified. It is mandatory for a UE supporting CCBS and is used in the case of a CCBS recall.

A.19 Abbreviated dialling

The directory number or part of it is stored in the mobile equipment together with the abbreviated address. After retrieval the directory number may appear on the display.

Abbreviated dialling numbers stored in the UE or SIM/USIM may contain wild characters.

If wild characters are used to indicate missing digits, each wild character shall be replaced for network access or supplementary service operation, by a single digit entered at the keypad. The completed directory number is transmitted on the radio path.

A.20 Barring of Dialled Numbers

This feature provides a mechanism so that by the use of an electronic lock it is possible to place a bar on calling any numbers belonging to a pre-programmed list of numbers in the SIM/USIM.

Barred Dialling Numbers stored in the /USIM may contain wild characters.

Under control of PIN2, “Barred Dialling Mode” may be enabled or disabled. The selected mode is stored in the SIM/USIM.

Under PIN2 control, it shall be possible to add, modify or delete a particular “Barred Dialling Number” (BDN) and to allocate or modify its associated comparison method(s). This BDN may have the function of an abbreviated dialling number / supplementary service control (AND/SSC), overflow and/or sub-address.

When BDN is inactive, no special controls are specified, and the barred dialling numbers may be read (though not modified or deleted, except under PIN2 control) as if they were normal abbreviated dialling numbers. Access to keyboard and normal abbreviated dialling numbers (including sub-address) is also permitted.

When Barring of Dialled Numbers is active:

- Considering a number dialled by the user, if it exists a BDN for which there is a successful comparison (see below) between that BDN and the dialled number, then the ME shall prevent the call attempt to that number. If there is no BDN to fulfil those conditions, the call attempt is allowed by the ME.

With each BDN is associated one (or a combination of) comparison method(s) used between that BDN and the number dialled by the user. At least three different comparison methods are possible:

- The comparison is made from the first digit of that BDN, from the first digit of the dialled number and for a number of digits corresponding to the length of the BDN.

- The comparison is made from the first digit of that BDN, from any digit of the dialled number and for a number of digits corresponding to the length of the BDN.
- The comparison is made backwards from the last digit of that BDN, from the last digit of the dialled number and for a number of digits corresponding to the length of the BDN.
- If a BDN stored in the SIM/USIM contains one or more wild characters in any position, each wild character shall be replaced by any single digit when the comparison between that BDN and the dialled number is performed.
- If a BDN contains a sub-address, and the same number without any sub-address or with that sub-address is dialled, the ME shall prevent the call attempt to that number.
- Numbers specified as "barred" may only be modified under PIN2 control.
- If the ME does not support barring of dialled numbers, the UE shall not allow the making or receiving calls. However, this feature does not affect the ability to make emergency calls.

If "Fixed Number Dialling" and "Barring of Dialled Numbers" are simultaneously active, the dialled number shall be checked against the two features before the ME allows the call attempt. In that case, a dialled number will only be allowed by the ME if it is in the FDN list and if the comparison between that number and any number from the BDN list is not successful.

The UE may support other selective barrings, e.g. applying to individual services (e.g. telephony, data transmission) or individual call types (e.g. long distance, international calls).

A.21 DTMF control digits separator

Provision has been made to enter DTMF digits with a telephone number, and upon the called party answering the UE shall send the DTMF digits automatically to the network after a delay of 3 seconds (± 20 %). The digits shall be sent according to the procedures and timing specified in TS~~GSM~~ ~~0~~2~~4~~.0~~0~~8 [13].

The first occurrence of the "DTMF Control Digits Separator" shall be used by the ME to distinguish between the addressing digits (i.e. the phone number) and the DTMF digits. Upon subsequent occurrences of the separator, the UE shall pause again for 3 seconds (± 20 %) before sending any further DTMF digits.

To enable the separator to be stored in the address field of an Abbreviated Dialling Number record in the SIM/USIM, the separator shall be coded as defined in 3GPP TS 31.102 [19]. The telephone number shall always precede the DTMF digits when stored in the SIM/USIM.

The way in which the separator is entered and display in the UE, is left to the individual manufacturer's MMI.

Mes which do not support this feature and encounter this separator in an AND record of the SIM/USIM will treat the character as "corrupt data" and act accordingly.

A.22 Selection of directory number in messages

The Short Message (Point to Point MT or MO, or Cell Broadcast), Network Initiated USSD or Network Response to Mobile Originated USSD message strings may be used to convey a Directory Number which the user may wish to call. This can be indicated by enclosing the directory number in a pair of inverted commas (" ").

If the displayed message contains these characters enclosing a directory number, a call can be set up by user action. Normal (unspecified) or International format (using + symbol) may be used.

The message may contain more than one directory number, in which case it is for the user to select the one required.

A.23 Last Numbers Dialled (LND)

The Last "N" Numbers dialled may be stored in the SIM/USIM and/or the ME. "N" may take the value up to 10 in the SIM/USIM. It may be any value in the ME. The method of presentation of these to the user for setting up a call is the responsibility of the UE but if these numbers are stored in both the SIM/USIM and the UE, those from the SIM/USIM shall take precedence.

A.24 Service Dialling Numbers

The Service Dialling Numbers feature allows for the storage of numbers related to services offered by the network operator/service provider in the SIM/USIM (e.g. customer care). The user can use these telephone numbers to make outgoing calls, but the access for updating of the numbers shall be under the control of the operator.

NOTE: No MMI is envisaged to be specified for these numbers and it is left to mobile manufacturer implementations.

A specific example of Service Dialling Numbers is the storage of mailbox dialling numbers on the SIM/USIM for access to mailboxes associated with Voicemail, Fax, Electronic Mail and Other messages.

A.25 Fixed number dialling

This feature provides a mechanism so that by the use of an electronic lock it is possible to place a bar on calling any numbers other than those pre-programmed in the SIM/USIM.

Under control of PIN 2, “Fixed Dialling Mode” may be enabled or disabled. The mode selected is stored in the SIM/USIM.

Fixed Dialling Numbers (FDNs) are stored in the SIM/USIM in the Fixed Dialling Number field. FDN entries are composed of a destination address/Supplementary Service Control. Destination addresses may have the format relevant to the bearer services/teleservices defined in [21] and [14]. FDN entries may take the function of an Abbreviated Dialling Number/Supplementary Service Control (AND/SSC), Overflow and/or sub-address. Fixed Dialling Numbers stored in the SIM/USIM may contain wild card characters.

The Fixed Dialling feature is optional, however when Fixed Dialling Mode is enabled, an ME supporting the feature shall;

- Prevent the establishment of bearer services/teleservices to destination addresses which are not in FDN entries on a per bearer service/teleservice basis. The list of bearer services/teleservices excluded from the FDN check shall be stored in the SIM/USIM. Those bearer services/teleservices are characterised by their service code as described in [23]. For instance if the SMS teleservices is indicated in this list, SMS can be sent to any destination. By default, the ME shall prevent the establishment of any bearer service/teleservice to destination addresses which are not in FDN entries.

- Only allow modification, addition or deletion of Fixed Number Dialling entries under control of PIN2.

- Allow the establishment of bearer services/teleservice to destination addresses stored in FDN entries. For SMS, the Service Center address and the end-destination address shall be checked.

- Support the reading and substitution of wildcards in any position of an FDN entry, via the ME MMI.

- Allow the user to replace each wildcard of an FDN entry by a single digit, on a per call basis without using PIN2. The digit replacing the wildcard may be used for network access or supplementary service operation.

- Only allow Supplementary Service (SS) Control (in Dedicated or Idle mode) if the SS control string is stored as an FDN entry.

- Allow the extension of an FDN entry by adding digits to the Fixed Dialling number on a per call basis.

- Allow the emergency numbers (see Section 8.4) to be called, even if it is not an FDN entry.

- Allow normal access to AND fields (i.e. allow AND entries to be modified, added or deleted) and the keyboard.

- Allow use of ADNs subject to the FDN filter.

When FDN is disabled, an ME supporting FDN shall;

- Allow FDN entries to be read as though they were normal AND entries.

- Only allow modification, addition or deletion of Fixed Number Dialling entries under control of PIN2.

- Allow normal access to AND fields and the keyboard.

If the ME does not support FDN, the UE shall not allow the making or receiving of calls when Fixed Dialling is enabled. However, emergency calls (112 and other user defined emergency numbers) shall still be possible.

NOTE: Wildcards are stored on the SIM/USIM. The wildcard coding is given in 3GPP TS 31.102 [19].

A.26 Message Waiting Indication

A short message may be used to provide and indication to the user about the status and number of types of messages waiting on systems connected to the PLMN. The ME shall present this indication as an icon on the screen, or other MMI indication, and store the indication status on the SIM/USIM to allow the status to be retained through power off/on, SIM/USIM movement between UEs etc.

The ME shall be able to accept and acknowledge these message waiting status short messages irrespective of the memory available in the SIM/USIM.

Annex B (informative): Change history

Change history					
Meeting No.	**Tdoc. No.**	**CR. No.**	**Section affected**	**New version**	**Subject/Comments**
SMG#22	302/97	001	4.6 (Role Model)	3.1.0	SMG3 queried the separation of network operator into core and access, which, on examination, SMG1 find unhelpful
SMG#22	319/97 (SMG1 WPC 125/97)	002		3.1.0	Editorial Changes: FLMPTS was replaced by IMT 2000, 2 new references given, additional clarifications.
SMG#22	320/97	003	8.5, 9.3, 9.5, 17	3.1.0	Changes on Emergency Calls, User identification, Multiple profiles and additional handover requirements.
After SMG#23	SMG1 433u/97 965/97	004		Draft 3.2.0	Based on Approved Changes at SMG#22 Distributed at SMG1 in Dresden Nov 3-7, 97 to be Approved at SMG#24
SMG#24	966/97	005	Sections 8, 9, 11	3.2.1	Restructuring of sections 8,9 and 11 to gather all requirements relating to multiple subscriptions into one section and to improve the clarity.
SMG#24	967/97	006	Section 8.1	3.2.1	To improve the accuracy of text on numbering principles and minor editorial change to section 8.1
SMG#27	98-0551	007	Section 4.6 and misc.	3.3.0	Removal of commercial role model from the specification in order to improve clarity
SMG#27	*98-0552 (Not Approved)*	*008*	*New Section 18 (Not Applied)*	*3.3.0*	*To include requirements for network selection in service principles: NOT APPROVED > NOT APPLIED*
Pre- SMG#28	*(SMG1 Tdoc 98-0893)* 99-040	008 r4 Rejected	New Section 18 Applied	[Draft 3.4.0]	Added Network Selection section – Agreed by correspondence – Jan 13, 1999 – Prepared with CRs applied with revision marks
SMG#27	98-0553	009	Section 4.3	3.3.0	To remove unnecessary reference to IN and B-ISDN
SMG#27	98-0682	010	Section 11	3.3.0	To improve the clarity of service requirements for multiple user profiles
Pre-SMG#28	*(SMG1 Tdoc 98-0869)* 99-040	011	Sections 1, 2, 3, 4, 9, 10, 12, 17	Draft 3.4.0	Clean up for TS phase 1 Agreed at SMG1 Rome
Pre-SMG#28	*(SMG1 Tdoc 98-852)* 99-040	012	Sections 3,8,9,11,14,15	Draft 3.4.0	Changes in IC card and terminal service requirements Agreed at SMG1 Rome
Pre-SMG#28	*(SMG1 Tdoc 98-0894)* 99-040	013r1	Section 3.2 & 4.3	Draft 3.4.0	Clarification of general requirements for efficient use of radio resources Agreed by correspondence – Jan 13, 1999 – Prepared with CRs applied with revision marks
NOTE				Draft 3.4.0	SMG1 agreed only
pre-SMG#28	99-040	015 Rejected	17	Draft 3.4.0	According to the outcome of the SMG 1 ad-hoc meeting on handover issues it is proposed that inter-operator handover is not required for TS phase 1.(rejected by smg#28)
SMG#28	99-305	008r5	Revised Section 18	3.4.0	Network Selection presented at SMG#28 in 2201_008r4 was further revised and Approved at SMG#28.

Change history					
Meeting No.	**Tdoc. No.**	**CR. No.**	**Section affected**	**New version**	**Subject/Comments**
NOTE				3.4.0	Removal of Section 12 on UPT with CR 011 causes a skip section from Section 11 to 13.

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**WI**
SP-03	SP-99104	S1-99202	22.101	A016		R99	B	Control of supplementary services (GSM 02.04), may use MMI procedures specified in GSM 02.30 and existing GSM MMI related MS features (GSM 02.07) may also be used.	3.4.0		
Post-SA#3			22.101			R99		Updated Logo, …	3.5.0	3.5.1	
SP-04	SP-99229	S1-99387	22.101	021		R99	B	MultiNumbering: It will be possible for multiple MSISDNs to be associated with a single subscription.	3.5.0	3.6.0	
SP-04	SP-99226	S1-99395	22.101	020	7	R99	B	Emergency: To route the call to the appropriate emergency service if more than one emergency number is supported in a country.	3.5.0	3.6.0	
SP-05	SP-99439	S1-99737	22.101	025		R99	B	Support of SAT by USIM	3.6.0	3.7.0	
SP-05	SP-99439	S1-99816	22.101	024		R99	B	Clarification on the usage on 2G SIM and 3G USIM	3.6.0	3.7.0	
SP-05	SP-99435	S1-99851	22.101	022		R99	C	Clarification of Emergency Call requirements	3.6.0	3.7.0	
SP-06	SP-99524	S1-991031	22.101	029		R99	B	Emergency Call	3.7.0	3.8.0	
SP-06	SP-99527	S1-991038	22.101	028		R99	C	FDN	3.7.0	3.8.0	
SP-06	SP-99519	S1-991026	22.101	026		R99	D	Mainly editorial update for GSM/3GPP use.	3.7.0	3.8.0	
SP-07	SP-000060	S1-000112	22.101	030		R99	A	Support of encryption in GPRS mobile stations	3.8.0	3.9.0	
SP-07	SP-000070	S1-000137	22.101	031		R99	F	Fixed Dialing Number (FDN)	3.8.0	3.9.0	
SP-08	SP-000210	S1-000271	22.101	033		R99	D	Network selection procedures removed from section 16, reference to 22.011 added	3.9.0	3.10.0	
SP-08	SP-000200	S1-000350	22.101	035		R99	B	Emergency Calls and numbers used	3.9.0	3.10.0	
SP-08	SP-000201	S1-000362	22.101	038		R99	F	CS multimedia support	3.9.0	3.10.0	
SP-08	SP-000202	S1-000326	22.101	039		R99	F	Clarification for USIM Application selection	3.9.0	3.10.0	
SP-08	SP-000210	S1-000270	22.101	034		R00	D	Network selection procedures removed from section 16, reference to 22.011 added	3.9.0	4.0.0	
SP-08	SP-000200	S1-000351	22.101	036		R00	B	Emergency Calls and numbers used	3.9.0	4.0.0	
SP-08	SP-000213	S1-000352	22.101	037		R00	B	Emergency Call enhancements	3.9.0	4.0.0	
SP-09	SP-000383	S1-000603	22.101	040		R4	B	Multimedia messaging	4.0.0	4.1.0	
SP-09	SP-000383	S1-000605	22.101	041		R4	C	Service Management requirements	4.0.0	4.1.0	
SP-09	SP-000430	S1-000700	22.101	042	1	R4	F	General corrections and clarifications to 22.101 for Release 2000	4.0.0	4.1.0	
SP-09	SP-000383	S1-000598	22.101	046		R4	D	Editorial changes to 22.101 for Release 2000	4.0.0	4.1.0	
SP-09	SP-000430	S1-000698	22.101	047	1	R4	C	Numbering Principles	4.0.0	4.1.0	
SP-09	SP-000383	S1-000620	22.101	048		R4	C	Service evolution	4.0.0	4.1.0	
SP-09	SP-000391	S1-000573	22.101	049		R4	D	Emergency Call	4.0.0	4.1.0	
SP-09	SP-000405	S1-000649	22.101	050		R4	B	Text Conversation	4.0.0	4.1.0	
SP-10	SP-000533	S1-000798	22.101	058		Rel-4	A	Deleting Encrypted USIM-ME interface	4.1.0	4.2.0	TEI4

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**WI**
SP-11	SP-010053	S1-010071	22.101	062		Rel-4	A	Handling of interactions between applications requiring the access to UE resources	4.2.0	4.3.0	Service Clean up R99
SP-11	SP-010054	S1-010207	22.101	064		Rel-4	B	PLMN name indication	4.2.0	4.3.0	TEI4
SP-11	SP-010055	S1-010178	22.101	066		Rel-4	B	CR to 22.101 on Introduction of CPHS features	4.2.0	4.3.0	UICC1-CPHS
SP-11	SP-010056	S1-010209	22.101	068		Rel-4	B	Display of service provider name in the UE	4.2.0	4.3.0	TEI4
SP-12	SP-010262	S1-010504	22.101	071		Rel-4	F	Replacement of references to 23.121 for R4 onwards	4.3.0	4.4.0	TEI4
SP-12	SP-010255	S1-010576	22.101	074		Rel-4	F	Addition of a Streaming paragraph	4.3.0	4.4.0	PSTREAM
SP-12	SP-010263	S1-010352	22.101	076		Rel-4	F	CS Multimedia fallback to speech	4.3.0	4.4.0	TEI4
SP-12	SP-010253	S1-010594	22.101	079		Rel-4	F	Clarification of PLMN Name Indication and Service Provider Name Indication feature.	4.3.0	4.4.0	SPANME
SP-12	SP-010254	S1-010586	22.101	081		Rel-4	F	Removal of Service Provider Name graphic format from Rel-4	4.3.0	4.4.0	SPANME
			22.101	-				Minor editorial corrections made	4.4.0	4.4.1	
SP-13	SP-010441	S1-010831	22.101	083		Rel-4	F	Addition of a statement on parameter storage on the SIM/USIM.	4.4.0	4.5.0	TEI4
SP-13	SP-010437	S1-010772	22.101	085		Rel-4	F	Correction of MMS paragraph	4.4.0	4.5.0	MMS

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CHANGE REQUEST

⌘ **22.097** **CR** **004** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **Multiple Subscriber Profile (MSP) Phase 1; Service description - Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

2 References

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

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

[1] 3GPP TR 22.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.004: "General on supplementary services".

[3] 3GPP TS 22.030: " Man-machine Interface (MMI) of the mobile station (MS)".

[4] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS) Point to Point (PP)".

[5] 3GPP TS 22.135: "Multicall".

[6] 3GPP TS 22.001: "Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLMN) ".

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

7 Interaction with other services

7.1 The Multi-Numbering Scheme

Each profile may employ the single-numbering scheme or the multi-numbering scheme. The multi-numbering scheme is described in ~~GSM~~ TS 2~~0~~2.0~~0~~1 [6~~2~~]. For each of the profile(s) defined above, it shall be possible for the subscriber to be allocated different MSISDNs for different basic services.

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CHANGE REQUEST

⌘ **22.094** **CR 002** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **Follow Me Service description; Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
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Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs Affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.004: "General on supplementary services".

[4] 3GPP TS 22.030: "Man-Machine Interface (MMI) of the Mobile Station (MS)".

[5] 3GPP TS 22.082: "Call Forwarding (CF) supplementary services - Stage 1".

[6] 3GPP TS 22.085: "Closed User Group (CUG) supplementary services - Stage 1".

[7] 3GPP TS 22.041: "Operator Determined Barring (ODB) - Stage 1".

[8] 3GPP TS 22.078: "Customized Applications for Mobile network Enhanced Logic (CAMEL); Service definition (Stage 1).

[9] 3GPP TS 22.079: "Support of Optimal Routeing (SOR); Service definition (Stage 1)".

[10] 3GPP TS 22.090: " Unstructured Supplementary Service Data (USSD) Stage 1"

[11] 3GPP TS 42.031: "Fraud Information Gathering System (FIGS); Service description - Stage 1"

[12] 3GPP TS 22.101: "~~UMTS~~ Service Principles".

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

4.1 Normal Operation

Due to reduced security requirements to the Follow Me feature the service shall not be offered in standard operations of public ~~GSM networks~~3GPP networks. In railway operations it must be enabled by definitive action on the part of the operator.

Fraud Information Gathering System (FIGS) as specified in [11] can be used to protect in CAMEL based inter-working networks.

The Follow Me feature shall be controlled by means of Subscriber Controlled Input using USSD.

5 Applicability to telecommunication services

~~GSM~~ TS ~~0~~22.~~0~~01 describes the principles of the Telecommunication services provided in a ~~GSM~~ PLMN. It also defines the concepts of Telecommunication services and describes their characterization by appropriate attributes. Bearer services and Teleservices, which are offered by a PLMN in connection with other networks, are defined in TS 22.002, TS~~GSM~~ 2~~0~~2.~~0~~03 and TS 22.101. A list of basic service groups can be found in ~~GSM~~ TS 22.004.

Follow Me is applicable to the following telecommunication services:

Table 1: Applicability of the Follow Me feature to telecommunication services

Feature	Telephony	Emergency Call	SMS PTP		SMS-CB	Fax	cct Data	~~PAD/Packet Access~~		Voice Group Services	
	TS11	TS12	TS21	TS22	TS 23	TS 6x	BS2x, BS3x	~~BS4x~~	~~BS5x~~	TS 91	TS 92
Follow Me	Yes					Yes	Yes			No[1]	No[1]

NOTE 1: The feature is in general not applicable for Voice Group Services. However a dispatcher may be an initiating subscriber or a remote party for the Follow Me feature.

EDITOR's Note: The applicability of FM to SMS is for further study.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

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CHANGE REQUEST

⌘ **22.088** **CR** **002** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **Call Barring (CB) Supplementary Services - Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
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Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
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B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

1.3.4 Erasure

If the served mobile subscriber at provision time has selected the subscription option "control of barring services by subscriber using password", a password can be erased as described in ~~GSM~~ TS ~~0~~2.0.04.

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

1.3.6 Deactivation

Deactivation takes place by means of an appropriate control procedure by the subscriber, or by the service provider, or finally by activation of a new barring program for the same basic service group.

If the served mobile subscriber at provision time has selected the subscription option "control of barring services by subscriber using password", the supplementary service is deactivated if the subscriber provides the following information to the network:

- password;
- information as to whether barring of all calls or calls of a specific basic service group should be deactivated.

NOTE: If no Basic Service code is inserted by the user this is interpreted as the group "All Basic Services".

- selected barring program (i.e. the code for one specific Outgoing Barring program given in ~~GSM~~ TS 2~~0~~2.030) or selected barring supplementary service (i.e. the code for Outgoing Barring Service or the code for All Barring Services given in TS 22.030).

If the served mobile subscriber at provision time has selected the subscription option "control of barring services by service provider", the supplementary service cannot be deactivated by the subscriber. The deactivation has to be performed by the service provider.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
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CR-Form-v4

CHANGE REQUEST

⌘ **22.085** **CR** **003** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **Closed User Group (CUG) Supplementary Services - Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

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Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

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R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

1.2 Description

1.2.1 Service description

An ISDN/MSISDN number shall identify each member of a CUG.

A CUG shall be defined for one or more basic service groups.

CUG members can have additional capabilities that allow them to originate calls outside the group, and/or to receive calls from outside the group. CUG members can have additional restrictions that prevent them from originating calls to other members of the CUG, or from receiving calls from other members of the CUG.

CUG shall remain unaffected when members roam to PLMNs supporting CUG. Roaming subscribers must have the same CUG facilities on the roamed-to PLMN as on the Home PLMN.

When roaming to networks not supporting CUG, the CUG restrictions must be enforced. (However, where possible, the CUG facilities should be supported, see subclause 1.4.10.)

Each individual subscriber may be a member of a maximum of 10 CUGs.

1.2.2 Applicability to telecommunication services

The applicability of this Supplementary Service is defined in ~~GSM~~ TS 22.004 [2].

1.2.3 Definitions

MSISDN: A number conforming to the numbering plan and structure specified in TS 23.003.

CUG member: A user who has subscribed to the CUG Supplementary Service and is one of the users in the group formed by a particular CUG.

CUG index: A value assigned by the network to identify a CUG.

CUG Interlock Code (IC): Is used by the network (not by the MS) to identify CUG membership.

preferential CUG: A preferential CUG, which can be specified for each basic service group, is the nominated default CUG to be used when no explicit CUG index is received by the network.

suppress preferential CUG: A user action to prohibit the use of the preferential CUG, on a per call basis.

Incoming Access (IA): An arrangement which allows a member of a CUG to receive calls from outside the CUG.

Outgoing Access (OA): An arrangement which allows a member of a CUG to place calls outside the CUG.

suppress OA: A user action to prohibit the use of the OA subscription option, on a per call basis.

Incoming Calls Barred Within A CUG (ICB): An access restriction that prevents a CUG member from receiving calls from other members of that group.

Outgoing Calls Barred Within A CUG (OCB): An access restriction that prevents a CUG member from placing calls to other members of that group.

CUG calls: A CUG call is a call which is restricted to a pre-defined group of users.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
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CHANGE REQUEST

⌘ **22.084** **CR 002** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **MultiParty (MPTY) Supplementary Services - Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	Sa1
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Category:	⌘	**F**
Release:	⌘	Rel-4

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Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

1.3.8.4 Managing a single call and a MPTY

1.3.8.4.1 Single active call

If the served mobile subscriber is connected to a single active call (regardless whether it is a private communication or a new initiated call) and has a MPTY on hold, she is able to:

1) Disconnect the single active call.

2) Disconnect the held MPTY.

3) Disconnect both. All calls, even if they are on hold, shall be released.

4) Join the single active call and the held MPTY together.
This would result in an active MPTY, except if the number of remote parties exceeds the number allowed.

   A "MPTY invoke" notification shall be sent towards all remote parties.

   A Retrieve notification (according to ~~GSM~~ TS 2~~0~~2.083) shall be sent towards the previously held remote party.

5) Alternate between both calls.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
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CHANGE REQUEST

⌘ **22.083** **CR 003** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **Call Waiting (CW) and Call Holding (HOLD); Supplementary Services - Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
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Category:	⌘	**F**
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Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

3GPP TS 22.083 V4.~~0~~1.0 (200~~2~~1-03)

Technical Specification

3rd Generation Partners

Technical Specification Group Services and System Aspects; Call Waiting (CW) and Call Holding (HOLD); Supplementary Services - Stage 1 (Release 4)

Keywords

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Contents

Foreword

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

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

Version x.y.z

where:

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

0 Scope

The present document describes the Supplementary Services belonging to the group Call Completion Supplementary Services.

The general aspects, including definitions and recommended provision, of the description of Supplementary Services are given in specification TS 22.004 [2].

The group of Call Completion Supplementary Services is divided into the following two Supplementary Services:

- Call waiting (clause 1);
- Call hold (clause 2).

0.1 References

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

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

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.004: "General on Supplementary Services".

[3] 3GPP TS 22.030: "Man-Machine Interface (MMI) of the Mobile Station (MS)".

[4] 3GPP TS 22.081: "Line identification Supplementary Services - Stage 1".

[5] 3GPP TS 22.084: "Digital cellular telecommunication system; MultiParty (MPTY) Supplementary Services - Stage 1".

[6] 3GPP TS 22.135: "Multicall Stage 1".

0.2 Abbreviations

Abbreviations used in the present document are listed in TR 21.905 [1].

1 Call Waiting (CW)

1.1 Definition

The Call Waiting Service permits a mobile subscriber to be notified of an incoming call (as per basic call procedures) whilst the traffic channel is not available for the incoming call and the mobile subscriber is engaged in an active or held call. Subsequently, the subscriber can either accept, reject, or ignore the incoming call.

1.2 Description

1.2.1 Description

This service operates when the traffic channel at the controlling subscriber B is not available and B is engaged in an active or held call.

When a third party (calling subscriber C) attempts to connect to that termination, the controlling subscriber B is given an appropriate indication of the waiting call. A notification that the call is waiting will be sent back towards the calling subscriber C.

The maximum number of waiting calls at one time per mobile access is one. This means that no further calls are offered to the subscriber while a call is waiting.

NOTE: As a network option this maximum number of waiting calls may be greater than one. This is considered as a possible future enhancement.

1.2.2 Applicability to telecommunication services

The applicability of this Supplementary Service to the ongoing call is defined in TS 22.004 [2]. The incoming, waiting, call may be of any kind.

1.2.3 Terminology

(Controlling) subscriber B

This is the subscriber who is provided by the network with the Call Waiting Service and who reacts to the Call Waiting.

Subscriber C

This is the subscriber who has originated a call to B which causes the Call Waiting Service to be invoked.

Subscriber A

This represents a subscriber who is engaged in a call with B, being either the calling or the called party.

T2; No answer time out

The duration of this time out is the time the network will wait for a response from subscriber B, to the offered call from subscriber C. The value of the timer is between 0.5 and 2 minutes at the service providers discretion.

1.3 Normal procedures with successful outcome

1.3.1 Provision

This Supplementary Service is provisioned for all Basic Services (BS) subscribed to and to which it is applicable, i.e. not provisioned to any subset of these BS.

1.3.2 Withdrawal

Withdrawal will be at the request of the subscriber or for administrative reasons.

1.3.5 Activation

This Supplementary Service will be activated either collectively for all applicable Basic Services or on a Basic Service group basis by the subscriber using a control procedure, as specified in TS 22.030 [3], or by the service provider. The controlling subscriber shall be informed by the network of the success or otherwise of her action.

1.3.6 Deactivation

The service will be deactivated either collectively for all applicable Basic Services or on a Basic Service group basis by the subscriber using a control procedure, as specified in TS 22.030 [3], or by the service provider. The controlling subscriber shall be informed by the network of the success or otherwise of her action.

1.3.7 Invocation

This service is invoked by the network on arrival of an incoming call if the service is active and the controlling subscriber B's traffic channel is not available, B is engaged in an active or held call and there is no other call currently waiting.

1.3.8 Normal operation with successful outcome

1.3.8.1 Incoming call from C

When an incoming call from subscriber C arrives, the served mobile subscriber is connected to - at least - one call (active or held) and a NDUB (Network Determined User Busy) condition does not exist, then the CW service shall be invoked and the call shall be offered to subscriber B with an appropriate indication, e.g. with a "Call Waiting Tone".

If a response to the offered call is received from the mobile termination at B, then the subscriber C shall be given an indication (e.g. ringing tone) that the called subscriber is being informed of the incoming call and, if possible, that call waiting is in operation.

1.3.8.2 Terminating call by A or B

If either subscriber A or subscriber B requests that the call is terminated, then this call shall be terminated as for basic call (see TS 22.030 [3] for more information). Subscriber B shall then be given the normal notification that there is a new call to her, as for a normal terminating call. The network shall continue to indicate; e.g. ringing tone towards subscriber C as for a normal call. B can then accept the call from C before the expiry of T2.

Subscriber B can also free resources by using the Call Hold Supplementary Service. Subscriber B shall then be able to accept the waiting call from subscriber C before the expiry of T2.

Alternatively, subscriber B may specifically request release or hold of the connection to A and accept the waiting call as one action (see TS 22.030 [3]). In this case, the network connects subscriber B to subscriber C with no further notifications to either subscriber. This must be done before the expiry of T2.

1.3.11 Interrogation

Status check

The controlling subscriber may interrogate the network by the use of a control procedure, as specified in TS 22.030 [3]. The network shall respond with an appropriate indication telling the subscriber whether the service is supported in this network and, if so, provide a list of all Basic Service groups to which the Call waiting Supplementary Service is active.

1.4 Exceptional procedures or unsuccessful outcome

1.4.1 Incoming call from subscriber C ignored by subscriber B

If no response is received by the network from controlling subscriber B before the expiry of T2, then the network shall inform the controlling subscriber B that the call is no longer waiting. Subscriber C shall then be given a no reply indication, unless e.g. Call Forwarding applies. The call waiting service is then made available for a subsequent incoming call.

1.4.2 Incoming call from subscriber C is indicated as UDUB by subscriber B (or terminal B)

If the waiting call is indicated as UDUB by B before the expiry of T2 the subscriber C shall be given a busy indication, unless e.g. Call Forwarding applies. The call waiting service is then made available for a subsequent incoming call.

1.4.3 Release by subscriber C within the specified period

If calling subscriber C terminates the call attempt to subscriber B before the expiry of T2, the call attempt from C shall be terminated, as for basic call, and subscriber B shall be notified.

1.4.4 Incoming call from subscriber C is rejected by subscriber B

If the waiting call is explicitly rejected by B before the expiry of T2, the subscriber C shall be given a reject indication. The call waiting service is then made available for a subsequent incoming call.

1.5 Alternate procedures

None identified.

1.6 Interactions with other Supplementary Services

1.6.82.1 Call forwarding unconditional

If call forwarding unconditional has been activated, it takes precedence over call waiting. Call forwarding unconditional can be activated while a call is waiting without changing the state of the waiting call.

1.6.82.2 Call forwarding on mobile subscriber busy

No impact, i.e. neither Supplementary Service shall affect the operation of the other Supplementary Service.

The following text clarifies the situation: If user B is NDUB (Network Determined User Busy), Call Forwarding shall take place, and the call is not offered to B. If B is not NDUB, the call shall be offered to B, and if the UDUB (User DUB) condition occurs, then the Call Forwarding shall take place.

1.6.82.3 Call forwarding on no reply

If the CFNRy is active and operative for the called subscriber then a waiting call shall still be offered as described in subclause 1.3.8.1 (call waiting indication). If no response is received to this call before the expiry of the No Reply Condition timer, then the call forwarding on no reply service becomes invoked and the call is forwarded as per that call forwarding on no reply service description.

1.6.83.2 Call hold

The served user may use the Call Hold service to answer subsequently a waiting call from C.

If the served mobile subscriber has an active call and a call one hold the network can still offer an incoming call with the waiting indication i.e. the NDUB condition is not used the normal way (n=2 not 1).

NOTE: Although the call is offered to the subscriber, she cannot accept the call as long as she has one active call and one call on hold.

If the served mobile subscriber has a call on hold and no active call, an incoming call is offered as a waiting call.

1.6.81.1 Calling line identification presentation

See TS 22.081 [4]

1.6.84.2 MultiParty

See ~~GSM~~ TS 22.084 [5] .

1.6.88.6 Barring of all incoming calls

Invocation of Barring of Incoming Calls takes precedence over invocation of Call Waiting.

Call waiting cannot be activated if barring of incoming calls is activated. The mobile subscriber requesting for call waiting shall be informed of this Supplementary Service incompatibility. The activation of barring of incoming calls does not affect any currently waiting calls.

1.6.88.7 Barring of incoming calls when roaming outside the home PLMN country

When active and operative, same as interaction with Barring of All Incoming Calls.

1.7 Interactions with other services

1.7.1 Multicall

See TS 22.135 [6].

1.8 Interworking considerations

Calls originating from outside the ISDN/PLMN can undergo call waiting at B.

A special in-band indication may be provided to the calling subscriber instead of the normal indication.

2 Call hold

2.1 Definition

The call hold service allows a served mobile subscriber, who is provisioned with this Supplementary Service, to interrupt communication on an existing active call and then subsequently, if desired, re-establish communication. The traffic channel remains assigned to the mobile subscriber after the communication is interrupted to allow the origination or possible termination of other calls.

2.2 Description

2.2.1 Description

When the call hold service is invoked, communication is interrupted on the traffic channel and the traffic channel is released from the existing call. The traffic channel is reserved for the served mobile subscriber invoking the call hold service. The served mobile subscriber can only have one call on hold at a time.

One traffic channel should be reserved for the served mobile subscriber as long as the subscriber has one call on hold and is currently not connected to any other call, i.e. the network should not reserve more than one traffic channel for a mobile station.

If the served mobile subscriber has a call on hold and is not connected to an active call, she can:

1) Retrieve the held call.

2) Set up another call.

3) Disconnect the held call.

If the served mobile subscriber has a call on hold and is not connected to an active call she can not receive a call, except when using the Call Waiting Supplementary Service. For additional information, see subclause 2.6.83.1 (Interaction with Call Waiting Supplementary Service).

If the served mobile subscriber is connected to an active call and has another call on hold, she can:

1) Alternate from one call to the other.

2) Disconnect the active call.

3) Disconnect the held call.

4) Disconnect both calls.

If the served mobile subscriber is connected to an active call and has another call on hold, she can not receive a call. For additional information, see subclause 2.6.83.1 (Interaction with Call Waiting Supplementary Service).

2.2.2 Applicability to telecommunication services

The applicability of this Supplementary Service is defined in TS 22.004 [2].

NOTE: If the served mobile subscriber has a call on hold she may set up another call using a different telecommunications service.

2.3 Normal procedures with successful outcome

2.3.1 Provision

This Supplementary Service is provisioned for all basic services subscribed to and to which it is applicable, i.e. not provisioned to any subset of these BS.

2.3.2 Withdrawal

The service will be withdrawn at the subscriber's request or for administrative reasons.

2.3.5 Activation

The Supplementary Service will be activated by the service provider as a result of provision.

2.3.6 Deactivation

The Supplementary Service will be deactivated by the service provider as a result of withdrawal.

2.3.7 Invocation

Call hold will be invoked by the served mobile subscriber by use of a control procedure as described in TS 22.030 [3].

2.3.8 Normal operation with successful outcome

Hold request

The served mobile subscriber indicates to the network that communication on the interface is to be interrupted. A call may be placed on hold:

- on the served calling subscriber's interface by her at any time after the call has been answered and before call clearing has begun.

- on the served called subscriber's interface by her at any time after the call has been answered and before call clearing has begun.

The communication on the connection is then interrupted An acknowledgement shall be given to the served mobile subscriber, and the traffic channel is now available for other uses. A notification shall be sent towards the held party indicating that the call has been placed on hold.

Disconnect

If at any time a call is in the held state, either party may disconnect from that call.

Unidirectionality

Assume that subscriber A and B are connected to a call and both have subscribed to the call hold services. The call hold service is unidirectional, so it is possible for:

1) only party A to have party B on hold;

   For party A the call is on hold, for the held party B the call is active.

2) only party B to have party A on hold;

   For party B the call is on hold, for the held party A the call is active; or

3) each party to have the other on hold.

   For party A and party B the call is on hold.

Handling of call hold service within a call

The served mobile subscriber may control the call hold service by use of the control procedures as described in TS 22.030 [3].

If the served mobile subscriber has a call on hold and is not connected to an active call, she can:

1) Retrieve the held call.

   A notification shall be send towards the previously held party that the call has been retrieved.

2) Set up another call.

   Results in the served mobile subscriber being engaged in that new call and still holding the other call.

3) Disconnect the held call (as for basic call).

If the served mobile subscriber is connected to an active call and has another call on hold, she can:

1) Alternate from one call to the other.

   Results in the previously active call being held and the previously held call becoming active. Privacy is provided between the two calls. A notification shall be sent towards the previously held party that the call has been retrieved and another notification shall be sent towards the party being put on hold.

2) Disconnect the active call.

   Results in the traffic channel being available for the served mobile subscriber and the other call being still on hold. The served mobile subscriber shall be notified that she has a call on hold. The disconnected party shall be notified as for a basic call.

NOTE: The notification about the held call towards the served mobile subscriber is given by the MS, not by the network.

3) Disconnect the held call.

   The disconnected party shall be notified as for a basic call.

4) Disconnect both calls (as for basic call).

If the served mobile subscriber is connected to an active call and has another call on hold, and the active call is disconnected by the other party; then the served mobile subscriber shall be notified that she has a call on hold.

NOTE: The notification about the held call towards the served mobile subscriber is given by the MS, not by the network.

2.4 Exceptional procedures or unsuccessful outcome

2.4.1 Exceptional operation or unsuccessful outcome

If the network cannot retrieve a previously held call, the mobile subscriber will be informed of the reason of the failure. (For example, the call may be in the process of being cleared). The call state is not affected.

If the network cannot alternate between two calls, the mobile subscriber will be informed of the reason for the failure. The call states are not affected.

2.4.6 Invocation

Hold

If a mobile subscriber tries to invoke the hold service while not subscribed to the service or for some other reason, the service provider cannot provide the hold service, an indication will be provided to the mobile subscriber with the reason of failure. The call state is not affected.

2.5 Alternate procedures

None identified.

2.6 Interactions with other Supplementary Services

2.6.83.1 Call waiting

See subclause 1.6.83.2.

2.6.84.2 MultiParty

See TS 22.084 [5]

2.7 Interactions with other services

2.7.1 Multicall

See TS 22.135 [6].

2.8 Interworking considerations

The operation of this Supplementary Service is not affected by the nature of the far end of the connection.

NOTE: In some networks the indication to the distant user about the held or retrieve state of the call may not be supported.

Annex A (informative): Change history

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**WI**
Jun 1999			GSM 02.83					Transferred to 3GPP SA1	7.0.0		
SA#04			22.083			R99		Transferred to 3GPP SA1		3.0.0	
SP-05	SP-99479	S1-99630	22.083	001		R99	D	Editorial changes for alignment	3.0.0	3.0.1	Editorial changes
SP-05	SP-99449	S1-99854	22.083	002		R99	B	Multicall	3.0.0	3.1.0	Multicall
SP-11	SP-010065	S1-010258	22.083			Rel-4		Transferred to 3GPP Release 4	3.1.0	4.0.0	

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.082** **CR** **004** ⌘ ev **-** ⌘ Current version: **4.2.0** ⌘

Spec Title: **Call Forwarding (CF) supplementary services - Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

3GPP TS 22.082 V4.~~1~~2.0 (~~2001~~2002-0~~3~~6)

Technical Specification

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Contents

Foreword

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

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

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3 or greater indicates TSG approved document under change control.

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

z the third digit is incremented when editorial only changes have been incorporated in the document.

0 Scope

This specification describes the supplementary services belonging to the group CALL OFFERING SUPPLEMENTARY SERVICES.

The general aspects, including definitions and recommended provision, of the description of the supplementary services are given in specification TS~~GSM~~ 22.004.

The group of supplementary services CALL OFFERING SUPPLEMENTARY SERVICES is divided into four different supplementary services:

- Call forwarding unconditional (section 1);
- Call forwarding on mobile subscriber busy (section 2);
- Call forwarding on no reply (section 3);
- Call forwarding on mobile subscriber not reachable (section 4).

Indication of active Call forwarding supplementary service.

An indication that a Call forwarding service is currently active and operative on a number will be given to the forwarding party each time an outgoing call is made. There will be one indication for Unconditional call forwarding and another common indication for the Conditional call forwarding services.

Note on the use of the forwarded-to number at registration.

If the forwarded-to number is a number in the HPLMN country, it may be entered by the served mobile subscriber in three different formats, independent of her actual location, according to the schemes:

1) National (significant) number.
2) National (trunk) prefix plus national (significant) number.
3) International prefix*, country code, national (significant) number.

Scheme 3) Storage of numbers in this format is mandatory for all PLMN operators.

If the forwarded-to number is a number in a country other than the HPLMN country, it shall be entered by the served mobile subscriber, independent of her actual location, according to the following scheme:

- International prefix (NOTE), country code, national (significant) number.

NOTE: The MMI for entering of international prefix is defined in 22.030.

The maximum forwarded-to number length is 28 digits.

Principles for interaction with the Barring of Outgoing Calls supplementary services.

Numbers allowed to call according to the Barring of Outgoing call service condition are allowed as forwarded-to numbers for the served mobile subscriber.

Numbers not allowed to call according to the Barring of Outgoing call service condition are not allowed as forwarded-to numbers for the served mobile subscriber.

For Unconditional Call Forwarding the forwarded leg is treated as an outgoing call from the HPLMN country.

For the Conditional Call Forwarding services the forwarded leg is treated as an outgoing call from the LPLMN (HPLMN or VPLMN) country.

Principles for interaction with the Barring of Incoming Calls supplementary services.

When Barring of all incoming calls is active for the served mobile subscriber - no Call forwarding services are allowed for her.

When Barring of all incoming calls when roaming outside the HPLMN country is active and operative - i.e. the served mobile subscriber is roaming outside the HPLMN country, the Conditional Call Forwarding services are not allowed.

0.1 References

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

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

[1] GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Definitions, abbreviations and acronyms".

[2] 3GPP TS 22.004: General on supplementary services".

[3] 3GPP TS 22.030: Man-Machine Interface (MMI) of the Mobile Station (MS)".

[4] 3GPP TS 22.081: Line identification supplementary services - Stage 1".

[5] 3GPP TS22.083Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

[6] 3GPP TS 22.084MultiParty (MPTY) supplementary services - Stage 1".

[7] 3GPP TS 22.085Closed User Group (CUG) supplementary services - Stage 1".

[8] 3GPP TS 22.086: Advice of charge (AoC) supplementary services - Stage 1".

[9] 3GPP TR 22.905: "Vocabulary for 3GPP Specifications".

0.2 Definitions and abbreviations

Abbreviations used in this specification are listed in GSM 01.04 [1] and TR 22.905 [9].

1 Call Forwarding Unconditional

1.1 Definition

This service permits a called mobile subscriber to have the network send all incoming calls, or just those associated with a specific Basic service group, addressed to the called mobile subscriber's directory number to another directory number. The ability of the served mobile subscriber to originate calls is unaffected. If this service is activated, calls are forwarded no matter what the condition of the termination.

1.2 Description

1.2.1 Description

The served mobile subscriber can request a different forwarded-to number for each Basic service group containing a basic service to which she has subscribed.

1.2.2 Applicability to telecommunication services

The applicability of this supplementary service is defined in TS 22.004.

1.2.3 Terminology

A served mobile subscriber is a mobile subscriber of a particular PLMN access who is requesting that calls to her number be forwarded. This subscriber may also be referred to as the forwarding subscriber or the called subscriber.

A forwarded-to subscriber is a subscriber to whom the call shall be forwarded.

1.3 Normal procedures with successful outcome

1.3.1 Provision

The supplementary service will be provisioned for all Basic Services subscribed to and to which it is applicable.

The service can be offered with several subscription options. Options apply to all Basic services subscribed to. For each subscription option, only one value can be selected.

Subscription options	Value
Calling subscriber receives notification the call has been forwarded	No Yes
MSISDN of the served subscriber can be presented to the forwarded-to subscriber	No Yes

1.3.2 Withdrawal

The service will be withdrawn at the subscriber's request or for administrative reasons.

1.3.3 Registration

The following information has to be registered in the network:

1) the forwarded-to number, which may be accompanied by a forwarded-to sub-address;

2) information as to whether all calls or all calls of one (or several) specific Basic service groups should be forwarded.

If no Basic Service code is inserted by the user this is interpreted as All Basic Services.

Registration can take place either by the service provider or with an appropriate control procedure by the subscriber.

Verification, where possible, of the forwarded-to number should be accomplished before accepting the call forwarding request. This verification is done by a simple check of the forwarded-to number to see if the number is within the allowed number range.

When the mobile subscriber so registers call forwarding unconditional, the network will return notification of acceptance or rejection of the request. This notification will include the forwarded-to number to which call forwarding unconditional is registered.

1.3.4 Erasure

A previous registration can be erased in either of three ways:

Firstly, the subscriber can specifically erase a previous registration with an appropriate control procedure.

Secondly, the subscriber can register information for call forwarding unconditional for the specific Basic service group to another directory number, thus causing the previous registration of call forwarding unconditional to be overridden.

Thirdly, all information is erased as a result of withdrawal of the service.

1.3.5 Activation

The user shall be allowed to activate Call Forwarding Unconditional (CFU) by e.g. using the MMI command described in TS 22.030. This activation request may include information of which Basic Service Group(s) it shall apply to. If no such information is included the Activation request applies to all Basic Service Groups.

When receiving an activation request the network shall activate CFU for the Basic Service Groups comprised in the BS group information given by the user against which a CFU forwarded-to-number is registered. The Activation(s) shall be in accordance with the rules set out in TS 22.004.

When CFU is activated for Basic Service Group (Voice – MMI service code 11; Fax – MMI service code 13; Data – MMI service code 12) as defined in TS 22.030 [3], a notification shall be sent to the user. Subsequently, when the UE is in idle mode, an indication may be given to the user to show that CFU for Basic Service Group Voice – MMI service code 11 is active.

The supplementary service is also activated for a Basic service group as a result of Registration for that Basic service group.

1.3.6 Deactivation

An active CFU can be deactivated in either of two ways;

- The user may deactivate CFU by means of an appropriate control procedure (e.g. as described in TS 22.030). A deactivation request may contain information of which Basic Service Group(s) it shall apply to. If no such information is included the Deactivation request applies to all Basic Service Groups.

  When receiving a deactivation request the network shall deactivate CFU for the Basic Service Group(s) comprised in the BS group information given by the user against which a CFU forwarded-to-number is registered. However, the registered information shall not be erased. The Deactivation(s) shall be in accordance with the rules set out in TS 22.004.

Even if there is no data stored against a particular Basic Service group comprised in a deactivation request, the request shall be accepted by the network for the other Basic Service group(s) included in the information given by the user.

- The service is deactivated as a result of Erasure.

In the former case, and also in the latter if Erasure is user controlled, the user shall receive a notification of whether her request was accepted or rejected in accordance with the rules set out in TS 22.004.

1.3.7 Invocation

If the supplementary service is activated for a Basic service incoming calls for the specified Basic service will be forwarded by network invocation.

1.3.8 Normal operation with successful outcome

When call forwarding unconditional is active and operative, incoming calls for the specified Basic Service(s) will be forwarded without being offered to the served mobile subscriber.

The forwarded-to subscriber will receive an indication that the call has been forwarded with the cause. The cause, when available, will be the appropriate forwarding condition. Depending on the value of the served subscribers subscription option, the forwarded-to subscriber may also receive the MSISDN of the served subscriber.

When multiple forwarding occurs the reason for forwarding and the MSISDN given to the forwarded-to subscriber should relate to the last forwarding subscriber in the chain.

When call forwarding unconditional is active and operative, the ability of the served mobile subscriber to originate calls is not affected. However, an indication that the call forwarding service is currently active and operative on a number will be given to the forwarding party each time an outgoing call is made.

As a subscription option, the served mobile subscriber can request that the calling subscriber receives a notification that the call has been forwarded.

NOTE: In case the notification is implemented using intermediate tones or announcements, the tones and/or announcements to the calling party should not be provided if the information transfer capability is set to UDI.

1.3.11 Interrogation

Data request

The data request procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. After having requested this procedure the network shall return the following information:

- in response to a general data request the served mobile subscriber should be given a list of all Basic service groups to which call forwarding unconditional is registered, including information whether or not it is active and operative, and the associated forwarded-to numbers;

- in response to a specific request concerning one particular Basic service group, the served mobile subscriber should be informed whether or not call forwarding unconditional is registered, including information whether or not it is active and operative for that Basic service group. If CFU is registered, the associated forwarded-to number shall be given.

1.3.12 Charging requirements

The forwarding subscriber may be charged for the forwarded part of the call.

1.4 Exceptional procedures or unsuccessful outcome

1.4.2 Registration

If the system cannot accept a registration request, the served mobile subscriber should receive a notification that call forwarding unconditional registration was not successful. Possible causes are:

- service not subscribed to;
- forwarded-to number is invalid directory number;
- use of an operator access prefix;
- insufficient information;
- forwarded-to number is a special service code (e.g. police);
- forwarded-to number is the directory number of the mobile subscriber herself;
- conflicting situation with other supplementary services (e.g. incoming call barring has been activated);
- no basic service provisioned within the basic service group(s).

The network is not required to validate information related to the forwarded-to number.

1.4.3 Erasure

If the network cannot accept a mobile subscriber's request for erasure, cause will be returned to the subscriber, such as:

- insufficient information;
- inconsistent with registration.

If the subscriber does not completely specify which call forwarding unconditional request is to be erased, the network will reject the erasure request with appropriate cause.

If no Basic Service Code is inserted by the user, CF will be erased from all Basic Services.

1.4.4 Activation

If there is no CFU forwarded-to-number registered against a Basic Service group, the activation request for that Basic Service group shall be denied.

Examples of causes for a not accepted activation request:

- service not provisioned;
- conflicting situation with other supplementary services;
- service not registered.

1.4.5 Deactivation

If the network cannot accept a deactivation request, an appropriate cause will be returned to the user, e.g. Service not Active.

1.4.6 Invocation

Within a PLMN or different PLMNs the number of tandem forwarding connections should be limited. The maximum number of tandem forwarding connections should be limited to a value between 1 and 5. This is to prevent infinite looping.

If the limit of successive forwardings of a call has already been reached, an unsuccessful call set up indication is sent backwards.

If the forwarded call cannot be completed to the forwarded-to destination, then the network will clear the forwarded part of the call and an unsuccessful call set up indication is sent backwards.

NOTE: Call forwarding unconditional applies only to the Basic services subscribed to. Calls to a directory number requesting a Basic service which is not subscribed to will never be forwarded.

1.5 Alternate procedures

None identified.

1.6 Interactions with other supplementary services

1.6.81.1 Calling line identification presentation

See ~~GSM 0~~TS 22.081.

1.6.81.2 Calling line identification restriction

See TS 22.0~~GSM 02.~~81.

1.6.81.3 Connected line identification presentation

See TS 22.0~~GSM 0~~2.81.

1.6.81.4 Connected line identification restriction

See TS 22.0~~GSM 0~~2.81.

1.6.82.2 Call forwarding on mobile subscriber busy

If Call forwarding unconditional is active, activation of Call forwarding on mobile subscriber busy is rejected. The served mobile subscriber shall be informed of this supplementary service incompatibility.

If Call forwarding on mobile subscriber busy is active, activation of Call forwarding unconditional will be accepted. Call forwarding on mobile subscriber busy will be quiescent during the active period of Call forwarding unconditional. If Call forwarding unconditional is subsequently deactivated, Call forwarding on mobile subscriber busy becomes operative again (unless the interaction with another supplementary service requests that it remains quiescent).

If Call forwarding unconditional is active for one particular basic service, activation of Call forwarding on mobile subscriber busy for all basic services is rejected. The served mobile subscriber shall be informed of this supplementary service incompatibility.

If Call forwarding on mobile subscriber busy is active for one particular basic service, activation of Call forwarding unconditional for all basic services will be accepted. Call forwarding on mobile subscriber busy will be quiescent during the active period of Call forwarding unconditional. If Call forwarding unconditional is subsequently deactivated, Call forwarding on mobile subscriber busy becomes operative again (unless the interaction with another supplementary service requests that it remains quiescent).

1.6.82.3 Call forwarding on no reply

Same as interaction between Call forwarding unconditional and Call forwarding on mobile subscriber busy.

1.6.82.4 Call forwarding on mobile subscriber not reachable

Same as interaction between Call forwarding unconditional and Call forwarding on mobile subscriber busy.

1.6.83.1 Call waiting

See TS 22.083.

1.6.84.1 Multi party

See TS 22.084.

1.6.85.1 Closed user group

See GSM 22.085.

1.6.86.1 Advice of charge

See GSM 22.086.

1.6.88.1 Barring of all outgoing calls

Served mobile subscriber:

- If barring of all outgoing calls is active, the registration and/or activation of call forwarding unconditional is denied. The mobile subscriber requesting for this call forwarding service shall be informed of this supplementary service incompatibility.
- If Call forwarding unconditional is active, activation of Barring of all outgoing calls is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

1.6.88.2 Barring of outgoing international calls

Served mobile subscriber:

- If barring of outgoing international calls is active, the registration of an international forwarded-to number (from the home PLMN country) for call forwarding unconditional, as well as the activation of call forwarding unconditional to such a forwarded-to number, is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.
- If Call forwarding unconditional is active to an international forwarded-to number (from the HPLMN country), activation of Barring of outgoing international calls is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

1.6.88.4 Barring of outgoing international calls except those directed to the home PLMN country

Same as interaction between Call forwarding unconditional and Barring of outgoing international calls.

1.6.88.6 Barring of all incoming calls

Calling subscriber: No interaction

Served mobile subscriber:

- If barring of all incoming calls is active, the registration and/or activation of call forwarding unconditional is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.
- If Call forwarding unconditional is active, activation of Barring of all incoming calls is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

Forwarded-to subscriber: Calls forwarded to a subscriber having Barring of all incoming calls active, will be denied as any other incoming call to that subscriber.

1.6.88.7 Barring of incoming calls when roaming outside the home PLMN country

Served mobile subscriber:

- If Barring of Incoming Calls when Roaming Outside the HPLMN Country is active, registration and/or activation of Call Forwarding Unconditional is permitted and Barring of Incoming Calls when Roaming Outside the HPLMN Country becomes quiescent.
- If Call Forwarding Unconditional is active, activation of Barring of Incoming Calls when Roaming Outside the HPLMN Country is not permitted. The mobile subscriber shall be informed of this supplementary service incompatibility.

Forwarded to subscriber: Calls forwarded to a subscriber having Barring of incoming calls when roaming outside the HPLMN country active and operative, will be denied as any other incoming call to that subscriber.

1.7 Interworking considerations

If the forwarded-to number is not a PLMN- or ISDN-number, then an interworking situation is said to exist.

If a forwarded call meets an interworking situation, then an interworking indication should be sent to the calling party. When interworking with non-PLMN or non-ISDN networks, tones and announcements will be required.

NOTE1: The number of times a call has been forwarded once it has exited the PLMN or ISDN may not be limited.

NOTE2: Tones and/or announcements should not be provided to the calling party if the information transfer capability is set to UDI.

2 Call Forwarding on Mobile Subscriber Busy

2.1 Definition

This service permits a called mobile subscriber to have the network send all incoming calls, or just those associated with a specific Basic service group, addressed to the called mobile subscriber's directory number and which meet mobile subscriber busy to another directory number. The ability of the served mobile subscriber to originate calls is unaffected. If this service is activated, a call is forwarded only if the call meets mobile subscriber busy.

2.2 Description

2.2.1 Description

The served mobile subscriber can request a different forwarded-to number for each Basic service group containing a basic service to which she has subscribed.

2.2.2 Applicability to telecommunication services

The applicability of this supplementary service is defined in TS 22.004.

2.2.3 Terminology

A served mobile subscriber is a mobile subscriber of a particular PLMN access who is requesting that calls to her number be forwarded. This subscriber may also be referred to as the forwarding subscriber or the called subscriber.

A forwarded-to subscriber is a subscriber to whom the call shall be forwarded.

2.3 Normal procedures with successful outcome

2.3.1 Provision

The supplementary service will be provisioned for all Basic Services subscribed to and to which it is applicable.

The service can be offered with several subscription options. Options apply to all Basic services subscribed to. For each subscription option, only one value can be selected.

Subscription options are summarized below:

Subscription options	Value
Forwarding subscriber receives notification that the call has been forwarded	- No - Yes
Calling subscriber receives notification that the call has been forwarded	- No - Yes
MSISDN of the served subscriber can be presented to the forwarded-to subscriber	- No - Yes

In case of User Determined User Busy (UDUB) a notification towards the forwarding subscriber will not be given.

2.3.2 Withdrawal

The service will be withdrawn at the subscriber's request or for administrative reasons.

2.3.3 Registration

The following information has to be registered in the network:

1) the forwarded-to number, which may be accompanied by a forwarded-to sub-address;

2) information as to whether all calls or all calls of one (or several) specific Basic service group(s) should be forwarded.

If no Basic Service Code is inserted by the user this is interpreted as All Basic Services.

Registration can take place either by the service provider or with an appropriate control procedure by the subscriber. Verification, where possible, of the forwarded-to number should be accomplished before accepting the call forwarding request. This verification is done by a simple check of the forwarded-to number to see if the number is within the allowed number range.

When the mobile subscriber so registers call forwarding on mobile subscriber busy, the network will return notification of acceptance or rejection of the request. This notification will include the forwarded-to number to which call forwarding on mobile subscriber busy is registered.

2.3.4 Erasure

A previous registration can be erased in either of three ways:

Firstly, the subscriber can specifically erase a previous registration with an appropriate control procedure.

Secondly, the subscriber can register information for call forwarding on mobile subscriber busy for the specific Basic service group to another directory number, thus causing the previous registration of call forwarding on mobile subscriber busy to be overridden.

Thirdly, all information is erased as a result of withdrawal of the service.

2.3.5 Activation

The user shall be allowed to activate Call Forwarding on Busy (CFB) by e.g. using the MMI command described in TS 22.030. This activation request may include information of which Basic Service Group(s) it shall apply to. If no such information is included, the Activation request applies to all Basic Service Groups.

When receiving an activation request the network shall activate CFB for the Basic Service Groups comprised in the BS group information given by the user against which a CFB forwarded-to-number is registered. The Activation(s) shall be in accordance with the rules set out in TS 22.004.

The user shall receive a notification that CFB has been activated.

The supplementary service is also activated for a Basic service group as a result of registration for that Basic service group.

2.3.6 Deactivation

An active CFB can be deactivated in either of two ways:

- The user may deactivate CFB by means of an appropriate control procedure (e.g. as described in TS 22.030). A deactivation request may contain information of which Basic Service Group(s) it shall apply to. If no such information is included, the Deactivation request applies to all Basic Service Groups.

  When receiving a deactivation request the network shall deactivate CFB for the Basic Service Groups comprised in the BS group information given by the user against which a CFB forwarded-to-number is registered. However, the registered information shall not be erased. The Deactivation(s) shall be in accordance with the rules set out in TS 22.004.

  Even if there is no data stored against a particular Basic Service group comprised in a deactivation request, the request shall be accepted by the network for the other Basic Service group(s) included in the information given by the user.

- The service is deactivated as a result of Erasure.

In the former case, and also in the latter if Erasure is user controlled, the user shall receive a notification of whether her request was accepted or rejected in accordance with the rules set out in TS 22.004.

2.3.7 Invocation

If the supplementary service is activated for a Basic service incoming calls for the specified Basic service that meet mobile subscriber busy will be forwarded by network invocation.

2.3.8 Normal operation with successful outcome

When call forwarding on mobile subscriber busy is active and operative, incoming calls for the specified Basic Service(s) that meet mobile subscriber busy with the condition UDUB (User Determined User Busy) will be forwarded.

Incoming calls for the specified basic service(s) that meet mobile subscriber busy with the condition NDUB (Network Determined User Busy) will be forwarded without being offered to the served mobile subscriber.

When an incoming call is forwarded on mobile subscriber busy with the condition NDUB the served mobile subscriber can, as a subscription option, receive notification.

The forwarded-to subscriber will receive an indication that the call has been forwarded with the cause. The cause, when available, will be the appropriate forwarding condition. Depending on the value of the served subscribers subscription option, the forwarded-to subscriber may also receive the MSISDN of the served subscriber.

When multiple forwarding occurs the reason for forwarding and the MSISDN given to the forwarded-to subscriber should relate to the last forwarding subscriber in the chain.

When call forwarding on mobile subscriber busy is active and operative, the ability of the served mobile subscriber to originate calls is not affected. However, an indication that the call forwarding service is currently active and operative on a number will be given to the forwarding party each time an outgoing call is made.

As a subscription option, the served mobile subscriber can request that the calling subscriber receives a notification that the call has been forwarded.

NOTE: In case the notification is implemented using intermediate tones or announcements, the tones and/or announcements to the calling party should not be provided if the information transfer capability is set to UDI.

2.3.11 Interrogation

Data request

The data request procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. After having requested this procedure the network shall return the following information:

- in response to a general data request the served mobile subscriber should be given a list of all Basic service groups to which call forwarding on mobile subscriber busy is registered, including information whether it is active and if so, whether it is operative or quiescent, and the associated forwarded-to numbers;

- in response to a specific request concerning one particular Basic service group, the served mobile subscriber should be informed whether or not call forwarding on mobile subscriber busy is registered, including information whether it is active and if so, whether it is operative or quiescent for that Basic service group. If CFB is registered, the associated forwarded-to number shall be given.

2.3.12 Charging requirements

The forwarding subscriber may be charged for the forwarded part of the call.

2.4 Exceptional procedures or unsuccessful outcome

2.4.2 Registration

If the system cannot accept a registration request, the served mobile subscriber should receive a notification that call forwarding on mobile subscriber busy registration was not successful. Possible causes are:

- service not subscribed to;

- forwarded-to number is invalid directory number;

- use of an operator access prefix;

- insufficient information;

- forwarded-to number is a special service code (e.g. police);

- forwarded-to number is the directory number of the mobile subscriber herself;

- conflicting situation with other supplementary services (e.g. incoming call barring has been activated);
- no basic service provisioned within the basic service groups.

The network is not required to validate information related to the forwarded-to number.

2.4.3 Erasure

If the network cannot accept a mobile subscriber's request for erasure, cause will be returned to the subscriber, such as:

- insufficient information;
- inconsistent with registration.

If the subscriber does not completely specify which call forwarding on mobile subscriber busy request is to be erased, the network will reject the erasure request with appropriate cause.

If no Basic Service Code is inserted by the user, CF will be erased from all Basic Services.

2.4.4 Activation

If there is no CFB forwarded-to-number registered against a Basic Service group, the activation request for that Basic Service group shall be denied.

Examples of causes for a not accepted activation request:

- service not provisioned;
- conflicting situation with other supplementary services;
- service not registered.

2.4.5 Deactivation

If the network cannot accept a deactivation request, an appropriate cause will be returned to the user, e.g. Service not Active.

2.4.6 Invocation

Within a PLMN or different PLMNs the number of tandem forwarding connections should be limited. The maximum number of tandem forwarding connections should be limited to a value between 1 and 5. This is to prevent infinite looping.

If the limit of successive forwardings of a call has already been reached, an unsuccessful call set up indication is sent backwards.

If the forwarded call cannot be completed to the forwarded-to destination, then the network will clear the forwarded part of the call and an unsuccessful call set up indication is sent backwards.

NOTE: Call forwarding on mobile subscriber busy applies only to the Basic services subscribed to. Calls to a directory number requesting a Basic service which is not subscribed to will never be forwarded.

2.5 Alternate Procedures

None identified.

2.6 Interactions with other supplementary services

2.6.81.1 Calling line identification presentation

See TS 22.081.

2.6.81.2 Calling line identification restriction

See TS 22.081.

2.6.81.3 Connected line identification presentation

See TS 22.081.

2.6.81.4 Connected line identification restriction

See TS 22.081.

2.6.82.1 Call forwarding unconditional

See section 1.6.82.2.

2.6.83.1 Call waiting

See TS 22.083.

2.6.84.1 Multi party

See TS 22.084.

2.6.85.1 Closed user group

See TS 22.085.

2.6.86.1 Advice of charge

See TS 22.086.

2.6.88.1 Barring of all outgoing calls

Same as the interaction between call forwarding unconditional and barring of all outgoing calls.

2.6.88.2 Barring of outgoing international calls

Served mobile subscriber:

- If barring of outgoing international calls is active, the registration of an international forwarded-to number (from the visited PLMN country) for call forwarding on mobile subscriber busy, as well as the activation of call forwarding on mobile subscriber busy to such a forwarded-to number, is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.
- If Call forwarding on mobile subscriber busy is active to an international forwarded-to number (from the local PLMN country), activation of Barring of outgoing international calls is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.
- If Barring of outgoing international calls and Call forwarding on mobile subscriber busy are simultaneously active (i.e. the forwarded-to number is a local number seen from the local PLMN country), Call forwarding on mobile subscriber busy will be made quiescent by the network as soon as the mobile subscriber updates in another PLMN country.

- If barring of outgoing international calls is subsequently deactivated, or if the mobile subscriber updates in a PLMN where the forwarded-to number is not considered as an international number, call forwarding on mobile subscriber busy is automatically made operative (unless the interaction with another supplementary service requests that it remains quiescent).

2.6.88.4 Barring of outgoing international calls except those directed to the home PLMN country

Served mobile subscriber:

- If Barring of outgoing international calls except those directed to the home PLMN country is active, the registration of an international forwarded-to number (from the local PLMN country) except to the HPLMN country, as well as the activation of call forwarding on mobile subscriber busy to such a forwarded-to number, is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

- If Call forwarding on mobile subscriber busy is active to an international forwarded-to number (from the local PLMN country) except to the HPLMN country, activation of Barring of outgoing international calls except those directed to the home PLMN country is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

- If Barring of outgoing international calls except those directed to the home PLMN country and Call forwarding on mobile subscriber busy are simultaneously active (i.e. the forwarded-to number is a local number seen from the local PLMN country or a number in the HPLMN country), Call forwarding on mobile subscriber busy will be made quiescent as soon as the mobile subscriber is updated in another PLMN country if the forwarded-to number is not a number in the HPLMN country.

- If Barring of outgoing international calls except those directed to the home PLMN country is subsequently deactivated, or if the mobile subscriber updates in a PLMN where the forwarded-to number is not barred, Call forwarding on mobile subscriber busy is automatically made operative (unless the interaction with another supplementary service requests that it remains quiescent).

2.6.88.6 Barring of all incoming calls

Same as the interaction between call forwarding unconditional and barring of all incoming calls.

2.6.88.7 Barring of incoming calls when roaming outside the home PLMN country

Served mobile subscriber:

- If Barring of incoming calls when roaming outside the home PLMN country is active and operative (i.e. the mobile subscriber is roaming outside the home PLMN country) then the registration and/or activation of Call forwarding on mobile subscriber busy is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

- If Barring of incoming calls when roaming outside the home PLMN country is active and quiescent (i.e. the mobile subscriber is in the home PLMN country), then the registration and/or activation of Call forwarding on mobile subscriber busy is not denied.

- If Barring of incoming calls when roaming outside the home PLMN country becomes operative after Call forwarding on mobile subscriber busy has been registered and/or activated, Call forwarding on mobile subscriber busy is made quiescent.

- If Barring of incoming calls when roaming outside the home PLMN country subsequently becomes quiescent, Call forwarding on mobile subscriber busy is automatically made operative (unless the interaction with another supplementary service requests that it remains quiescent).

- If Call forwarding on mobile subscriber busy is active and operative and the mobile subscriber is roaming outside the home PLMN country, activation of Barring of incoming calls when roaming outside the HPLMN country is denied. The mobile subscriber shall be informed of this supplementary service incompatibility.

- If call forwarding on mobile subscriber busy is active and quiescent and the mobile subscriber is roaming in the home PLMN country, activation of Barring of incoming calls when roaming outside the HPLMN country is not denied.

Forwarded to subscriber: Calls forwarded to a subscriber having Barring of incoming calls when roaming outside the HPLMN country active and operative, will be denied as any other incoming call to that subscriber.

2.7 Interworking considerations

If the forwarded-to number is not a PLMN- or ISDN-number, then an interworking situation is said to exist.

If a forwarded call meets an interworking situation, then an interworking indication should be sent to the calling party. When interworking with non-PLMN or non-ISDN networks, tones and announcements will be required.

NOTE1: The number of times a call has been forwarded once it has exited the PLMN or ISDN may not be limited.

NOTE2: Tones and/or announcements should not be provided to the calling party if the information transfer capability is set to UDI.

3 Call Forwarding on No Reply

3.1 Definition

This service permits a called mobile subscriber to have the network send all incoming calls, or just those associated with a specific Basic service group, addressed to the called mobile subscriber's directory number and which meet no reply to another directory number. The ability of the served mobile subscriber to originate calls is unaffected. If this service is activated, a call is forwarded only if the call meets no reply.

3.2 Description

3.2.1 Description

The served mobile subscriber can request a different forwarded-to number for each Basic service group containing a basic service to which she has subscribed.

3.2.2 Applicability to telecommunication services

The applicability of this supplementary service is defined in TS 22.004.

3.2.3 Terminology

A served mobile subscriber is a mobile subscriber of a particular PLMN access who is requesting that calls to her number be forwarded. This subscriber may also be referred to as the forwarding subscriber or the called subscriber.

A forwarded-to subscriber is a subscriber to whom the call shall be forwarded.

3.3 Normal procedures with successful outcome

3.3.1 Provision

The supplementary service will be provisioned for all Basic Services subscribed to and to which it is applicable.

The service can be offered with several subscription options. Options apply to all Basic services subscribed to. For each subscription option, only one value can be selected.

Subscription options are summarized below:

Subscription options	Value

Forwarding subscriber receives	- No
notification that the call has been forwarded	- Yes
Calling subscriber receives	- No
notification that the call has been forwarded	- Yes
MSISDN of the served subscriber can be	- No
presented to the forwarded-to subscriber	- Yes

3.3.2 Withdrawal

The service will be withdrawn at the subscriber's request or for administrative reasons.

3.3.3 Registration

The following information has to be registered in the network:

1) the forwarded-to number, which may be accompanied by a forwarded-to sub-address;

2) information as to whether all calls or all calls of one (or several) specific Basic service group(s) should be forwarded;

   If no Basic Service Code is inserted by the user this is interpreted as All Basic Services.

3) the duration of the no reply condition timer.

Registration can take place either by the service provider or with an appropriate control procedure by the subscriber. If the duration of the no reply condition timer is not registered by the mobile subscriber then the previous value set by the mobile subscriber applies. If no previous value exists, a default value set by the service provider applies. The value is in between 5 and 30 seconds, in steps of 5 seconds.

Verification, where possible, of the forwarded-to number should be accomplished before accepting the call forwarding request. This verification is done by a simple check of the forwarded-to number to see if the number is within the allowed number range.

When the mobile subscriber so registers call forwarding on no reply, the network will return notification of acceptance or rejection of the request. This notification will include the forwarded-to number to which call forwarding on no reply is registered and the duration of the no reply condition timer.

3.3.4 Erasure

A previous registration can be erased in either of three ways:

Firstly, the subscriber can specifically erase a previous registration with an appropriate control procedure.

Secondly, the subscriber can register information for call forwarding on no reply for the specific Basic service group to another directory number, thus causing the previous registration of call forwarding on no reply to be overridden.

Thirdly, all information is erased as a result of withdrawal of the service.

3.3.5 Activation

The user shall be allowed to activate Call Forwarding on No Reply (CFNRy) by e.g. using the MMI command described in TS 22.030. This activation request may include information of which Basic Service Group(s) it shall apply to. If no such information is included, the Activation request applies to all Basic Service Groups.

When receiving an activation request the network shall activate CFNRy for the Basic Service Groups comprised in the BS group information given by the user against which a CFNRy forwarded-to-number is registered. The Activation(s) shall be in accordance with the rules set out in TS 22.004.

The user shall receive a notification that CFNRy has been activated.

The supplementary service is also activated for a Basic service group as a result of Registration for that Basic service group.

3.3.6 Deactivation

An active CFNRy can be deactivated in either of two ways:

- The user may deactivate CFNRy by means of an appropriate control procedure (e.g. as described in TS 22.030). A deactivation request may contain information of which Basic Service Group(s) it shall apply to. If no such information is included the Deactivation request applies to all Basic Service Groups.

  When receiving a deactivation request the network shall deactivate CFNRy for the Basic Service Groups comprised in the BS group information given by the user against which a CFNRy forwarded-to-number is registered. However, the registered information shall not be erased. The Deactivation(s) shall be in accordance with the rules set out in TS 22.004.

  Even if there is no data stored against a particular Basic Service group comprised in a deactivation request, the request shall be accepted by the network for the other Basic Service groups included in the information given by the user.

- The service is deactivated as a result of Erasure.

  In the former case, and also in the latter if Erasure is user controlled, the user shall receive a notification of whether her request was accepted or rejected in accordance with the rules set out in TS 22.004.

3.3.7 Invocation

If the supplementary service is activated for a Basic service incoming calls for the specified Basic service that are not answered within the period defined by the no reply condition timer, will be forwarded by network invocation.

3.3.8 Normal operation with successful outcome

When call forwarding on no reply is active and operative, incoming calls for the specified Basic Service(s) that are not answered within the period defined by the no reply condition timer, will be forwarded without being offered to the served mobile subscriber.

When an incoming call is forwarded on no reply the served mobile subscriber can, as a subscription option, receive notification (but will not be able to answer the incoming call).

The forwarded-to subscriber will receive an indication that the call has been forwarded with the cause. The cause, when available, will be the appropriate forwarding condition. Depending on the value of the served subscribers subscription option, the forwarded-to subscriber may also receive the MSISDN of the served subscriber.

When multiple forwarding occurs the reason for forwarding and the MSISDN given to the forwarded-to subscriber should relate to the last forwarding subscriber in the chain.

When call forwarding on no reply is active and operative, the ability of the served mobile subscriber to originate calls is not affected. However, an indication that the call forwarding service is currently active and operative on a number will be given to the forwarding party each time an outgoing call is made.

As a subscription option, the served mobile subscriber can request that the calling subscriber receives a notification that the call has been forwarded.

NOTE: In case the notification is implemented using intermediate tones or announcements, the tones and/or announcements to the calling party should not be provided if the information transfer capability is set to UDI.

3.3.11 Interrogation

Data request

The data request procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. After having requested this procedure the network shall return the following information:

- in response to a general data request the served mobile subscriber should be given a list of all Basic service groups to which call forwarding on no reply is registered, including information whether it is active and if so, whether it is operative or quiescent, the associated forwarded-to numbers and the duration of the no reply timer;

- in response to a specific request concerning one particular Basic service group, the served mobile subscriber should be informed whether or not call forwarding on no reply is registered, including information whether it is active and if so, whether it is operative or quiescent for that Basic service group. If CFNRy is registered, the associated forwarded-to number and the duration of the no reply timer shall be given.

3.3.12 Charging requirements

The forwarding subscriber may be charged for the forwarded part of the call.

3.4 Exceptional procedures or unsuccessful outcome

3.4.2 Registration

If the system cannot accept a registration request, the served mobile subscriber should receive a notification that call forwarding on no reply registration was not successful. Possible causes are:

- service not subscribed to;

- forwarded-to number is invalid directory number;

- use of an operator access prefix;

- insufficient information;

- forwarded-to number is a special service code (e.g. police);

- forwarded-to number is the directory number of the mobile subscriber herself;

- conflicting situation with other supplementary services (e.g. incoming call barring has been activated);

- no basic service provisioned within the basic service group(s).

The network is not required to validate information related to the forwarded-to number.

3.4.3 Erasure

If the network cannot accept a mobile subscriber's request for erasure, cause will be returned to the subscriber, such as:

- insufficient information;

- inconsistent with registration.

If the subscriber does not completely specify which call forwarding on no reply request is to be erased, the network will reject the erasure request with appropriate cause.

If no Basic Service Code is inserted by the user, CF will be erased from all Basic Services.

3.4.4 Activation

If there is no CFNRy forwarded-to-number registered against a Basic Service group, the activation request for that Basic Service group shall be denied. However, if there is CFNRy forwarded-to-numbers stored against other Basic Service groups contained in the same activation request, these will be activated.

Examples of causes for a not accepted activation request:

- service not provisioned;
- conflicting situation with other supplementary services;
- service not registered.

3.4.5 Deactivation

If the network cannot accept a deactivation request, an appropriate cause will be returned to the user, e.g. Service not Active.

3.4.6 Invocation

Within a PLMN or different PLMNs the number of tandem forwarding connections should be limited. The maximum number of tandem forwarding connections should be limited to a value between 1 and 5. This is to prevent infinite looping.

If the limit of successive forwardings of a call is reached and an attempt is made to forward the call an additional time, then the forwarded call shall be treated as in the following paragraph.

If the forwarded call cannot be completed to the forwarded-to destination, then the network will clear the call towards the calling user with an indication that the call cannot be completed. This indication shall not include information that the call has been forwarded.

NOTE 1: The alerting of the forwarding user shall have ceased on invocation of the CFNRy Service.

NOTE 2: The alerting of the calling subscriber should, if possible, not cease on invocation of CFNRy.

NOTE 3: Call forwarding on no reply applies only to the Basic services subscribed to. Calls to a directory number requesting a Basic service which is not subscribed to will never be forwarded.

3.5 Alternate procedures

None identified.

3.6 Interactions with other supplementary services

3.6.81.1 Calling line identification presentation

See TS 22.081.

3.6.81.2 Calling line identification restriction

See TS 22.081.

3.6.81.3 Connected line identification presentation

See TS 22.081.

3.6.81.4 Connected line identification restriction

See TS 22.081.

3.6.82.1 Call forwarding unconditional

See section 1.6.82.3.

3.6.83.1 Call waiting

See TS 22.083.

3.6.84.1 Multi party

See TS 22.084.

3.6.85.1 Closed user group

See TS 22.085.

3.6.86.1 Advice of charge

See TS 22.086.

3.6.88.1 Barring of all outgoing calls

Same as the interaction between call forwarding unconditional and barring of all outgoing calls.

3.6.88.2 Barring of outgoing international calls

Same as the interaction between call forwarding on mobile subscriber busy and barring of outgoing international calls.

3.6.88.4 Barring of outgoing international calls except those directed to the home PLMN country

Same as the interaction between call forwarding on mobile subscriber busy and barring of outgoing international calls except those directed to the home PLMN country.

3.6.88.6 Barring of all incoming calls

Same as the interaction between call forwarding unconditional and barring of all incoming calls.

3.6.88.7 Barring of incoming calls when roaming outside the home PLMN country

Same as the interaction between call forwarding on mobile subscriber busy and barring of incoming calls when roaming outside the home PLMN country.

3.7 Interworking considerations

If the forwarded-to number is not a PLMN- or ISDN-number, then an interworking situation is said to exist.

If a forwarded call meets an interworking situation, then an interworking indication should be sent to the calling party. When interworking with non-PLMN or non-ISDN networks, tones and announcements will be required.

NOTE1: The number of times a call has been forwarded once it has exited the PLMN or ISDN may not be limited.

NOTE2: Tones and/or announcements should not be provided to the calling party if the information transfer capability is set to UDI.

4 Call Forwarding on Mobile Subscriber Not Reachable

4.1 Definition

This service permits a called mobile subscriber to have the network send all incoming calls, or just those associated with a specific Basic service group, addressed to the called mobile subscriber's directory number, but which is not reachable, to another directory number. The ability of the served mobile subscriber to originate calls is principally unaffected, but practically it is affected if the mobile subscriber is de-registered, if there is radio congestion or if the mobile subscriber for example is being out of radio coverage. If this service is activated, a call is forwarded only if the mobile subscriber is not reachable.

4.2 Description

4.2.1 Description

The served mobile subscriber can request a different forwarded-to number for each Basic service group containing a basic service to which he has subscribed.

4.2.2 Applicability to telecommunication services

The applicability of this supplementary service is defined in TS 22.004.

4.2.3 Terminology

A served mobile subscriber is a mobile subscriber of a particular PLMN access who is requesting that calls to his number be forwarded. This subscriber may also be referred to as the forwarding subscriber or the called subscriber. A forwarded-to subscriber is a subscriber to whom the call shall be forwarded.

4.3 Normal procedures with successful outcome

4.3.1 Provision

The supplementary service will be provisioned for all Basic Services subscribed to and to which it is applicable.

The service can be offered with several subscription options. Options apply to all Basic service subscribed to. For each subscription option only one value can be selected.

Subscription options	Value
Calling subscriber receives notification that the call has been forwarded	- No - Yes
MSISDN of the served subscriber can be presented to the forwarded-to subscriber	- No - Yes

4.3.2 Withdrawal

The service will be withdrawn at the subscriber's request or for administrative reasons.

4.3.3 Registration

The following information has to be registered in the network:

1) the forwarded-to number, which may be accompanied by a forwarded-to sub-address;

2) information as to whether all calls or all calls of one (or several) specific Basic service group(s) should be forwarded.

   If no Basic Service Code is inserted by the user this is interpreted as All Basic Services.

Registration can take place either by the service provider or with an appropriate control procedure by the subscriber.

Verification, where possible, of the forwarded-to number should be accomplished before accepting the call forwarding request. This verification is done by a simple check of the forwarded to number to see if the number is within the allowed number range.

When the mobile subscriber so registers call forwarding on mobile subscriber not reachable the network will return notification of acceptance or rejection of the request. This notification will include the forwarded-to number to which call forwarding on mobile subscriber not reachable is registered.

4.3.4 Erasure

A previous registration can be erased in either of three ways:

Firstly, the subscriber can specifically erase a previous registration with an appropriate control procedure.

Secondly, the subscriber can register information for call forwarding on mobile subscriber not reachable for the specific Basic service group to another directory number, thus causing the previous registration of call forwarding on mobile subscriber not reachable to be overridden.

Thirdly, all information is erased as a result of withdrawal of the service.

4.3.5 Activation

The user shall be allowed to activate Call Forwarding on mobile not Reachable (CFNRc) by e.g. using the MMI command described in TS 22.030. This activation request may include information of which Basic Service Group(s) it shall apply to. If no such information is included the Activation applies to all Basic Service Groups against which CFNRc data (forwarded-to-number) is registered.

When receiving an activation request the network shall activate CFNRc for the Basic Service Groups comprised in the BS group information given by the user and against which a CFNRc forwarded-to-number is registered. The Activation(s) shall be in accordance with the rules set out in TS 22.004.

The user shall receive a notification that CFNRc has been activated.

The supplementary service is also activated for a Basic service group as a result of registration for that Basic service group.

4.3.6 Deactivation

An active CFNRc can be deactivated in either of two ways:

- The user may deactivate CFNRc by means of an appropriate control procedure (e.g. as described in TS 22.030). An explicit deactivation request may contain information of which Basic Service Group(s) it shall apply to. If no such information is included the Deactivation applies to all Basic Service Groups.

  When receiving a deactivation request the network shall deactivate CFNRc for the Basic Service Groups comprised in the BS group information given by the user and against which a CFNRc forwarded-to-number is registered. However, the registered information shall not be erased. The Deactivation(s) shall be in accordance with the rules set out in TS 22.004.

  Even if there is no data stored against a particular Basic Service group comprised in deactivation request, the request shall be accepted by the network for the other Basic Service groups included in the information given by the user.

- The service is deactivated as a result of Erasure.

In the former case, and also in the latter if Erasure is user controlled, the user shall receive a notification of whether her request was accepted or rejected in accordance with the rules set out in TS 22.004.

4.3.7 Invocation

If the supplementary service is activated for a Basic service incoming calls for the specified Basic service when the mobile subscriber is not reachable, will be forwarded by network invocation.

4.3.8 Normal operation with successful outcome

When call forwarding on mobile subscriber not reachable is active and operative, all incoming calls for the specified Basic Service(s) when the mobile subscriber is not reachable, will be forwarded without being offered to the served mobile subscriber.

The forwarded-to subscriber will receive an indication that the call has been forwarded with the cause. The cause, when available, will be the appropriate forwarding condition. Depending on the value of the served subscribers subscription option, the forwarded-to subscriber may also receive the MSISDN of the served subscriber.

When multiple forwarding occurs the reason for forwarding and the MSISDN given to the forwarded-to subscriber should relate to the last forwarding subscriber in the chain.

When call forwarding on mobile subscriber not reachable is active and operative, the ability of the served mobile subscriber to originate calls is principally not affected, but practically it is affected if the mobile subscriber is de-registered, on radio congestion or on no paging response. However, an indication that the call forwarding service is currently active and operative on a number will be given to the forwarding party each time an outgoing call is made.

As a subscription option, the served mobile subscriber can request that the calling subscriber receives a notification that the call has been forwarded.

NOTE: In case the notification is implemented using intermediate tones or announcements, the tones and/or announcements to the calling party should not be provided if the information transfer capability is set to UDI.

4.3.11 Interrogation

Data request

The data request procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. After having requested this procedure the network shall return the following information:

- in response to a general data request the served mobile subscriber should be given a list of all Basic service groups to which call forwarding on mobile subscriber not reachable is registered, including information whether it is active and if so, whether it is operative or quiescent, and the associated forwarded-to numbers;

- in response to a specific request concerning one particular Basic service group, the served mobile subscriber should be informed whether or not call forwarding on mobile subscriber not reachable is registered, including information whether it is active and if so, whether it is operative or quiescent for that Basic service group. If CFNRc is registered, the associated forwarded-to number shall be given.

4.3.12 Charging requirements

The forwarding subscriber may be charged for the forwarded part of the call.

4.4 Exceptional procedures or unsuccessful outcome

4.4.2 Registration

If the system cannot accept a registration request, the served mobile subscriber should receive a notification that call forwarding on mobile subscriber not reachable registration was not successful. Possible causes are:

- service not subscribed to;
- forwarded-to number is invalid directory number;
- use of an operator access prefix;
- insufficient information;
- forwarded-to number is a special service code (e.g. police);
- forwarded-to number is the directory number of the mobile subscriber herself;
- conflicting situation with other supplementary services (e.g. incoming call barring has been activated);
- no basic service provisioned within the basic service group(s).

The network is not required to validate information related to the forwarded-to number.

4.4.3 Erasure

If the network cannot accept a mobile subscriber's request for erasure, cause will be returned to the subscriber, such as:

- insufficient information;
- inconsistent with registration.

If the subscriber does not completely specify which call forwarding on mobile subscriber not reachable request is to be erased, the network will reject the erasure request with appropriate cause.

If no Basic Service Code is inserted by the user, CF will be erased from all Basic Services.

4.4.4 Activation

If there is no CFNRc forwarded-to-number registered against a Basic Service group, the activation request for that Basic Service group shall be denied.

Examples of causes for a not accepted activation request:

- service not provisioned;
- conflicting situation with other supplementary services;
- service not registered.

4.4.5 Deactivation

If the network cannot accept a deactivation request, an appropriate cause will be returned to the user, e.g. Service not Active.

4.4.6 Invocation

Within a PLMN or different PLMNs the number of tandem forwarding connections should be limited. The maximum number of tandem forwarding connections should be limited to a value between 1 and 5. This is to prevent infinite looping.

If the limit of successive forwardings of a call has already been reached, an unsuccessful call set up indication is sent backwards.

If the forwarded call cannot be completed to the forwarded-to destination, then the network will clear the forwarded part of the call and an unsuccessful call set up indication is sent backwards.

NOTE: Call forwarding on mobile subscriber not reachable applies only to the Basic services subscribed to. Calls to a directory number requesting a Basic service which is not subscribed to will never be forwarded.

4.5 Alternate procedures

None identified.

4.6 Interactions with other supplementary services

4.6.81.1 Calling line identification presentation

See TS 02.081.

4.6.81.2 Calling line identification restriction

See TS 02.081.

4.6.81.3 Connected line identification presentation

See TS 02.081.

4.6.81.4 Connected line identification restriction

See TS 02.081.

4.6.82.1 Call forwarding unconditional

See section 1.6.82.4.

4.6.83.1 Call waiting

See TS 22.083.

4.6.84.1 Multi party

See ~~GSM~~ TS 22.084.

4.6.85.1 Closed user group

See ~~GSM~~ TS 22.085.

4.6.86.1 Advice of charge

See ~~GSM~~ TS 22.086.

4.6.88.1 Barring of all outgoing calls

Same as the interaction between call forwarding unconditional and barring of all outgoing calls.

4.6.88.2 Barring of outgoing international calls

Same as the interaction between call forwarding on mobile subscriber busy and barring of outgoing international calls.

4.6.88.4 Barring of outgoing international calls except those directed to the home PLMN country

Same as the interaction between call forwarding on mobile subscriber busy and barring of outgoing international calls except those directed to the home PLMN country.

4.6.88.6 Barring of all incoming calls

Same as the interaction between call forwarding unconditional and barring of all incoming calls.

4.6.88.7 Barring of incoming calls when roaming outside the home PLMN country

Same as the interaction between call forwarding on mobile subscriber busy and barring of incoming calls when roaming outside the home PLMN country.

4.7 Interworking considerations

If the forwarded-to number is not a PLMN- or ISDN-number, then an interworking situation is said to exist.

If a forwarded call meets an interworking situation, then an interworking indication should be sent to the calling party.

When interworking with non-PLMN or non-ISDN networks, tones and announcements will be required.

NOTE 1: The number of times a call has been forwarded once it has exited the PLMN or ISDN may not be limited.

NOTE 2: Tones and/or announcements should not be provided to the calling party if the information transfer capability is set to UDI.

Annex A (informative): Change history

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**WI**
Jun 1999			02.82					Transferred to 3GPP SA1	8.0.0		
SA#04			22.082							3.0.0	
SP-05	SP-99479	S1-99629	22.082	001		R99	D	Editorial changes for alignment	3.0.0	3.0.1	Editorial changes
SP-11	SP-010052	S1-010073	22.082	002		Rel-4	B	Notification of active CFU	3.0.1	4.0.0	CPHS
SP-12	SP-010259	S1-010438	22.082	003		Rel-4	C	Clarification of CPHS CFU Indication	4.0.0	4.1.0	UICC1-CPHS

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.081** **CR** **004** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **Line identification Supplementary Services; Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

3GPP TS 22.081 V4.~~0~~1.0 (200~~2~~1-03)

Technical Specification

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

3rd Generation Partners

Technical Specification Group Services and System Aspects; Line identification Supplementary Services; Stage 1 (Release 4)

Keywords

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Contents

Foreword

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

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

Version x.y.z

where:

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

0 Scope

The present document describes the Supplementary Services belonging to the group Line Identification Supplementary Services.

The general aspects, including definitions and recommended provision, of the description of the Supplementary Services are given in 3GPP TS 22.004.

The group of Line Identification Supplementary Services is divided into the following four Supplementary Services:

CLIP - Calling line identification presentation (clause 1);

CLIR - Calling line identification restriction (clause 2);

COLP - Connected line identification presentation (clause 3);

COLR - Connected line identification restriction (clause 4).

Definition of line identity: The line identity is made up of a number of information units:

- the subscriber's national ISDN/MSISDN number (MSISDN number is the number stored in the VLR);
- the country code;
- optionally, subaddress information. The PLMN cannot be responsible for the content of this subaddress. (For definition of the subaddress see ITU-T Recommendation E.164 [3] subclause 11.2).

  In a full ISDN environment, the line identity shall include all the address information necessary to unambiguously identify a subscriber.

  The calling line identity is the line identity of the calling party.

  The connected line identity is the line identity of the connected party.

If for the line identity of the calling party or the connected party additional line identification is received (additional calling party/connected party number) in a PLMN this additional line identification shall be used for the presentation purpose of the line identification presentation services.

Definition of Presentation and Screening Indicators: In addition to or instead of the line identity, the network may give a Presentation Indicator (PI) and/or a Screening Indicator (SI) to the served subscriber. The following information may be given:

- Presentation Indicator showing:

  a) presentation allowed, or

  b) presentation restricted, or

  c) number not available due to interworking;

If Presentation Indicator is set to "Presentation Restricted", then the MS can get additional information on the Cause of no CLI, if provided by the network.

The Cause of no CLI value may be one of the following :

- Unavailable
- reject by user
- interaction with other services
- coin line / pay phone
- Screening Indicator showing:

  a) user provided, verified and passed, or

b) user provided, not screened, or

c) network provided.

If the line identity is that of a PLMN subscriber, then:

the national number and the country code shall always be provided by the network;

the subaddress shall only be included if it is provided by the user (or user equipment);

the screening indicator shall indicate "network provided".

0.1 References

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

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

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

[1] TR 21.905: " Vocabulary for 3GPP Specifications ".

[2] ~~GSM~~ TS 22.004: General on Supplementary Services".

[3] ITU-T Recommendation E.164: "Numbering plan for the ISDN era".

0.2 Abbreviations

Abbreviations used in the present document are listed in TR 21.905 [1].

1 Calling Line Identification Presentation (CLIP)

1.1 Definition

The CLIP Supplementary Service provides the called party with the possibility to receive the line identity of the calling party.

1.2 Description

1.2.1 Description

This Supplementary Service provides for the ability to indicate the line identity of the calling party to the called party.

The network shall deliver the calling line identity to the called party at call set-up time, regardless of the terminal capability to handle the information.

1.2.2 Applicability to telecommunication services

The applicability of this Supplementary Service is defined in ~~GSM~~ TS 22.004 [2].

1.3 Normal procedures with successful outcome

1.3.1 Provision

This Supplementary Service is provisioned for all Basic Services subscribed to and to which it is applicable, i.e. not provisioned for any subset of these Basic Services.

Override category within a PLMN

Override category within an ISDN/PLMN. Depending on national regulations, some networks may define categories of subscribers that have the ability to override the presentation restriction (CLIR, clause 2) and have the calling line identity presented (e.g., the police). The ability to have such override category is a national option.

Override category between a PLMN and a network providing calling line identification restriction

Override category between ISDN/PLMNs. When a call originates in one ISDN/PLMN and terminates in another ISDN/PLMN and the CLIR Supplementary Service is applied, the rules and regulations of the destination network shall apply. For example, the override category may not be applicable in the originating network but may be applicable in the destination network. In this situation, a call with the CLIR Supplementary Service applied can still be overridden in the destination network.

The override category is only applicable within the HPLMN country.

1.3.2 Withdrawal

The CLIP Supplementary Service shall be withdrawn at the customer's request or for administrative reasons.

1.3.5 Activation

The CLIP Supplementary Service is activated as a result of provision.

1.3.6 Deactivation

The CLIP Supplementary Service is deactivated as a result of withdrawal.

1.3.7 Invocation

The network shall automatically invoke the CLIP Supplementary Service in the call set-up phase.

1.3.8 Normal operation with successful outcome

A user who has subscribed to the CLIP Supplementary Service and receives a call shall also receive the line identity of the calling party.

In addition to or instead of the calling line identity, the subscriber may be given a Presentation Indicator and/or a Screening Indicator with the relevant information. If provided by the network, the subscriber may also be given some additional information on the Cause of no CLI in case of a presentation restricted.

1.3.11 Interrogation

Status check

The mobile subscriber can request the status of the Supplementary Service and be informed if the service is provided to her.

1.4 Exceptional procedures or unsuccessful outcome

If the CLIR Supplementary Service is applicable to the call, then the called PLMN user shall receive an indication that the calling line identity is not available because of restriction.

NOTE: See also subclause 1.3.1 (override category).

In some interworking situations in which the connection is not completely supported by the sufficient signalling capability, then the called PLMN user shall receive an indication that the calling line identity is not available.

For an international call in which the originating network does not provide the calling line identity, then the called PLMN user shall receive an indication that the calling line identity is not available.

1.5 Alternate procedures

None identified.

1.6 Interactions with other Supplementary Services

1.6.81.2 Calling line identification restriction

The CLIR Supplementary Service shall take precedence over the CLIP Supplementary Service.

The CLIP Supplementary Service can take precedence over the CLIR Supplementary Service when the called user has an override category. The availability of the override category as well as the handling of calling line identity parameters for the override category is a national matter.

1.6.82.1 Call forwarding unconditional

When a call has been forwarded and the forwarded-to user has been provided with the CLIP Supplementary Service, the forwarded-to user shall receive the number of the original calling user, if this calling user has not subscribed to or invoked the CLIR Supplementary Service.

1.6.82.2 Call forwarding on mobile subscriber busy

Same as the interaction with call forwarding unconditional.

1.6.82.3 Call forwarding on no reply

Same as the interaction with call forwarding unconditional.

1.6.82.4 Call forwarding on mobile subscriber not reachable

Same as the interaction with call forwarding unconditional.

1.6.83.1 Call Waiting

If the served mobile subscriber is provisioned with the CLIP service, the notification of an incoming (waiting) call offered to that subscriber shall include the calling line identity, as for a normal call.

1.7 Interworking considerations

According to national network specific rules, the CLIP Supplementary Services need not be applicable, if at least one of the two parties is not an ISDN or PLMN subscriber.

2 Calling Line Identification Restriction (CLIR)

2.1 Definition

The CLIR Supplementary Service enables the calling party to prevent presentation of its line identity to the called party.

2.2 Description

2.2.1 Description

The CLIR Supplementary Service is a Supplementary Service offered to the calling party to prevent presentation of the calling party's line identity, to the called party. In the case where the called party has an override category, see subclause 2.4.

2.2.2 Applicability to telecommunications services

The applicability of this Supplementary Service is defined in ~~GSM~~ TS 22.004.

2.3 Normal procedures with successful outcome

2.3.1 Provision

This Supplementary Service is provisioned for all Basic Services subscribed to and to which it is applicable, i.e. not provisioned for any subset of these Basic Services.

As a service provider option, the CLIR Supplementary Service can be offered with one subscription option permanent (invoked for all relevant calls) or temporary (suppressed by the user on a per call basis).

In temporary mode, the subscriber may subscribe to the default values:

- presentation restricted: or,
- presentation not restricted.

The option applies to all BS which are provisioned for this SS.

2.3.2 Withdrawal

This Supplementary Service will be withdrawn at the subscriber's request or for administrative reasons.

2.3.5 Activation

The CLIR Supplementary Service shall be activated on provision.

2.3.6 Deactivation

The CLIR Supplementary Service shall be deactivated on withdrawal.

2.3.7 Invocation

If subscribed to in the permanent mode, then the network shall automatically invoke the CLIR Supplementary Service for each outgoing call.

If subscribed-to in the temporary mode with the default value "presentation restricted", then the network shall automatically invoke the CLIR Supplementary Service for each outgoing call unless CLIR is suppressed by subscriber request at the time of call request.

If subscribed-to in the temporary mode with the default value "presentation not restricted", then the network shall only invoke the CLIR Supplementary Service if requested by subscriber at the time of call request.

2.3.8 Normal operation with successful outcome

When the CLIR Supplementary Service is invoked, the originating network shall provide the destination network with a notification that the line identity of the calling party is not allowed to be presented to the called party. The originating network may also provide information on the cause of no CLI.

If the called party subscribes to the CLIP Supplementary Service and the CLIR Supplementary Service has been invoked, then the called party shall receive an indication that the calling line identity is not available due to restriction.

2.3.11 Interrogation

Data request

The mobile subscriber can request the data of the Supplementary Service.

In response the following information shall be given:

- whether the service is provided of not;
- if provided which mode is subscribed;
- if subscribed-to the temporary mode, which default value.

2.4 Exceptional procedures or unsuccessful outcome

If the subscriber has subscribed to the permanent mode and she tries to suppress the invocation of the CLIR Supplementary Service per MMI command during call set-up (i.e. requests that the CLI is displayed), she shall be notified that the suppression has not been performed and the call set-up shall continue. If the user has not subscribed to CLIR Supplementary Service and she tries to invoke it during call set-up per MMI command (i.e. requests that the CLI is not displayed), the call set-up attempt shall be rejected.

If the called party has a relevant override category (see subclause 1.3.1), the restriction service will be overridden and the calling line identity will be presented to the called party.

2.5 Alternate Procedures

A VPLMN which supports the CLIR service shall ensure that the line identity of a subscriber whose HPLMN does not support the CLIR service shall not be displayed to the called party unless the subscriber wishes so or the called party has CLIR override capability.

2.6 Interactions with other Supplementary Services

2.6.81.1 Calling line identification presentation

See subclause 1.6.81.2.

2.6.82.1 Call forwarding unconditional

No interaction, i.e. when the CLIR Supplementary Service is applicable and invoked for the original calling subscriber, her line identity shall not be presented to the forwarded-to user unless the forwarded-to user has an override category.

2.6.82.2 Call forwarding on mobile subscriber busy

Same as the interaction with call forwarding unconditional.

2.6.82.3 Call forwarding on no reply

Same as the interaction with call forwarding unconditional.

2.6.82.4 Call forwarding on mobile subscriber not reachable

Same as the interaction with call forwarding unconditional.

2.7 Interworking considerations

On calls to or via non-ISDNs, it cannot be assured that a calling line identification restriction indication can be carried to the destination network. As a national option the originating network can restrict any information identifying the calling party from being forwarded to the destination network when the CLIR Supplementary Service is applicable. If a destination network receives a calling line identity without any indication of presentation allowed or restricted, the destination network shall act according to its rules and regulations.

For inter-network calls, when the CLIR Supplementary Service is invoked, the originating network shall provide the destination network with a notification that the line identity of the calling party is not allowed to be presented to the called party. The originating network may also provide information on the cause of no CLI.

NOTE: When the Supplementary Service CLIR is invoked, some network providers may not send the identity of the calling subscriber to other network.

3 Connected Line Identification Presentation (COLP)

3.1 Definition

The Connected Line Identification Presentation (COLP) Supplementary Service provides the calling party with the possibility to receive the line identity of the connected party.

3.2 Description

3.2.1 Description

This Supplementary Service is not a dialling check but an indication to the calling subscriber of the connected line identity in a full ISDN/PLMN environment, the connected line identity shall include all the information necessary to unambiguously identify the connected party.

The network shall deliver the connected line identity to the calling party regardless of the terminal capability to handle the information.

3.2.2 Applicability to telecommunication services

The applicability of this Supplementary Service is defined in ~~GSM~~ TS 22.004.

3.3 Normal procedure with successful outcome

3.3.1 Provision

This Supplementary Service is provisioned for all Basic Services subscribed to and to which it is applicable, i.e. not provisioned for any subset of these Basic Services.

Override category within a PLMN

Override category within an ISDN/PLMN. Depending on national regulations, some networks may define categories of subscribers that have the ability to override the presentation restriction (COLR, clause4) and have the connected line identity presented (e.g., the police). The ability to have such an override category is a national option.

Override category between a PLMN and a network providing connected line identification restriction.

Override category between ISDNs/PLMNs. When a call originates in one ISDN/PLMN and terminates in another ISDN/PLMN and the COLR Supplementary Service is applied, the rules and regulations of the originating network shall apply.

The override category is only applicable within the HPLMN country.

3.3.2 Withdrawal

The COLP Supplementary Service shall be withdrawn at the customer's request or for administrative reasons.

3.3.5 Activation

The COLP Supplementary Service is activated as a result of provision.

3.3.6 Deactivation

The COLP Supplementary Service is deactivated as a result of withdrawal.

3.3.7 Invocation

The network shall automatically invoke the COLP Supplementary Service on each outgoing call made by the served user.

3.3.8 Normal operation with successful outcome

The calling subscriber shall at the end of the call set-up phase receive the connected line identity.

In addition to or instead of the connected line identity the subscriber may be given a Presentation Indicator and/or a Screening Indicator with the relevant information.

3.3.11 Interrogation

Status check

The mobile subscriber can request the status of the Supplementary Service and be informed if the service is provided to her.

3.4 Exceptional procedures or unsuccessful outcome

If the COLR Supplementary Service is applicable to the call, the served user shall receive an indication that the connected line identity is not available due to restriction.

NOTE: See also subclause 3.3.1 (override category).

In some interworking situations in which the connection is not completely supported by sufficient signalling capability, the served user shall receive an indication that the connected line identity is not available.

For an international call in which the destination network does not provide the connected line identity, then the served user shall receive an indication that the connected line identity is not available.

3.5 Alternate procedures

None identified.

3.6 Interactions with other Supplementary Services

3.6.81.4 Connected line identification restriction

The COLR Supplementary Service shall take precedence over the COLP Supplementary Service. The COLP Supplementary Service can take precedence over the COLR Supplementary Service when the served user has an override category. The availability of the override category as well as the handling of connected line identity parameters for the override category is a national option.

3.6.82.1 Call forwarding unconditional

If the served (forwarding) user selects the option that the calling user is not notified of call forwarding, then the calling user shall receive no forwarding notification, and the calling user shall not receive the connected line identity when the call is answered, unless the calling user has override capability. Otherwise, no interaction.

3.6.82.2 Call forwarding on mobile subscriber busy

Same as the interaction with call forwarding unconditional.

3.6.82.3 Call forwarding on no reply

Same as the interaction with call forwarding unconditional.

3.6.82.4 Call forwarding on mobile subscriber not reachable

Same as the interaction with call forwarding unconditional.

3.6.84.1 Multiparty

Multiparty controller: no impact, i.e. neither Supplementary Service shall affect the operation or the other Supplementary Service.

Remote parties: they shall not receive the COLP Supplementary Service information of parties being added to the conference.

3.7 Interworking considerations

According to national network specific rules the COLP Supplementary Service need not be applicable, if at least one of the two parties is not an ISDN or ~~GSM~~ PLMN subscriber.

4 Connected Line Identification Restriction (COLR)

4.1 Definition

The COLR Supplementary Service enables the connected party to prevent presentation of its line identity to the calling party.

4.2 Description

4.2.1 Description

The COLR Supplementary Service is a Supplementary Service offered to the connected party to prevent presentation of the connected line identity, to the calling party. In the case where the calling party has an override category, see subclause 4.4.

4.2.2 Applicability to telecommunications services

The applicability of this Supplementary Service is defined in TS~~GSM~~ 22.004.

4.3 Normal procedures with successful outcome

4.3.1 Provision

This Supplementary Service is provisioned for all Basic Services subscribed to and to which it is applicable, i.e. not provisioned for any subset of these Basic Services.

4.3.2 Withdrawal

This Supplementary Service will be withdrawn at the subscriber's request or for administrative reasons.

4.3.5 Activation

The COLR Supplementary Service shall be activated on provision.

4.3.6 Deactivation

The COLR Supplementary Service shall be deactivated on withdrawal.

4.3.7 Invocation

The network shall automatically invoke the COLR Supplementary Service for each incoming call at call set-up phase.

4.3.8 Normal operation with successful outcome

If the calling party subscribes to the COLP Supplementary Service and the COLR Supplementary Service has been invoked, then the calling party shall receive an indication that the connected line identity is not available due to restriction.

When the COLR Supplementary Service is invoked, the destination network shall provide the originating network with a notification that the line identity of the connected party is not allowed to be presented to the calling party.

4.3.11 Interrogation

Status check

The mobile subscriber can request the status of the Supplementary Service and be informed if the service is provided to her.

4.4 Exceptional procedures or unsuccessful outcome

If the calling party has a relevant override category (see subclause 3.3.1) the restriction service will be overridden and the connected line identity will be presented to the calling party.

4.5 Alternate procedures

A VPLMN which supports the COLR service shall ensure that the line identity of a subscriber whose HPLMN does not support the COLR service shall not be displayed to the calling party unless the calling party has COLR override capability.

4.6 Interactions with other Supplementary Services

4.6.81.3 Connected line identification presentation

See subclause 3.6.81.4.

4.6.82.1 Call forwarding unconditional

If a forwarded-to user subscribes to the COLR Supplementary Service, then the forwarded-to user's line identity shall not be provided with the notification that the call has been forwarded.

A calling user that subscribes to the COLP Supplementary Service and who has override capability shall not be able to receive the forwarded-to user's line identity as part of the diverting notification information, but can invoke the COLP Supplementary Service with override in order to receive the connected line identity when the call is answered.

4.6.82.2 Call forwarding on mobile subscriber busy

Same as the interaction with call forwarding unconditional.

4.6.82.3 Call forwarding on no reply

Same as the interaction with call forwarding unconditional.

4.6.82.4 Call forwarding on mobile subscriber not reachable

Same as the interaction with call forwarding unconditional.

4.7 Interworking consideration

On calls from or via non-ISDNs, it cannot be assured that a connected line restriction indication can be carried to the originating network. As a national option, the destination network can restrict any information identifying the connected party from being returned to the originating network when the COLR Supplementary Service is applicable. If an originating network receives a connected line identity without any indication of presentation allowed or restricted, the originating network shall act according to its rules and regulations.

For inter-network calls, when the COLR Supplementary Service is invoked, the destination network shall provide the originating network with a notification that the line identity of the connected party is not allowed to be presented to the calling party.

NOTE: When the COLR Supplementary Service is invoked, some network providers may not send the identity of the connected customer to other network providers.

Annex A (informative): Change history

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**WI**
Jun 1999			GSM 02.81					Transferred to 3GPP SA1	7.0.0		
SA#04			22.081			R99		Transferred to 3GPP SA1		3.0.0	
SP-05	SP-99479	S1-99628	22.081	001		R99	D	Editorial changes for alignment	3.0.0	3.0.1	Editorial changes
SP-06	SP-99519	S1-99908	22.081	002		R99	D	Editorial update to TS 22.081 in order to include 3G systems	3.0.1	3.1.0	
SP-08	SP-000199	S1-000443	22.081	003		R99	B	Access dependent services (on Cause for no CLI)	3.1.0	3.2.0	
SP-11	SP-010065	S1-010258	22.081			Rel-4		Transferred to 3GPP Release 4	3.2.0	4.0.0	

CR-Form-v4

CHANGE REQUEST

⌘ **22.078** **CR** **143** ⌘ ev **-** ⌘ Current version: **5.5.0** ⌘

Spec Title: **Customised Applications for Mobile network Enhanced Logic (CAMEL); Service description, Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**A**
Release:	⌘	Rel-5

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

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	Note that although this is a consequential change, it includes an extra modification to section 8 that does not exist in the release 4 version of this TS.

1 Scope

This standard specifies the stage 1 description for the CAMEL feature (Customised Applications for Mobile network Enhanced Logic) which provides the mechanisms to support services consistently independently of the serving network. The CAMEL features shall facilitate service control of operator specific services external from the serving PLMN. The CAMEL feature is a network feature and not a supplementary service. It is a tool to help the network operator to provide the subscribers with the operator specific services even when roaming outside the HPLMN.

If an IPLMN or VPLMN supports CAMEL Phase 4, it shall also provide the functionality of all previous CAMEL phases.

Phase 4 network signalling shall support interworking with CAMEL Phases 3 and 2.

The CAMEL feature is applicable

- To mobile originated and mobile terminated call related activities;
- To supplementary service invocations;
- To SMS MO, to GPRS sessions and PDP contexts, to the control of HLR subscriber data, to the control of network signalling load.

The mechanism described addresses especially the need for information exchange among the VPLMN, HPLMN and the CAMEL Service Environment (CSE) for support of such operator specific services. Any user procedures for operator specific services are outside the scope of this standard.

This specification describes the interactions between the functions of the VPLMN, HPLMN, IPLMN and the CSE.

The second phase of CAMEL enhances the capabilities of phase 1 where the following capabilities have been added:

- Additional event detection points;
- Interaction between a user and a service using announcements, voice prompting and information collection via in band interaction or USSD interaction;
- Control of call duration and transfer of Advice of Charge Information to the mobile station;
- The CSE can be informed about the invocation of the supplementary services ECT, CD and MPTY;
- For easier post-processing, charging information from a serving node can be integrated in normal call records.

The third phase of CAMEL enhances the capabilities of phase 2. The following capabilities are added:

- Support of facilities to avoid overload;
- Capabilities to support Dialled Services;
- Capabilities to handle mobility events, such as (Not-)reachability and roaming;
- Control of GPRS sessions and PDP contexts;
- Control of mobile originating SMS through both circuit switched and packet switched serving network entities.
- Interworking with SoLSA. (Support of Localised Service Area). Support for this interworking is optional.
- The CSE can be informed about the invocation of the ~~GSM~~ supplementary services CCBS.

Detailed information is given in the respective sections.

The fourth phase of CAMEL enhances the capabilities of phase 3. The following capabilities are added:

- CAMEL support for Optimal Routeing of circuit-switched mobile-to-mobile calls;
- The capability for the CSE to create additional parties in an existing call;
- The capability for the CSE to create a new call unrelated to any other existing call;
- Capabilities for the enhanced handling of call party connections;
- Enhanced CSE capability for Subscribed Dialled Services;
- The capability for the CSE to control sessions in the IP Multimedia Subsystem.

2 References

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

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

[1] 3GPP TS 22.093: "Completion of Calls to Busy Subscriber (CCBS); Service description, Stage 1".

[2] 3GPP TS 22.079: "Support of Optimal Routeing (SOR); Service definition (Stage 1)".

[3] 3GPP TS 22.030: "Man-machine Interface (MMI) of the Mobile Station (MS) (Stage 1)".

[4] 3GPP TS 22.090: "Stage 1 Decision of Unstructured Supplementary Service Data (USSD)".

[5] 3GPP TS 22.097: "Multiple Subscriber Profile (MSP); Service definition (Stage 1)".

[6] 3GPP TS 22.060: "General Packed Radio Service (GPRS); Service definition (Stage 1)".

[7] 3GPP TS 22.057: "Mobile Environment (MExE); Service definition (Stage 1)".

[8] 3GPP TS 22.071: "Location Services; Service Definition (Stage1) ".

[9] 3GPP TS 23.018: "Basic Call Handling; Technical Realization".

[10] 3GPP TS 22.003: “Circuit teleservices supported by a public land mobile network (PLMN)”.

[11] 3GPP TS 22.228: “Service Requirements for IP multimedia Core Network; (Stage1)”.

[12] 3GPP TS 23.228: “IP Multimedia (IM) Subsystem - Stage 2”.

[13] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".

3 Definitions and abbreviations

Operator Specific Service (OSS): Any non-standardised service offered to a mobile user.

Interrogating PLMN (IPLMN): The PLMN which interrogates the HPLMN for information to handle a mobile terminating call.

CAMEL Service Environment (CSE): A CSE is a logical entity which processes activities related to Operator Specific Services (OSS).

Route select failure: A condition when routeing to the called party fails. Route Select Failure can be reported in an existing relationship or a new relationship can be initiated.

Service event: A specific event of a process which may be used as part of an operator specific service.

Initial service event: A service event which triggers the establishment of a relationship between the CSE and the controlled entity.

Subsequent service event: A service event which is reported in the context of an existing relationship between the CSE and the reporting entity.

Service procedure: A part of the CAMEL feature to be used when a specific CAMEL service event is detected.

Network CAMEL Service Information (N-CSI): Identifies services offered by the serving PLMN operator equally for all subscribers.

NOTE: These services may also be provided using a technology other than CAMEL.

CAMEL Subscription Information (CSI): Identifies that CAMEL support is required for the subscriber and the identities of the CSEs to be used for that support. The CSI also contains information related to the OSS of the subscriber, e.g. Service Key.

The OSS may include both services provisioned for individual subscribers and services provisioned equally for all users of a VPLMN.

Location Area Code: Indicates the global identity of that part of the service area of a VLR in which the subscriber is currently located, and in which the subscriber will be paged for mobile terminated traffic

Location Information: The location information shall be an identification of the location of the served subscriber.

The following location information shall be sent to the CSE (if available):

- **Geographical information** indicates the location (latitude and longitude) of the served subscriber. When Cell ID or Location Area Code is known the latitude and longitude may be calculated as the nominal central point of the cell or of the location area; alternative mechanisms for determining latitude and longitude may also be supported. The uncertainty of the indicated location is part of the geographical information.

- **Geodetic Information** provides the same functional capability as geographical information; however it is encoded differently.

- **Cell ID** indicates the global identity of the current or last cell which the subscriber is using or has used if the subscriber is using GERAN~~SM radio access~~. The VPLMN shall update the stored Cell ID at establishment of every radio connection and whenever the subscriber is handed over between cells.

- **Routing Area ID** indicates the global identity of the current or last GPRS routing area which the subscriber is using or has used if the subscriber is using GERAN~~SM~~ radio access in a GPRS serving network.

- **Service Area ID** indicates the global identity of the current or last service area which the subscriber is using or has used if the subscriber is using ~~UMTS~~ UTRAN radio access. The VPLMN shall update the stored Service Area ID at establishment of every radio connection and whenever the subscriber is handed over between service areas.

- **VLR number** is the number of the serving VLR stored in the HPLMN.

- **Location status** indicates whether or not the location information has been confirmed by radio contact. If the location information has not been confirmed by radio contact a time stamp is sent indicating the time elapsed since the last radio contact with the subscriber.

- **Location number** is the number received on the incoming circuit (for an incoming call) or to be sent on the outgoing circuit (for an outgoing call).

Service Key: An identifier of the OSS which shall be transparent to the IPLMN/VPLMN.

Subscriber Status: An indication of the status of a subscriber, determined by the state of the subscriber's MS. The subscriber status depends on the domain for which it is requested:

The **Subscriber Status in the circuit switched domain** can take one of three values:

- **CAMEL-busy**: The MS is engaged in a mobile-originated or mobile-terminated circuit-switched call.

- **Network determined not reachable**: The network can determine from its internal data that the MS is not reachable. This includes detached and purged mobile stations.

- **Assumed idle**: The MS is not CAMEL-busy or network determined not reachable.

The **Subscriber Status in the packet switched domain** can take one of five values:

- **Detached:** The network can determine from its internal data that the MS is not registered to the GPRS data network.

- **CAMEL-attached, MS not reachable for paging:** The MS is registered to the GPRS data network, but there are no PDP contexts active for this MS; the GPRS data network can determine from its internal data that the MS is not reachable for paging.

- **CAMEL-attached, MS may be reachable for paging:** The MS is registered to the GPRS data network, but there are no PDP contexts active for this MS; the GPRS data network has not determined from its internal data that the MS is not reachable for paging.

- **CAMEL-connected, MS not reachable for paging:** The MS is registered to the GPRS data network, and there is at least one PDP context active for this MS; the GPRS data network can determine from its internal data that the MS is not reachable for paging. The status includes the information for each active PDP context, as specified in 3GPP TS 23.060 [13].

- **CAMEL-connected, MS may be reachable for paging:** The MS is registered to the GPRS data network, and there is at least one PDP context active for this MS; the GPRS data network has not determined from its internal data that the MS is not reachable for paging. The status includes the information for each active PDP context, as specified in 3GPP TS 23.060 [13].

GPRS session: The period during which the GPRS subscriber is registered to the GPRS data network. A GPRS session starts when the GPRS subscriber attaches to the GPRS data network. It ends when the GPRS subscriber detaches from the GPRS data network.

PDP Context: A transaction for the exchange of data between an MS and a peer entity, which is addressed by the Access Point Name. A PDP context starts when the request from a GPRS subscriber successfully establishes the PDP context and ends when the subscriber deactivates the PDP context.

PDP: Packet Data Protocol (as defined in TS 22.060 [6])

Carrier Identification Code: Identifies uniquely the Carrier (NAEA).

Carrier Selection Information: An indication of whether the subscriber selected a carrier, or the carrier is predefined for the subscriber (NAEA).

Originating Line Identification: Identifies uniquely the subscriber to be charged for the usage of the carrier (NAEA).

Charge Number: Identifies uniquely the organisation to be charged for the usage of the carrier (NAEA).

North American Equal Access (NAEA): A service used in the North American region whereby a subscriber may select the carrier to be used for long distance calls.

Subscribed Dialled Services: Identifies a set of at most ten service numbers. The served subscriber can originate calls by entering a service number for the destination. This is in addition to the possibility to route calls by entering the destination number. Each service number is defined at the HPLMN operator's discretion. The set of service numbers forms part of the subscriber's profile, whether she is registered in the HPLMN or another PLMN.

Call Party Handling (CPH): A method of manipulating call legs which includes creating new parties in a call, placing individual call parties on hold, reconnecting them to the group of call parties and disconnecting individual call parties.

CPH Configuration: One or more groups of call legs that share a common dialogue to the CSE.

Call Leg: The connection joining the call party to the CPH configuration.

Call Party: A party (e.g. served subscriber, called party, PSTN subscriber etc.) in the CPH configuration.

IP multimedia session (IPMM session): See [11] for definition.

IM CN subsystem (IP Multimedia Core Network subsystem): See [11] for definition.

IM application level registration: See [12] for definition.

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

8 Procedures for Call Party Handling - $(CAMEL4$)

CPH procedures only apply to speech telephony (TS11) as defined in TS 22.003 [10].

CPH procedures apply to MO, MF, MT, VT and CSE initiated calls. If the served subscriber is involved in a CPH configuration controlled by her CSE, then any further MO or MT call setup request involving the served subscriber shall be handled by a separate relationship with the served subscriber's CSE. This new relationship may lead to the creation of a further CPH configuration for the served subscriber. The service logic for one CSE relationship is not necessarily aware of what is happening in another CSE relationship involving the same served subscriber.

It is not required to transfer a leg or a group of legs between separate CPH configurations.

Where service logic involves Call Party Handling procedures, the Service Interaction Indicators Two parameter should be used to manage interactions with ~~GSM~~ Supplementary Services (CF, CD and MPTY for each call leg and ECT and HOLD for the served subscriber).

The CSE shall be able to add parties to, or remove parties from, the group. Each party in this group can communicate with all other parties in the group. The IPLMN/VPLMN shall support at least 6 parties (of which one may be a Specialised Resource Function) in a group.

If a control relationship exists, the CSE may order in-band user interaction with any held call party at any point during the active phase of the call leg.

Charging activities shall be possible during a CPH configuration as indicated in clause 15.

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

A.3 GPRS Information provided to the CSE

Table A-3 shows the information which shall be reported to the CSE at various GPRS events. The numbers reflect the applicable CAMEL phase (3).

	Attach	PDP Context Establishment (Initial Service Event)	PDP Context Establishment (Subsequent Service Event)	PDP Context Establishment Ack (Initial Service Event)	PDP Context Establishment Ack (Subsequent Service Event – PDP Context relationship)	PDP Context Establishment Ack (Subsequent Service Event – GPRS Session Relationship I) – **note 1**	PDP Context Establishment Ack (Subsequent Service Event – GPRS Session relationship II) – **note 2**
Event met	3	3	3	3	3	3	3
Type of monitoring	-	-	3	-	3	3	3
MSISDN	3	3	-	3	-	-	-
IMSI	3	3	-	3	-	-	-
Service Key	3	3	-	3	-	-	-
Location information, at least to the resolution of Routing Area of the attaching subscriber	3	3	3	3	-	3	-
Time stamp information	3	3	3	3	-	3	-
Time zone information	3	3	3	3	-	3	-
GPRS MS Class (**note 3**)	3	3	-	3	-	-	-
PDP transport protocol, i.e. IP or X.25	-	3	3	3	-	3	-
Quality of Service (requested)	-	3	3	3	-	3	-
Quality of Service (subscribed)	-	3	3	3	-	3	-
Quality of Service (negotiated)	-	-	-	3	3	3	3
Destination address information	-	3	3	3	-	3	-
GPRS charging ID	-	-	-	3	3	3	3
GGSN Address	-	-	-	3	3	3	3

Table A-3: GPRS Information transferred to the CSE

Note 1: PDP Context Establishment Ack (Subsequent Service Event – GPRS Session relationship I): The PDP Context Establishment event for this PDP Context has not been reported.

Note 2: PDP Context Establishment Ack (Subsequent Service Event – GPRS Session relationship II): The PDP Context Establishment event for this PDP Context has been reported.

Note 3: GPRS MS Class: Subparameter MS RadioAccessCapability is not supported in case of UTRAN~~UMTS Network~~.

Table A-4 shows the information which shall be reported to the CSE at the Change of Position events. The numbers reflect the applicable CAMEL phase (3).

Table A-4: GPRS Information reported to the CSE

	Intra Change of Position PDP Context, (Subsequent Service Event)	Intra Change of Position Session (Subsequent Service Event)	Inter Change of Position PDP Context, (Initial Service Event)	Inter Change of Position Session (Initial Service Event)
Event met	3	3	3	3
Type of monitoring	3	3	-	-
MSISDN	-	-	3	3
IMSI	-	-	3	3
Service Key	-	-	3	3
Location information, at least to the resolution of Routing Area of the attached subscriber	3	3	3	3
Time stamp information	-	-	3	3
Time zone information	-	-	3	3
GPRS MS Class (**note 1**)	-	-	3	3
PDP transport protocol, i.e. IP or X.25	-	-	3	-
Quality of Service (requested)	-	-	3	-
Quality of Service (subscribed)	-	-	3	-
Quality of Service (negotiated)	-	-	3	-
Destination address information	-	-	3	-
GPRS Charging ID	-	-	3	-
GGSN Address	-	-	3	-

Note 1: GPRS MS Class: Subparameter MS RadioAccessCapability is not supported in ~~UMTS Networks~~case of UTRAN.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.078** **CR** **142** ⌘ ev **-** ⌘ Current version: **4.4.0** ⌘

Spec Title: **Customised Applications for Mobile network Enhanced Logic (CAMEL); Service description, Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
F *(correction)*
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B *(addition of feature),*
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Detailed explanations of the above categories can be found in 3GPP TR 21.900.

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

1 Scope

This standard specifies the stage 1 description for the CAMEL feature (Customised Applications for Mobile network Enhanced Logic) which provides the mechanisms to support services consistently independently of the serving network. The CAMEL features shall facilitate service control of operator specific services external from the serving PLMN. The CAMEL feature is a network feature and not a supplementary service. It is a tool to help the network operator to provide the subscribers with the operator specific services even when roaming outside the HPLMN.

CAMEL is developed in phases. The following phases exist:

- CAMEL phase 1. This is the default phase in this specification. Text which is applicable only to phase 1 is marked with the formal designator - $(CAMEL1$)
- CAMEL phase 2. Material which applies for CAMEL phase 2 and later phases is marked with the formal designation - $(CAMEL2$) for a single subclause or paragraph, and with the formal designation $(begin$(CAMEL2$) ... $(end$(CAMEL2$) for multiple paragraphs.
- CAMEL phase 3. Material which applies for CAMEL phase 3 and later phases is marked with the formal designation - $(CAMEL3$) for a single subclause or paragraph, and with the formal designation $(begin$(CAMEL3$) ... $(end$(CAMEL3$) for multiple paragraphs.

A VPLMN or IPLMN supporting CAMEL phase 2 shall also support CAMEL phase 1, so far as it is applicable to the network entities concerned. -$(CAMEL2$)

A VPLMN or IPLMN supporting CAMEL phase 3 shall also support CAMEL phase 2 and CAMEL phase 1, so far as it is applicable to the network entities concerned. For instance, an SGSN has no capability defined for CAMEL phase 2 or CAMEL phase 1. -$(CAMEL3$)

The CAMEL feature is applicable

- To mobile originated and mobile terminated call related activities;
- As a CAMEL phase 2 function, to supplementary service invocations - $(CAMEL2$);
- As a CAMEL Phase 3 function, to SMS MO, to GPRS sessions and PDP contexts, to the control of HLR subscriber data, to the control of network signalling load - $(CAMEL3$).

The mechanism described addresses especially the need for information exchange among the VPLMN, HPLMN and the CAMEL Service Environment (CSE) for support of such operator specific services. Any user procedures for operator specific services are outside the scope of this standard.

This specification describes the interactions between the functions of the VPLMN, HPLMN, IPLMN and the CSE.

The second phase of CAMEL enhances the capabilities of phase 1. The following capabilities are added:

- Additional event detection points;
- Interaction between a user and a service using announcements, voice prompting and information collection via in band interaction or USSD interaction;
- Control of call duration and transfer of Advice of Charge Information to the mobile station;
- The CSE can be informed about the invocation of the supplementary services ECT, CD and MPTY;
- For easier post-processing, charging information from a serving node can be integrated in normal call records.

The third phase of CAMEL enhances the capabilities of phase 2. The following capabilities are added:

- Support of facilities to avoid overload;
- Capabilities to support Dialled Services;
- Capabilities to handle mobility events, such as (Not-)reachability and roaming;
- Control of GPRS sessions and PDP contexts;

- Control of mobile originating SMS through both circuit switched and packet switched serving network entities;
- Interworking with SoLSA (Support of Localised Service Area). Support for this interworking is optional;
- The CSE can be informed about the invocation of the ~~GSM~~ supplementary service CCBS.

Detailed information is given in the respective sections.

2 References

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

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

[1] 3GPP TS 22.093: "Completion of Calls to Busy Subscriber (CCBS); Service description, Stage 1".

[2] 3GPP TS 22.079: "Support of Optimal Routeing (SOR); Service definition (Stage 1)".

[3] 3GPP TS 22.030: "Man-machine Interface (MMI) of the Mobile Station (MS) (Stage 1)".

[4] 3GPP TS 22.090: "Stage 1 Decision of Unstructured Supplementary Service Data (USSD)".

[5] 3GPP TS 22.097: "Multiple Subscriber Profile (MSP); Service definition (Stage 1)".

[6] 3GPP TS 22.060: "General Packed Radio Service (GPRS); Service definition (Stage 1)".

[7] 3GPP TS 22.057: "Mobile Execution Environment (MExE); Service definition (Stage 1)".

[8] 3GPP TS 22.071: "Location Services; Service Definition (Stage1)".

[9] 3GPP TS 23.018: "Basic Call Handling; Technical Realization".

3 Definitions and abbreviations

Operator Specific Service (OSS): Any non-standardised service offered to a mobile user.

Interrogating PLMN (IPLMN): The PLMN which interrogates the HPLMN for information to handle a mobile terminating call.

CAMEL Service Environment (CSE): A CSE is a logical entity which processes activities related to Operator Specific Services (OSS).

Route select failure: A condition when routeing to the called party fails. Route Select Failure can be reported in an existing relationship - $(CAMEL2$) or a new relationship can be initiated. - $(CAMEL3$)

Service event: A specific event of a process which may be used as part of an operator specific service.

Initial service event: A service event which triggers the establishment of a relationship between the CSE and the controlled entity.

Subsequent service event: A service event which is reported in the context of an existing relationship between the CSE and the reporting entity.

Service procedure: A part of the CAMEL feature to be used when a specific CAMEL service event is detected.

Network CAMEL Service Information (N-CSI): Identifies services offered by the serving PLMN operator equally for all subscribers. - $(CAMEL3$)

NOTE: These services may also be provided using a technology other than CAMEL.

CAMEL Subscription Information (CSI): Identifies that CAMEL support is required for the subscriber and the identities of the CSEs to be used for that support. The CSI also contains information related to the OSS of the subscriber, e.g. Service Key.

The OSS may include both services provisioned for individual subscribers and services provisioned equally for all users of a VPLMN. - $(CAMEL3$)

Location Area Code: Indicates the global identity of that part of the service area of a VLR in which the subscriber is currently located, and in which the subscriber will be paged for mobile terminated traffic

Location Information: The location information shall be an identification of the location of the served subscriber.

The following location information shall be sent to the CSE (if available):

- **Geographical information** indicates the location (latitude and longitude) of the served subscriber. When Cell ID or Location Area Code is known the latitude and longitude may be calculated as the nominal central point of the cell or of the location area; alternative mechanisms for determining latitude and longitude may also be supported. The uncertainty of the indicated location is part of the geographical information.

- **Geodetic Information** provides the same functional capability as geographical information; however it is encoded differently.

- **Cell ID** indicates the global identity of the current or last cell which the subscriber is using or has used if the subscriber is using ~~GSM~~ GERAN~~radio access~~. The VPLMN shall update the stored Cell ID at establishment of every radio connection and whenever the subscriber is handed over between cells.

- **Routing Area ID** indicates the global identity of the current or last GPRS routing area which the subscriber is using or has used if the subscriber is using GERAN~~SM~~ radio access in a GPRS serving network.

- **Service Area ID** indicates the global identity of the current or last service area which the subscriber is using or has used if the subscriber is using UTRAN ~~UMTS~~ radio access. The VPLMN shall update the stored Service Area ID at establishment of every radio connection and whenever the subscriber is handed over between service areas.

- **VLR number** is the number of the serving VLR stored in the HPLMN.

- **Location status** indicates whether or not the location information has been confirmed by radio contact. If the location information has not been confirmed by radio contact a time stamp is sent indicating the time elapsed since the last radio contact with the subscriber.

- **Location number** is the number received on the incoming circuit (for an incoming call) or to be sent on the outgoing circuit (for an outgoing call).

Service Key: An identifier of the OSS which shall be transparent to the IPLMN/VPLMN.

Subscriber Status: An indication of the status of a subscriber, determined by the state of the subscriber's MS. The subscriber status can take one of three values:

- **CAMEL-busy**: The MS is engaged in a mobile-originated or mobile-terminated circuit-switched call.

- **Network determined not reachable**: The network can determine from its internal data that the MS is not reachable. This includes detached and purged mobile stations.

- **Assumed idle**: The MS is not CAMEL-busy or network determined not reachable.

GPRS session: The period during which the GPRS subscriber is registered to the GPRS data network. A GPRS session starts when the GPRS subscriber attaches to the GPRS data network. It ends when the GPRS subscriber detaches from the GPRS data network. - $(CAMEL3$)

PDP Context: A transaction for the exchange of data between an MS and a peer entity, which is addressed by the Access Point Name. A PDP context starts when the request from a GPRS subscriber successfully establishes the PDP context and ends when the subscriber deactivates the PDP context. - $(CAMEL3$)

PDP: Packet Data Protocol (as defined in TS 22.060 [6]) - $(CAMEL3$)

Carrier Identification Code: Identifies uniquely the Carrier (NAEA). - $(CAMEL2$)

Carrier Selection Information: An indication of whether the subscriber selected a carrier, or the carrier is predefined for the subscriber (NAEA). - $(CAMEL2$)

Originating Line Identification: Identifies uniquely the subscriber to be charged for the usage of the carrier (NAEA). - $(CAMEL2$)

Charge Number: Identifies uniquely the organisation to be charged for the usage of the carrier (NAEA). - $(CAMEL2$)

North American Equal Access (NAEA): A service used in the North American region whereby a subscriber may select the carrier to be used for long distance calls. - $(CAMEL2$)

Subscribed Dialled Services: Identifies a set of at most ten service numbers. The served subscriber can originate calls by entering a service number for the destination. This is in addition to the possibility to route calls by entering the destination number. Each service number is defined at the HPLMN operator's discretion. The set of service numbers forms part of the subscriber's profile, whether she is registered in the HPLMN or another PLMN. - $(CAMEL3$)

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

A.3 GPRS Information provided to the CSE

Table A-3 shows the information which shall be reported to the CSE at various GPRS events. The numbers reflect the applicable CAMEL phase (3).

	Attach	PDP Context Establishment (Initial Service Event)	PDP Context Establishment (Subsequent Service Event)	PDP Context Establishment Ack (Initial Service Event)	PDP Context Establishment Ack (Subsequent Service Event – PDP Context relationship)	PDP Context Establishment Ack (Subsequent Service Event – GPRS Session Relationship I) – **note 1**	PDP Context Establishment Ack (Subsequent Service Event – GPRS Session relationship II) – **note 2**
Event met	3	3	3	3	3	3	3
Type of monitoring	-	-	3	-	3	3	3
MSISDN	3	3	-	3	-	-	-
IMSI	3	3	-	3	-	-	-
Service Key	3	3	-	3	-	-	-
Location information, at least to the resolution of Routing Area of the attaching subscriber	3	3	3	3	-	3	-
Time stamp information	3	3	3	3	-	3	-
Time zone information	3	3	3	3	-	3	-
GPRS MS Class (**note 3**)	3	3	-	3	-	-	-
PDP transport protocol, i.e. IP or X.25	-	3	3	3	-	3	-
Quality of Service (requested)	-	3	3	3	-	3	-
Quality of Service (subscribed)	-	3	3	3	-	3	-
Quality of Service (negotiated)	-	-	-	3	3	3	3
Destination address information	-	3	3	3	-	3	-
GPRS charging ID	-	-	-	3	3	3	3

GGSN Address	-	-	-	3	3	3	3

Table A-3: GPRS Information transferred to the CSE

Note 1: PDP Context Establishment Ack (Subsequent Service Event – GPRS Session relationship I): The PDP Context Establishment event for this PDP Context has not been reported.

Note 2: PDP Context Establishment Ack (Subsequent Service Event – GPRS Session relationship II): The PDP Context Establishment event for this PDP Context has been reported.

Note 3: GPRS MS Class: Subparameter MS RadioAccessCapability is not supported in case of UTRAN~~UMTS Network~~.

Table A-4 shows the information which shall be reported to the CSE at the Change of Position events. The numbers reflect the applicable CAMEL phase (3).

Table A-4: GPRS Information reported to the CSE

	Intra Change of Position PDP Context, (Subsequent Service Event)	Intra Change of Position Session (Subsequent Service Event)	Inter Change of Position PDP Context, (Initial Service Event)	Inter Change of Position Session (Initial Service Event)
Event met	3	3	3	3
Type of monitoring	3	3	-	-
MSISDN	-	-	3	3
IMSI	-	-	3	3
Service Key	-	-	3	3
Location information, at least to the resolution of Routing Area of the attached subscriber	3	3	3	3
Time stamp information	-	-	3	3
Time zone information	-	-	3	3
GPRS MS Class (**note 1**)	-	-	3	3
PDP transport protocol, i.e. IP or X.25	-	-	3	-
Quality of Service (requested)	-	-	3	-
Quality of Service (subscribed)	-	-	3	-
Quality of Service (negotiated)	-	-	3	-
Destination address information	-	-	3	-
GPRS Charging ID	-	-	3	-
GGSN Address	-	-	3	3

Note 1: GPRS MS Class: Subparameter MS RadioAccessCapability is not supported in case of UTRAN~~UMTS Networks~~.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.071** **CR** **039** ⌘ ev **-** ⌘ Current version: **5.0.0** ⌘

Spec Title: **Location Services (LCS); Service description, Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**A**
Release:	⌘	Rel-5

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
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Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

3GPP TS 22.071 V5.~~0~~1.0 (~~2001~~2002-03~~12~~)

Technical Specification

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

3rd Generation Partners

Technical Specification Group Services and System Aspects;
Location Services (LCS);
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Contents

Foreword

This Technical Specification (TS) has been produced by the 3GPP.

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

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

z the third digit is incremented when editorial only changes have been incorporated in the specification;

1 Scope

This document provides the Stage One description of Location Services (LCS). A Stage One description provides an overall service description, primarily from the service subscriber's and user's points of view, but not dealing with the details of the Man Machine Interface (MMI). This TS includes information applicable to network operators, service providers and terminal, base station system, switch, and data base manufacturers.

NOTE: Location Services may be considered as a network provided enabling technology consisting of standardized service capabilities which enable the provision of location based applications. These applications may be service provider specific. The description of the numerous and varied possible location applications which are enabled by this technology are outside the scope of this specification. However, clarifying examples of how the functionality being specified may be used to provide specific location services is included in various sections of the specification.

This document provides core requirements to an extent sufficient to derive a complete definition of location services at the service level. However, the present document also provides additional requirements which may suggest in a non-normative manner certain ways the system may be implemented to support location services.

LCS can be offered without subscription to basic telecommunication services. LCS is available to the following categories of LCS clients:

- Value Added Services LCS Clients – use LCS to support various value added services. These clients can include UE subscribers as well as non-subscribers to other services.
- PLMN Operator LCS Clients – use LCS to enhance or support certain O&M related tasks, supplementary services, IN related services and bearer services and teleservices.
- Emergency Services LCS Clients – use LCS to enhance support for emergency calls from subscribers.
- Lawful Intercept LCS Clients – use LCS to support various legally required or sanctioned services.

LCS is applicable to any target UE whether or not the UE supports LCS, but with restrictions on choice of positioning method or notification of a location request to the UE user when LCS or individual positioning methods, respectively, are not supported by the UE.

LCS is being developed in phases with enhancements added in yearly releases:

1. GSM Release 98: This is the initial default phase of LCS. It provides a generic flexible architecture capable of supporting all positioning methods. Specific support is provided for Time Of Arrival (TOA), Enhanced Observed Time Difference (E-OTD) and Global Positioning System (GPS) based positioning methods. Support is provided for emergency services, value added services and PLMN operator services.
2. GSM Release 99: This provides the same capabilities as GSM Release 98, since GSM Release 98 specifications were copied as "mirror" specifications in GSM Release 99.
3. 3GPP~~UMTS~~ Release 99: LCS is supported in the circuit switched domain of the 3GPP core network (GMLC connected to MSC). UTRAN R99 specifications support cell coverage (ie cell identity) based LCS. (The radio interface RRC specification also support IPDL-OTDOA and network assisted GPS (assistance data broadcasting), but the UTRAN internal interfaces do not yet support these two methods in R99.)
4. 3GPP~~GSM/UMTS~~ Release 4 (including both UTRAN and GERAN): LCS shall be supported in the circuit switched domain and in the packet switched domain including GPRS. LCS shall be supported in GERAN and in UTRAN FDD and UTRAN TDD. The positioning methods in UTRAN will be at least the 3 methods identified earlier: cell coverage based, IPDL-OTDOA and assisted GPS. LCS support is to be included in the Open Service Architecture (OSA) including enhancements for the support of value added services, and support for the velocity parameter in the position request /response. The objective is to have common service descriptions for all Access Networks in this stage 1 specification. Possible deviations shall be noted in the text.
5. Future releases: For further study.

2. References

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

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

2.1 Normative references

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

[2] 3GPP TR 21.905: “Vocabulary for 3GPP Specifications”.

[3] 3GPP TS 23.032: "Universal Geographical Area Description"

[4] 3GPP TS 22.101: "Service principles"

[5] 3GPP TS 22.105: "Services and Service Capabilities"

[6] 3GPP TS 22.115: "Charging and Billing"

[7] 3GPP TS 22.121: "Virtual Home Environment"

[8] 3GPP TS 23.110: " UMTS Access Stratum; Services and Functions"

2.2 Informative references

[9] 3GPP TR 25.923: "Report on Location Services (LCS)"

[10] PD 30.lcs: "Project Plan for location services in UMTS"

[11] Third generation (3G) mobile communication system; Technical study report on the location services and technologies, ARIB ST9 December 1998.

[12] The North American Interest Group of the GSM MoU ASSOCIATION: Location Based Services, Service Requirements Document of the Services Working Group

3 Definitions and abbreviations

3.1 Abbreviations

For the purposes of the present document, in addition to GSM 01.04 [1] and TR.21.905, the following abbreviations apply:

LCS	Location Service
NA-ESRD	North American Emergency Services Routing Digits
NA-ESRK	North American Emergency Services Routing Key
NANP	North American Numbering Plan

NOTE: In the present document, acronyms are used in the text as if they are read either in their fully expanded form or in their alphabet names with no consistent principle.

3.2 Definitions

For the purposes of the present document the following definitions apply:

Current Location: after a location attempt has successfully delivered a location estimate and its associated time stamp, the location estimate and time stamp are referred to as the 'current location' at that point in time.

Deferred location request: a location request where the location response (responses) is (are) not required immediately.

Immediate location request: a location request where a single location response only is required immediately.

Initial Location: in the context of an originating emergency call the location estimate and the associated time stamp at the commencement of the call set-up is referred to as 'initial location'.

Last Known Location: The current location estimate and its associated time stamp for Target UE stored in the LCS Server is referred to as the 'last known location' and until replaced by a later location estimate and a new time stamp is referred to as the 'last known location'.

LCS Client: a software and/or hardware entity that interacts with a LCS Server for the purpose of obtaining location information for one or more Mobile Stations. LCS Clients subscribe to LCS in order to obtain location information. LCS Clients may or may not interact with human users. The LCS Client is responsible for formatting and presenting data and managing the user interface (dialogue). The LCS Client is identified by a unique international identification, e.g. E.164, number or Access Point Name (APN).

NOTE: The LCS Client may reside inside or outside the PLMN.

LCS Client Access barring list: an optional list of MSISDNs per LCS Client where the LCS Client is not allowed to locate any MSISDN therein.

LCS Client Subscription Profile: a collection of subscription attributes of LCS related parameters that have been agreed for a contractual period of time between the LCS client and the service provider.

LCS Feature: the capability of a PLMN to support LCS Client/server interactions for locating Target UEs.

LCS Server: a software and/or hardware entity offering LCS capabilities. The LCS Server accepts requests, services requests, and sends back responses to the received requests. The LCS server consists of LCS components which are distributed to one or more PLMN and/or service provider.

Location Estimate: the geographic location of a UE and/or a valid Mobile Equipment (ME), expressed in latitude and longitude data. The Location Estimate shall be represented in a well-defined universal format. Translation from this universal format to another geographic location system may be supported, although the details are considered outside the scope of the primitive services.

North American Emergency Services Routing Digits (NA-ESRD): a telephone number in the North American Numbering Plan (NANP) that can be used to identify a North American emergency services provider and its associated LCS client. The ESRD also identifies the base station, cell site or sector from which a North American emergency call originates.

North American Emergency Services Routing Key (NA-ESRK): a telephone number in the North American Numbering Plan (NANP) assigned to an emergency services call by a North American VPLMN for the duration of the call. The NA-ESRK is used to identify (e.g. route to) both the emergency services provider and the switch in the VPLMN currently serving the emergency caller. During the lifetime of an emergency services call, the NA-ESRK also identifies the calling mobile subscriber.

PLMN Access barring list: an optional list of MSISDN per PLMN where any LCS Client is not allowed to locate any MSISDN therein except for certain exceptional cases.

Privacy Class: list of LCS Clients defined within a privacy exception class to which permission may be granted to locate the target UE. The permission shall be granted either on activation by the target UE or permanently for a contractual period of time agreed between the target UE and the service provider.

Privacy Exception List: a list consisting of various types of privacy classes (i.e. operator related, personal etc.). Certain types of classes may require agreement between the service provider and the target MS.**Target MS:** The UE being positioned.

Target UE: The UE being positioned.

Target UE Subscription Profile: the profile detailing the subscription to various types of privacy classes.

4 Functional Requirements

3GPP standards shall support location service features, to allow new and innovative location based services to be developed. It shall be possible to identify and report in a standard format (e.g. geographical co-ordinates) the current location of the user's terminal and to make the information available to the user, ME, network operator, service provider, value added service providers and for PLMN internal operations.

The location is provided to identify the likely location of specific MEs. This is meant to be used for charging, location-based services, lawful interception, emergency calls, etc., as well as the positioning services.

The standard shall support both ~~GSM BSS~~GERAN and UTRAN to facilitate determination of the location of a mobile station.

The following subsections provide general descriptions of attributes that can be used to describe or characterize various location services.

The relative importance of these attributes varies from service to service. However, accuracy, coverage, privacy and transaction rate may be considered the primary distinguishing attributes that define a value-added service. Briefly:

- accuracy is the difference between actual location and estimated location,
- coverage is an expression of the geographic area in which the UE user will receive an adequate perceived quality of service,
- privacy describes the user's perception of confidentiality of the location information, and
- transaction rate indicates how frequently network messaging is required to support the service.

A general comparison of the specific attributes of various location-based services is provided in Annex C of this document.

4.1 High Level Requirements

The following high level requirements are applicable:

1 The supporting mechanisms should incorporate flexible modular components with open interfaces that facilitate equipment interoperability and the evolution of service providing capabilities.

2 The network should be sufficiently flexible to accommodate evolving enabling mechanisms and service requirements to provide new and improved services.

3 It shall be possible to provide multiple layers of permissions to comply with local, national, and regional privacy requirements.

4 Multiple positioning methods should be supported in the different Access Networks, including (but not limited to) UL-TOA, E-OTD, IPDL-OTDOA, Network Assisted GPS and methods using cell site or sector information and Timing Advance or RoundTrip Time measurements.

5 The location determining process should be able to combine diverse positioning techniques and local knowledge when considering quality of service parameters to provide an optimal positioning request response.

6 It should be possible to provide position information to location services applications existing within the PLMN, external to the PLMN, or in Mobile Equipment;

7 Support should be provided for networks based on an Intelligent Network architecture (i.e. with specific support for CAMEL based Location Services).

4.2 Location Information

Location Information consists of Geographic Location, Velocity, and Quality of Service information, as described in the subsequent sections.

4.2.1 Geographic Location

Provision of the geographic location of a target UE is applicable to all LCS services.

Note: For services other than LCS the network may also determine within which Cell or Service Area the Target UE is located ("Service Area" is a UTRAN concept and it may consist of one (in R99) or more than one cell). The Service Area information or Cell ID may be used for routing of calls or for CAMEL applications.

It should be noted that the Service Area concept is different from the Localized Service Area concept used for SoLSA.

4.2.2 Velocity

Velocity is the combination of Speed and Heading (direction) of a Target UE. The LCS Server may provide the Velocity of an UE.

For Value Added Services and PLMN Operator Services, the following is applicable:

Provision of the velocity of a target UE is application driven. Location Services may allow an LCS Client to request or negotiate the provision of velocity.

For Emergency Services there is no requirement to provide velocity.

4.3 Quality of Service

4.3.1 Horizontal Accuracy

The accuracy that can be provided with various positioning technologies depends on a number of factors, many of which are dynamic in nature. As such the accuracy that will be realistically achievable in an operational system will vary due to such factors as the dynamically varying radio environments (considering signal attenuation and multipath propagation), network topography in terms of base station density and geography, and positioning equipment available.

The accuracy for location services can be expressed in terms of a range of values that reflect the general accuracy level needed for the application. Different services require different levels of positioning accuracy. The range may vary from tens of meters (navigation services) to perhaps kilometers (fleet management).

The majority of attractive value added location services are enabled when location accuracies of between 25m and 200m can be provided.

Based on decreasing accuracy requirement some examples of location services are provided below:

· Location-independent	Most existing cellular services, Stock prices, sports reports
· PLMN or country	Services that are restricted to one country or one PLMN
· Regional (up to 200km)	Weather reports, localized weather warnings, traffic information (pre-trip)
· District (up to 20km)	Local news, traffic reports
· Up to 1 km	Vehicle asset management, targeted congestion avoidance advice
· 500m to 1km	Rural and suburban emergency services, manpower planning, information services (where are?)
· 100m (67%) · 300m (95%)	U.S. FCC mandate (99-245) for wireless emergency calls using network based positioning methods
· 75m-125m	Urban SOS, localized advertising, home zone pricing, network maintenance, network demand monitoring, asset tracking, information services (where is the nearest?)
· 50m (67%) · 150m (95%)	U.S. FCC mandate (99-245) for wireless emergency calls using handset based positioning methods
· 10m-50m	Asset Location, route guidance, navigation

Accuracy may be independently considered with respect to horizontal and vertical positioning estimates. Some location services may not require both, others may require both, but with different degrees of accuracy.

Given that the location estimate is the best possible within the bounds of required response time, the location estimates of a fixed position UE (assuming several estimates are made) will reveal a 'spread' of estimates around the actual UE position. The distribution of locations can be described by normal statistical parameters and suggests that a small proportion of location estimates may lie outside of the acceptable Quality of Service (QoS) parameters for specific services (as determined by the network operator).

It may be possible to provide information on the confidence that can be associated with a location estimate. This may be used by location services to decide if a position update should be requested, for example, if the reported accuracy falls below a threshold determined by the LCS Client or Network Operator for a specific service.

It may also be possible to determine velocity (speed and heading) information from a single location request. (i.e. the response to a single request may provide the results of multiple positionings).

When delivered with a location estimate, the confidence region parameters, speed and heading may allow an application to improve the service delivered to the UE user. Some examples are given below:

a) Confidence Region: Simple measure of uncertainty that specifies the size and orientation of the ellipse in which an UE is likely to lie with a predetermined confidence (e.g. 67%). The size of the confidence region may be used by the network operator or the LCS Client to request an updated location estimate.

b) Speed: enables e.g. congestion monitoring, and average travel time estimates between locations.

c) Heading: the location estimate of a vehicle may be improved to identify the appropriate side of the highway. This may enable the provision of traffic information that relates only to the user's direction of travel.

For Value Added Services and PLMN Operator Services, the following is applicable:

Accuracy is application driven and is one of the negotiable Quality of Service (QoS) parameters.

The precision of the location shall be network design dependent, i.e., should be an operator's choice. This precision requirement may vary from one part of a network to another.

The LCS shall allow an LCS Client to specify or negotiate the required horizontal accuracy. The LCS shall normally attempt to satisfy or approach as closely as possible the requested or negotiated accuracy when other quality of service parameters are not in conflict. The achieved accuracy level of location information shall be indicated using the shapes and uncertainty areas defined in TS 23.032 [3].

For Emergency Services (where required by local regulatory requirements) the following requirements shall be met:

- The LCS Server shall attempt to obtain the horizontal location of the calling UE, in terms of universal latitude and longitude coordinates, and shall provide this to an Emergency Service Provider. The accuracy shall be defined by local regulatory requirements. Annex A shows such requirements as exist in the United States.

NOTE: The LCS Server provides the location service capabilities but the mechanism by which location is reported to an emergency service provider is outside the scope of this service.

4.3.2 Vertical Accuracy

For Value Added Services, and PLMN Operator Services, the following is applicable:

The LCS Server may provide the vertical location of an UE in terms of either absolute height/depth or relative height/depth to local ground level. The LCS Server shall allow a LCS Client to specify or negotiate the required vertical accuracy. The LCS Server shall normally attempt to satisfy or approach as closely as possible the requested or negotiated accuracy when other quality of service parameters are not in conflict.

The vertical accuracy may range from about ten metres (e.g. to resolve within 1 floor of a building) to hundreds of metres.

For Emergency Services (where required by local regulatory requirements) there is no requirement for the support of vertical positioning.

4.3.3 Response Time

Different location based services, or different LCS Clients, may have different requirements (depending on the urgency of the positioning request) for obtaining a response. The location server may need to make trade-offs between requirements for positioning accuracy and response time.

For Value Added Services, and PLMN Operator Services, the following is applicable:

Response Time is one of the negotiable QoS parameters. Support of response time by a Public Land Mobile Network (PLMN) is optional. The LCS Server may allow a LCS Client to specify or negotiate the required response time (in the context of immediate location request, see table 1) either at provisioning or when the request is made. The LCS Server may optionally ignore any response time specified by the LCS Client that was not negotiated. If response time is not ignored, the LCS Server shall attempt to satisfy or approach it as closely as possible when other quality of service parameters are not in conflict.

For immediate location request response time options are as follows::

a) “no delay”: the server should immediately return any location estimate that it currently has. The LCS Server shall return either the Initial or Last Known Location of the Target UE. If no estimate is available, the LCS Server shall return the failure indication and may optionally initiate procedures to obtain a location estimate (e.g. to be available for a later request).

b) “low delay”: fulfillment of the response time requirement takes precedence over fulfillment of the accuracy requirement. The LCS Server shall return the Current Location with minimum delay. The LCS shall attempt to fulfill any accuracy requirement, but in doing so shall not add any additional delay (i.e. a quick response with lower accuracy is more desirable than waiting for a more accurate response).

c) “delay tolerant”: fulfillment of the accuracy requirement takes precedence over fulfillment of the response time requirement. If necessary, the server should delay providing a response until the accuracy requirement of the requesting application is met. The LCS Server shall obtain a Current Location with regard to fulfilling the accuracy requirement.

For Emergency Services (where required by local regulatory requirements) there may be no requirement to support negotiation of response time. The network shall then provide a response as quickly as possible with minimum delay. Response time supervision is implementation dependent.

4.4 Reliability

Reliability provides a measure of how often positioning requests that satisfy QoS requirements are successful. For some applications, such as cross-country vehicle tracking, this may not be especially critical. If a positioning attempt fails, due to lack of coverage or transient radio conditions, etc, another positioning attempt may be made. This attempt should be specified in Location Service Request. (see the section 5.3.1.1). However for other services, perhaps such as child tracking, reliability may be more important.

The network shall provide statistical reporting of reliability (QoS parameters) data.

4.5 Priority

Location requests for different services may be processed with different levels of priority.

For Value Added Services, and PLMN Operator Services, the following is applicable:

The LCS Server may allow different location requests to be assigned different levels of priority. A location request with a higher priority may be accorded faster access to resources than one with a lower priority and may receive a faster, more reliable and/or more accurate location estimate.

For Emergency Services (where required by local regulatory requirements) the location request shall be processed with the highest priority level.

4.6 Timestamp

For Value Added Services, and PLMN Operator Services, and Emergency Services (where required by local regulatory requirements), the LCS Server shall timestamp all location estimates provided to a LCS Client indicating the time at which the estimate was obtained.

4.7 Security

Specific local, national, and regional security regulations must be complied with.

Position information should be safeguarded against unapproved disclosure or usage. Position information should also be provided in a secure and reliable manner that ensures the information is neither lost nor corrupted. Audit records should be maintained of positioning requests and responses to facilitate resolution of security violations.

The LCS Client may be authorized by the LCS Server. Existing security mechanisms as well as security mechanisms of the LCS Server shall be used for authorizing the LCS Client and its request for location information.

For Value Added Services, the following is applicable:

Only authorized LCS Clients shall be able to access the LCS Server. Before providing the location of a Target UE to any authorized LCS Client, the LCS Server shall verify both the identity and authorization privileges of the LCS Client .

Once the LCS Server has verified that a particular LCS Client is authorized to locate a particular Target UE, any location estimate requested shall be provided to the LCS Client in a secure and reliable manner, such that the location information is neither lost, corrupted nor made available to any unauthorized third party.

For PLMN operator services, location information shall be provided in a secure and reliable manner. The ability to obtain location information shall depend on local regulatory laws and requirements in conjunction with requirements for UE privacy.

For Emergency Services (where required by local regulatory requirements) the following requirements shall be met:

Position information shall be provided to the Emergency Services Network as an authorized LCS client. Target UE authorization checks normally performed for value added services are not applicable (privacy is over-ridden). The position information shall be provided to the Emergency Services Network in a secure and reliable manner, such that the location information is neither lost, corrupted, nor made available to any unauthorized third party.

4.8 Privacy

Specific local, national, and regional privacy regulations must be complied with, and multiple layers of permissions may be required.

Location information must always be available to the network service provider.

Means shall be provided for the UE subscriber to control privacy for value added services.

The user shall be able to change the setting of the Privacy exception list at any time.

Unless required by local regulatory requirements, or overridden by the target UE User, the target UE may be positioned only if allowed in the UE subscription profile. In general, for valued added location services, the target UE being positioned should be afforded the maximum possible privacy, and should not be positioned unless the positioning attempt is explicitly authorized. In the absence of specific permission to position the target UE, the target UE should not be positioned.

It may also be possible for a target UE to authorize positioning attempts after the target UE is notified of a positioning request and the target UE grants permission for positioning This notification condition (notification with privacy verification) shall be specified in the Target UE Subscription Profile. (See the subsequent "target subscriber notification" section of this document for charging and billing aspects.)

The privacy of an inanimate asset for an embedded target UE may be completely defined by the UE subscriber.

Additionally, specific privacy exceptions may exist for compliance with mandated location based services (such as for emergency services or lawful intercept) which are required by national or local regulatory requirements.

For Value Added Services, the following is applicable:

The Target UE Subscriber shall be able to restrict access to the Location Information (permanently or on a per attempt basis). The LCS Client access shall be restricted unless otherwise stated in the Target UE Subscription Profile. The home network shall have the capability of defining the default circumstances in which the Target UE's Location Information is allowed to be provided - as required by various administrations and/or network requirements.

It shall be possible for location services to support conditional positioning. Under these conditions, an application that is granted conditional positioning authorization must notify and obtain positioning authorization from the user of the target UE prior to performing the positioning process. Thus the user of the target UE shall be able to accept or reject the positioning attempt.

The default treatment, which is applicable in the absence of a response from the Target UE, shall be specified in the Target UE Subscription Profile. Thus for some location services the default treatment may be to accept the positioning request, whereas for other location services the default treatment may be to reject the positioning attempt.

However, considering that in general, users shall be afforded the maximum possible privacy, and shall not be positioned unless the target subscriber authorizes the requesting location application to perform positioning, the default condition shall normally be to deny the positioning attempt.

For PLMN operator services, the target UE subscriber may be able to restrict access to location information used to enhance or support particular types of service. The LCS client access shall be restricted unless stated otherwise in the Target UE subscription profile. The target UE user shall not be notified of any authorized location attempt.

For Emergency Services (where required by local regulatory requirements) Target UEs making an emergency call may be positioned regardless of the privacy attribute value of the subscriber associated with the Target UE (or ME) making the call.

For Lawful Interception Services (where required by local regulatory requirements), target UEs may be positioned under all circumstances required by local regulatory requirements. The target UE user shall not be notified of any location attempt.

4.9 Service Authorization

Requests for positioning information should be processed only if the requesting application is authorized. The identity and authorization privileges of the requesting application should be verified prior to processing positioning requests.

4.10 Service Activation and De-Activation

To maximize the adoption of location services, the service activation process must be simple. Three types of service package, may be distinguished, each of which may require a different service activation process:

1 On Demand: the user accesses services only when required.

2 Period Subscription: the subscriber requires periodic availability of the service

3 Mixed: some services provided on subscription and the remainder on-demand.

The process of activation + service delivery + deactivation may be provided in a single transaction. It may be possible for a subscriber to activate a location service on one occasion before deactivating an existing invocation.

Furthermore, a location service may be 'enabled' at the point of sale as part of the service package purchased by the UE subscriber. The use of Over-The-Air (OTA) provisioning may allow the location feature to be enabled for UE-based positioning methods.

4.11 Coverage

In general an UE user should be able to access a location service anywhere within the operator's coverage area, or within the roaming area. Three levels of coverage may be considered:

1 Home Network - Complete

2 Home Network - Partial

3 Roaming Networks

Considering network topography and dynamically varying environmental factors, a network operator may not be able to guarantee homogeneous service quality across the entire home network geographic area, or roaming partners' networks. Even within those areas where service is offered, the provided quality of service may vary due to dynamic environmental (i.e. radio) conditions. Additionally, the location method may have an accuracy that depends on the UE location, for example due to varying radio conditions, cell configuration and cell density in different areas, and geometric dilution of precision.

Furthermore the roaming partner's network may not accept a similar location method to that experienced by the user in the home network.

Finally, the service may not be available in a roaming partner's network despite technical interoperability between the location method supported by the UE and the network.

Therefore coverage may be considered not only to be a technical attribute, but may also be related to roaming contracts between network operators. In general, provided that a roaming agreement exists, any properly authorized location-based service may position a Target UE in either the Home PLMN (HPLMN) or a Visited PLMN (VPLMN). It may also be noteworthy that some location based services (such as location based information services) may be especially attractive to subscribers roaming outside their home networks.

4.12 Roaming Target UE

With respect to roaming, specific local, national, and regional privacy regulations must be complied with, and multiple layers of permissions may be required.

Many location-based services may be especially attractive to subscribers roaming outside their home PLMN. As such, support should be provided for the transparent and consistent provision of location based services to the fullest extent possible. Consideration for roaming support should be provided with the following priorities:

1. Roaming between ~~GSM~~ 3GPP~~family~~ networks.
2. Roaming between 3GPP~~2~~ 2nd ~~Generation GSM~~ systems and IMT 2000 family networks.
3. Roaming between ~~GSM~~ 3GPP and ANSI-41 or other systems.

If the location capability in the VPLMN is compatible with that provided in the HPLMN, the same parameters must be provided to the location server in the VPLMN that would be provided to the server in the HPLMN to enable provision of the same services.

For Value Added Services, the following is applicable:

Provided that a roaming agreement exists, the LCS feature shall allow any properly authorized LCS client to request and receive the location of a particular Target UE when the Target UE is either located in its Home PLMN (HPLMN) or Visited PLMN (VPLMN). Any PLMN not supporting the LCS feature shall return a suitable error response to any other PLMN from which an LCS request is received. The requesting PLMN shall then infer that the LCS feature is not supported and provide a suitable error response in turn to the requesting LCS Client.

For PLMN Operator Services, location of any roaming target UE shall be supported in the VPLMN as allowed by both local regulatory requirements and considerations, where applicable, of UE privacy.

For Emergency Services (where required by local regulatory requirements) the Serving PLMN shall support the positioning of all Target UEs including roaming Target UEs currently serviced by that serving PLMN. There is no requirement for a HPLMN to position Target UEs that have roamed outside the HPLMN.

4.13 Support for all UEs

For value added services, and PLMN operator services, the LCS feature may be supported for all UEs.

For Emergency Services (where required by local regulatory requirements), positioning shall be supported for all UEs (i.e. including legacy UEs) where coverage is provided, and also UEs without a SIM/USIM.

Both “active” and “idle” UEs shall be capable of being positioned.

4.14 Support for Unauthorized UEs

For value added services, support of unauthorized UEs may be provided by the PLMN.

For PLMN operator services, positioning of unauthorized UEs may be provided by the PLMN as required by local regulatory requirements.

For Emergency Services (where required by local regulatory requirements), the PLMN shall support positioning for unauthorized UEs (i.e. including stolen UEs and UEs without a SIM/USIM).

NOTE: A subscriber is in general identified as an UE containing in it the SIM/USIM associated with the subscriber. In some exceptional cases (e.g., an Emergency call), an UE without a valid subscription recognized in the PLMN can become a Target UE. In such a case, the subscriber may be identified by the identity associated with the Mobile Equipment (ME) involved in the call.

4.15 Periodic Location Reporting

Periodic location reporting is the act of the LCS Server initiating multiple position locations spread over a period of time.

The periodic reporting function is generally applicable for asset management services and exists as several variants, each applicable to different value added services:

· Location reporting only within predetermined period	e.g. commercial asset tracking and, subject to provision of privacy, manpower planning.
· Periodic location reporting within specified period and reporting triggered by a specific event	e.g. high value asset security, stolen vehicle monitoring, home zone charging.
· Periodic location reporting triggered by a specific event	e.g. 24hr depot management, transit passenger information systems

Periodic location determination and reporting increases network traffic. However, scheduling the periods of location monitoring and reporting will reduce this. Finally, event-based logic provided by the network operator that monitors the asset (location and status) and only reports events that meet conditions agreed with the application may reduce network traffic further without reducing the QoS.

If this event-based or time-based decision process is the responsibility of the application and not the network operator then all of the above services can be regarded as periodic location reporting.

For value added services, and PLMN operator services, support of periodic location reporting may be provided by the PLMN.

When an LCS client activates Periodic Location Reporting, the LCS server shall be able to inform the target Ms of this activation according to the Privacy Exception List.

It should be possible for the target UE at any time to query the LCS server about any valid requests activated for that target UE, and/or cancel the request.

When a request is cancelled by the target UE, the LCS server shall inform the LCS client of this cancellation.

It should be possible for more than one LCS client to activate requests for the same target UE.

For Emergency Services (where required by local regulatory requirements), there is no requirement for the PLMN to support periodic location reporting.

4.16 UE-Based Location Calculation

UE-Based Location Calculation may be supported on either a per-request basis or autonomously whereby a single request from an UE subscriber enables UE based location calculation over an extended period without further interaction with the PLMN.

For Commercial Services, the following may be applicable for autonomous location:

The network may broadcast location assistance information to mobiles, which enables mobiles to calculate their own location. The network may encrypt the location assistance information. If the location assistance information is encrypted, a single common standardized encryption algorithm shall be used.

The location assistance information may be available to the UE at all times, continuously in idle mode and during a call, without additional point to point signalling. The network may request location information from the UE for operator or for service provider applications. For this purpose a point to point signalling connection must be established.

4.17 UE_Assisted LCS Location Calculation

The UE-Assisted Location Calculation is accomplished by network resources based upon radio ranging measurements provided by the UE.

For Commercial Services, the following may be applicable for UE-Assisted location services:

The network may broadcast assistance information to mobiles, which enables mobiles to obtain the appropriate radio ranging measurements. The network may encrypt the assistance information. If the assistance information is encrypted, a single common standardized encryption algorithm shall be used.

The assistance information may be available to the UE at all times, continuously in idle mode and during a call, without additional point to point signalling. The network may request radio ranging measurement data from the UE for operator or for service provider applications. For this purpose a point to point signalling connection must be established. Optionally, this point to point connection can be used to deliver the resulting location to the UE.

4.18 Mobile Originating Location

Mobile Originating Location is the capability of the mobile station to obtain its own geographical location or have its own geographic location transferred to another LCS client.

For Value Added Services, the following may be applicable:

There are three classes of mobile originating location:

Basic Self Location - The mobile station needs to interact with the network for each separate location request

Autonomous Self Location - The mobile station does not need to interact with the network for each separate location request. One interaction with the network enables the mobile station to obtain multiple location positionings over a predetermined period of time.

Transfer to Third Party – The location of the mobile station is transferred by request of the mobile station to another specified LCS client.

4.19 Network support for LCS

The provision of location services shall be possible without significantly adversely impacting the radio transmission or the signalling capabilities of the network.

5 Logical Description

5.1 Logical Reference Model

Figure 1 shows the logical reference model for LCS whereby an LCS Client is enabled to request location information for one or more certain target UEs from the LCS Server supported by a PLMN. The LCS Server employs a positioning function to obtain the location information and furnish the information to the LCS Client. The particular requirements and characteristics of an LCS Client are made known to the LCS Server by its LCS Client Subscription Profile. The particular LCS-related restrictions associated with each Target UE are detailed in the Target UE Subscription Profile. The LCS feature shall allow a Target UE to be positioned within a specified Quality of Service. The LCS feature shall allow the location of a Target UE to be determined at any time whilst the UE is attached.

The LCS feature shall support conveyance of both the location Quality of Service (QoS) requirements of the LCS Client and the location information returned to the LCS Client in a universal standard format.

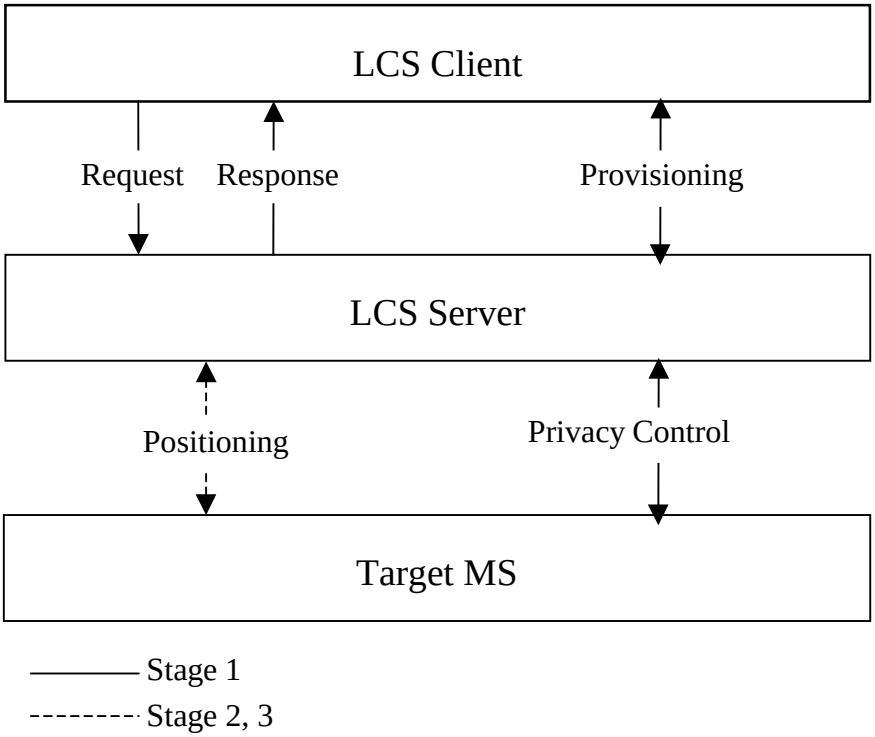

Figure 1. LCS Logical Reference Model

5.2 Functional Entities

5.2.1 LCS Client

An LCS Client is a logical functional entity that makes a request to the PLMN LCS server for the location information of one or more than one target UEs within a specified set of parameters such as QoS. The LCS Client may reside in an entity (including an UE) within the PLMN or in an entity external to the PLMN. The specification of the LCS Client's internal logic and its relationship to any external user is outside the scope of this document.

5.2.2 LCS Server

An LCS server consists of a number of location service components and bearers needed to serve the LCS clients. The LCS server shall provide a platform which will enable the support of location based services in parallel to other telecommunication services such as speech, data, messaging, other teleservices, user applications and supplementary services and therefore enable the market for services to be determined by users and service providers. The LCS server may respond to a location request from a properly authorized LCS client with location information for the target UEs specified by the LCS client if considerations of target UE privacy are satisfied. The LCS server may enable an LCS client to determine the services provided to it by the LCS server through a process of provisioning.

5.2.3 Positioning Function

Positioning is the basic function that performs the actual positioning of a specific target UE. The input to this function is a positioning request from a LCS Client with a set of parameters such as QoS requirements. The end results of this function are the location information for the positioned target UE.

5.2.4 Target UE

The Target UE is the object to be positioned by the LCS Server. For network based positioning methods, no support for LCS is required by the target UE. For mobile assisted and mobile based positioning methods, the target UE actively supports LCS. For all positioning methods, the ability to control privacy may be required to be given to the UE user for

each location request and/or to the UE subscriber through the Target UE subscription profile to satisfy local regulatory requirements (see the previous section on Privacy).

5.3 Functional Interfaces

5.3.1 LCS Client / LCS Server Interface

The LCS client/server use LCS messages to exchange information. Each LCS message contains a set of parameters.

In the case of UE Based positioning methods, if the LCS Client is located in the UE, then an internal LCS Client /LCS Server interface may be supported.

NOTE: Further regional/national specific interfaces between LCS clients and servers may need to be supported in addition to the interfaces described here.

5.3.1.1 Location Service Request

Using the Location Service Request, an LCS client communicates with the LCS server to request the location information for one or more target UEs within a specified set of quality of service parameters.

As shown in Table 1, a location service may be specified as immediate or deferred.

Table 1: Location Service Requests

Request Type	Response Time	Number of Responses
Immediate	Immediate	Single
Deferred	Delayed (event driven)	One or More

If a positioning attempt fails, the LCS server may make another positioning attempt. This attempt should be made when the target UE can be detected by the network. It may be possible for the LCS client to set this action as an option. This optional action should be applied for both request types.

Note: This functionality may be provided using one or more of the existing toolkits, including but not limited to CAMEL and OSA.

When using the Deferred type (event driven), the LCS client shall be able to set the following items:

- Time interval of positioning
- Number of responses (if needed)
- Valid period of the request (if needed)

It shall be possible for the LCS client to cancel the pre-arranged request.

It shall be possible for the LCS server to set the minimum time interval of positioning allowed.

For Emergency Services, LCS shall support requests for the initial, the current (updated), or the last known position of an ME while a voice connection is established.

5.3.1.2 Location Service Response

The Location Service Response provides the result of a Location Service Request from the LCS Server to the LCS Client.

A LCS response is either '*immediate*' or '*deferred*'. The LCS Request indicates the type of response the LCS Client wishes to receive. The two types of location response are described in table 2.

Table 2: Types of LCS Response

Response	Description
Immediate	A Location Response is referred to as 'immediate ', when a response to a request for location information is answered immediately (within a set time). The response shall be single and not dependent to any event.
Deferred	A Location Response is referred to as 'deferred', when a response to a request for location information is returned after the occurrence of an event specified by the LCS client. The response can be single or periodic.

When the location positioning for the target UE has failed, the LCS server may be able to report the reason for failure and Last Known Location with the relevant timestamp.

5.3.1.3 Location Service Request Report

The Location Service Request Report provides the result of a deferred Location Service Request from the LCS Server to the LCS Client. The report is provided using a dialog between the LCS Client and the LCS Server that is initiated by the LCS Server.

5.4 Location information

5.4.1 Sources of location information

It shall be possible for the location determining process to make use of several sources of information in determining the location. Propagation and deployment conditions may limit the number or quality of measurements or additional measurements may be possible. Some ME may also have additional (independent) sources of position information. The LCS shall be capable of making use of the restricted or the extra information as appropriate for the service being requested.

6 Service Provision

6.1 Identification of a Target UE

For value added services, the following is applicable:

The LCS client shall identify a target UE using the UEISDN.

The LCS Client shall be able to identify the target UE using IP addressing.

For PLMN operator services, the LCS client may identify a target UE using any of the following:

MISISDN

IMSI

An identifier internal to the PLMN

For emergency services (where required by local regulatory requirements), the LCS client may identify a target UE using any one of the following:

MSISDN

IMSI

NA-ESRK + (optionally) IMEI

6.2 Location Information Provided to the LCS Client

For value added services, the following is applicable:

The LCS Server shall provide, on request, the current or most recent Location Information (if available) of the Target UE or, if positioning fails, an error indication plus optional reason for the failure.

For PLMN operator services (where allowed by local regulatory requirements and restrictions on UE privacy), Location Information for a particular target UE may be provided to a PLMN operator LCS client either on request or on the occurrence of an event in the LCS server that has been defined to equate to such a request.

For emergency services (where required by local regulatory requirements), the geographic location may be provided to an emergency services LCS Client either without any request from the client at certain points in an emergency services call (e.g. following receipt of the emergency call request, when the call is answered, when the call is released) or following an explicit request from the client. The former type of provision is referred to as a "push" while the latter is known as a "pull". In the case of a "pull", the emergency service LCS Client shall identify the Target UE as defined in section 6.1. Table 3 shows the information that may be provided to the client for either a "push" or a "pull".

Table 3: Location related information provided to an emergency services LCS Client

Type of Access	Information Items
Push	Current Geographic Location (if available) MSISDN IMSI IMEI NA-ESRK NA-ESRD State of emergency call – unanswered, answered, released (note 1)
Pull	Geographic location (note 2), either: Current location initial location at start of emergency call

NOTE 1: indication of call release means that any NA-ESRK will no longer identify the calling UE subscriber

NOTE 2: which type of location is required will be indicated by the LCS Client

6.3 LCS Client Subscription

It shall be possible for an LCS Client to subscribe to the LCS feature for third-party location with or without subscription to other services. A LCS Client may subscribe to one or more service providers' LCS feature in one or more PLMNs. The LCS Client Subscription Profile of a client may contain the range of QoS and subscriptions that the LCS Client is allowed to request.

For certain authorized LCS Clients internal to the PLMN, a subscription profile may be unnecessary. For these LCS Clients subscription to LCS feature is given implicitly as a result of subscription to an authorized PLMN service (e.g. supplementary services). These LCS Clients are empowered to access the LCS Server and request location information for a Target UE.

For emergency services, the subscription requirements to the LCS feature may not be needed.

6.4 Target UE Subscription

6.4.1 Privacy Subscription Options

It shall be possible for a Target UE Subscriber to subscribe to various types of privacy classes. The default treatment in the absence of the information to the contrary in the Target UE Subscription Profile shall be to assume that access is restricted to all LCS Clients (unless using privacy overriding, or otherwise overridden by local regulatory requirements).

Privacy Attributes consist of:

Privacy Exception List: determines which LCS Clients and classes of LCS Clients may position a Target UE;

Privacy Override Indicator: determines applicability of the Privacy Exception List.

6.4.2 Privacy Exception List

To support privacy, the LCS Server shall enable each Target UE Subscriber to subscribe to a "privacy exception list" containing the LCS Client identifiers, classes of LCS Clients, the target subscriber notification setting (with/without notification) and the default treatment, which is applicable in the absence of a response from the Target UE for each LCS Client identifiers.

The privacy exception list shall support a minimum of 20 clients. The maximum number of clients shall be determined by implementation constraints.

If the target subscriber notification is set as "notification with verification", each positioning request from the LCS Client shall be notified to the target UE before positioning. The treatment for location request from the LCS Client, which is not registered in the privacy exception list, shall also be specified in the privacy exception list. An empty privacy exception list shall signify an intent to withhold location from all LCS Clients.

The classes that can be included are as follows.

- Universal Class: location services may be provided to all LCS Clients;
- Call/session-related Class: location services may be provided to any value added LCS clients or a particular value added LCS client or particular group of value added LCS Clients – where each LCS Client or group of LCS Clients is identified by a unique international identification, e.g. E.164 or Access Point Name (APN) that currently has a temporary association with the Target UE in the form of an established voice, data call or PS session originated by the Target UE. For each identified LCS Client or group of LCS Clients, one of the following geographical restrictions shall apply:

    a) Location request allowed from an LCS Client served by identified PLMN only;

    b) Location request allowed from an LCS Client served in the home country only;

    c) Location request allowed from any LCS Client;

- Call/session-unrelated Class; location services may be provided to a particular value added LCS Client or particular group of value added LCS Clients – where each LCS Client or group of LCS Clients is identified by a unique international identification, e.g. E.164, number or Access Point Name (APN). For each identified LCS Client or group of LCS Clients, one of the following geographical restrictions shall apply:

    a) Location request allowed from an LCS Client served by identified PLMN only;

    b) Location request allowed from an LCS Client served in the home country only;

    c) Location request allowed from any LCS Client;

PLMN Operator Class – location services may be provided by particular types of LCS clients supported within the HPLMN or VPLMN. The following types of clients are distinguished (see note):

a) Clients broadcasting location related information to the UEs in a particular geographic area – e.g. on weather, traffic, hotels, restaurants;

b) O&M client (e.g. an Operations System) in the HPLMN

c) O&M client (e.g. an Operations System) in the VPLMN

d) Clients recording anonymous location information (i.e. without any UE identifiers) – e.g. for traffic engineering and statistical purposes

e) Clients enhancing or supporting any supplementary service, IN service, bearer service or teleservice subscribed to by the target UE subscriber.

NOTE: The definitions of the various PLMN operator categories may be supplemented by more precise language in contractual agreements both between UE subscribers and their home service providers and between individual network operators with inter-PLMN roaming agreements. Such classification of the PLMN operator categories is outside the scope of this specification.

6.4.3 Privacy Override Indicator

The privacy override indicator is applicable to lawful intercept and emergency services as allowed by local regulatory requirements. It is not applicable to value added and PLMN operator services. The Privacy Override Indicator shall be used to determine whether Subscriber Privacy of the Target UE subscriber should be overridden or not. This indicator will be set for certain special LCS Clients when it is justified. Each LCS Client shall be associated with a particular value of a position privacy override indicator during the LCS Client provisioning. The privacy override indicator is normally only valid when the LCS Server for the LCS client is located in the same country of the Target UE. If agreed by bi-lateral agreements between operators, the privacy override indicator shall also be valid when the LCS client is not located in the same country as the Target UE.

6.4.4 Subscription to Mobile Originating Location

The UE subscriber may subscribe to the following types of Mobile Originating Location (as defined in section 4):

A) Basic Self Location

B) Autonomous Self Location

C) Transfer to Third Party

6.5 Security

The LCS Server may authorize the LCS Client. There may be security mechanisms to authorize the LCS Client's request for locating a Target UE based on:

LCS Client access barring list(s),

PLMN/SP access barring list,

Point of origin of a location request.

6.6 Charging

The LCS Server shall enable a PLMN to charge LCS Clients for the LCS features that the PLMN provides. . The information that the operator uses to generate a bill to an LCS Client is operator or service provider specific. The charging information may be collected both for the LCS Client and for inter-network revenue sharing.

To support charging and billing for location services, additional information will need to be provided in call detail records.

Charging for value added location services may be provided on a transaction basis, periodically, or a mixture of both.

To support transaction based charging where applicable, service associated call detail records may need to include (as a minimum) the following additional information (depending on the specific service):

- Type and Identity of the LCS Client;
- Identity of the target UE;
- Results (e.g. success/failure, method used, position, response time, accuracy)
- Time Stamp;
- Type of coordinate system used.

6.7 LCS Open Service Architecture and Application Programming Interface

LCS shall support the Open Service Architecture (OSA) standardized Application Programming Interface (API). The OSA and Virtual Home Environment (VHE) service aspects of LCS are described in 22.121.

7 Provisioning and Administration

7.1 Procedures for an LCS Client

These procedures are concerned with the LCS client's provisioning and administration to the LCS feature.

7.1.1 Provisioning

Provisioning is an action to make the LCS feature available to a subscriber.

Provisioning may be:

- General: where the service may be made available to all subscribers without prior arrangements being made with the service provider (i.e. emergency calls).
- Pre-arranged: where the service is made available to an individual LCS Client only after the necessary arrangements have been made with the service provider.

7.1.2 Withdrawal

Withdrawal is an action taken by the service provider to remove an available LCS feature from a LCS Client's subscription profile.

Withdrawal may be:

- General: where the LCS feature is removed from all LCS Clients.
- Specific: where the LCS feature is removed on an individual basis per LCS Client.

7.1.3 Invocation

Invocation is an action to invoke the LCS feature, taken by the LCS Client (e.g. issuing a location request) or automatically by the LCS server as a result of a particular condition (e.g. periodic location request, mobile originating emergency call, etc.).

7.2 Procedures for a Target UE

These procedures are concerned with a Target UE's privacy exception list.. For emergency services, provisioning and withdrawal for Target UEs may not apply.

7.2.1 Provisioning

Provisioning is an an action to make the privacy exception list with its privacy classes available to a Target UE. The provision may be:

- General: where the list is made available to all Target UE's without prior arrangements being made with the service provider. The list shall contain the default privacy class.

- Pre-arranged: where any extra privacy permission class (--granting permission to locate an UE Client) shall be capable of being independently provisioned for a target UE as agreed with the service provider for a certain contractual period.

7.2.2 Withdrawal

Withdrawal is an action taken by the service provider to remove an available privacy class from a target UE's PEL. Withdrawal may be:

- General: where a privacy class is removed from all target UEs provided with this privacy class.
- Specific: where each of the privacy classes in the privacy exception list shall be independently withdrawn at the subscriber's request or for administrative reasons.

7.2.3 User Control

The user shall be able to change the following settings in the privacy exception list.

- the LCS Client and/or group of LCS Clients list
- the target subscriber notification setting (with/without notification)
- the default treatment, which is applicable in the absence of a response from the Target UE for each LCS Client identifiers

8 Interactions with Bearer and Teleservices and Other Services

LCS shall support location of any Target UE that is idle or has established any CS teleservice, bearer service or PS session.

Location of a GPRS terminal or an UE using SMS may be supported.

Provision of location services to assist supplementary services and CAMEL is outside the scope of this specification. The operation of location services shall be independent of other services - including Number Portability, private numbering, CAMEL, supplementary services, teleservices, and bearer services.

9 Cross Phase Compatibility between releases

This section details the cross phase compatibility requirements relating to the service requirements in this document.

Note: when a change is introduced which affects the 3GPP specifications, it is said to be 'backward compatible' if existing equipment can continue to operate and perform correctly with equipment that conforms to the new implementation.

9.1 Compatibility With Existing Standards

Where the service and operational requirements in this document relate to a core network functionality, compatibility is required.

UTRAN LCS mechanisms shall be developed to maximise synergies with earlier LCS phases.

9.2 Compatibility With Future Releases

It is envisaged that 3GPP standards will evolve in future releases, for example with the addition of new service requirements. The standards which define the technical implementation of LCS should be developed in such a way that it is practical to add the requirements in this section in a backward compatible manner.

Following chapters include requirements that are foreseen for future release.

9.2.1 Void

9.2.2 Location determination in call or PDP context activation and release

A possible future enhancement in LCS is that location information of a specific target UE may be obtained at the activation of a Call or PDP Context. A corresponding mechanism to obtain the location information of a specific target UE at the release of a Call or PDP Context may also be feasible.

9.2.3 Void

9.2.4 Defined geographical areas

It shall be possible to specify a geographical area as ellipse to a resolution that will be limited by the accuracy capability of the part of the serving network where the user is registered.

It may be possible to identify and report when the user's terminal enters or leaves a specified geographic area.

In order to enable ME to determine itself if it enters or leaves a defined geographical area information about the defined geographical area shall be made available to client. The method is FFS, one alternative is that cells covering parts of the geographical area broadcasts information about the geographical area.

9.2.5 Continuous check of location

The client may continuously check its current location with or without requesting signalling support from the network using the Self Location feature. In this way the client may become aware of entering or leaving a predefined geographical area, as defined above, and/ or it can supply the user or an application with real-time tracking information.

9.2.6 Identification of a Target UE

In future releases usage of IP addresses for UE identification shall be supported by the standard.

9.2.7 Void

9.2.8 VHE

LCS shall support VHE 22.121 [7].

Annex A (informative): USA FCC Wireless E911 Rules

Action was taken by the FCC on September 15, 1999, with respect to E911 location technology by the Third Report and Order (FCC 99-245).The FCC has adopted the following revisions to its wireless E911 rules:

- Wireless carriers who employ a Phase II location technology that requires new, modified or upgraded handsets (such as GPS-based technologies) may phase-in deployment of Phase II subject to the following requirements:

  - Without respect to any PSAP request for Phase II deployment, the carrier shall:

    1. Begin selling and activating ALI-capable handsets no later than March 1, 2001;
    2. Ensure that at least 50 percent of all new handsets activated are ALI-capable no later than October 1, 2001; and
    3. Ensure that at least 95 percent of all new digital handsets activated are ALI- capable no later than October 1, 2002.

  - Once a PSAP request is received, the carrier shall, in the area served by the PSAP:

  Within six months or by October 1, 2001, whichever is later:

    1. Ensure that 100 percent of all new handsets activated are ALI-capable;
    2. Implement any network upgrades or other steps necessary to locate handsets; and
    3. Begin delivering to the PSAP location information that satisfies Phase II requirements.

  Within two years or by December 31, 2004, whichever is later, undertake reasonable efforts to achieve 100 percent penetration of ALI-capable handsets in its total subscriber base.

- For roamers and other callers without ALI-capable handsets, carriers shall support Phase I ALI and other available best practice methods of providing the location of the handset to the PSAP.

- To be allowable under the FCC rules, an ALI technology that requires new, modified, or upgraded handsets shall conform to general standards and be interoperable, allowing roaming among different carriers employing handset-based location technologies.

- For carriers employing network-based location technologies, the FCC replaces its current plan, which requires that implementation be fully accomplished within 6 months of a PSAP request, with a revised rule requiring the carrier to deploy Phase II to 50 percent of callers within 6 months of a PSAP request and to 100 percent of callers within 18 months of such a request.

- The FCC adopts the following revised standards for Phase II location accuracy and reliability:

- For network-based solutions: 100 meters for 67 percent of calls, 300 meters for 95 percent of calls;

- For handset-based solutions: 50 meters for 67 percent of calls, 150 meters for 95 percent of calls.

- The FCC directs wireless carriers to report their plans for implementing E911 Phase II, including the technology they plan to use to provide caller location, by October 1, 2000. This report shall provide information to permit planning for Phase II implementation by public safety organizations, equipment manufacturers, local exchange carriers, and the FCC, in order to support Phase II deployment by October 1, 2001.

Annex B (informative): Descriptions of possible location based services

B1 Public Safety Services

Service providers offer these location-based services for the good of the public. They are made available without requiring pre-subscription.

B1.1 Emergency Services

Specific consideration of mandated Emergency Services is outside the scope of this specification. Such requirements may be regionally or nationally specific.

B1.1.1 Attributes

Specific consideration of the attributes for mandated Emergency Services is outside the scope of this specification. However, the current requirements specified by the U.S. FCC Phase II Mandate may be useful as an example.

> The FCC's Third Report and Order (FCC 99-245) in the matter of revision of the commission's rules to ensure compatibility with Enhanced 911 Emergency Calling Systems (CC Docket No. 94-102 RM-8143), adopted September 15, 1999, states:
>
> *We adopt the following revised standards for Phase II location accuracy and reliability:*
>
> - *For network-based solutions: 100 meters for 67% of calls, 300 meters for 95 percent of calls;*
> - *For handset-based solutions: 50 meters for 67% of calls, 150 meters for 95 percent of calls.*

The network should be sufficiently flexible to accommodate evolving enabling mechanisms and service requirements to provide new and improved services.

B1.1.2 Emergency Alert Services

Emergency Alert Services may be enabled to notify wireless subscribers within a specific geographic location of emergency alerts. This may include such alerts as tornado warnings, pending volcano eruptions, etc.

No requirements currently exist for Emergency Alert Services, and they may be considered for further study.

B2 Location Based Charging

Location Based Charging allows a subscriber to be charged different rates depending on the subscriber's location or geographic zone, or changes in location or zone. The rates charged may be applicable to the entire duration of the call, or to only a part of call's duration. This service may be provided on an individual subscriber basis, or on a group basis.

For example, when provided on an individual basis this service could apply reduced rates to those areas most often frequented by the subscriber by taking into consideration the subscriber's daily route and life style. Different rates may be applied at country clubs, golf courses, or shopping malls. For example, a "home" zone may be defined which is centered around a user’s home, an agreed larger area, work or travel corridor or some unrelated zone. The zone may vary in size and shape from a cell (or sector) coverage area to a precisely defined polygon completely independent of cell coverage.

Additionally, different rates may be applied in different zones based on the time of day or week.

In addition to being applicable on an individual basis, this service may be applicable on a group basis, which may be desirable for example, for business groups. Locations may be defined for business groups to include corporate campuses, work zones or business zones with different tiers of charging rates.

Individual and group subscribers should be notified of the zone or billing rate currently applicable, and be notified when the rate changes. Location Based Charging may be invoked upon initial registration. A charging zone would then be associated with the subscriber's location. When the subscriber moves to a different zone, the subscriber would be notified.

This service should be transparently provided to the subscriber (i.e. independent of existing voice calls, data, or other services being provided).

B2.1 Attributes

Normal service operation includes invocation upon initial registration, autonomous registration, call origination, and call termination. Location-Based Charging should analyze location information to compare against service zones established for the subscriber. The service would notify the subscriber of their relative location to the established service zone, indicating either "in" or "out" of zone. As the subscriber changes location or predefined location service area they should be notified of their location-based charging service opportunity, being "in" or "out" of a subscribed zone. Except for subscriber notification, the user should experience transparency in interaction with other services (Voice, Data, SMS, etc).

This service may, as an option, be activated/de-activated using special feature codes on a subscriber or business customer basis.

B2.1.1 Target Subscriber Notification

The user needs to be informed on an ongoing basis which zone and billing rate is currently applicable.

Users should be enabled to make an informed decision on expected call charges and therefore need to be provided charging zone information accurately, and in a timely manner, being notified which zone they are in when a call is set up. Notification to the subscriber/user could be provided in several forms including tone, announcement, or short message.

The billing system will need to consider the following possible scenarios:

1. For the duration of the call, the subscriber remains in a single charging zone

2. During the call, the charging zones may change

2.1. The user may initiate a call in one zone, then move to a different zone where the call is terminated.

2.2. The user may cross back and forth between zones multiple times during the duration of a call, and the call may terminate in the zone it was originated from, or in a different zone.

Notification to the user may be via the UE MMI prior to initiation of the call and, during the call.

B2.1.2 Charging

To support appropriate charging, call detail records may need to include the following additional information:

1 Location Service (Location Based Charging) Identification

2 Location Information

3 Zone Information

4 Type of Event

5 Duration of Event

B2.1.3 Roaming

If a subscriber with active location based charging roams into a system that does not support the service, the subscriber may be notified of an "out of coverage zone" notification using the best possible method (UE display, SMS, etc.).

B3 Tracking Services

Although Fleet and Asset Management services may be offered as separate services, within this document they are described as a single service category. In a similar manner, Person Tracking may be viewed as a form of personal asset tracking.

B3.1 Fleet and Asset Management Services

Fleet and Asset Management services allow the tracking of location and status of specific service group users. Examples may include a supervisor of a delivery service who needs to know the location and status of employees, parents who need to know where their children are, animal tracking, and tracking of assets.

The service may be invoked by the managing entity, or the entity being managed, depending on the service being provided.

Fleet Management may enable an enterprise or a public organization to track the location of vehicles (cars, trucks, etc.) and use location information to optimize services.

Asset management services, for example, may range from asset visualization (general reporting of position) to stolen vehicle location and geofencing (reporting of location when an asset leaves or enters a defined zone). The range of attributes for these services is wide.

For Fleet and Asset Management services, a distinction may be made between the manager of the fleet/assets in charge of tracking, and the entities being tracked (service group users, etc). The tracking service may make use of mobile station handsets with possible specialized functions (Web browsers, etc) to allow for tracking and specific methods for communicating with the managing entity. A managing entity would be able to access one or several managed entities' location and status information through a specified communication interface (Internet, Interactive Voice Response, Data service, etc). The managing entity would be able to access both real-time and recent location and status results of managed entities.

The network shall provide the capability to provide the last known location and timestamp. In cases where the service group user's mobile station is not registered (i.e. Inactive, out of coverage) the last known location information and timestamp may optionally be provided. If this information is unavailable in real-time, a reason for why the information is unattainable may be provided. The managing entity may also be able to relay messages to service group users through the appropriate interface, as well as receive messages originated by the service group users.

Activation of Fleet and Asset Management services could be performed via subscriber provisioning by the service provider, as well as by offering subscriber-based service activation codes to the service group user/subscriber. The managing entity could also initiate service via requests to a provisioning system through Interactive Voice Response or Internet request. A feature code may optionally also be provided to allow for specific mobile user group subscriber activation by the managing entity (*FC + Mobile ID). A specific user group mobile could also be able to self-activate through the use of a feature code.

B3.2 Traffic Monitoring

Mobiles in automobiles on freeways anonymously sampled to determine average velocity of vehicles. Congestion detected and reported.

Congestion, average flow rates, vehicle occupancy and related traffic information can be gathered from a variety of sources including roadside telematic sensors, roadside assistance organizations and ad-hoc reports from individual drivers. In addition average link speeds can be computed through anonymous random sampling of UE locations.

B3.2.1 Attributes

B3.2.1.1 Privacy

Anonymous sampling of target UE requires all unique information relating to the UE location to be retained by the network operator. Depending on the capabilities of the location method (ref. section 3.4) traffic behavior described above can only be determined if an UE is sampled at least twice within a finite predetermined period.

The UE identification must be sufficiently unique to allow time separated measurements to be paired before discarding the source UE identification.

The level of uniqueness can be a highly truncated form of the UE-IMSI (or equivalent). For example maintaining 1000 unattached location estimates for subsequent pairing with future estimates will only require 3 least significant digits of the IMSI. Ambiguity in matching will occur but at a low (detectable) rate. Finally, all unattached estimates can be set to expire after a preset time.

B4 Enhanced Call Routing

Enhanced Call Routing (ECR) allows subscriber or user calls to be routed to the closest service client based on the location of the originating and terminating calls of the user. The user may optionally dial a feature or service code to invoke the service (*GAS for closest gas station, etc).

In addition to routing the call based on location, ECR should be capable of delivering the location information to the associated service client. For example, this capability may be needed for services such as Emergency Roadside Service. This could be used for the purpose of dispatching service agents for ECR service clients that can make use of this information.

ECR services may be offered, for example, through menu driven access allowing users to interactively select from a variety of services.

B5 Location Based Information Services

Location-Based Information services allow subscribers to access information for which the information is filtered and tailored based on the location of the requesting user. Service requests may be initiated on demand by subscribers, or automatically when triggering conditions are met, and may be a singular request or result in periodic responses.

The following subsections provide some examples of possible location based information services.

B5.1 Navigation

The purpose of the navigation application is to guide the handset user to his/her destination. The destination can be input to the terminal, which gives guidance how to reach the destination. The guidance information can be e.g. plain text, symbols with text information (e.g. turn + distance) or symbols on the map display. The instructions may also be given verbally to the users by using a voice call.

Note: this may involve a service provider giving verbal directions to a lost motorist, or providing periodic short text messages (possibly using SMS), in addition to, or as an alternative to the provision of a graphic map.

This can be accomplished through carrying a ~~GSM~~ mobile phone that has location technology capabilities down to a few feet. Less granularity impedes the applicability of this functionality.

This service can either be menu driven from a handset using SIM Application Toolkit or a WAP based terminal with a map application running – similar to a GPS system. A central server may handle all mapping of locations, and may save specific locations (i.e., favorite fishing holes).

B5.2 City Sightseeing

City Sightseeing would enable the delivery of location specific information to a sightseer. Such information might consist of combinations of the services described throughout this document to describe historical sites, providing navigation directions between sites, facilitate finding the nearest restaurant, bank, airport, bus terminal, restroom facility, etc.

B5.3 Location Dependent Content Broadcast

The main characteristic of this service category is that the network automatically broadcasts information to terminals in a certain geographical area. The information may be broadcast to all terminals in a given area, or only to members of specific group (perhaps only to members of a specific organization). The user may disable the functionality totally from the terminal or select only the information categories that the user is interested in.

An example of such a service may be localized advertising. For example, merchants could broadcast advertisements to passersby based on location / demographic / psychographic information (for example "today only, 30% off on blue jeans").

B5.4 Mobile Yellow Pages

The internet has also changed how people find phone numbers. Instead of thumbing through the yellow pages or calling Directory assistance you simply go online and search the number. The need for paper copy phonebooks is gone. Wireless takes this one step further by adding the location of the subscriber to the search. Now the phone number of the nearest location can be ascertained as opposed to all locations within a 50-mile area.

Mobile Yellow Pages services provide the user with the location of the nearest service point, e.g. Italian restaurant. The result of the query may be a list of service points fulfilling the criteria (e.g. Italian restaurants within three kilometers). The information can be provided to the users in text format (e.g. name of the restaurant, address and telephone number) or in graphical format (map showing the location of the user and the restaurants).

B5.5 Location Sensitive Internet

Location Sensitive Internet is for further study.

B6 Network Enhancing Services

The Network Enhancing Services described in this section are for further study and privacy issues will require further consideration.

B6.1 Applications for Network Planning

The network operator may be able to use location information to aid network planning. The operator may be able to locate calls in certain areas to estimate the distribution of calls and user mobility for network planning purposes. These applications may be used for hot spot detection and user behavior modeling

B6.2 Applications for Network QoS Improvements

The network operator may be able to use location services to improve the Quality of Service of the network. The location system may be used to track dropped calls to identify problematic areas. The system may also be used to identify poor quality areas.

B6.3 Improved Radio Resource Management

The location of the handset may be used for more intelligent handovers and more efficient channel allocation techniques.

Appendix C (Informative): Attributes of Specific Services

The following table (provided by the GSM Alliance Services Working Group) depicts ranges of values that may be expected for various attributes of location based services.

Requirement -> Service Category	Service Authorization	Privacy	Target Subscriber Notification	Horizontal Accuracy	Vertical Accuracy	Response Time	Reliability	Security	Periodic Location Reporting	Service Registration	Service Activation	Service De-Activation	Service Invocation	Roaming	Service Specific Considerations
Public Safety Services															
Emergency Services	None req'd	Implied when dialing 911 info provided to safety organizations	Not required	Network based: 100m (67%) 300m (95%) Handset based: 50m (67%) 150m (95%)	n/a now (5-15m future?)	5 sec.	Same as GSM	Same as GSM	Required Period TBD suggest 1-10 minutes	None req'd	None required	Not Allowed	Keystroke or Dialed string (911)	Required if emergency call can be made	
Emergency Alert Services	Req'd	Info only passed to subscribed to service provider	Not required	125 m (10 m future?)	n/a now (5-15m future?)	5 sec.	Same as GSM	Same as GSM	Required Period TBD suggest 1-10 minutes	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Automatic	Preferred where roaming is allowed	
Location Sensitive Charging															

Requirement -> Service Category	Service Authorization	Privacy	Target Subscriber Notification	Horizontal Accuracy	Vertical Accuracy	Response Time	Reliability	Security	Periodic Location Reporting	Service Registration	Service Activation	Service De-Activation	Service Invocation	Roaming	Service Specific Considerations
Home-Zone Billing	Req'd	Info only passed to subscribed to carrier	Not required	Depends on billing zone (5m-300m)	n/a	Depends on increments of billing.	Same as GSM	Same as GSM	Required depends on billing increment and coverage zone	Req'd	Interactive with Carrier	Interactive with Carrier	Automatic	n/a	
Tracking Services															
Fleet Mgment.	Req'd	Info only passed to subscribed to service provider	Not required	125m-Cell ID	n/a	5 sec.	Same as GSM	Same as GSM	Required (1-10 minutes)	Req'd	Interactive or live operator	Interactive or live operator	Interactive or live operator	Preferred where roaming is allowed	
Asset Mgment	Req'd	Info only passed to subscribed to service provider	Not required	10m-125m	n/a (5-15m future?	5 sec.	Same as GSM	Same as GSM	Required (1-10 minutes)	Req'd	Interactive or live operator	Interactive or live operator	Interactive or live operator	Preferred where roaming is allowed	Special Terminal

Requirement -> Service Category	Service Authorization	Privacy	Target Subscriber Notification	Horizontal Accuracy	Vertical Accuracy	Response Time	Reliability	Security	Periodic Location Reporting	Service Registration	Service Activation	Service De-Activation	Service Invocation	Roaming	Service Specific Considerations
Person Tracking	Req'd	Info only passed to subscribed to service provider	May be required (Child versus Employee?)	10m-125m	n/a (5-15m future?	5 sec.	Same as GSM	Same as GSM	Required (1-10 minutes)	Req'd	Interactive or live operator	Interactive or live operator	Interactive or live operator	Preferred where roaming is allowed	
Pet Tracking	Req'd	Info only passed to subscribed to service provider	Not required	10m-125m	n/a (5-15m future?	5 sec.	Same as GSM	Same as GSM	Required (1-10 minutes)	Req'd	Interactive or live operator	Interactive or live operator	Interactive or live operator	Preferred where roaming is allowed	Special Terminal
Traffic Monitoring															
Traffic Congestion Reporting	Req'd	No specific Target UE info allowed	Not required	10-40m Hi- res. req'd muti- near proximity lanes (opposing and adjacent)	May be req'd for over-passes	5 sec.	Same as GSM	Same as GSM	Required (1-2 minutes)	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	High bandwidth req on network.
Enhanced Call Routing															

Requirement -> Service Category	Service Authorization	Privacy	Target Subscriber Notification	Horizontal Accuracy	Vertical Accuracy	Response Time	Reliability	Security	Periodic Location Reporting	Service Registration	Service Activation	Service De-Activation	Service Invocation	Roaming	Service Specific Considerations
Routing to Nearest Commercial Enterprise	Req'd	Info only passed to subscribed to service provider	Not required	10m-125m	n/a	5 sec.	Same as GSM	Same as GSM	Not required	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	
Roadside Assistance	Req'd	Info only passed to subscribed to service provider	Not required	10m-125m	n/a	5 sec.	Same as GSM	Same as GSM	Not required	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	
Location Based Information Services															
Navigation	Req'd	Info only passed to subscribed to service provider	Required	10m-125m	n/a	5 sec.	Same as GSM	Same as GSM	Required (1-10 minutes)	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	
City Sightseeing	Req'd	Info only passed to subscribed to service provider	Not required	10m-125m	n/a	5 sec.	Same as GSM	Same as GSM	Not required	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	

Requirement -> Service Category	Service Authorization	Privacy	Target Subscriber Notification	Horizontal Accuracy	Vertical Accuracy	Response Time	Reliability	Security	Periodic Location Reporting	Service Registration	Service Activation	Service De-Activation	Service Invocation	Roaming	Service Specific Considerations
Localized Advertising	Req'd	Info only passed to subscribed to service provider	Not required	125m-Cell ID	n/a	Not sensitive (default to 5 sec.)	Same as GSM	Same as GSM	Not required	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	
Mobile Yellow Pages	Req'd	Info only passed to subscribed to service provider	Not required	125m-Cell ID	n/a	5 sec.	Same as GSM	Same as GSM	Not required	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	
Service Provider Specific Services															
Network Planning	Not Req'd	Specific Target UE info allowed	Not Required	10m-Cell ID	n/a	5 sec.	Same as GSM	Same as GSM	Required (1 minute)	Not Req'd	N/a	n/a	n/a	n/a	
Dynamic Network Control	Not Req'd	Specific Target UE info allowed	Not Required	10m-Cell ID	n/a	5 sec.	Same as GSM	Same as GSM	Required (1 minute)	Not Req'd	N/a	n/a	n/a	n/a	

Annex D (informative): Change history

Change history											
TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	WI
Jun 1999			GSM 02.71					Transferred to 3GPP SA1	7.0.0		
SP-04			22.071						3.0.0		
SP-05	SP-99486	S1-99831	22.071	001	1	R99	C	UMTS LCS service requirements support for mobile originated positioning requests, and velocity as a service parameter	3.0.0	3.1.0	
SP-05	SP-99438	S1-99832	22.071	002		R99	B	UMTS LCS service requirements	3.0.0	3.1.0	
SP-05	SP-99438	S1-99833	22.071	003		R99	C	LCS accuracy requirements	3.0.0	3.1.0	
SP-05	SP-99479	S1-99625	22.071	004		R99	D	Editorial changes for alignment	3.0.0	3.1.0	
SP-06	SP-99522	S1-99955	22.071	005		R99	D	U.S. specific Emergency Services requirements included as an informative annex.	3.1.0	3.2.0	
SP-08	SP-000212	S1-000338	22.071	006		R00	C	Incorporation of TSG SA1#8 LCS Contributions and email contributions	3.2.0	4.0.0	
SP-09	SP-000378	S1-000484	22.071	008		R4	F	Correction to LCS Service Description Stage 1 Document (R'00)	4.0.0	4.1.0	
SP-09	SP-000392	S1-000667	22.071	009		R4	C	Provision of Velocity for Location Services	4.0.0	4.1.0	
SP-09	SP-000392	S1-000670	22.071	010		R4	B	External LCS client identity	4.0.0	4.1.0	
SP-09	SP-000392	S1-000671	22.071	011		R4	B	Privacy Control for LCS	4.0.0	4.1.0	
SP-09	SP-000392	S1-000672	22.071	012		R4	F	Privacy Control for LCS	4.0.0	4.1.0	
SP-09	SP-000392	S1-000673	22.071	013		R4	D	Clarifications to LCS on privacy and Service response	4.0.0	4.1.0	
SP-09	SP-000392	S1-000674	22.071	014		R4	F	LCS: Geographic Location	4.0.0	4.1.0	
SP-09	SP-000392	S1-000675	22.071	015		R4	D	Adding statement on "active" and "idle" UE in chapter 4.13	4.0.0	4.1.0	
SP-09	SP-000392	S1-000676	22.071	016		R4	D	Radio Access Network support for LCS	4.0.0	4.1.0	
SP-09	SP-000392	S1-000677	22.071	017		R4	D	LCS, Identification of a Target UE using IP addresses	4.0.0	4.1.0	
SP-09	SP-000392	S1-000678	22.071	018		R4	D	LCS: LCS Open Service Architecture (OSA) and Application Programming Interface.	4.0.0	4.1.0	
SP-10	SP-000544	S1-000787	22.071	019		Rel-4	B	Privacy Exception List	4.1.0	4.2.0	LCS
SP-10	SP-000544	S1-000788	22.071	020		Rel-4	B	Periodic Location Reporting	4.1.0	4.2.0	LCS
SP-10	SP-000544	S1-000791	22.071	021		Rel-4	B	Location Service Request	4.1.0	4.2.0	LCS
SP-10	SP-000544	S1-000851	22.071	022		Rel-4	C	Periodic Location Reporting amendment	4.1.0	4.2.0	LCS1
SP-10	SP-000544	S1-000803	22.071	023		Rel-4	C	Addition of achieved location information accuracy with reference to TS 23.032	4.1.0	4.2.0	LCS1
SP-11	SP-010044	S1-010235	22.071	024		Rel-4	C	Quality level negation	4.2.0	4.3.0	LCS1
SP-11	SP-010044	S1-010239	22.071	025		Rel-4	C	Location determination in call or PDP context activation and release	4.2.0	4.3.0	LCS1-PS
SP-11	SP-010044	S1-010237	22.071	026		Rel-4	C	OSA support for LCS	4.2.0	4.3.0	LCS1
SP-11	SP-010044	S1-010218	22.071	027		Rel-4	D	Editorial Cleanup	4.2.0	4.3.0	LCS1
SP-11	SP-010044	S1-010269	22.071	028		Rel-4	C	Number of LCS Clients	4.2.0	4.3.0	LCS1
SP-14	SP-010673	1285	22.071	029		Rel-5	C	Privacy Override Indicator	4.3.0	5.0.0	LCS1

CR-Form-v4

CHANGE REQUEST

⌘ **22.071** **CR 038** ⌘ ev **-** ⌘ Current version: **4.3.0** ⌘

Spec Title: **Location Services (LCS); Service description, Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title: ⌘	Editorial CR to correct terms and references	
Source: ⌘	SA1	
Work item code: ⌘	CORRECT	***Date:*** ⌘ 11/02/02
Category: ⌘	**F**	***Release:*** ⌘ Rel-4

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

Use one of the following releases:

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

Reason for change: ⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change: ⌘	References have been changed where necessary.
Consequences if not approved: ⌘	Illegal references will exist in the specification set.

Clauses affected: ⌘	Various		
Other specs affected: ⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments: ⌘			

3GPP TS 22.071 V4.~~3~~4.0 (~~2001~~2002-03)

Technical Specification

3rd Generation Partners
Technical Specification Group Services and System Aspects;
Location Services (LCS);
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Contents

Foreword

This Technical Specification (TS) has been produced by the 3GPP.

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

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

z the third digit is incremented when editorial only changes have been incorporated in the specification;

1 Scope

This document provides the Stage One description of Location Services (LCS). A Stage One description provides an overall service description, primarily from the service subscriber's and user's points of view, but not dealing with the details of the Man Machine Interface (MMI). This TS includes information applicable to network operators, service providers and terminal, base station system, switch, and data base manufacturers.

NOTE: Location Services may be considered as a network provided enabling technology consisting of standardized service capabilities which enable the provision of location based applications. These applications may be service provider specific. The description of the numerous and varied possible location applications which are enabled by this technology are outside the scope of this specification. However, clarifying examples of how the functionality being specified may be used to provide specific location services is included in various sections of the specification.

This document provides core requirements to an extent sufficient to derive a complete definition of location services at the service level. However, the present document also provides additional requirements which may suggest in a non-normative manner certain ways the system may be implemented to support location services.

LCS can be offered without subscription to basic telecommunication services. LCS is available to the following categories of LCS clients:

- Value Added Services LCS Clients – use LCS to support various value added services. These clients can include UE subscribers as well as non-subscribers to other services.
- PLMN Operator LCS Clients – use LCS to enhance or support certain O&M related tasks, supplementary services, IN related services and bearer services and teleservices.
- Emergency Services LCS Clients – use LCS to enhance support for emergency calls from subscribers.
- Lawful Intercept LCS Clients – use LCS to support various legally required or sanctioned services.

LCS is applicable to any target UE whether or not the UE supports LCS, but with restrictions on choice of positioning method or notification of a location request to the UE user when LCS or individual positioning methods, respectively, are not supported by the UE.

LCS is being developed in phases with enhancements added in yearly releases:

1. GSM Release 98: This is the initial default phase of LCS. It provides a generic flexible architecture capable of supporting all positioning methods. Specific support is provided for Time Of Arrival (TOA), Enhanced Observed Time Difference (E-OTD) and Global Positioning System (GPS) based positioning methods. Support is provided for emergency services, value added services and PLMN operator services.

2. GSM Release 99: This provides the same capabilities as GSM Release 98, since GSM Release 98 specifications were copied as "mirror" specifications in GSM Release 99.

3. 3GPP ~~UMTS~~ Release 99: LCS is supported in the circuit switched domain of the 3GPP core network (GMLC connected to MSC). UTRAN R99 specifications support cell coverage (ie cell identity) based LCS. (The radio interface RRC specification also support IPDL-OTDOA and network assisted GPS (assistance data broadcasting), but the UTRAN internal interfaces do not yet support these two methods in R99.)

4. 3GPP ~~GSM/UMTS~~ Release 4 (including both UTRAN and GERAN): LCS shall be supported in the circuit switched domain and in the packet switched domain including GPRS. LCS shall be supported in GERAN and in UTRAN FDD and UTRAN TDD. The positioning methods in UTRAN will be at least the 3 methods identified earlier: cell coverage based, IPDL-OTDOA and assisted GPS. LCS support is to be included in the Open Service Architecture (OSA) including enhancements for the support of value added services, and support for the velocity parameter in the position request /response. The objective is to have common service descriptions for all Access Networks in this stage 1 specification. Possible deviations shall be noted in the text.

5. Future releases: For further study.

2. References

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

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

2.1 Normative references

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

[2] TR 21.905: “Vocabulary for 3GPP Specifications”.

[3] TS 23.032: "Universal Geographical Area Description"

[4] TS 22.101: "Service principles"

[5] TS 22.105: "Services and Service Capabilities"

[6] TS 22.115: "Charging and Billing"

[7] TS 22.121: "Virtual Home Environment"

[8] TS 23.110: " UMTS Access Stratum; Services and Functions"

2.2 Informative references

[9] TR 25.923: "Report on Location Services (LCS)"

[10] PD 30.lcs: "Project Plan for location services in UMTS"

[11] Third generation (3G) mobile communication system; Technical study report on the location services and technologies, ARIB ST9 December 1998.

[12] The North American Interest Group of the GSM MoU ASSOCIATION: Location Based Services, Service Requirements Document of the Services Working Group

3 Definitions and abbreviations

3.1 Abbreviations

For the purposes of the present document, in addition to GSM 01.04 [1] and TR.21.905, the following abbreviations apply:

LCS	Location Service
NA-ESRD	North American Emergency Services Routing Digits
NA-ESRK	North American Emergency Services Routing Key
NANP	North American Numbering Plan

NOTE: In the present document, acronyms are used in the text as if they are read either in their fully expanded form or in their alphabet names with no consistent principle.

3.2 Definitions

For the purposes of the present document the following definitions apply:

Current Location: after a location attempt has successfully delivered a location estimate and its associated time stamp, the location estimate and time stamp are referred to as the ‘current location’ at that point in time.

Deferred location request: a location request where the location response (responses) is (are) not required immediately.

Immediate location request: a location request where a single location response only is required immediately.

Initial Location: in the context of an originating emergency call the location estimate and the associated time stamp at the commencement of the call set-up is referred to as ‘initial location’.

Last Known Location: The current location estimate and its associated time stamp for Target UE stored in the LCS Server is referred to as the ‘last known location’ and until replaced by a later location estimate and a new time stamp is referred to as the ‘last known location’.

LCS Client: a software and/or hardware entity that interacts with a LCS Server for the purpose of obtaining location information for one or more Mobile Stations. LCS Clients subscribe to LCS in order to obtain location information. LCS Clients may or may not interact with human users. The LCS Client is responsible for formatting and presenting data and managing the user interface (dialogue). The LCS Client is identified by a unique international identification, e.g. E.164, number or Access Point Name (APN).

NOTE: The LCS Client may reside inside or outside the PLMN.

LCS Client Access barring list: an optional list of MSISDNs per LCS Client where the LCS Client is not allowed to locate any MSISDN therein.

LCS Client Subscription Profile: a collection of subscription attributes of LCS related parameters that have been agreed for a contractual period of time between the LCS client and the service provider.

LCS Feature: the capability of a PLMN to support LCS Client/server interactions for locating Target UEs.

LCS Server: a software and/or hardware entity offering LCS capabilities. The LCS Server accepts requests, services requests, and sends back responses to the received requests. The LCS server consists of LCS components which are distributed to one or more PLMN and/or service provider.

Location Estimate: the geographic location of a UE and/or a valid Mobile Equipment (ME), expressed in latitude and longitude data. The Location Estimate shall be represented in a well-defined universal format. Translation from this universal format to another geographic location system may be supported, although the details are considered outside the scope of the primitive services.

North American Emergency Services Routing Digits (NA-ESRD): a telephone number in the North American Numbering Plan (NANP) that can be used to identify a North American emergency services provider and its associated LCS client. The ESRD also identifies the base station, cell site or sector from which a North American emergency call originates.

North American Emergency Services Routing Key (NA-ESRK): a telephone number in the North American Numbering Plan (NANP) assigned to an emergency services call by a North American VPLMN for the duration of the call. The NA-ESRK is used to identify (e.g. route to) both the emergency services provider and the switch in the VPLMN currently serving the emergency caller. During the lifetime of an emergency services call, the NA-ESRK also identifies the calling mobile subscriber.

PLMN Access barring list: an optional list of MSISDN per PLMN where any LCS Client is not allowed to locate any MSISDN therein except for certain exceptional cases.

Privacy Class: list of LCS Clients defined within a privacy exception class to which permission may be granted to locate the target UE. The permission shall be granted either on activation by the target UE or permanently for a contractual period of time agreed between the target UE and the service provider.

Privacy Exception List: a list consisting of various types of privacy classes (i.e. operator related, personal etc.). Certain types of classes may require agreement between the service provider and the target MS.**Target MS:** The UE being positioned.

Target UE: The UE being positioned.

Target UE Subscription Profile: the profile detailing the subscription to various types of privacy classes.

4 Functional Requirements

3GPP standards shall support location service features, to allow new and innovative location based services to be developed. It shall be possible to identify and report in a standard format (e.g. geographical co-ordinates) the current location of the user's terminal and to make the information available to the user, ME, network operator, service provider, value added service providers and for PLMN internal operations.

The location is provided to identify the likely location of specific MEs. This is meant to be used for charging, location-based services, lawful interception, emergency calls, etc., as well as the positioning services.

The standard shall support both GERAN~~GSM BSS~~ and UTRAN to facilitate determination of the location of a mobile station.

The following subsections provide general descriptions of attributes that can be used to describe or characterize various location services.

The relative importance of these attributes varies from service to service. However, accuracy, coverage, privacy and transaction rate may be considered the primary distinguishing attributes that define a value-added service. Briefly:

- accuracy is the difference between actual location and estimated location,
- coverage is an expression of the geographic area in which the UE user will receive an adequate perceived quality of service,
- privacy describes the user's perception of confidentiality of the location information, and
- transaction rate indicates how frequently network messaging is required to support the service.

A general comparison of the specific attributes of various location-based services is provided in Annex C of this document.

4.1 High Level Requirements

The following high level requirements are applicable:

1 The supporting mechanisms should incorporate flexible modular components with open interfaces that facilitate equipment interoperability and the evolution of service providing capabilities.

2 The network should be sufficiently flexible to accommodate evolving enabling mechanisms and service requirements to provide new and improved services.

3 It shall be possible to provide multiple layers of permissions to comply with local, national, and regional privacy requirements.

4 Multiple positioning methods should be supported in the different Access Networks, including (but not limited to) UL-TOA, E-OTD, IPDL-OTDOA, Network Assisted GPS and methods using cell site or sector information and Timing Advance or RoundTrip Time measurements.

5 The location determining process should be able to combine diverse positioning techniques and local knowledge when considering quality of service parameters to provide an optimal positioning request response.

6 It should be possible to provide position information to location services applications existing within the PLMN, external to the PLMN, or in Mobile Equipment;

7 Support should be provided for networks based on an Intelligent Network architecture (i.e. with specific support for CAMEL based Location Services).

4.2 Location Information

Location Information consists of Geographic Location, Velocity, and Quality of Service information, as described in the subsequent sections.

4.2.1 Geographic Location

Provision of the geographic location of a target UE is applicable to all LCS services.

Note: For services other than LCS the network may also determine within which Cell or Service Area the Target UE is located ("Service Area" is a UTRAN concept and it may consist of one (in R99) or more than one cell). The Service Area information or Cell ID may be used for routing of calls or for CAMEL applications.

It should be noted that the Service Area concept is different from the Localized Service Area concept used for SoLSA.

4.2.2 Velocity

Velocity is the combination of Speed and Heading (direction) of a Target UE. The LCS Server may provide the Velocity of an UE.

For Value Added Services and PLMN Operator Services, the following is applicable:

Provision of the velocity of a target UE is application driven. Location Services may allow an LCS Client to request or negotiate the provision of velocity.

For Emergency Services there is no requirement to provide velocity.

4.3 Quality of Service

4.3.1 Horizontal Accuracy

The accuracy that can be provided with various positioning technologies depends on a number of factors, many of which are dynamic in nature. As such the accuracy that will be realistically achievable in an operational system will

vary due to such factors as the dynamically varying radio environments (considering signal attenuation and multipath propagation), network topography in terms of base station density and geography, and positioning equipment available.

The accuracy for location services can be expressed in terms of a range of values that reflect the general accuracy level needed for the application. Different services require different levels of positioning accuracy. The range may vary from tens of meters (navigation services) to perhaps kilometers (fleet management).

The majority of attractive value added location services are enabled when location accuracies of between 25m and 200m can be provided.

Based on decreasing accuracy requirement some examples of location services are provided below:

· Location-independent	Most existing cellular services, Stock prices, sports reports
· PLMN or country	Services that are restricted to one country or one PLMN
· Regional (up to 200km)	Weather reports, localized weather warnings, traffic information (pre-trip)
· District (up to 20km)	Local news, traffic reports
· Up to 1 km	Vehicle asset management, targeted congestion avoidance advice
· 500m to 1km	Rural and suburban emergency services, manpower planning, information services (where are?)
· 100m (67%) · 300m (95%)	U.S. FCC mandate (99-245) for wireless emergency calls using network based positioning methods
· 75m-125m	Urban SOS, localized advertising, home zone pricing, network maintenance, network demand monitoring, asset tracking, information services (where is the nearest?)
· 50m (67%) · 150m (95%)	U.S. FCC mandate (99-245) for wireless emergency calls using handset based positioning methods
· 10m-50m	Asset Location, route guidance, navigation

Accuracy may be independently considered with respect to horizontal and vertical positioning estimates. Some location services may not require both, others may require both, but with different degrees of accuracy.

Given that the location estimate is the best possible within the bounds of required response time, the location estimates of a fixed position UE (assuming several estimates are made) will reveal a ‘spread’ of estimates around the actual UE position. The distribution of locations can be described by normal statistical parameters and suggests that a small proportion of location estimates may lie outside of the acceptable Quality of Service (QoS) parameters for specific services (as determined by the network operator).

It may be possible to provide information on the confidence that can be associated with a location estimate. This may be used by location services to decide if a position update should be requested, for example, if the reported accuracy falls below a threshold determined by the LCS Client or Network Operator for a specific service.

It may also be possible to determine velocity (speed and heading) information from a single location request. (i.e. the response to a single request may provide the results of multiple positionings).

When delivered with a location estimate, the confidence region parameters, speed and heading may allow an application to improve the service delivered to the UE user. Some examples are given below:

a) Confidence Region: Simple measure of uncertainty that specifies the size and orientation of the ellipse in which an UE is likely to lie with a predetermined confidence (e.g. 67%). The size of the confidence region may be used by the network operator or the LCS Client to request an updated location estimate.

b) Speed: enables e.g. congestion monitoring, and average travel time estimates between locations.

c) Heading: the location estimate of a vehicle may be improved to identify the appropriate side of the highway. This may enable the provision of traffic information that relates only to the user's direction of travel.

For Value Added Services and PLMN Operator Services, the following is applicable:

Accuracy is application driven and is one of the negotiable Quality of Service (QoS) parameters.

The precision of the location shall be network design dependent, i.e., should be an operator's choice. This precision requirement may vary from one part of a network to another.

The LCS shall allow an LCS Client to specify or negotiate the required horizontal accuracy. The LCS shall normally attempt to satisfy or approach as closely as possible the requested or negotiated accuracy when other quality of service parameters are not in conflict. The achieved accuracy level of location information shall be indicated using the shapes and uncertainty areas defined in TS 23.032 [3].

For Emergency Services (where required by local regulatory requirements) the following requirements shall be met:

- The LCS Server shall attempt to obtain the horizontal location of the calling UE, in terms of universal latitude and longitude coordinates, and shall provide this to an Emergency Service Provider. The accuracy shall be defined by local regulatory requirements. Annex A shows such requirements as exist in the United States.

NOTE: The LCS Server provides the location service capabilities but the mechanism by which location is reported to an emergency service provider is outside the scope of this service.

4.3.2 Vertical Accuracy

For Value Added Services, and PLMN Operator Services, the following is applicable:

The LCS Server may provide the vertical location of an UE in terms of either absolute height/depth or relative height/depth to local ground level. The LCS Server shall allow a LCS Client to specify or negotiate the required vertical accuracy. The LCS Server shall normally attempt to satisfy or approach as closely as possible the requested or negotiated accuracy when other quality of service parameters are not in conflict.

The vertical accuracy may range from about ten metres (e.g. to resolve within 1 floor of a building) to hundreds of metres.

For Emergency Services (where required by local regulatory requirements) there is no requirement for the support of vertical positioning.

4.3.3 Response Time

Different location based services, or different LCS Clients, may have different requirements (depending on the urgency of the positioning request) for obtaining a response. The location server may need to make trade-offs between requirements for positioning accuracy and response time.

For Value Added Services, and PLMN Operator Services, the following is applicable:

Response Time is one of the negotiable QoS parameters. Support of response time by a Public Land Mobile Network (PLMN) is optional. The LCS Server may allow a LCS Client to specify or negotiate the required response time (in the context of immediate location request, see table 1) either at provisioning or when the request is made. The LCS Server may optionally ignore any response time specified by the LCS Client that was not negotiated. If response time is not ignored, the LCS Server shall attempt to satisfy or approach it as closely as possible when other quality of service parameters are not in conflict.

For immediate location request response time options are as follows::

a) "no delay": the server should immediately return any location estimate that it currently has. The LCS Server shall return either the Initial or Last Known Location of the Target UE. If no estimate is available, the LCS Server shall return the failure indication and may optionally initiate procedures to obtain a location estimate (e.g. to be available for a later request).

b) "low delay": fulfillment of the response time requirement takes precedence over fulfillment of the accuracy requirement. The LCS Server shall return the Current Location with minimum delay. The LCS shall attempt to fulfill any accuracy requirement, but in doing so shall not add any additional delay (i.e. a quick response with lower accuracy is more desirable than waiting for a more accurate response).

c) "delay tolerant": fulfillment of the accuracy requirement takes precedence over fulfillment of the response time requirement. If necessary, the server should delay providing a response until the accuracy requirement of the

requesting application is met. The LCS Server shall obtain a Current Location with regard to fulfilling the accuracy requirement.

For Emergency Services (where required by local regulatory requirements) there may be no requirement to support negotiation of response time. The network shall then provide a response as quickly as possible with minimum delay. Response time supervision is implementation dependent.

4.4 Reliability

Reliability provides a measure of how often positioning requests that satisfy QoS requirements are successful. For some applications, such as cross-country vehicle tracking, this may not be especially critical. If a positioning attempt fails, due to lack of coverage or transient radio conditions, etc, another positioning attempt may be made. This attempt should be specified in Location Service Request. (see the section 5.3.1.1). However for other services, perhaps such as child tracking, reliability may be more important.

The network shall provide statistical reporting of reliability (QoS parameters) data.

4.5 Priority

Location requests for different services may be processed with different levels of priority.

For Value Added Services, and PLMN Operator Services, the following is applicable:

The LCS Server may allow different location requests to be assigned different levels of priority. A location request with a higher priority may be accorded faster access to resources than one with a lower priority and may receive a faster, more reliable and/or more accurate location estimate.

For Emergency Services (where required by local regulatory requirements) the location request shall be processed with the highest priority level.

4.6 Timestamp

For Value Added Services, and PLMN Operator Services, and Emergency Services (where required by local regulatory requirements), the LCS Server shall timestamp all location estimates provided to a LCS Client indicating the time at which the estimate was obtained.

4.7 Security

Specific local, national, and regional security regulations must be complied with.

Position information should be safeguarded against unapproved disclosure or usage. Position information should also be provided in a secure and reliable manner that ensures the information is neither lost nor corrupted. Audit records should be maintained of positioning requests and responses to facilitate resolution of security violations.

The LCS Client may be authorized by the LCS Server. Existing security mechanisms as well as security mechanisms of the LCS Server shall be used for authorizing the LCS Client and its request for location information.

For Value Added Services, the following is applicable:

Only authorized LCS Clients shall be able to access the LCS Server. Before providing the location of a Target UE to any authorized LCS Client, the LCS Server shall verify both the identity and authorization privileges of the LCS Client .

Once the LCS Server has verified that a particular LCS Client is authorized to locate a particular Target UE, any location estimate requested shall be provided to the LCS Client in a secure and reliable manner, such that the location information is neither lost, corrupted nor made available to any unauthorized third party.

For PLMN operator services, location information shall be provided in a secure and reliable manner. The ability to obtain location information shall depend on local regulatory laws and requirements in conjunction with requirements for UE privacy.

For Emergency Services (where required by local regulatory requirements) the following requirements shall be met:

Position information shall be provided to the Emergency Services Network as an authorized LCS client. Target UE authorization checks normally performed for value added services are not applicable (privacy is over-ridden). The position information shall be provided to the Emergency Services Network in a secure and reliable manner, such that the location information is neither lost, corrupted, nor made available to any unauthorized third party.

4.8 Privacy

Specific local, national, and regional privacy regulations must be complied with, and multiple layers of permissions may be required.

Location information must always be available to the network service provider.

Means shall be provided for the UE subscriber to control privacy for value added services.

The user shall be able to change the setting of the Privacy exception list at any time.

Unless required by local regulatory requirements, or overridden by the target UE User, the target UE may be positioned only if allowed in the UE subscription profile. In general, for valued added location services, the target UE being positioned should be afforded the maximum possible privacy, and should not be positioned unless the positioning attempt is explicitly authorized. In the absence of specific permission to position the target UE, the target UE should not be positioned.

It may also be possible for a target UE to authorize positioning attempts after the target UE is notified of a positioning request and the target UE grants permission for positioning This notification condition (notification with privacy verification) shall be specified in the Target UE Subscription Profile. (See the subsequent "target subscriber notification" section of this document for charging and billing aspects.)

The privacy of an inanimate asset for an embedded target UE may be completely defined by the UE subscriber.

Additionally, specific privacy exceptions may exist for compliance with mandated location based services (such as for emergency services or lawful intercept) which are required by national or local regulatory requirements.

For Value Added Services, the following is applicable:

The Target UE Subscriber shall be able to restrict access to the Location Information (permanently or on a per attempt basis). The LCS Client access shall be restricted unless otherwise stated in the Target UE Subscription Profile. The home network shall have the capability of defining the default circumstances in which the Target UE's Location Information is allowed to be provided - as required by various administrations and/or network requirements.

It shall be possible for location services to support conditional positioning. Under these conditions, an application that is granted conditional positioning authorization must notify and obtain positioning authorization from the user of the target UE prior to performing the positioning process. Thus the user of the target UE shall be able to accept or reject the positioning attempt.

The default treatment, which is applicable in the absence of a response from the Target UE, shall be specified in the Target UE Subscription Profile. Thus for some location services the default treatment may be to accept the positioning request, whereas for other location services the default treatment may be to reject the positioning attempt.

However, considering that in general, users shall be afforded the maximum possible privacy, and shall not be positioned unless the target subscriber authorizes the requesting location application to perform positioning, the default condition shall normally be to deny the positioning attempt.

For PLMN operator services, the target UE subscriber may be able to restrict access to location information used to enhance or support particular types of service. The LCS client access shall be restricted unless stated otherwise in the Target UE subscription profile. The target UE user shall not be notified of any authorized location attempt.

For Emergency Services (where required by local regulatory requirements) Target UEs making an emergency call may be positioned regardless of the privacy attribute value of the subscriber associated with the Target UE (or ME) making the call.

For Lawful Interception Services (where required by local regulatory requirements), target UEs may be positioned under all circumstances required by local regulatory requirements. The target UE user shall not be notified of any location attempt.

4.9 Service Authorization

Requests for positioning information should be processed only if the requesting application is authorized. The identity and authorization privileges of the requesting application should be verified prior to processing positioning requests.

4.10 Service Activation and De-Activation

To maximize the adoption of location services, the service activation process must be simple. Three types of service package, may be distinguished, each of which may require a different service activation process:

1 On Demand: the user accesses services only when required.

2 Period Subscription: the subscriber requires periodic availability of the service

3 Mixed: some services provided on subscription and the remainder on-demand.

The process of activation + service delivery + deactivation may be provided in a single transaction. It may be possible for a subscriber to activate a location service on one occasion before deactivating an existing invocation.

Furthermore, a location service may be 'enabled' at the point of sale as part of the service package purchased by the UE subscriber. The use of Over-The-Air (OTA) provisioning may allow the location feature to be enabled for UE-based positioning methods.

4.11 Coverage

In general an UE user should be able to access a location service anywhere within the operator's coverage area, or within the roaming area. Three levels of coverage may be considered:

1 Home Network - Complete

2 Home Network - Partial

3 Roaming Networks

Considering network topography and dynamically varying environmental factors, a network operator may not be able to guarantee homogeneous service quality across the entire home network geographic area, or roaming partners' networks. Even within those areas where service is offered, the provided quality of service may vary due to dynamic environmental (i.e. radio) conditions. Additionally, the location method may have an accuracy that depends on the UE location, for example due to varying radio conditions, cell configuration and cell density in different areas, and geometric dilution of precision.

Furthermore the roaming partner's network may not accept a similar location method to that experienced by the user in the home network.

Finally, the service may not be available in a roaming partner's network despite technical interoperability between the location method supported by the UE and the network.

Therefore coverage may be considered not only to be a technical attribute, but may also be related to roaming contracts between network operators. In general, provided that a roaming agreement exists, any properly authorized location-based service may position a Target UE in either the Home PLMN (HPLMN) or a Visited PLMN (VPLMN). It may also be noteworthy that some location based services (such as location based information services) may be especially attractive to subscribers roaming outside their home networks.

4.12 Roaming Target UE

With respect to roaming, specific local, national, and regional privacy regulations must be complied with, and multiple layers of permissions may be required.

Many location-based services may be especially attractive to subscribers roaming outside their home PLMN. As such, support should be provided for the transparent and consistent provision of location based services to the fullest extent possible. Consideration for roaming support should be provided with the following priorities:

1. Roaming between 3GPP ~~GSM family~~ networks.

2. Roaming between 3GPP ~~2nd Generation GSM~~ systems and IMT 2000 family networks.

3. Roaming between 3GPP ~~GSM~~ and ANSI-41 or other systems.

If the location capability in the VPLMN is compatible with that provided in the HPLMN, the same parameters must be provided to the location server in the VPLMN that would be provided to the server in the HPLMN to enable provision of the same services.

For Value Added Services, the following is applicable:

Provided that a roaming agreement exists, the LCS feature shall allow any properly authorized LCS client to request and receive the location of a particular Target UE when the Target UE is either located in its Home PLMN (HPLMN) or Visited PLMN (VPLMN). Any PLMN not supporting the LCS feature shall return a suitable error response to any other PLMN from which an LCS request is received. The requesting PLMN shall then infer that the LCS feature is not supported and provide a suitable error response in turn to the requesting LCS Client.

For PLMN Operator Services, location of any roaming target UE shall be supported in the VPLMN as allowed by both local regulatory requirements and considerations, where applicable, of UE privacy.

For Emergency Services (where required by local regulatory requirements) the Serving PLMN shall support the positioning of all Target UEs including roaming Target UEs currently serviced by that serving PLMN. There is no requirement for a HPLMN to position Target UEs that have roamed outside the HPLMN.

4.13 Support for all UEs

For value added services, and PLMN operator services, the LCS feature may be supported for all UEs.

For Emergency Services (where required by local regulatory requirements), positioning shall be supported for all UEs (i.e. including legacy UEs) where coverage is provided, and also UEs without a SIM/USIM.

Both “active” and “idle” UEs shall be capable of being positioned.

4.14 Support for Unauthorized UEs

For value added services, support of unauthorized UEs may be provided by the PLMN.

For PLMN operator services, positioning of unauthorized UEs may be provided by the PLMN as required by local regulatory requirements.

For Emergency Services (where required by local regulatory requirements), the PLMN shall support positioning for unauthorized UEs (i.e. including stolen UEs and UEs without a SIM/USIM).

NOTE: A subscriber is in general identified as an UE containing in it the SIM/USIM associated with the subscriber. In some exceptional cases (e.g., an Emergency call), an UE without a valid subscription recognized in the PLMN can become a Target UE. In such a case, the subscriber may be identified by the identity associated with the Mobile Equipment (ME) involved in the call.

4.15 Periodic Location Reporting

Periodic location reporting is the act of the LCS Server initiating multiple position locations spread over a period of time.

The periodic reporting function is generally applicable for asset management services and exists as several variants, each applicable to different value added services:

· Location reporting only within predetermined period	e.g. commercial asset tracking and, subject to provision of privacy, manpower planning.
· Periodic location reporting within specified period and reporting triggered by a specific event	e.g. high value asset security, stolen vehicle monitoring, home zone charging.
· Periodic location reporting triggered by a specific event	e.g. 24hr depot management, transit passenger information systems

Periodic location determination and reporting increases network traffic. However, scheduling the periods of location monitoring and reporting will reduce this. Finally, event-based logic provided by the network operator that monitors the asset (location and status) and only reports events that meet conditions agreed with the application may reduce network traffic further without reducing the QoS.

If this event-based or time-based decision process is the responsibility of the application and not the network operator then all of the above services can be regarded as periodic location reporting.

For value added services, and PLMN operator services, support of periodic location reporting may be provided by the PLMN.

When an LCS client activates Periodic Location Reporting, the LCS server shall be able to inform the target Ms of this activation according to the Privacy Exception List.

It should be possible for the target UE at any time to query the LCS server about any valid requests activated for that target UE, and/or cancel the request.

When a request is cancelled by the target UE, the LCS server shall inform the LCS client of this cancellation.

It should be possible for more than one LCS client to activate requests for the same target UE.

For Emergency Services (where required by local regulatory requirements), there is no requirement for the PLMN to support periodic location reporting.

4.16 UE-Based Location Calculation

UE-Based Location Calculation may be supported on either a per-request basis or autonomously whereby a single request from an UE subscriber enables UE based location calculation over an extended period without further interaction with the PLMN.

For Commercial Services, the following may be applicable for autonomous location:

The network may broadcast location assistance information to mobiles, which enables mobiles to calculate their own location. The network may encrypt the location assistance information. If the location assistance information is encrypted, a single common standardized encryption algorithm shall be used.

The location assistance information may be available to the UE at all times, continuously in idle mode and during a call, without additional point to point signalling. The network may request location information from the UE for operator or for service provider applications. For this purpose a point to point signalling connection must be established.

4.17 UE_Assisted LCS Location Calculation

The UE-Assisted Location Calculation is accomplished by network resources based upon radio ranging measurements provided by the UE.

For Commercial Services, the following may be applicable for UE-Assisted location services:

The network may broadcast assistance information to mobiles, which enables mobiles to obtain the appropriate radio ranging measurements. The network may encrypt the assistance information. If the assistance information is encrypted, a single common standardized encryption algorithm shall be used.

The assistance information may be available to the UE at all times, continuously in idle mode and during a call, without additional point to point signalling. The network may request radio ranging measurement data from the UE for operator or for service provider applications. For this purpose a point to point signalling connection must be established. Optionally, this point to point connection can be used to deliver the resulting location to the UE.

4.18 Mobile Originating Location

Mobile Originating Location is the capability of the mobile station to obtain its own geographical location or have its own geographic location transferred to another LCS client.

For Value Added Services, the following may be applicable:

There are three classes of mobile originating location:

Basic Self Location - The mobile station needs to interact with the network for each separate location request

Autonomous Self Location - The mobile station does not need to interact with the network for each separate location request. One interaction with the network enables the mobile station to obtain multiple location positionings over a predetermined period of time.

Transfer to Third Party – The location of the mobile station is transferred by request of the mobile station to another specified LCS client.

4.19 Network support for LCS

The provision of location services shall be possible without significantly adversely impacting the radio transmission or the signalling capabilities of the network.

5 Logical Description

5.1 Logical Reference Model

Figure 1 shows the logical reference model for LCS whereby an LCS Client is enabled to request location information for one or more certain target UEs from the LCS Server supported by a PLMN. The LCS Server employs a positioning function to obtain the location information and furnish the information to the LCS Client. The particular requirements and characteristics of an LCS Client are made known to the LCS Server by its LCS Client Subscription Profile. The particular LCS-related restrictions associated with each Target UE are detailed in the Target UE Subscription Profile. The LCS feature shall allow a Target UE to be positioned within a specified Quality of Service. The LCS feature shall allow the location of a Target UE to be determined at any time whilst the UE is attached.

The LCS feature shall support conveyance of both the location Quality of Service (QoS) requirements of the LCS Client and the location information returned to the LCS Client in a universal standard format.

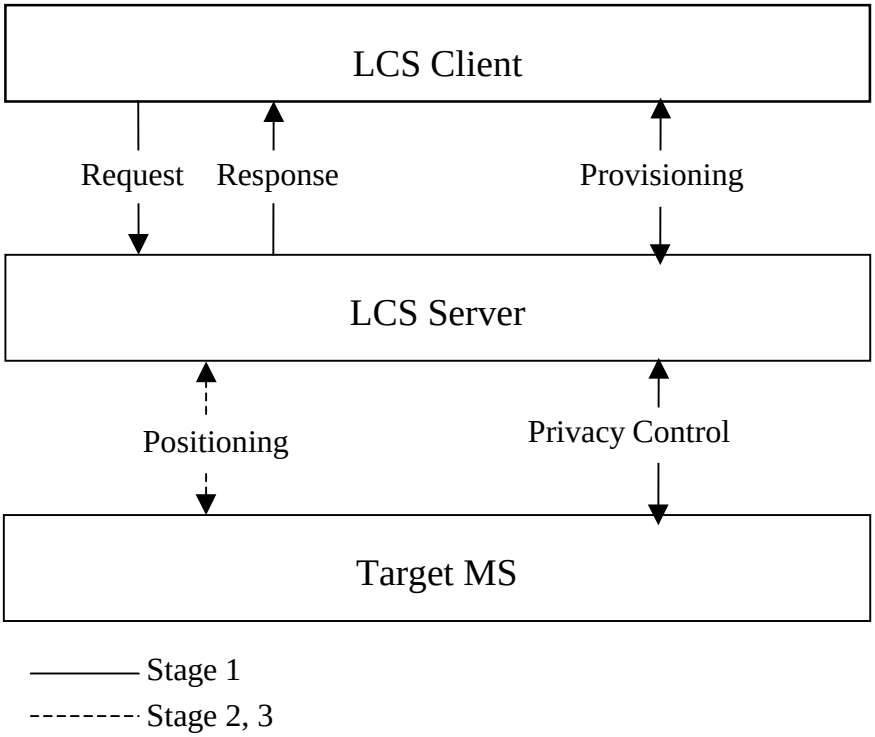

Figure 1. LCS Logical Reference Model

5.2 Functional Entities

5.2.1 LCS Client

An LCS Client is a logical functional entity that makes a request to the PLMN LCS server for the location information of one or more than one target UEs within a specified set of parameters such as QoS. The LCS Client may reside in an entity (including an UE) within the PLMN or in an entity external to the PLMN. The specification of the LCS Client's internal logic and its relationship to any external user is outside the scope of this document.

5.2.2 LCS Server

An LCS server consists of a number of location service components and bearers needed to serve the LCS clients. The LCS server shall provide a platform which will enable the support of location based services in parallel to other telecommunication services such as speech, data, messaging, other teleservices, user applications and supplementary services and therefore enable the market for services to be determined by users and service providers. The LCS server may respond to a location request from a properly authorized LCS client with location information for the target UEs specified by the LCS client if considerations of target UE privacy are satisfied. The LCS server may enable an LCS client to determine the services provided to it by the LCS server through a process of provisioning.

5.2.3 Positioning Function

Positioning is the basic function that performs the actual positioning of a specific target UE. The input to this function is a positioning request from a LCS Client with a set of parameters such as QoS requirements. The end results of this function are the location information for the positioned target UE.

5.2.4 Target UE

The Target UE is the object to be positioned by the LCS Server. For network based positioning methods, no support for LCS is required by the target UE. For mobile assisted and mobile based positioning methods, the target UE actively supports LCS. For all positioning methods, the ability to control privacy may be required to be given to the UE user for

each location request and/or to the UE subscriber through the Target UE subscription profile to satisfy local regulatory requirements (see the previous section on Privacy).

5.3 Functional Interfaces

5.3.1 LCS Client / LCS Server Interface

The LCS client/server use LCS messages to exchange information. Each LCS message contains a set of parameters.

In the case of UE Based positioning methods, if the LCS Client is located in the UE, then an internal LCS Client /LCS Server interface may be supported.

NOTE: Further regional/national specific interfaces between LCS clients and servers may need to be supported in addition to the interfaces described here.

5.3.1.1 Location Service Request

Using the Location Service Request, an LCS client communicates with the LCS server to request the location information for one or more target UEs within a specified set of quality of service parameters.

As shown in Table 1, a location service may be specified as immediate or deferred.

Table 1: Location Service Requests

Request Type	Response Time	Number of Responses
Immediate	Immediate	Single
Deferred	Delayed (event driven)	One or More

If a positioning attempt fails, the LCS server may make another positioning attempt. This attempt should be made when the target UE can be detected by the network. It may be possible for the LCS client to set this action as an option. This optional action should be applied for both request types.

Note: This functionality may be provided using one or more of the existing toolkits, including but not limited to CAMEL and OSA.

When using the Deferred type (event driven), the LCS client shall be able to set the following items:

- Time interval of positioning
- Number of responses (if needed)
- Valid period of the request (if needed)

It shall be possible for the LCS client to cancel the pre-arranged request.

It shall be possible for the LCS server to set the minimum time interval of positioning allowed.

For Emergency Services, LCS shall support requests for the initial, the current (updated), or the last known position of an ME while a voice connection is established.

5.3.1.2 Location Service Response

The Location Service Response provides the result of a Location Service Request from the LCS Server to the LCS Client.

A LCS response is either '*immediate*' or '*deferred*'. The LCS Request indicates the type of response the LCS Client wishes to receive. The two types of location response are described in table 2.

Table 2: Types of LCS Response

Response	Description
Immediate	A Location Response is referred to as 'immediate ', when a response to a request for location information is answered immediately (within a set time). The response shall be single and not dependent to any event.
Deferred	A Location Response is referred to as 'deferred', when a response to a request for location information is returned after the occurrence of an event specified by the LCS client. The response can be single or periodic.

When the location positioning for the target UE has failed, the LCS server may be able to report the reason for failure and Last Known Location with the relevant timestamp.

5.3.1.3 Location Service Request Report

The Location Service Request Report provides the result of a deferred Location Service Request from the LCS Server to the LCS Client. The report is provided using a dialog between the LCS Client and the LCS Server that is initiated by the LCS Server.

5.4 Location information

5.4.1 Sources of location information

It shall be possible for the location determining process to make use of several sources of information in determining the location. Propagation and deployment conditions may limit the number or quality of measurements or additional measurements may be possible. Some ME may also have additional (independent) sources of position information. The LCS shall be capable of making use of the restricted or the extra information as appropriate for the service being requested.

6 Service Provision

6.1 Identification of a Target UE

For value added services, the following is applicable:

The LCS client shall identify a target UE using the UEISDN.

The LCS Client shall be able to identify the target UE using IP addressing.

For PLMN operator services, the LCS client may identify a target UE using any of the following:

MISISDN

IMSI

An identifier internal to the PLMN

For emergency services (where required by local regulatory requirements), the LCS client may identify a target UE using any one of the following:

MSISDN

IMSI

NA-ESRK + (optionally) IMEI

6.2 Location Information Provided to the LCS Client

For value added services, the following is applicable:

The LCS Server shall provide, on request, the current or most recent Location Information (if available) of the Target UE or, if positioning fails, an error indication plus optional reason for the failure.

For PLMN operator services (where allowed by local regulatory requirements and restrictions on UE privacy), Location Information for a particular target UE may be provided to a PLMN operator LCS client either on request or on the occurrence of an event in the LCS server that has been defined to equate to such a request.

For emergency services (where required by local regulatory requirements), the geographic location may be provided to an emergency services LCS Client either without any request from the client at certain points in an emergency services call (e.g. following receipt of the emergency call request, when the call is answered, when the call is released) or following an explicit request from the client. The former type of provision is referred to as a "push" while the latter is known as a "pull". In the case of a "pull", the emergency service LCS Client shall identify the Target UE as defined in section 6.1. Table 3 shows the information that may be provided to the client for either a "push" or a "pull".

Table 3: Location related information provided to an emergency services LCS Client

Type of Access	Information Items
Push	Current Geographic Location (if available) MSISDN IMSI IMEI NA-ESRK NA-ESRD State of emergency call – unanswered, answered, released (note 1)
Pull	Geographic location (note 2), either: Current location initial location at start of emergency call

NOTE 1: indication of call release means that any NA-ESRK will no longer identify the calling UE subscriber

NOTE 2: which type of location is required will be indicated by the LCS Client

6.3 LCS Client Subscription

It shall be possible for an LCS Client to subscribe to the LCS feature for third-party location with or without subscription to other services. A LCS Client may subscribe to one or more service providers' LCS feature in one or more PLMNs. The LCS Client Subscription Profile of a client may contain the range of QoS and subscriptions that the LCS Client is allowed to request.

For certain authorized LCS Clients internal to the PLMN, a subscription profile may be unnecessary. For these LCS Clients subscription to LCS feature is given implicitly as a result of subscription to an authorized PLMN service (e.g. supplementary services). These LCS Clients are empowered to access the LCS Server and request location information for a Target UE.

For emergency services, the subscription requirements to the LCS feature may not be needed.

6.4 Target UE Subscription

6.4.1 Privacy Subscription Options

It shall be possible for a Target UE Subscriber to subscribe to various types of privacy classes. The default treatment in the absence of the information to the contrary in the Target UE Subscription Profile shall be to assume that access is restricted to all LCS Clients (unless using privacy overriding, or otherwise overridden by local regulatory requirements).

Privacy Attributes consist of:

Privacy Exception List: determines which LCS Clients and classes of LCS Clients may position a Target UE;

Privacy Override Indicator: determines applicability of the Privacy Exception List.

6.4.2 Privacy Exception List

To support privacy, the LCS Server shall enable each Target UE Subscriber to subscribe to a "privacy exception list" containing the LCS Client identifiers, classes of LCS Clients, the target subscriber notification setting (with/without notification) and the default treatment, which is applicable in the absence of a response from the Target UE for each LCS Client identifiers.

The privacy exception list shall support a minimum of 20 clients. The maximum number of clients shall be determined by implementation constraints.

If the target subscriber notification is set as "notification with verification", each positioning request from the LCS Client shall be notified to the target UE before positioning. The treatment for location request from the LCS Client, which is not registered in the privacy exception list, shall also be specified in the privacy exception list. An empty privacy exception list shall signify an intent to withhold location from all LCS Clients.

The classes that can be included are as follows.

- Universal Class: location services may be provided to all LCS Clients;
- Call/session-related Class: location services may be provided to any value added LCS clients or a particular value added LCS client or particular group of value added LCS Clients – where each LCS Client or group of LCS Clients is identified by a unique international identification, e.g. E.164 or Access Point Name (APN) that currently has a temporary association with the Target UE in the form of an established voice, data call or PS session originated by the Target UE. For each identified LCS Client or group of LCS Clients, one of the following geographical restrictions shall apply:

    a) Location request allowed from an LCS Client served by identified PLMN only;

    b) Location request allowed from an LCS Client served in the home country only;

    c) Location request allowed from any LCS Client;

- Call/session-unrelated Class; location services may be provided to a particular value added LCS Client or particular group of value added LCS Clients – where each LCS Client or group of LCS Clients is identified by a unique international identification, e.g. E.164, number or Access Point Name (APN). For each identified LCS Client or group of LCS Clients, one of the following geographical restrictions shall apply:

    a) Location request allowed from an LCS Client served by identified PLMN only;

    b) Location request allowed from an LCS Client served in the home country only;

    c) Location request allowed from any LCS Client;

PLMN Operator Class – location services may be provided by particular types of LCS clients supported within the HPLMN or VPLMN. The following types of clients are distinguished (see note):

a) Clients broadcasting location related information to the UEs in a particular geographic area – e.g. on weather, traffic, hotels, restaurants;

b) O&M client (e.g. an Operations System) in the HPLMN

c) O&M client (e.g. an Operations System) in the VPLMN

d) Clients recording anonymous location information (i.e. without any UE identifiers) – e.g. for traffic engineering and statistical purposes

e) Clients enhancing or supporting any supplementary service, IN service, bearer service or teleservice subscribed to by the target UE subscriber.

NOTE: The definitions of the various PLMN operator categories may be supplemented by more precise language in contractual agreements both between UE subscribers and their home service providers and between individual network operators with inter-PLMN roaming agreements. Such classification of the PLMN operator categories is outside the scope of this specification.

6.4.3 Privacy Override Indicator

The privacy override indicator is applicable to lawful intercept and emergency services as allowed by local regulatory requirements. It is not applicable to value added and PLMN operator services. The Privacy Override Indicator shall be used to determine whether Subscriber Privacy of the Target UE subscriber should be overridden or not. This indicator will be set for certain special LCS Clients when it is justified. Each LCS Client shall be associated with a particular value of a position privacy override indicator during the LCS Client provisioning. The privacy override indicator is only valid when the LCS Server for the LCS client is located in the same country of the Target UE.

6.4.4 Subscription to Mobile Originating Location

The UE subscriber may subscribe to the following types of Mobile Originating Location (as defined in section 4):

A) Basic Self Location

B) Autonomous Self Location

C) Transfer to Third Party

6.5 Security

The LCS Server may authorize the LCS Client. There may be security mechanisms to authorize the LCS Client's request for locating a Target UE based on:

LCS Client access barring list(s),

PLMN/SP access barring list,

Point of origin of a location request.

6.6 Charging

The LCS Server shall enable a PLMN to charge LCS Clients for the LCS features that the PLMN provides. . The information that the operator uses to generate a bill to an LCS Client is operator or service provider specific. The charging information may be collected both for the LCS Client and for inter-network revenue sharing.

To support charging and billing for location services, additional information will need to be provided in call detail records.

Charging for value added location services may be provided on a transaction basis, periodically, or a mixture of both.

To support transaction based charging where applicable, service associated call detail records may need to include (as a minimum) the following additional information (depending on the specific service):

- Type and Identity of the LCS Client;
- Identity of the target UE;
- Results (e.g. success/failure, method used, position, response time, accuracy)
- Time Stamp;
- Type of coordinate system used.

6.7 LCS Open Service Architecture and Application Programming Interface

LCS shall support the Open Service Architecture (OSA) standardized Application Programming Interface (API). The OSA and Virtual Home Environment (VHE) service aspects of LCS are described in 22.121.

7 Provisioning and Administration

7.1 Procedures for an LCS Client

These procedures are concerned with the LCS client's provisioning and administration to the LCS feature.

7.1.1 Provisioning

Provisioning is an action to make the LCS feature available to a subscriber.

Provisioning may be:

- General: where the service may be made available to all subscribers without prior arrangements being made with the service provider (i.e. emergency calls).
- Pre-arranged: where the service is made available to an individual LCS Client only after the necessary arrangements have been made with the service provider.

7.1.2 Withdrawal

Withdrawal is an action taken by the service provider to remove an available LCS feature from a LCS Client's subscription profile.

Withdrawal may be:

- General: where the LCS feature is removed from all LCS Clients.
- Specific: where the LCS feature is removed on an individual basis per LCS Client.

7.1.3 Invocation

Invocation is an action to invoke the LCS feature, taken by the LCS Client (e.g. issuing a location request) or automatically by the LCS server as a result of a particular condition (e.g. periodic location request, mobile originating emergency call, etc.).

7.2 Procedures for a Target UE

These procedures are concerned with a Target UE's privacy exception list.. For emergency services, provisioning and withdrawal for Target UEs may not apply.

7.2.1 Provisioning

Provisioning is an an action to make the privacy exception list with its privacy classes available to a Target UE. The provision may be:

- General: where the list is made available to all Target UE's without prior arrangements being made with the service provider. The list shall contain the default privacy class.
- Pre-arranged: where any extra privacy permission class (--granting permission to locate an UE Client) shall be capable of being independently provisioned for a target UE as agreed with the service provider for a certain contractual period.

7.2.2 Withdrawal

Withdrawal is an action taken by the service provider to remove an available privacy class from a target UE's PEL. Withdrawal may be:

- General: where a privacy class is removed from all target UEs provided with this privacy class.

- Specific: where each of the privacy classes in the privacy exception list shall be independently withdrawn at the subscriber's request or for administrative reasons.

7.2.3 User Control

The user shall be able to change the following settings in the privacy exception list.

- the LCS Client and/or group of LCS Clients list
- the target subscriber notification setting (with/without notification)
- the default treatment, which is applicable in the absence of a response from the Target UE for each LCS Client identifiers

8 Interactions with Bearer and Teleservices and Other Services

LCS shall support location of any Target UE that is idle or has established any CS teleservice, bearer service or PS session.

Location of a GPRS terminal or an UE using SMS may be supported.

Provision of location services to assist supplementary services and CAMEL is outside the scope of this specification. The operation of location services shall be independent of other services - including Number Portability, private numbering, CAMEL, supplementary services, teleservices, and bearer services.

9 Cross Phase Compatibility between releases

This section details the cross phase compatibility requirements relating to the service requirements in this document.

Note: when a change is introduced which affects the 3GPP specifications, it is said to be 'backward compatible' if existing equipment can continue to operate and perform correctly with equipment that conforms to the new implementation.

9.1 Compatibility With Existing Standards

Where the service and operational requirements in this document relate to a core network functionality, compatibility is required.

UTRAN LCS mechanisms shall be developed to maximise synergies with earlier LCS phases.

9.2 Compatibility With Future Releases

It is envisaged that 3GPP standards will evolve in future releases, for example with the addition of new service requirements. The standards which define the technical implementation of LCS should be developed in such a way that it is practical to add the requirements in this section in a backward compatible manner.

Following chapters include requirements that are foreseen for future release.

9.2.1 Void

9.2.2 Location determination in call or PDP context activation and release

A possible future enhancement in LCS is that location information of a specific target UE may be obtained at the activation of a Call or PDP Context. A corresponding mechanism to obtain the location information of a specific target UE at the release of a Call or PDP Context may also be feasible.

9.2.3 Void

9.2.4 Defined geographical areas

It shall be possible to specify a geographical area as ellipse to a resolution that will be limited by the accuracy capability of the part of the serving network where the user is registered.

It may be possible to identify and report when the user's terminal enters or leaves a specified geographic area.

In order to enable ME to determine itself if it enters or leaves a defined geographical area information about the defined geographical area shall be made available to client. The method is FFS, one alternative is that cells covering parts of the geographical area broadcasts information about the geographical area.

9.2.5 Continuous check of location

The client may continuously check its current location with or without requesting signalling support from the network using the Self Location feature. In this way the client may become aware of entering or leaving a predefined geographical area, as defined above, and/ or it can supply the user or an application with real-time tracking information.

9.2.6 Identification of a Target UE

In future releases usage of IP addresses for UE identification shall be supported by the standard.

9.2.7 Void

9.2.8 VHE

LCS shall support VHE 22.121 [7].

Annex A (Informative): USA FCC Wireless E911 Rules

Action was taken by the FCC on September 15, 1999, with respect to E911 location technology by the Third Report and Order (FCC 99-245).The FCC has adopted the following revisions to its wireless E911 rules:

- Wireless carriers who employ a Phase II location technology that requires new, modified or upgraded handsets (such as GPS-based technologies) may phase-in deployment of Phase II subject to the following requirements:

  - Without respect to any PSAP request for Phase II deployment, the carrier shall:

    1. Begin selling and activating ALI-capable handsets no later than March 1, 2001;
    2. Ensure that at least 50 percent of all new handsets activated are ALI-capable no later than October 1, 2001; and
    3. Ensure that at least 95 percent of all new digital handsets activated are ALI- capable no later than October 1, 2002.

  - Once a PSAP request is received, the carrier shall, in the area served by the PSAP:

  Within six months or by October 1, 2001, whichever is later:

    1. Ensure that 100 percent of all new handsets activated are ALI-capable;
    2. Implement any network upgrades or other steps necessary to locate handsets; and
    3. Begin delivering to the PSAP location information that satisfies Phase II requirements.

  Within two years or by December 31, 2004, whichever is later, undertake reasonable efforts to achieve 100 percent penetration of ALI-capable handsets in its total subscriber base.

- For roamers and other callers without ALI-capable handsets, carriers shall support Phase I ALI and other available best practice methods of providing the location of the handset to the PSAP.

- To be allowable under the FCC rules, an ALI technology that requires new, modified, or upgraded handsets shall conform to general standards and be interoperable, allowing roaming among different carriers employing handset-based location technologies.

- For carriers employing network-based location technologies, the FCC replaces its current plan, which requires that implementation be fully accomplished within 6 months of a PSAP request, with a revised rule requiring the carrier to deploy Phase II to 50 percent of callers within 6 months of a PSAP request and to 100 percent of callers within 18 months of such a request.

- The FCC adopts the following revised standards for Phase II location accuracy and reliability:

- For network-based solutions: 100 meters for 67 percent of calls, 300 meters for 95 percent of calls;

- For handset-based solutions: 50 meters for 67 percent of calls, 150 meters for 95 percent of calls.

- The FCC directs wireless carriers to report their plans for implementing E911 Phase II, including the technology they plan to use to provide caller location, by October 1, 2000. This report shall provide information to permit planning for Phase II implementation by public safety organizations, equipment manufacturers, local exchange carriers, and the FCC, in order to support Phase II deployment by October 1, 2001.

Annex B (Informative): Descriptions of Possible Location Based Services

B1 Public Safety Services

Service providers offer these location-based services for the good of the public. They are made available without requiring pre-subscription.

B1.1 Emergency Services

Specific consideration of mandated Emergency Services is outside the scope of this specification. Such requirements may be regionally or nationally specific.

B1.1.1 Attributes

Specific consideration of the attributes for mandated Emergency Services is outside the scope of this specification. However, the current requirements specified by the U.S. FCC Phase II Mandate may be useful as an example.

> The FCC's Third Report and Order (FCC 99-245) in the matter of revision of the commission's rules to ensure compatibility with Enhanced 911 Emergency Calling Systems (CC Docket No. 94-102 RM-8143), adopted September 15, 1999, states:
>
> *We adopt the following revised standards for Phase II location accuracy and reliability:*
>
> - *For network-based solutions: 100 meters for 67% of calls, 300 meters for 95 percent of calls;*
> - *For handset-based solutions: 50 meters for 67% of calls, 150 meters for 95 percent of calls.*

The network should be sufficiently flexible to accommodate evolving enabling mechanisms and service requirements to provide new and improved services.

B1.1.2 Emergency Alert Services

Emergency Alert Services may be enabled to notify wireless subscribers within a specific geographic location of emergency alerts. This may include such alerts as tornado warnings, pending volcano eruptions, etc.

No requirements currently exist for Emergency Alert Services, and they may be considered for further study.

B2 Location Based Charging

Location Based Charging allows a subscriber to be charged different rates depending on the subscriber's location or geographic zone, or changes in location or zone. The rates charged may be applicable to the entire duration of the call, or to only a part of call's duration. This service may be provided on an individual subscriber basis, or on a group basis.

For example, when provided on an individual basis this service could apply reduced rates to those areas most often frequented by the subscriber by taking into consideration the subscriber's daily route and life style. Different rates may be applied at country clubs, golf courses, or shopping malls. For example, a "home" zone may be defined which is centered around a user’s home, an agreed larger area, work or travel corridor or some unrelated zone. The zone may vary in size and shape from a cell (or sector) coverage area to a precisely defined polygon completely independent of cell coverage.

Additionally, different rates may be applied in different zones based on the time of day or week.

In addition to being applicable on an individual basis, this service may be applicable on a group basis, which may be desirable for example, for business groups. Locations may be defined for business groups to include corporate campuses, work zones or business zones with different tiers of charging rates.

Individual and group subscribers should be notified of the zone or billing rate currently applicable, and be notified when the rate changes. Location Based Charging may be invoked upon initial registration. A charging zone would then be associated with the subscriber's location. When the subscriber moves to a different zone, the subscriber would be notified.

This service should be transparently provided to the subscriber (i.e. independent of existing voice calls, data, or other services being provided).

B2.1 Attributes

Normal service operation includes invocation upon initial registration, autonomous registration, call origination, and call termination. Location-Based Charging should analyze location information to compare against service zones established for the subscriber. The service would notify the subscriber of their relative location to the established service zone, indicating either "in" or "out" of zone. As the subscriber changes location or predefined location service area they should be notified of their location-based charging service opportunity, being "in" or "out" of a subscribed zone. Except for subscriber notification, the user should experience transparency in interaction with other services (Voice, Data, SMS, etc).

This service may, as an option, be activated/de-activated using special feature codes on a subscriber or business customer basis.

B2.1.1 Target Subscriber Notification

The user needs to be informed on an ongoing basis which zone and billing rate is currently applicable.

Users should be enabled to make an informed decision on expected call charges and therefore need to be provided charging zone information accurately, and in a timely manner, being notified which zone they are in when a call is set up. Notification to the subscriber/user could be provided in several forms including tone, announcement, or short message.

The billing system will need to consider the following possible scenarios:

1. For the duration of the call, the subscriber remains in a single charging zone

2. During the call, the charging zones may change

2.1. The user may initiate a call in one zone, then move to a different zone where the call is terminated.

2.2. The user may cross back and forth between zones multiple times during the duration of a call, and the call may terminate in the zone it was originated from, or in a different zone.

Notification to the user may be via the UE MMI prior to initiation of the call and, during the call.

B2.1.2 Charging

To support appropriate charging, call detail records may need to include the following additional information:

1 Location Service (Location Based Charging) Identification

2 Location Information

3 Zone Information

4 Type of Event

5 Duration of Event

B2.1.3 Roaming

If a subscriber with active location based charging roams into a system that does not support the service, the subscriber may be notified of an "out of coverage zone" notification using the best possible method (UE display, SMS, etc.).

B3 Tracking Services

Although Fleet and Asset Management services may be offered as separate services, within this document they are described as a single service category. In a similar manner, Person Tracking may be viewed as a form of personal asset tracking.

B3.1 Fleet and Asset Management Services

Fleet and Asset Management services allow the tracking of location and status of specific service group users. Examples may include a supervisor of a delivery service who needs to know the location and status of employees, parents who need to know where their children are, animal tracking, and tracking of assets.

The service may be invoked by the managing entity, or the entity being managed, depending on the service being provided.

Fleet Management may enable an enterprise or a public organization to track the location of vehicles (cars, trucks, etc.) and use location information to optimize services.

Asset management services, for example, may range from asset visualization (general reporting of position) to stolen vehicle location and geofencing (reporting of location when an asset leaves or enters a defined zone). The range of attributes for these services is wide.

For Fleet and Asset Management services, a distinction may be made between the manager of the fleet/assets in charge of tracking, and the entities being tracked (service group users, etc). The tracking service may make use of mobile station handsets with possible specialized functions (Web browsers, etc) to allow for tracking and specific methods for communicating with the managing entity. A managing entity would be able to access one or several managed entities' location and status information through a specified communication interface (Internet, Interactive Voice Response, Data service, etc). The managing entity would be able to access both real-time and recent location and status results of managed entities.

The network shall provide the capability to provide the last known location and timestamp. In cases where the service group user's mobile station is not registered (i.e. Inactive, out of coverage) the last known location information and timestamp may optionally be provided. If this information is unavailable in real-time, a reason for why the information is unattainable may be provided. The managing entity may also be able to relay messages to service group users through the appropriate interface, as well as receive messages originated by the service group users.

Activation of Fleet and Asset Management services could be performed via subscriber provisioning by the service provider, as well as by offering subscriber-based service activation codes to the service group user/subscriber. The managing entity could also initiate service via requests to a provisioning system through Interactive Voice Response or Internet request. A feature code may optionally also be provided to allow for specific mobile user group subscriber activation by the managing entity (*FC + Mobile ID). A specific user group mobile could also be able to self-activate through the use of a feature code.

B3.2 Traffic Monitoring

Mobiles in automobiles on freeways anonymously sampled to determine average velocity of vehicles. Congestion detected and reported.

Congestion, average flow rates, vehicle occupancy and related traffic information can be gathered from a variety of sources including roadside telematic sensors, roadside assistance organizations and ad-hoc reports from individual drivers. In addition average link speeds can be computed through anonymous random sampling of UE locations.

B3.2.1 Attributes

B3.2.1.1 Privacy

Anonymous sampling of target UE requires all unique information relating to the UE location to be retained by the network operator. Depending on the capabilities of the location method (ref. section 3.4) traffic behavior described above can only be determined if an UE is sampled at least twice within a finite predetermined period.

The UE identification must be sufficiently unique to allow time separated measurements to be paired before discarding the source UE identification.

The level of uniqueness can be a highly truncated form of the UE-IMSI (or equivalent). For example maintaining 1000 unattached location estimates for subsequent pairing with future estimates will only require 3 least significant digits of the IMSI. Ambiguity in matching will occur but at a low (detectable) rate. Finally, all unattached estimates can be set to expire after a preset time.

B4 Enhanced Call Routing

Enhanced Call Routing (ECR) allows subscriber or user calls to be routed to the closest service client based on the location of the originating and terminating calls of the user. The user may optionally dial a feature or service code to invoke the service (*GAS for closest gas station, etc).

In addition to routing the call based on location, ECR should be capable of delivering the location information to the associated service client. For example, this capability may be needed for services such as Emergency Roadside Service. This could be used for the purpose of dispatching service agents for ECR service clients that can make use of this information.

ECR services may be offered, for example, through menu driven access allowing users to interactively select from a variety of services.

B5 Location Based Information Services

Location-Based Information services allow subscribers to access information for which the information is filtered and tailored based on the location of the requesting user. Service requests may be initiated on demand by subscribers, or automatically when triggering conditions are met, and may be a singular request or result in periodic responses.

The following subsections provide some examples of possible location based information services.

B5.1 Navigation

The purpose of the navigation application is to guide the handset user to his/her destination. The destination can be input to the terminal, which gives guidance how to reach the destination. The guidance information can be e.g. plain text, symbols with text information (e.g. turn + distance) or symbols on the map display. The instructions may also be given verbally to the users by using a voice call.

Note: this may involve a service provider giving verbal directions to a lost motorist, or providing periodic short text messages (possibly using SMS), in addition to, or as an alternative to the provision of a graphic map.

This can be accomplished through carrying a ~~GSM~~ mobile phone that has location technology capabilities down to a few feet. Less granularity impedes the applicability of this functionality.

This service can either be menu driven from a handset using SIM Application Toolkit or a WAP based terminal with a map application running – similar to a GPS system. A central server may handle all mapping of locations, and may save specific locations (i.e., favorite fishing holes).

B5.2 City Sightseeing

City Sightseeing would enable the delivery of location specific information to a sightseer. Such information might consist of combinations of the services described throughout this document to describe historical sites, providing navigation directions between sites, facilitate finding the nearest restaurant, bank, airport, bus terminal, restroom facility, etc.

B5.3 Location Dependent Content Broadcast

The main characteristic of this service category is that the network automatically broadcasts information to terminals in a certain geographical area. The information may be broadcast to all terminals in a given area, or only to members of specific group (perhaps only to members of a specific organization). The user may disable the functionality totally from the terminal or select only the information categories that the user is interested in.

An example of such a service may be localized advertising. For example, merchants could broadcast advertisements to passersby based on location / demographic / psychographic information (for example "today only, 30% off on blue jeans").

B5.4 Mobile Yellow Pages

The internet has also changed how people find phone numbers. Instead of thumbing through the yellow pages or calling Directory assistance you simply go online and search the number. The need for paper copy phonebooks is gone. Wireless takes this one step further by adding the location of the subscriber to the search. Now the phone number of the nearest location can be ascertained as opposed to all locations within a 50-mile area.

Mobile Yellow Pages services provide the user with the location of the nearest service point, e.g. Italian restaurant. The result of the query may be a list of service points fulfilling the criteria (e.g. Italian restaurants within three kilometers). The information can be provided to the users in text format (e.g. name of the restaurant, address and telephone number) or in graphical format (map showing the location of the user and the restaurants).

B5.5 Location Sensitive Internet

Location Sensitive Internet is for further study.

B6 Network Enhancing Services

The Network Enhancing Services described in this section are for further study and privacy issues will require further consideration.

B6.1 Applications for Network Planning

The network operator may be able to use location information to aid network planning. The operator may be able to locate calls in certain areas to estimate the distribution of calls and user mobility for network planning purposes. These applications may be used for hot spot detection and user behavior modeling

B6.2 Applications for Network QoS Improvements

The network operator may be able to use location services to improve the Quality of Service of the network. The location system may be used to track dropped calls to identify problematic areas. The system may also be used to identify poor quality areas.

B6.3 Improved Radio Resource Management

The location of the handset may be used for more intelligent handovers and more efficient channel allocation techniques.

Appendix C (Informative): Attributes of Specific Services

The following table (provided by the GSM Alliance Services Working Group) depicts ranges of values that may be expected for various attributes of location based services.

Requirement -> Service Category	Service Authorization	Privacy	Target Subscriber Notification	Horizontal Accuracy	Vertical Accuracy	Response Time	Reliability	Security	Periodic Location Reporting	Service Registration	Service Activation	Service De-Activation	Service Invocation	Roaming	Service Specific Considerations
Public Safety Services															
Emergency Services	None req'd	Implied when dialing 911 info provided to safety organizations	Not required	Network based: 100m (67%) 300m (95%) Handset based: 50m (67%) 150m (95%)	n/a now (5-15m future?)	5 sec.	Same as GSM	Same as GSM	Required Period TBD suggest 1-10 minutes	None req'd	None required	Not Allowed	Keystroke or Dialed string (911)	Required if emergency call can be made	
Emergency Alert Services	Req'd	Info only passed to subscribed to service provider	Not required	125 m (10 m future?)	n/a now (5-15m future?)	5 sec.	Same as GSM	Same as GSM	Required Period TBD suggest 1-10 minutes	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Automatic	Preferred where roaming is allowed	
Location Sensitive Charging															

Requirement -> Service Category	Service Authorization	Privacy	Target Subscriber Notification	Horizontal Accuracy	Vertical Accuracy	Response Time	Reliability	Security	Periodic Location Reporting	Service Registration	Service Activation	Service De-Activation	Service Invocation	Roaming	Service Specific Considerations
Home-Zone Billing	Req'd	Info only passed to subscribed to carrier	Not required	Depends on billing zone (5m-300m)	n/a	Depends on increments of billing.	Same as GSM	Same as GSM	Required depends on billing increment and coverage zone	Req'd	Interactive with Carrier	Interactive with Carrier	Automatic	n/a	
Tracking Services															
Fleet Mgment.	Req'd	Info only passed to subscribed to service provider	Not required	125m-Cell ID	n/a	5 sec.	Same as GSM	Same as GSM	Required (1-10 minutes)	Req'd	Interactive or live operator	Interactive or live operator	Interactive or live operator	Preferred where roaming is allowed	
Asset Mgment	Req'd	Info only passed to subscribed to service provider	Not required	10m-125m	n/a (5-15m future?	5 sec.	Same as GSM	Same as GSM	Required (1-10 minutes)	Req'd	Interactive or live operator	Interactive or live operator	Interactive or live operator	Preferred where roaming is allowed	Special Terminal

Requirement -> Service Category	Service Authorization	Privacy	Target Subscriber Notification	Horizontal Accuracy	Vertical Accuracy	Response Time	Reliability	Security	Periodic Location Reporting	Service Registration	Service Activation	Service De-Activation	Service Invocation	Roaming	Service Specific Considerations
Person Tracking	Req'd	Info only passed to subscribed to service provider	May be required (Child versus Employee?)	10m-125m	n/a (5-15m future?	5 sec.	Same as GSM	Same as GSM	Required (1-10 minutes)	Req'd	Interactive or live operator	Interactive or live operator	Interactive or live operator	Preferred where roaming is allowed	
Pet Tracking	Req'd	Info only passed to subscribed to service provider	Not required	10m-125m	n/a (5-15m future?	5 sec.	Same as GSM	Same as GSM	Required (1-10 minutes)	Req'd	Interactive or live operator	Interactive or live operator	Interactive or live operator	Preferred where roaming is allowed	Special Terminal
Traffic Monitoring															
Traffic Congestion Reporting	Req'd	No specific Target UE info allowed	Not required	10-40m Hi- res. req'd muti- near proximity lanes (opposing and adjacent)	May be req'd for over-passes	5 sec.	Same as GSM	Same as GSM	Required (1-2 minutes)	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	High bandwidth req on network.
Enhanced Call Routing															

Requirement -> Service Category	Service Authorization	Privacy	Target Subscriber Notification	Horizontal Accuracy	Vertical Accuracy	Response Time	Reliability	Security	Periodic Location Reporting	Service Registration	Service Activation	Service De-Activation	Service Invocation	Roaming	Service Specific Considerations
Routing to Nearest Commercial Enterprise	Req'd	Info only passed to subscribed to service provider	Not required	10m-125m	n/a	5 sec.	Same as GSM	Same as GSM	Not required	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	
Roadside Assistance	Req'd	Info only passed to subscribed to service provider	Not required	10m-125m	n/a	5 sec.	Same as GSM	Same as GSM	Not required	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	
Location Based Information Services															
Navigation	Req'd	Info only passed to subscribed to service provider	Required	10m-125m	n/a	5 sec.	Same as GSM	Same as GSM	Required (1-10 minutes)	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	
City Sightseeing	Req'd	Info only passed to subscribed to service provider	Not required	10m-125m	n/a	5 sec.	Same as GSM	Same as GSM	Not required	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	

Requirement -> Service Category	Service Authorization	Privacy	Target Subscriber Notification	Horizontal Accuracy	Vertical Accuracy	Response Time	Reliability	Security	Periodic Location Reporting	Service Registration	Service Activation	Service De-Activation	Service Invocation	Roaming	Service Specific Considerations
Localized Advertising	Req'd	Info only passed to subscribed to service provider	Not required	125m-Cell ID	n/a	Not sensitive (default to 5 sec.)	Same as GSM	Same as GSM	Not required	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	
Mobile Yellow Pages	Req'd	Info only passed to subscribed to service provider	Not required	125m-Cell ID	n/a	5 sec.	Same as GSM	Same as GSM	Not required	Req'd	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	By menu, keystroke, interactive or live operator	Preferred where roaming is allowed	
Service Provider Specific Services															
Network Planning	Not Req'd	Specific Target UE info allowed	Not Required	10m-Cell ID	n/a	5 sec.	Same as GSM	Same as GSM	Required (1 minute)	Not Req'd	N/a	n/a	n/a	n/a	
Dynamic Network Control	Not Req'd	Specific Target UE info allowed	Not Required	10m-Cell ID	n/a	5 sec.	Same as GSM	Same as GSM	Required (1 minute)	Not Req'd	N/a	n/a	n/a	n/a	

Annex D:
Change history

Change history											
TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	WI
Jun 1999			GSM 02.71					Transferred to 3GPP SA1	7.0.0		
SP-04			22.071						3.0.0		
SP-05	SP-99486	S1-99831	22.071	001	1	R99	C	UMTS LCS service requirements support for mobile originated positioning requests, and velocity as a service parameter	3.0.0	3.1.0	
SP-05	SP-99438	S1-99832	22.071	002		R99	B	UMTS LCS service requirements	3.0.0	3.1.0	
SP-05	SP-99438	S1-99833	22.071	003		R99	C	LCS accuracy requirements	3.0.0	3.1.0	
SP-05	SP-99479	S1-99625	22.071	004		R99	D	Editorial changes for alignment	3.0.0	3.1.0	
SP-06	SP-99522	S1-99955	22.071	005		R99	D	U.S. specific Emergency Services requirements included as an informative annex.	3.1.0	3.2.0	
SP-08	SP-000212	S1-000338	22.071	006		R00	C	Incorporation of TSG SA1#8 LCS Contributions and email contributions	3.2.0	4.0.0	
SP-09	SP-000378	S1-000484	22.071	008		R4	F	Correction to LCS Service Description Stage 1 Document (R'00)	4.0.0	4.1.0	
SP-09	SP-000392	S1-000667	22.071	009		R4	C	Provision of Velocity for Location Services	4.0.0	4.1.0	
SP-09	SP-000392	S1-000670	22.071	010		R4	B	External LCS client identity	4.0.0	4.1.0	
SP-09	SP-000392	S1-000671	22.071	011		R4	B	Privacy Control for LCS	4.0.0	4.1.0	
SP-09	SP-000392	S1-000672	22.071	012		R4	F	Privacy Control for LCS	4.0.0	4.1.0	
SP-09	SP-000392	S1-000673	22.071	013		R4	D	Clarifications to LCS on privacy and Service response	4.0.0	4.1.0	
SP-09	SP-000392	S1-000674	22.071	014		R4	F	LCS: Geographic Location	4.0.0	4.1.0	
SP-09	SP-000392	S1-000675	22.071	015		R4	D	Adding statement on "active" and "idle" UE in chapter 4.13	4.0.0	4.1.0	
SP-09	SP-000392	S1-000676	22.071	016		R4	D	Radio Access Network support for LCS	4.0.0	4.1.0	
SP-09	SP-000392	S1-000677	22.071	017		R4	D	LCS, Identification of a Target UE using IP addresses	4.0.0	4.1.0	
SP-09	SP-000392	S1-000678	22.071	018		R4	D	LCS: LCS Open Service Architecture (OSA) and Application Programming Interface.	4.0.0	4.1.0	
SP-10	SP-000544	S1-000787	22.071	019		Rel-4	B	Privacy Exception List	4.1.0	4.2.0	LCS
SP-10	SP-000544	S1-000788	22.071	020		Rel-4	B	Periodic Location Reporting	4.1.0	4.2.0	LCS
SP-10	SP-000544	S1-000791	22.071	021		Rel-4	B	Location Service Request	4.1.0	4.2.0	LCS
SP-10	SP-000544	S1-000851	22.071	022		Rel-4	C	Periodic Location Reporting amendment	4.1.0	4.2.0	LCS1
SP-10	SP-000544	S1-000803	22.071	023		Rel-4	C	Addition of achieved location information accuracy with reference to TS 23.032	4.1.0	4.2.0	LCS1
SP-11	SP-010044	S1-010235	22.071	024		Rel-4	C	Quality level negation	4.2.0	4.3.0	LCS1
SP-11	SP-010044	S1-010239	22.071	025		Rel-4	C	Location determination in call or PDP context activation and release	4.2.0	4.3.0	LCS1-PS
SP-11	SP-010044	S1-010237	22.071	026		Rel-4	C	OSA support for LCS	4.2.0	4.3.0	LCS1
SP-11	SP-010044	S1-010218	22.071	027		Rel-4	D	Editorial Cleanup	4.2.0	4.3.0	LCS1
SP-11	SP-010044	S1-010269	22.071	028		Rel-4	C	Number of LCS Clients	4.2.0	4.3.0	LCS1

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.067** **CR** **003** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 1 ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs Affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

3GPP TS 22.067 V4.0.0 (2000-01)

Technical Specification

3rd Generation Partners

Technical Specification Group Services and System Aspects; enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 1 (Release 2000)

Reference
DTS/TSGSA-0122067U

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Contents

Foreword

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

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

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

1 Scope

The present document specifies the stage 1 description of the enhanced Multi-Level Precedence and Pre-emption Service (eMLPP). This service has two parts: precedence and pre-emption. Precedence involves assigning a priority level to a call in combination with fast call set-up. Pre-emption involves the seizing of resources, which are in use by a call of a lower precedence, by a higher level precedence call in the absence of idle resources. Pre-emption can also involve the disconnection of an on-going call of lower precedence to accept an incoming call of higher precedence.

The eMLPP service is provided as a network operator's option to a domain of a network. The domain can be the whole network or a subset of the network. The eMLPP service applies to all network resources in the domain that is in common use. The eMLPP service is applicable to all mobile stations in the domain with all or some mobile stations having a respective subscription assigning precedence according to the eMLPP service.

eMLPP is a supplementary service and shall be provided to a subscriber for all basic services subscribed to and for which eMLPP applies.

NOTE: It is under study whether normal GSM Phase 2 Mobile Stations will be able to be used for this service.

The service is described from the service subscriber's and user's point of view, in particular:

- the procedure for normal operation with successful outcome;
- the action to be taken in exceptional circumstances;
- the interaction with other services and features.

The present document does not deal with the Man-Machine Interface (MMI) requirements, but makes reference to the appropriate specifications.

The present document is applicable to teleservices 1x and 6x and to all bearer services used in a mobile network if eMLPP is provided. Any interaction with other services and/or networks not dealt with in clauses 8 or 9 are outside the scope of the present document.

2 References

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

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

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

[2] TS 22.004: "General on supplementary services".

[3] TS 22.024: "Description of Charge Advice Information (CAI)".

~~[4] GSM 02.40: "Digital cellular telecommunications system (Phase 2+); Procedures for call progress indications".~~

[5] TS 22.068: "Voice Group Call Service (VGCS) - Stage 1".

[6] TS 22.069: "Voice Broadcast Service (VBS) - Stage 1".

[7] TS~~GSM~~ 4~~0~~3.0~~0~~5: "~~Digital cellular telecommunications system (Phase 2+);~~ Technical performance objectives".

[8] TS 23.068: "Voice Group Call Service (VGCS) - Stage 2".

[9] TS 23.069: "Voice Broadcast Service (VBS) - Stage 2".

[10] ITU-T Recommendation I.255.3: "ISDN Multi-Level Precedence and Pre-emption (MLPP) stage 1".

[11] TR 21.905: "Vocabulary for 3GPP Specifications".

3 Definitions and abbreviations

3.1 Definitions

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

called-party pre-emption: Termination of a call to a particular user when a higher priority call is directed towards that specific user. Called party pre-emption is decided by the User Equipment without interaction of the user.

calling subscriber: Service subscriber which invokes the eMLPP service.

network operator: Entity which provides the network operating elements and resources for the execution of the enhanced Multi-Level Precedence and Pre-emption service (eMLPP).

precedence: Precedence is the priority associated with a call.

service provider: Entity which offers the eMLPP service for subscription. The network operator may be the service provider.

service subscriber: Mobile subscriber which subscribes to the eMLPP service. In principle, if a network provides eMLPP service, all users are able to subscribe to this service.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply, in addition to those listed in GSM 01.04 and TR 21.905 [11]:

eMLPP enhanced Multi-Level Precedence and Pre-emption

4 Description

a) The enhanced Multi-Level Precedence and Pre-emption service (eMLPP) provides different levels of precedence for call set-up and for call continuity in case of handover.

eMLPP shall be applicable also in case of roaming if supported by the related networks.

The maximum precedence level of a subscriber is set at the subscription time by the service provider, based on the subscriber's need. The subscriber may select a precedence level up to and including the maximum precedence level subscribed to, on a per call basis.

There are at maximum 7 priority levels. The two highest levels are reserved for network internal use, e.g. for emergency calls or the network related service configurations for specific voice broadcast or voice group call services. These two levels can only be used locally, i.e. in the domain of one MSC. The other five priority levels are offered for subscription and can be applied globally, e.g. on inter switch trunks, if supported by all related network elements, and also for interworking with ISDN networks providing the MLPP service.

The seven priority levels are defined as follows:

A (highest, for network internal use).

B (for network internal use).

0 (for subscription).

1 (for subscription).

2 (for subscription).

3 (for subscription).

4 (lowest, for subscription).

Levels A and B shall be mapped to level 0 for priority treatment outside of the MSC area in which they are applied.

b) Priorities shall be treated in the network as defined for the following call scenarios:

- Mobile originated calls:
  - The priority level depends on the calling subscriber.
  - If the user has no eMLPP subscription, the call shall have a default priority level defined in the network.
  - If the user has an eMLPP subscription, the call shall have the priority level selected by the user at set-up or the priority level predefined by the subscriber as default priority level by registration.
- Mobile terminated calls:
  - The priority level depends on the calling party. For this, interworking with the ISDN MLPP (Multi-Level Precedence and Pre-emption) service is required.
  - If the call is not an ISDN MLPP call, i.e. no priority level is defined, the call shall be treated in the mobile network with a default priority level.
  - If the call is an ISDN MLPP call, the call shall be treated with the priority level provided by the interfacing network.
- Mobile-to-mobile calls in case of roaming:

  The priority shall be treated for the calling subscriber as for mobile originated calls and for the called subscriber as for mobile terminated calls.
- Mobile-to-mobile calls in one network:

The priority shall be treated for the calling subscriber as for mobile originated calls and for the called subscriber as for mobile terminated calls.

- Voice broadcast (VBS) and voice group calls (VGCS):

  At the first instances of the voice broadcast or voice group call, when there is only a link between the calling mobile station and the network, the call shall be treated as defined for mobile originated calls. Then, for the set-up of the voice broadcast or voice group call links in the related cells, the call shall have the priority level as defined for the related voice broadcast or voice group call in the network.

c) There are three classes of set-up time performance and examples of the call set-up times are:

- class 1 fast set-up 1-2 s;
- class 2 normal set-up < 5 s;
- class 3 slow set-up < 10 s.

The achievement of the set-up times depends on technical realizations and network planning. Mechanisms shall be implemented to provide the performance defined by the service provider under normal circumstances (no congestion). They do not include any allowance for user reaction times. The call set-up time is considered to be the time from pressing the "send" button to the point at which the called party, or at least one called party in the case of a multi-party, voice group or voice broadcast call, can receive information.

The class 1 figures depend on the required connection type and service and will have to be considered accordingly. It is assumed that for calls which originate or terminate in external networks, 25 % of the set-up time is spent in these external networks. The procedures assume normal operating conditions apply, e.g. ~~GSM~~ reference loads as defined in TS~~GSM~~ 4~~0~~3.0~~0~~5, the mobile station is in an area of sufficient coverage, the mobile station is not busy, no call redirection is in place, etc.

d) Calls with a high priority requiring a class 1 set-up may not require authentication at call set-up nor confidentiality on the radio link.

e) For precedence calls, the network shall have the possibility to pre-empt on-going calls with lower priority, in ascending order of priority, in case of congestion at set-up on the radio interface or the ~~GSM~~ core network side, respectively, or at handover of the precedence call to a congested cell. In case of necessary pre-emption of another on-going call at set-up, the successful call set-up may exceed the set-up time performance defined under c) but shall be completed as soon as possible.

A call can be pre-empted any time after the precedence level of the call has been established and before call clearing has begun.

Pre-emption shall only be performed to provide precedence for those priority levels which have a pre-emption capability allocated by the network operator. Priority levels with no pre-emption capability allocated shall only have queuing priority.

f) A subscriber shall be able to set her mobile station to automatic answer a call if the incoming call is of or exceeds a defined priority level, respectively.

In case of called mobile subscriber busy, the on-going call shall be pre-empted (or set automatically on call hold by the mobile station in case of telephony and if the subscriber is entitled to call hold services) to accept the incoming call with the priority defined for automatic answering. If the on-going call is a point-to-point call, this function is only possible if the subscriber has a subscription for Call Waiting (CW).

NOTE: A pre-emption of an on-going call is not possible if the on-going call is a TS12 call (emergency call).

The definition of the priority level which shall cause automatic answering of an incoming call or pre-emption of another on-going call shall be stored in the mobile station and can be changed by the subscriber.

If a mobile station does not automatically accept an incoming call while being idle and the user does not accept the call, the call may be forwarded to another party if Call Forwarding on No Reply (CFNRy) applies.

If a mobile station does not pre-empt an on-going point-to-point call to accept an incoming call of higher priority, the call is indicated by CW and the user may still accept the incoming call. It the user rejects CW, the call may be forwarded to another party if Call Forwarding on mobile station Busy (CFB) applies.

If the mobile station does not pre-empt an on-going voice broadcast or voice group call to accept an incoming call of higher priority, the call may be forwarded to another party if CFNRy applies.

g) The network operator can allocate set-up classes and resource pre-emption capabilities to each priority level. Table 1 presents an example for the assignment of priority levels and the corresponding parameters.

Table 1: Example on eMLPP service composition

Priority level	Set-up time	Pre-emption	Examples
A	class 1	yes	VBS/VGCS emergency applications
B	class 2	yes	Operators calls
0	class 2	yes	TS12 Emergency calls
1	class 3	yes	Premium rate calls
2	class 3	no	Standard rate calls
3	class 3	no	Default for no eMLPP subscription
4	class 3	no	Low tariff calls

Network operators which provide the eMLPP service for subscription need to consider the interrelation of the number of subscriptions offered (possibly restricted for particular users), the technical performance and the network planning issues in order to guarantee the service performance for the subscriber.

h) In case of pre-emption the pre-empted subscriber shall be provided with a suitable indication.

4.1 Applicability to telecommunication services

The applicability of this supplementary service is defined in TS 22.004.

The effects of the eMLPP service are applicable, potentially, to all subscribers in a network, should a precedence call set-up or handover occur and pre-emption be necessary.

5 Normal operation with successful outcome

5.1 Provision

A maximum authorized precedence level is provided to a service subscriber after prior arrangements with the service provider. Service subscribers without an eMLPP subscription are assigned to a default priority level (in case of emergency calls, TS12, exceptions shall be possible).

5.2 Withdrawal

The maximum authorized precedence level can be changed or the complete eMLPP service withdrawn at the subscriber's request or for administrative reasons.

5.3 Registration

The definition of the priority level to be used as default level at mobile originated call establishment shall be registered in the network. This default level will be used if a subscriber has a subscription for a priority level higher than the lowest priority level and has not selected a priority level at call set-up.

Registration can take place either by the service provider or with an appropriate control procedure by the subscriber.

If the subscriber requests a priority level higher than the maximum entitled one then the network shall reject this registration with an appropriate indication to the subscriber.

5.4 Erasure

Erasure of a default priority level is done as a result of a new registration overruling, and thus effectively erasing the previous registration.

5.5 Network related service configuration

The allocation of eMLPP priority levels to the call set-up classes and the possibility of pre-emption of on-going calls in case of congestion will be arranged by the network operator for a specific composition of the eMLPP service in a network. This is not related to one specific service subscriber.

An example is given in table 1 of clause 4.

5.6 Activation

Not applicable.

5.7 Deactivation

Not applicable.

5.8 Invocation

The eMLPP shall be invoked automatically by the network at call set-up.

The precedence level may be selected by the user on a per call basis. The user may select any precedence level up to and including her maximum authorized precedence level. The maximum authorized precedence level shall be stored on the SIM/USIM and the mobile station shall check that only an authorized level is used for set-up. In addition, it shall be possible to verify in the network the level used at set-up against the maximum authorized level.

If the user has not selected a precedence level at set-up, the network shall apply the subscriber specific default precedence level.

If the user has selected a precedence level higher than the maximum authorized level, the maximum authorized precedence level shall be applied for the call.

5.9 Normal operation

At invocation of the eMLPP on a call set-up, the network notes the call priority related to the call and decides on the respective actions to be taken, i.e. on queuing priority, fast call set-up procedures and possibly pre-emption in case of congestion of network resources. In case of pre-emption the network shall release the lowest lower priority call and seize the necessary resources that are required to set-up the higher priority call.

Once set for a call, the precedence level cannot be changed.

In the case of automatic answering of an incoming call with a sufficient priority level, the alerting indication to the calling party may not be provided in order shorten the set-up time. In case of called mobile subscriber busy, the on-going call shall be released if automatic answering applies (or set on call hold in case of a telephony call) to accept an incoming call of higher priority.

When pre-emption applies, at handover to a congested cell, higher priority calls shall replace those of the lowest priority. The pre-empted user shall receive an indication for congestion as defined in ~~GSM 0~~ TS 22.001~~40~~.

TSG-SA WG 1 **S1-020463**
Saalfelden, Austria, February 2002

CR-Form-v4

CHANGE REQUEST

⌘ **TS22.060** **CR** **022** ⌘ ev **-** ⌘ Current version: **5.0.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT ***Date:*** ⌘ 15 Feb 2002
Category:	⌘	F ***Release:*** ⌘ REL-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
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R96	*(Release 1996)*
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R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary, and invalid sections removed.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various.
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

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

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

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

3GPP TS 22.060 V5.0.0 (2001-10)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
General Packet Radio Service (GPRS);
Service description, Stage 1
(Release 5)

Reference

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

z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

This TS defines the stage one description of the General Packet Radio Service (GPRS). Stage one is an overall service description, primarily from the service subscriber's and user's points of view, but does not deal with the details of the human interface itself. This TS includes information applicable to network operators, service providers and terminal, switch and data base manufacturers.

This TS contains the core requirements for the packet switched networks specified by 3GPP which are sufficient to provide a complete service. It defines a set of bearer services that provide packet mode transmission within the PLMN and interwork with external networks.

The term GPRS shall be used in this document to refer ~~to~~ the GPRS service offered via GERAN and UTRAN~~. , EGPRS~~ and the PS Domain of the 3G PLMN.

The GPRS shall not prevent the user's operation of other ~~GSM~~ 3GPP services.

2 References

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[1] TS 22.001: " Principles of telecommunication services supported by a ~~GSM~~ Public Land Mobile Network (PLMN)".

[2] TS~~GSM 0~~ 24.002: "~~Digital cellular telecommunications system (Phase 2+); GSM~~ Public Land Mobile Network (PLMN) access reference configuration".

[3] ISO 8348: "Information processing systems - data communications - network service definition".

[4] Internet STD 5:RFC 791: Internet protocol, RFC 950: "Internet standard subnetting procedure", RFC 919: "Broadcasting internet datagrams", RFC 922: "Broadcasting internet datagrams in the presence of subnets", RFC 792: "Internet control message protocol", RFC 1112: "Host extensions for IP multicasting" RFC 1122:" Requirements for Internet hosts - communication layers". RFC 1920:" Internet official protocol standards", RFC 1458: "Requirements for multicast protocols", RFC 1301: "Multicast transport protocol".

[5] TS22.004 (ETS 300 918): " General on supplementary services".

[6] TS22.030 (ETS 300 907): " Man-Machine Interface (MMI) of the Mobile Station (MS)".

[7] ~~GSM~~ TS 402.017 ~~(ETS 300 922)~~: "~~Digital cellular telecommunications system;~~ Subscriber Identity Modules (SIM) Functional characteristics".

[8] TS 22.041: "Operator Determined Barring (ODB)"

[9] TS 27.060: "General Packet Radio Service (GPRS); Mobile Station (MS) supporting GPRS".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this TS the following definitions apply:

A

access delay: The value of elapsed time between an access request and a successful access (source: ITU-T X.140).

access protocol: a defined set of procedures that is adopted at an interface at a specified reference point between a user and a network to enable the user to employ the services and/or facilities of that network (source: ITU-T I.112).

accuracy: A performance criterion that describes the degree of correctness with which a function is performed. (The function may or may not be performed with the desired speed.) (source: ITU-T I.350).

B

bearer service: A type of telecommunication service that provides the capability for the transmission of signals between user-network interfaces (source: GSM 01.04, ITU-T I.112).

broadcast: A value of the service attribute "communication configuration", which denotes unidirectional distribution to all users (source: ITU-T I.113).

C

closed group: A group with a pre-defined set of members. Only defined members may participate in a closed group.

conversational service: An interactive service which provides for bi-directional communication by means of real-time (no store-and-forward) end-to-end information transfer from user to user (source: ITU-T I.113).

D

dependability: A performance criterion that describes the degree of certainty (or surety) with which a function is performed regardless of speed or accuracy, but within a given observational interval (source: ITU-T I.350).

destination user: Entity to which calls to the General Packet Radio Service (GPRS) are directed.

F

functional group: A set of functions that may be performed by a single equipment (source: ITU-T I.112).

G

I

interactive service: A service which provides the means for bi-directional exchange of information between users. Interactive services are divided into three classes of services: conversational services, messaging services and retrieval services (source: ITU-T I.113).

interface: The common boundary between two associated systems (source: GSM 01.04, ITU-T I.112).

M

mean bit rate: A measure of throughput. The average (mean) bit rate available to the user for the given period of time (source: ITU-T I.210).

messaging service: An interactive service which offers user-to-user communication between individual users via storage units with store-and-forward, mailbox and/or message handling, (e.g., information editing, processing and conversion) functions (source: ITU-T I.113).

mobile station: Equipment intended to access a set of PLMN telecommunication services. Services may be accessed while the equipment capable of surface movement within the system area is in motion or during halts at unspecified points.

mobile termination: The part of the mobile station which terminates the radio transmission to and from the network and adapts terminal equipment capabilities to those of the radio transmission (source GSM 01.04).

multicast service: A unidirectional PTM service in which a message is transmitted from a single source entity to multiple destinations.

multipoint: A value of the service attribute "communication configuration", which denotes that the communication involves more than two network terminations (source: ITU-T I.113).

N

network operator: Entity which provides the network operating elements and resources for the execution of the General Packet Radio Service (GPRS).

network service data unit (NSDU): A unit of data passed between the user and the GPRS network across a Network Service Access Point (NSAP).

network termination: A functional group on the network side of a user-network interface (source: ITU-T I.112).

O

open group: A group that does not have a pre-defined set of members. Any user may participate in an open group.

P

packet: An information unit identified by a label at layer 3 of the OSI reference model (source: ITU-T I.113). A network protocol data unit (NPDU).

packet data protocol (PDP): Any protocol which transmits data as discrete units known as packets, e.g., IP.

packet transfer mode: Also known as packet mode. A transfer mode in which the transmission and switching functions are achieved by packet oriented techniques, so as to dynamically share network transmission and switching resources between a multiplicity of connections (source: ITU-T I.113).

PLMN Operator: Public Land Mobile Network operator. The entity which offers a GPRS.

point-to-multipoint (PTM) service: A service type in which data is sent to ”all service subscribers or a pre-defined subset of all subscribers” within an area defined by the Service Requester.

point-to-point (PTP): A value of the service attribute "communication configuration", which denotes that the communication involves only two network terminations.

point-to-point (PTP) service: A service type in which data is sent from a single network termination to another network termination.

protocol: A formal set of procedures that are adopted to ensure communication between two or more functions within the within the same layer of a hierarchy of functions (source: ITU-T I.112).

protocol data unit (PDU): In the reference model for OSI, a unit of data specified in an (N)-protocol layer and consisting of (N)-protocol control information and possibly (N)-user data (source: ITU-T X.200 / ISO-IEC 7498-1).

push service: service type which delivers information (data/multimedia) initiated from a network (which may be external to the PLMN) to the UE. The service will cause a PDP context to be activated if needed.

Q

quality of service: The collective effect of service performances which determine the degree of satisfaction of a user of the service (ITU-T E.800). The set of performance parameters that can be directly observed and measured at the point at which the service is accessed by the user. There are three criteria by which performance is measured: speed, accuracy and dependability (source: ITU-T I.350).

R

reference configuration: A combination of functional groups and reference points that shows possible network arrangements (source: GSM 01.04, ITU-T I.112).

reference point: A conceptual point at the conjunction of two non-overlapping functional groups (source: GSM 01.04, ITU-T I.112).

retrieval service: An interactive service which provides the capability of accessing information stored in data base centres. The information will be sent to the user on demand only. The information is retrieved on an individual basis, i.e., the time at which an information sequence is to start is under the control of the user (source ITU-T I.113).

S

SDU loss probability: The ratio of total lost service data units (SDUs) to total transmitted service data units in a specified sample (source: ITU-T X.140).

NOTE: the source document term "user information unit" has been replaced by the term "service data unit".

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SDU transfer delay: The value of elapsed time between the start of transfer and successful transfer of a specified service data unit (SDU) (source: ITU-T X.140).

NOTE: the source document term "user information unit" has been replaced by the term "service data unit".

SDU transfer rate: The total number of successfully transferred service data units (SDUs) in a transfer sample divided by the input/output time for that sample. The input/output time is the larger of the input time or the output time for the sample (source: ITU-T X.140).

NOTE: the source document term "user information unit" has been replaced by the term "service data unit".

service access point (SAP): In the reference model for OSI, the points through which services are offered to an adjacent higher layer (source: GSM 01.04, ITU-T X.200 / ISO-IEC 7498-1).

service attribute: A specified characteristic of a telecommunication service (source: ITU-T I.112).

NOTE: the value(s) assigned to one or more service attributes may be used to distinguish that telecommunications service from others.

service bit rate: The bit rate that is available to a user for the transfer of user information (source: ITU-T I.113).

service category or **service class:** A service offered to the users described by a set of performance parameters and their specified values, limits or ranges. The set of parameters provides a comprehensive description of the service capability.

service data unit (SDU): In the reference model for OSI, an amount of information whose identity is preserved when transferred between peer (N+1)-layer entities and which is not interpreted by the supporting (N)-layer entities (source: ITU-T X.200 / ISO-IEC 7498-1).

service delay: The time elapsed from the invocation of the service request, to the corresponding service request indication at the Service Receiver, indicating the arrival of application data.

service model: A general characterisation of services based upon a QoS paradigm, without specifying the actual performance targets.

service provider: Entity which offers the General Packet Radio Service (GPRS) for subscription. The network operator may be the service provider.

service receiver: The entity which receives the service request indication primitive, containing the SDU.

service request: This is defined as being one invocation of the service through a service request primitive.

service requester: The entity which requests the initiation of a GPRS operation, through a service request.

service subscriber: Entity which subscribes to the General Packet Radio Service (GPRS) service.

signalling: The exchange of information specifically concerned with the establishment and control of connections, and with management, in a telecommunications network (source: ITU-T I.112).

speed: A performance criterion that describes the time interval required to perform a function or the rate at which the function is performed. (The function may or may not be performed with the desired accuracy.) (source: ITU-T I.350).

supplementary service: A service that modifies or supplements a basic telecommunication service (as defined in GSM 01.04). It cannot be offered to a customer as a stand-alone service. It must be offered together or in association with a basic telecommunication service (bearer or teleservice). The same supplementary service may be common to a number of telecommunication services (source: ITU-T I.210).

T

telecommunication service: That which is offered by a PLMN operator or service provider to its customers in order to satisfy a specific telecommunication requirement. (source: GSM 01.04, ITU-T I.112). Telecommunication services are divided into two broad families: bearer services and teleservices (source: ITU-T I.210).

teleservice: A type of telecommunication service that provides the complete capability, including terminal equipment functions, for communication between users according to protocols established by agreement between Administrations (source: GSM 01.04, ITU-T I.112).

terminal equipment: Equipment that provides the functions necessary for the operation of the access protocols by the user (source: GSM 01.04). A functional group on the user side of a user-network interface (source: ITU-T I.112).

throughput: A parameter describing service speed. The number of data bits successfully transferred in one direction between specified reference points per unit time (source: ITU-T I.113).

transit delay: A parameter describing service speed. The time difference between the instant at which the first bit of a protocol data unit (PDU) crosses one designated boundary (reference point), and the instant at which the last bit of the PDU crosses a second designated boundary (source: ITU-T I.113).

U

user access or **user network access:** The means by which a user is connected to a telecommunication network in order to use the services and/or facilities of that network (source: GSM 01.04, ITU-T I.112).

user-network interface: The interface between the terminal equipment and a network termination at which interface the access protocols apply (source: ITU-T I.112).

user-user protocol: A protocol that is adopted between two or more users in order to ensure communication between them (source: ITU-T I.112).

V

variable bit rate service: A type of telecommunication service characterised by a service bit rate specified by statistically expressed parameters which allow the bit rate to vary within defined limits (source: ITU-T I.113).

3.2 Abbreviations

For the purposes of this TS the following definitions apply:

CLNP	Connectionless network protocol
CLNS	Connectionless network service
EGPRS	Enhanced GPRS
FFS	For further study
GPRS	General packet radio service
HSDPA	High Speed Downlink Packet Access
IP	Internet protocol
IP-M	Internet protocol multicast
NSDU	Network service data unit
PDP	Packet data protocol
PDU	Protocol data unit
PLMN	Public land mobile network
PTM	Point to multipoint
PTP	Point to point
QoS	Quality of service

SAP	Service access point
SVC	Switched virtual circuit
SDU	Service data unit
TBD	To be defined
TLLI	Temporary link level identity

4 Main Concepts

The GPRS allows the service subscriber to send and receive data in an end-to-end packet transfer mode, without utilizing network resources in circuit switched mode.

GPRS enables the cost effective and efficient use of network resources for packet mode data applications e.g. for applications that exhibit one or more of the following characteristics:

- intermittent, non-periodic (i.e., bursty) data transmissions, where the time between successive transmissions greatly exceeds the average transfer delay;
- frequent transmissions of small volumes of data, for example transactions consisting of less than 500 octets of data occurring at a rate of up to several transactions per minute;
- infrequent transmission of larger volumes of data, for example transactions consisting of several kilobytes of data occurring at a rate of up to several transactions per hour.

Within the GPRS, two different bearer service types are defined. These are:

- Point-To-Point (PTP);
- Point-To-Multipoint (PTM).

Based on standardized network protocols supported by the GPRS bearer services, a GPRS network administration may offer (or support) a set of additional services. This is outside the scope of this specification, however, a number of possible PTP interactive teleservices include:

- retrieval services which provide the capability of accessing information stored in data base centres. The information is sent to the user on demand only. An example of one such service in the Internet's World Wide Web (WWW);
- messaging services which offer user-to-user communication between individual users via storage units with store-and-forward mailbox, and/or message handling (e.g., information editing, processing and conversion) functions;
- conversational services which provide bi-directional communication by means of real-time (no store-and-forward) end-to-end information transfer from user to user. An example of such a service is the Internet's Telnet application;
- tele-action services which are characterized by low data-volume (short) transactions, for example credit card validations, lottery transactions, utility meter readings and electronic monitoring and surveillance systems.

Some examples of teleservices which may be supported by a PTM bearer service include:

- distribution services which are characterized by the unidirectional flow of information from a given point in the network to other (multiple) locations. Examples may include news, weather and traffic reports, as well as product or service advertisements;
- dispatching services which are characterized by the bi-directional flow of information from a given point in the network (dispatcher) and other (multiple) users. Examples include taxi and public utility fleet services;
- conferencing services which provide multi-directional communication by means of real-time (no store-and-forward) information transfer between multiple users.

EGPRS is an enhancement of GPRS for GERAN allowing higher data rates on the radio interface. The same set of services provided by GPRS is available in EGPRS.

HSDPA is an enhancement to Packet data services for UTRAN allowing higher data rates on the radio interface downlink. The same set of services provided by GPRS is available with GPRS using HSDPA.

5 Service Requirements

5.1 GPRS reference model

The GPRS can be described using the simplified reference model in figure 1.

GPRS provides data transfer capabilities between a sending entity and one or more receiving entities. These entities may be an ~~MS~~UE or a Terminal Equipment, the latter being attached either to a GPRS network or to an external data network. The base station provides radio channel access for ~~MS~~UEs to the GPRS network. User data may be transferred between four types of ~~MS~~UEs as described in TS22.001 [1] and ~~GSM~~ TS 2~~0~~4.0~~0~~2 [2].

Each PLMN has two access points, the radio interface (labelled Um for ~~GSM BSS~~GERAN and Uu for UTRAN) used for mobile access and the R reference point used for origination or reception of messages. The R reference point for the ~~MS~~UEs is defined in 27.060 [9].

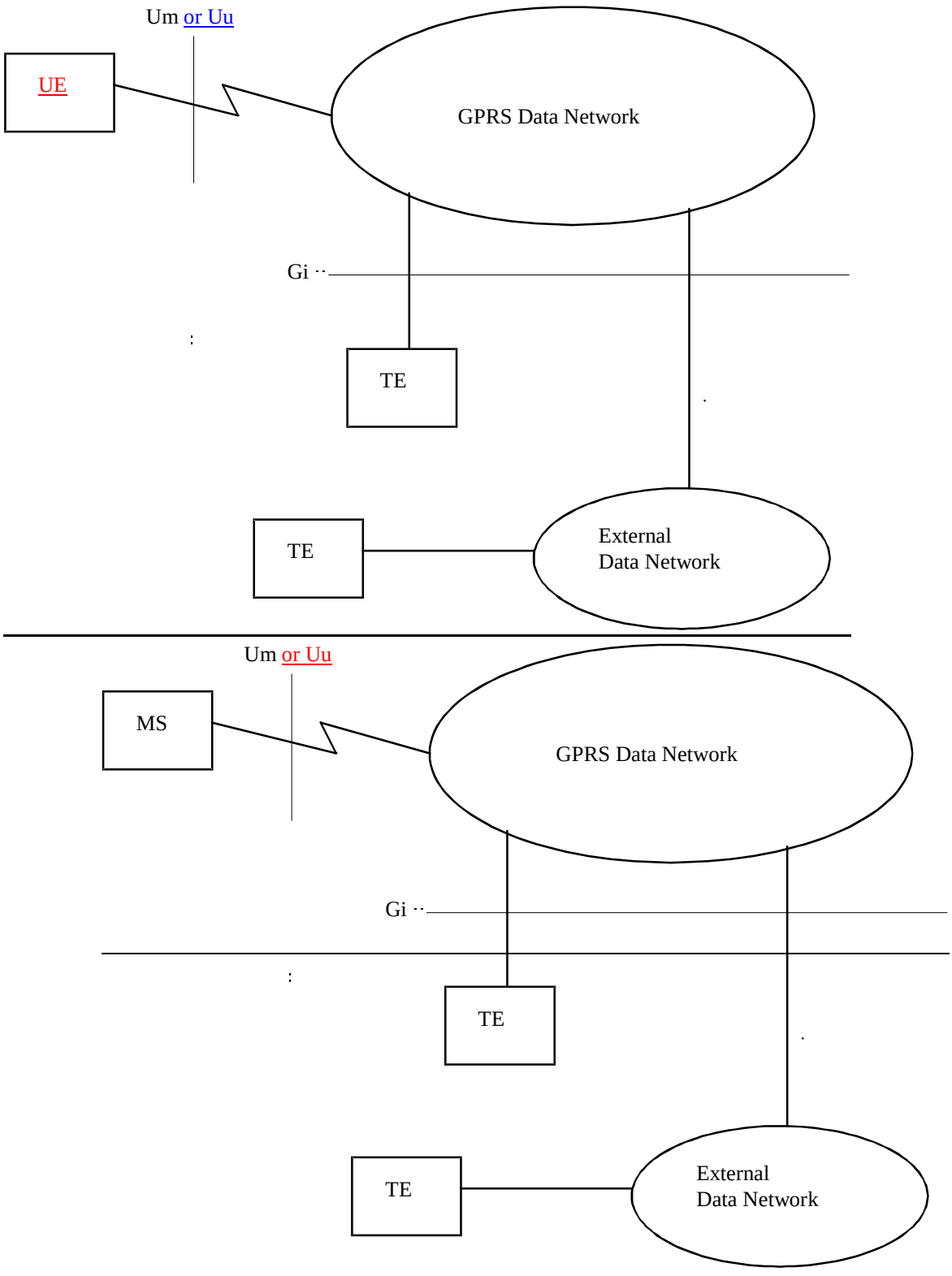

Figure 1: GPRS simplified reference model

5.1.1 Bearer services

The GPRS bearer services support the capability to transmit data between user-network access points.

~~5.1.2 Teleservices~~

~~GPRS supports teleservices to provide complete communication service capabilities including the terminal equipment functions necessary for communication between network customers using the user-user protocols supported by the GPRS service provider(s) (see also TS 22.001 [1]).~~

5.1.3 (Void)

5.2 Network Interworking

Network interworking is required whenever a PLMN and a non-PLMN are involved in the execution of a GPRS Service request.

In general the mobile user of a GPRS network will receive and experience all the services provided by an external data network. In this case the external data network refers to the network that the GPRS PLMN interworks with as determined by the network operator. With this in mind it can be said that a user :-

1) will require a universal identity(ies) of the form compatible with the interworked with network(s);

2) and experience access to and provision of all services as offered by the interworked with networks (some reduction of capability may result from unavoidable restrictions due to the complexity of implementation).

5.2.1 Interworking with other data networks and other PLMNs

GPRS shall provide means to interwork with external data networks. The GPRS operator may provide an appropriate address to the external data network for the subscriber as part of the GPRS subscription. That address can be either dynamic (e.g. the user's IP address is allocated from a pool of unused IP addresses every time the subscriber activates the access to an IP network) or static (e.g. a certain IP address is permanently allocated to a particular subscriber). In addition, the GPRS network shall be able to notify the server IP address (e.g. the gateway IP address) to the subscriber, when the subscriber activates. When connected with some external data networks, the routeing protocols of these networks may limit the data network addresses that can be allocated. For example, when interworking with IP networks, the IP address for the GPRS subscriber shall belong to that GPRS operator's IP subnetwork that allocates the address. In the case of a simple point to point connection, a GPRS subscriber need not have an associated network address.

The type of interworking between a PLMN and data networks is determined by the network operator.

Interworking with the following types of data networks shall be defined:

- IP networks;
- other PLMNs, directly or via a transit network.

5.2.1.1 QoS when Interworking

GPRS shall satisfy, within the constraints introduced by the mobile radio environment, the QoS requirements of the interworked-with network.

5.2.2 GPRS Numbering Plan

It is required that GPRS ~~MS~~UE addresses conform to the numbering plan already defined for 3GPP system~~GSM~~.

5.2.3 Addressing and routeing requirements

5.2.3.1 PTP network layer services

A GPRS subscriber identified by an IMSI, may have a network layer address(es) temporarily and/or permanently associated with it that conforms to the standard addressing scheme of the respective network layer service used, e.g.:

- IP Version 4 and 6 addresses for Internet CLNS.

In the case of a simple point to point connection, a GPRS subscriber need not have an associated network layer address.

5.2.4 Interworking for subscriber roaming

Interworking between different GPRS PLMNs is required in order to support subscriber roaming.

It shall be possible for the VPLMN to provide access to the external data network when the external non-3GPP~~GSM~~ data network address is dynamically assigned by the VPLMN.

5.3 GPRS service description

There are two categories of GPRS services:

- Point to Point (PTP) services,
- Point to Multipoint (PTM) services.

The PTP service provides a transmission of one or more packets between two users, initiated by a service requester and received by a receiver.

There is one PTP service: - PTP Connectionless Network Service (PTP-CLNS). The PTM service provides a transmission of packets between a service requester and a receiver group.

There is one PTM service:

- IP Multicast (IP-M).

An invocation of the service request by a service requester is possible from the fixed and mobile access points.

Table 1 presents the relationship between service requests and the Service Requester/Receiver.

Table 1: Relationship of service request and service requester/receiver

Service requester/receiver AP = Access Point	**Types of service request**	
	PTP-CLNS	**IP-M**
From fixed AP to mobile AP	Supported	Supported
From mobile AP to mobile AP (see note 1)	Supported	Supported
From mobile AP to fixed AP	Supported	Supported
NOTE 1: It shall be possible to transfer data between two mobiles of the same operator without the use of external data networks.		

5.3.1 Point-To-Point Connectionless Network Service (PTP-CLNS)

Point-To-Point Connectionless Network Service (PTP-CLNS) is a service in which one (or more) single packet(s) is (are) sent from a single service subscriber "A" to a single destination user "B". Each packet is independent of the preceding and succeeding packet. This service is of the datagram type and is intended to support bursty applications. On the radio interface PTP-CLNS supports the acknowledged transfer mode for reliable delivery.

GPRS provides data communications services consistent with the connectionless network layer service definition ISO 8348 [3]. Specifically, GPRS shall be able to support applications based on the following network layer protocol:

- Internet Protocol (IP);
    - IP is the network layer protocol of the Internet TCP/IP protocol suite defined by Internet STD 5 [4].

5.3.2 (Void)

5.3.3 Point-To-Multipoint (PTM) service overview

A PTM service is the transmission of a single message to multiple subscribers. The GPRS PTM services provide the capability for a subscriber to send data to multiple destinations.

There is one PTM service:

- IP Multicast (IP-M), which is a service defined as a part of the IP protocol suite. In IP-M messages are sent between participants of an IP-M group. An IP-M group can be internal to the PLMN or distributed across the Internet. Participation and data transfer in the IP-M service shall be compliant with the Internet protocols. See RFC 1920 [4], RFC 1458 [4], RFC 1301 [4] and RFC 1112 [4]. The Service Receiver of a point-to-multipoint service request shall be able to filter out packets at a network level, through use of the Packet Identities, which are of no interest either because they are for a service for which no subscription is held, or the packet belongs to a sub-group within the offered application service which is of no interest. It is required that the ~~MS~~UE-Application resources shall not be utilized for this function.

Table 2: PTM Service Characteristics

Characteristics	IP-M
Primary addressing mechanism	specified group of subscribers
Secondary addressing mechanism	no
Present subscribers known	yes, group members shall join the IP-M call to become participants.
Delivery time	real time
Direction of transmission	multi-directional
Reliable delivery	acknowledged as normal IP PTP packets
Ciphering	yes

5.4 Service interworking

It shall be possible for the GPRS PTP services to be utilized as a bearer service for the SMS-MO and SMS-MT services.

5.5 Transfer Characteristics

The packet multiplexing mechanisms developed for GPRS shall be independent of a given channel type. It shall be possible to operate GPRS over low and high capacity channels. ~~These may be existing and/or future channels whose capacities are as yet unspecified (e.g., a signalling channel, or two time-slots or an entire 200 kHz carrier).~~ Table 3 is only applicable to the GPRS part of the connection.

Table 3: Transfer Characteristics

Attributes		Supported capabilities
Information Transfer Capability		Unrestricted digital information
Information Transfer Mode	Connection mode	Connection orientated, connectionless
	Traffic type (a)	Variable bit rate and variable delay
	Timing end-to-end (b)	Asynchronous
Information Transfer Rate (c)		Maximum bit rate.
Information Structure		- Service data unit integrity - Data sequence integrity
Communication Configuration		- Point to point - Point to multipoint
Establishment of Communication (d)		Demand mobile originated or mobile terminated
Negotiation		- Out of band - In band
Symmetry		- Bi-directional - Unidirectional
Radio Channel assignment		Shared, multi-user

a) Traffic type: describing data streams with constant bit rate or variable bit rate characteristics.

b) Timing end-to-end: describing the timing relation between the source and destination of signals.

c) Flexible channels with a maximum bit rate that depends on the type of channel and the number of time slots that are used. This capability defines the maximum capability associated with the channel(s). The actual bit rate for a particular user may be any value up to this maximum value.

d) Establishment of communication: may be on demand, reserved or permanent.

5.6 Service characteristics

5.6.1 Subscriber profile

The subscriber profile holds subscription information about services and other parameters that have been assigned for an agreed contractual period. It includes the following information:

- subscribed services (PTP-CLNS);
- subscribed QoS profile (service precedence(priority), reliability, delay, throughput).

An invocation of a service by any user with the appropriate subscription profile shall be possible.

It shall be possible to validate a service request against a service subscriber's subscription profile.

5.6.2 Quality of Service (QoS)

The mapping of user application QoS parameters to GPRS QoS parameters is an implementation issue and is not part of GPRS specifications.

It shall be possible to respond to local data traffic conditions adaptively. GPRS shall include the functionality to increase or decrease the amount of radio resources allocated to GPRS on a dynamic basis. The criteria used to decide on dynamic changes of the GPRS part of the radio resource should not be specified. Thus, only the necessary procedure, including radio protocol and timers, needed to perform the change of radio resources shall be specified within the ETSI specifications.

Within GPRS the dynamic allocation of the radio resource for bursty or lengthy file transfer applications shall be such that it can be controlled by the network operator.

5.6.2.1 QoS parameter definitions

The defined QoS parameter values, assume the user is at a location with acceptable -coverage and refer to and are valid for normal network operating conditions or, as in the case of the service precedence parameter, regulate how the network shall handle abnormal conditions.

5.6.2.1.1 Service precedence (priority)

The service precedence indicates the relative priority of maintaining the service. For example under abnormal conditions (e.g. network congestion) packets which may be discarded can be identified. The following precedence levels are defined:

- High precedence: Service commitments will be maintained ahead of all other precedence levels.
- Normal precedence: Service commitments will be maintained ahead of low priority users.
- Low precedence: Service commitments will be maintained after the high and normal priority commitments have been fulfilled.

5.6.2.1.2 Reliability

The reliability parameter indicates the transmission characteristics that are required by an application. The reliability class defines the probability of loss of, duplication of, mis-sequencing of or corruption of SDUs.

Table 4 lists the three classes of the data reliability.

Table 4: Reliability classes

Reliability class	Lost SDU probability (a)	Duplicate SDU probability	Out of Sequence SDU probability	Corrupt SDU probability (b)	Example of application characteristics.
1	10^{-9}	10^{-9}	10^{-9}	10^{-9}	Error sensitive, no error correction capability, limited error tolerance capability.
2	10^{-4}	10^{-5}	10^{-5}	10^{-6}	Error sensitive, limited error correction capability, good error tolerance capability.
3	10^{-2}	10^{-5}	10^{-5}	10^{-2}	Not error sensitive, error correction capability and/or very good error tolerance capability.

a) To protect against buffer overflow or a protocol malfunction, there is a maximum holding time for each SDU in the GPRS network after which the SDU is discarded. The maximum holding time depends on the protocols used (e.g., TCP/IP).

b) Corrupt SDU probability: the probability that a SDU will be delivered to the user with an undetected error.

5.6.2.1.3 Delay

GPRS is not a „store and forward“ service - although data is temporarily stored at network nodes during transmission - thus, any delay incurred is due to technical transmission characteristics (or limitations) of the system and is to be minimised for a particular delay class. The delay parameter thus defines the maximum values for the mean delay and 95-percentile delay to be incurred by the transfer of data through the GPRS network(s). The delay parameter defines the end-to-end transfer delay incurred in the transmission of SDUs through the GPRS network(s).

This includes the radio channel access delay (on uplink) or radio channel scheduling delay (on downlink), the radio channel transit delay (uplink and/or downlink paths) and the GPRS-network transit delay (multiple hops). It does not include transfer delays in external networks.

Delay is measured between the R or S (for ~~MS~~UE) and Gi (for FS) reference points when applied to "~~MS~~UE to fixed station (FS)" or "FS to ~~MS~~UE" transmissions.

Table 5: Delay classes

Delay Class	Delay (maximum values)			
	SDU size: 128 octets		SDU size: 1024 octets	
	Mean Transfer Delay (sec)	95 percentile Delay (sec)	Mean Transfer Delay (sec)	95 percentile Delay (sec)
1. (Predictive)	< 0.5	< 1.5	< 2	< 7
2. (Predictive)	< 5	< 25	< 15	< 75
3. (Predictive)	< 50	< 250	< 75	< 375
4. (Best Effort)	Unspecified			

5.6.2.1.4 Throughput

The throughput parameter indicates the user data throughput requested by the user.

Throughput is defined by two negotiable parameters:

- Maximum bit rate
- Mean bit rate (includes, for example for "bursty" transmissions, the periods in which no data is transmitted.)

The maximum and mean bit rates can be negotiated to a value up to the Information Transfer Rate value (see table 3).

It shall be possible for the network to re-negotiate the throughput parameters at any time during a session.

5.6.2.2 QoS profile - PTP

The subscriber´s QoS profile for the PTP service consists of the following parameters which are negotiated or set to default values:

- service precedence (priority),
- reliability,
- delay,
- user data throughput.

5.6.2.3 Monitor

As an option, the ~~MS~~UE may monitor the current QoS level. If this option is implemented, the following information shall be monitored:

- user data throughput;
- radio channel access delay;
- round-trip ~~MS~~UE/PLMN delay; and
- reliability,

The ~~MS~~UE shall provide means of communicating this information to the application(s) via the R and S reference points as shown in Figure 2.

5.6.3 Packet size

Both PTP and PTM services shall allow the transfer of variable length Network Service Data Units (NSDU).

6 Operational Requirements

6.1 GPRS ~~MS~~UE Modes of Operation

The purpose of the definition of the GPRS ~~MS~~UE Classes is to enable the different needs of the various market segments to be satisfied by a number of ~~MS~~UE types with distinct capabilities (e.g., simultaneous use and number of time-slots)~~-~~. A means shall be provided to indicate the multi-slot capability and current configuration to the network when necessary.

Three GPRS ~~MS~~UE modes of operation are identified:

NOTE 1: The term simultaneous (attach, traffic, etc.) is the requirement to simultaneously support GSM GPRS services and GSM circuit switched services including SMS.

Class A: The ~~MS~~UE is attached to both GPRS and other GSM services. The ~~MS~~UE supports simultaneous attach, simultaneous activation, simultaneous monitor, simultaneous invocation and simultaneous traffic. The mobile user can make and/or receive calls on the two services simultaneously subject to the QoS requirements.

A minimum of one time slot shall be available for each type of service (circuit switched and GPRS) when required.

Class B: The ~~MS~~UE is attached to both GPRS and other GSM services, but the ~~MS~~UE can only operate one set of services at a time. When the ~~MS~~UE is in both idle mode and packet idle mode it should be able to monitor paging channels for both circuit-switched and packet-switched services depending on the mode of network operation.

At least one mode of network operation shall be defined so that when an ~~MS~~UE is in both idle mode and packet idle mode it shall be able to respond to paging for both circuit-switched and packet-switched services. A mode of network operation where the network performs the paging for circuit-switched and packet-switched services on different paging channels is also defined. In such case an ~~MS~~UE in both idle mode and packet idle mode should either attempt to listen to both paging channels with priority for the circuit-switched service or revert to class-C mode of operation.

If in a mode of network operation the network performs both the paging for circuit-switched and packet-switched services on the same paging channel, then the mobile station shall respond to paging messages for both services.

There is no requirement for the ~~MS~~UE to monitor the packet paging channel when in dedicated mode.

One mode of network operation shall be defined so that when an ~~MS~~UE is engaged in packet data transfer, it shall receive paging messages via the packet data channel without degradation of the packet data transfer. Modes of network operation where paging for other GSM services is not done via the packet data channel are also defined. In such cases an ~~MS~~UE engaged in packet data transfer may attempt to receive paging messages.

When responding to a paging message for other GSM services, the ~~MS~~UE shall establish the connection for that incoming service (i.e., enter dedicated mode) and suspend GPRS activity. GPRS activity is resumed upon return to idle mode.

If paged for an incoming circuit-switched call, the ~~MS~~UE shall indicate the presence of the call to the user or user's application, and where possible provide to the user the CLI. It shall be possible for the user (or the user's application) to decide how to proceed with an incoming call (e.g., accept the call, indicate UDUB, or invoke Call Deflection).

It shall be possible for the ~~MS~~UE to receive SMS-CB messages if it attached to GPRS but is not engaged in packet data transfer.

NOTE 2: Users should be aware that monitoring paging (in some modes of network operation), responding to paging, alerting of circuit-switched service, or acceptance or establishment of a circuit-switched call during an active GPRS connection may degrade the performance of the established GPRS connection and, in some cases, may cause failures in an application using the GPRS connection (e.g., a file transfer might be aborted due to a timeout of the application protocol).

Class C: The ~~MS~~UE is attached to either GPRS or other GSM services. Alternate use only. If both services (GPRS and Circuit Switched) are supported then a Class C ~~MS~~UE can make and/or receive calls only from the manually or default selected service, i.e., either GPRS or Circuit Switched service. The status of the service which has not been selected is detached i.e., not reachable. The capability for GPRS-attached class-C ~~MS~~UEs to receive and transmit SMS messages is optional.

The network shall support SMS message reception and transmission for GPRS-attached class-C MSs.

It shall be possible for the ~~MS~~UE to receive SMS-CB messages if it attached to GPRS but is not engaged in packet data transfer.

An ~~MS~~UE may be reconfigured. E.g., a class A ~~MS~~UE configured as 1 slot for circuit switched plus 1 slot for GPRS may be reconfigured as a class C configured as 0 slots for circuit switched plus 2 slots for GPRS.

Non-voice only ~~MS~~UEs do not have to (but may) support emergency calls.

6.2 Subscriber roaming

GPRS shall provide the ability for subscribers to access the service while roaming between networks. This implies the pre-existence of an international signalling mechanism and a service agreement between the different network operators involved.

It shall be possible for GPRS subscribers to remain GPRS attached when moving from one PLMN to another.

HSDPA shall be supported when roaming providing a roaming agreement for the necessary transport/bearer service(s) is currently valid.

6.3 Construction of GPRS subscriber numbers

The number of a GPRS subscriber shall be composed such that the PLMN operator can maintain control of the numbering scheme, thereby ensuring subscriber numbering integrity. The ability to allocate a subset of the numbers privately shall be possible.

6.4 Battery life extension

The GPRS service shall provide for a means to extend the battery life of an ~~MS~~UE, by allowing the ~~MS~~UE to reduce current drain; e.g., by using a discontinuous reception (DRX) strategy. The power conservation strategy should allow the ~~MS~~UE to remain in a very low current state for a considerable proportion of the time. Moreover, the power conservation strategy should ensure that no messages are lost and that bandwidth is not wasted.

When conserving power through the use of DRX, or other techniques, the ~~MS~~UE shall still meet all QoS requirements of selected classes. Some classes of service may necessitate continuous reception (i.e., no DRX capability).

6.5 Format Of Message User Data

The user data is to be presented as an octet string between GPRS's access points, and is not interpreted by the PLMN.

6.6 Charging aspects

The charging information that the GPRS network collects for each ~~MS~~UE shall be standardised. The information that the operator uses to generate a bill to a subscriber is operator specific. Billing aspects, e.g. a regular fee for a fixed period, are outside the scope of this specification.

The HPLMN Operator/Service Provider may be able to charge the GPRS subscriber for all costs incurred including those costs incurred in an external network be it a VPLMN or a data network.

The charging requirements of HSDPA shall be identical to the existing packet data services.

6.6.1 PTP and IP-M charging information

The charging information of PTP and IP-M services is collected for the GPRS subscriber. As a minimum the following charging information shall be collected:

- destination and source: The charging information shall describe the destination and source addresses;
- usage of radio interface: The charging information shall describe the amount of data transmitted in MO and MT directions categorized with QoS and user protocols;
- usage of the external data networks: The charging information shall describe the amount of data sent/received to/from the external data network;
- usage of the packet data protocol addresses: The charging information shall describe how long the ~~MS~~UE has used the packet data protocol addresses;
- usage of the general GPRS resources: The charging information shall describe the usage of other GPRS related resources and ~~MS~~UE's activity in the GPRS network (e.g. Attach/Detach, mobility management);
- location of ~~MS~~UE: HPLMN, VPLMN, plus optional higher accuracy location information.

6.6.2 Reverse Charging

It shall be possible to provide reverse charging as a subscription option. However, reverse charging may not be applicable to certain external data network protocols. It shall be possible, as an option, to allow users to roam from one environment to another, between fixed and mobile, between public and private as well as between different public systems.

6.7 Security services

The use of radio communications for transmission to/from subscribers in mobile networks makes them particularly sensitive to:

1) misuse of their resources by unauthorized persons using manipulated ~~MS~~UEs;
2) eavesdropping on the information being exchanged on the radio path.

Therefore, to protect the system in the two cases mentioned above, the following security features are provided for GPRS:

- ~~MS~~UE authentication; i.e., the confirmation by the land-based part of the system that the subscriber identity, transferred by the ~~MS~~UE within the identification procedure on the radio path, is the one claimed. The purpose of this authentication is to protect the network against unauthorized use. It also enables the protection of GPRS subscribers by denying intruders the ability to impersonate authorized users;
- access control; i.e., the network can support restrictions on access by or to different GPRS subscribers, such as restrictions by location, screening lists, and so on;
- user identity confidentiality; i.e., the property that the user identity on the radio link is not made available or disclosed to unauthorized individuals, entities or processes. The purpose is to provide privacy of identities of the subscribers who are using GPRS radio resources. It allows for the improvement of other security features, e.g.,

user information confidentiality, and also provides for the protection against tracing the location of a mobile subscriber by listening to the signalling exchanges on the radio path;

- user information confidentiality; i.e., the property that the user information is not made available or disclosed to unauthorized individuals, entities or processes. The purpose is to provide for confidentiality of user data, i.e., protection of the message part pertaining to layers 3 and above, that passes over the radio path.

Both user identity and user data shall be protected as shown in table 6:

Table 6: Protection of user identity and user data

Service	User Identity Protection	User Data Protection
PTP	Yes	Yes
IP-M	Yes	Yes

Security mechanisms available for existing teleservices and bearer services should be used if possible.

6.8 Message Screening

The message screening function is concerned with filtering out unauthorized or unwanted messages. Message screening may be used to restrict the types of message or the volume of data which may be transferred across the GPRS network to/from an individual subscriber.

6.9 GPRS Operator Determined Barring

GPRS subscribers can request packet oriented services from access points within the HPLMN, or from access points within another GPRS enabled PLMN. Similarly, when roaming, a subscriber may request to be connected to an access point within the HPLMN which requires all of the packets to be sent over an international link, which may attract a higher charge from Service Providers. Therefore, similarly to circuit switched ~~GSM~~ domain-, barring capability is required.

The specific requirements for ODB of GPRS can be found in ~~3G~~ TS 22.041 (Operator Determined Barring) [8].

7 Normal procedures with successful outcome

7.1 Provision

The GPRS services shall be provided to the subscriber after prior arrangement with the service provider. The provision of each of the following GPRS services independently or any combination thereof shall be possible:

1) Point To Point - Connectionless Network Service (PTP-CLNS);

2) Point To Multipoint (PTM).

It shall be possible to subscribe to GPRS services with or without subscription to other ~~GSM~~ services. ~~When a subscriber has subscribed to the Multiple Subscriber Profile (MSP) supplementary service, it shall be possible to assign GPRS services to each of the individual MSPs.~~

It shall be possible for the network operator to offer GPRS to the Service Provider(s) who may then offer GPRS-based services to the end-user.

GPRS services can be offered to a subscriber with the subscription option of using a password to control the services. A single GPRS-password per subscriber is supported by the network for all GPRS services.

As a subscription option modification of the subscriber's service profile (e.g., registration, erasure) shall be possible only in conjunction with the GPRS-password.

The following Quality of Service (QoS) parameters shall be assigned to the subscriber profile upon provision of the GPRS service(s). These parameters may be negotiated or set to default values:

- service precedence (priority),
- reliability,
- delay,
- user data throughput.
- scheduled repeated transmission.

7.2 Withdrawal

The service(s) shall be withdrawn at the subscriber's request or for administrative reasons. Withdrawal shall de-activate the service.

7.3 GPRS-Attach, GPRS-Detach

GPRS-Attach is performed when the ~~MS~~UE indicates its presence to the PLMN for the purpose of using the GPRS PTP or PTM services. This can be immediately after the ~~MS~~UE has been switched on or later as the user decides to use the GPRS services. The ~~MS~~UE identifies itself with its identity (IMSI, TLLI). A GPRS-Attach shall be successfully performed only if the subscriber has a valid GPRS subscription. It is assumed that the user will not, under normal circumstances, initiate a GPRS Attach without first ensuring that the data handling capability necessary in the terminating equipment has been activated.

GPRS-Detach is performed when the ~~MS~~UE indicates to the PLMN that the ~~MS~~UE will no longer be using the GPRS services. The ~~MS~~UE identifies itself with its identity (IMSI, TLLI).

7.4 Registration

Registration of the service parameters shall enable the subscriber to optimize the actual (dynamic) service profile to the subscriber's present, actual requirements within the limitations of the (static) subscription profile (see subclause 6.1). The result of the registration shall be indicated (i.e. accepted/registered or rejected/not registered). The registered service profile is valid for all GPRS transactions until modified by re-registration or erasure or changes to the subscription profile.

As a subscription option registration of the service parameters shall be possible only in conjunction with a GPRS-password.

It shall be possible for the user to activate connections to non-preconfigured external networks by using non-subscribed Access Point Names (APN's).

Table 7 defines which service parameters shall be able to be registered for the different GPRS services. The range of values for the service parameters is specified in subclause 5.6.

Table 7: Registration of service parameters

Service Parameter	PTP-CLNS	IP-M
Service precedence (priority)	2,3,4	2,3,4
Reliability	2,4	2,4
Throughput	2, 3, 4	2, 3, 4
Simultaneous use class	2	2
Delay	2, 4	2, 4
Security management / encryption	1	1
Interworking profile (a)	2	2
Password Active / De-active	2	2

Legend: 1 Network determined.

2 User determined per subscription and registration.

3 User determined per request.

4 Negotiable.

N/A Not applicable.

a) This is the set of subscription attributes (including a user-ID and/or address valid in the external data network if necessary) adopted by the subscriber when utilizing a particular destination network. A set of subscription attributes is required for each destination network. Multiple user-IDs and/or addresses for each destination network are allowed.

Registration of an identity other than the IMSI (i.e. a user-ID/address in an external data network, e.g. Internet, etc.) is performed to couple this identity to the IMSI for the purpose of accessing (MO and/or MT) the external data network. Registration of an identity other than the IMSI is subject to valid subscription agreements with the network operator. This also provides an effective operator determined barring of access to external data networks.

Each of the registered interworking profiles can be individually activated and de-activated.

Screening parameters can be assigned to a particular interworking profile as a user protection against unwanted costs and/or data.

7.5 Erasure

The subscriber shall be able to erase previously registered service parameter values from the service profile.

Erasure of a non-GSM identity (e.g., Internet) which is currently registered for an interworking profile shall be possible without erasure of the other parameters of the interworking profile.

As a subscription option erasure shall only be possible in conjunction with the GPRS-password.

Note: The concept of Erasure in GPRS is not clear. This section shall be revised.

7.6 Interrogation

The subscriber shall be able to interrogate the status/value of registered service parameters as defined in the current service profile.

7.7 Activation

The subscriber shall be able to activate each of the registered interworking profiles independently within the limitations of the subscription profile. As an option the GPRS network may request the activation of a specific interworking profile for a GPRS attached mobile, when an mobile terminated packet or activation request from external data network with user-ID (e.g. MSISDN) packet is received even if a mobile is inactive. This option may be available for one or more PDP. The activation of the inter-working profile(s) may be performed automatically by the ~~MS~~UE immediately after GPRS Attach. When an interworking profile is activated a dynamic binding between the ~~GSM/GPRS~~3GPP identity of the ~~MS~~UE and the external data network user-ID and/or address is made by the system, and the appropriate service parameters are applied thus establishing a virtual connection between the ~~MS~~UE and the GPRS network. Activation of an interworking profile results in a dynamic binding until de-activation is performed.

7.8 De-activation

The subscriber shall be able to de-activate the previously activated interworking profiles independently within the limitations of the subscription profile thus releasing the previously established virtual connection. An interworking

profile(s) shall be automatically de-activated if the provision for the supporting GPRS service is withdrawn. Interworking profiles are deactivated automatically upon GPRS detach..

De-activation of a particular interworking profile shall abort all presently on-going communication between the ~~MS~~UE and the external data network.

7.9 Invocation and operation

The GPRS service is invoked upon transmission or reception of GPRS data.

It shall be possible for a ~~MS~~UE to be a GPRS service requester and a service receiver. This allows generation and origination of GPRS messages from the mobile termination itself as a standalone GPRS data source. It also allows the mobile termination to provide DCE capabilities for user applications based in terminal equipment outside the mobile termination.

It shall be possible for a subscriber to set-up multiple GPRS communication sessions and maintain these over prolonged periods (e.g. several hours). It shall be possible to establish these connections via more than one external data network. This enables more than one logical data channel to exist to a single mobile termination.

PTP-CLNS and IP-M communications in any combination shall be possible in parallel.

7.10 PIN and Password Management

GPRS-Attach shall only be possible after correct subscriber identification has been confirmed by entry of the current ~~GSM~~ PIN if this option is active. Thus only one PIN is required to gain access to either the ~~GSM~~ Circuit Switched Services/SMS or the ~~GSM~~ GPRS Services or both.

GPRS services can be offered to a subscriber with the subscription option of using a password to control the services. One password per subscriber is supported by the network for all GPRS services. The GPRS password shall be the specified password for supplementary services according to TS22.004 [5] and TS22.030 [6].

When this option is selected the following actions shall only be performed with the concurrent entry of the password:

- registration, de-registration/erasure;

8 Exceptional procedures

8.1 Provision

None.

8.2 Withdrawal

None.

8.3 Registration

An attempt to register a service or service parameter not available to that subscriber shall result in an indication to the user. The reason shall be indicated:

- the service or service parameter is not supported by the PLMN;
- the subscriber’s present (static) subscription profile prohibits the use of this service or service parameter;
- parameter is network determined;
- the entered parameter value is outside the range of that supported by the PLMN.

If, in the case of interworking with an external data network, an attempt is made to set a parameter to a value outside the range of that supported by the interworking to the external data network, it shall be indicated to the user and confirmation required before the parameter value is changed to a value selected by the network.

8.4 Erasure

An attempt to erase a service parameter which is not registered shall result in an indication to the user, the service parameter shall remain in the not registered state.

Erasure of a non-GSM identity (e.g., Internet) which is presently registered as "active" shall result in an indication to the user with a request for confirmation before the de-activation and erasure is performed.

Note: The concept of Erasure in GPRS is not clear. This section shall be revised.

8.5 Interrogation

None.

8.6 Activation

An attempt to activate an interworking profile which is already in the active state shall result in an indication to the user, the interworking profile shall remain in the active state.

8.7 De-activation

An attempt to de-activate an interworking profile which is already in the de-active state shall result in an indication to the user, the interworking profile shall remain in the de-active state.

8.8 Invocation and operation

An attempt to send an MO message with an ~~MS~~UE identity which is not valid in the network shall be rejected with an appropriate error status.

An MT message that cannot be delivered due to an invalid ~~MS~~UE identity shall be discarded by the network. A message that is received by an incorrect ~~MS~~UE shall be discarded by the ~~MS~~UE.

8.9 PIN and Password management

PIN and password exceptional procedures are as defined in TS ~~0~~4~~2~~.0~~1~~7 [7] and 22.004 [5].

9 Addressing

9.1 Point to Point services

A GPRS-PTP subscription is identified by an IMSI.

9.2 Point to Multipoint services

For mobile originated PTM communications the IMSI shall be the basis for the access to the network.

9.3 Overview

How the identities are used within the different services is described in table 8.

Table 8: Services and Identities

Services	mobile originated		mobile terminated
	calling party	Called party	
GPRS PTP	IMSI	Address (note 1)	IMSI
IP-M	IMSI	Address (note 1)	IMSI
NOTE 1: The IMSI or in the case of network interworking refer to subclause 5.2.3.			

Annex A:
Change history

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**WI**
Jun 1999			02.60					Transferred to 3GPP SA1	8.1.0		
SA#04			22.060					Version 3.0.0 Approved		3.0.0	
SP-05	SP-99440	S1-99792	22.060	001		R99	A	Class B mode of operation	3.0.0	3.1.0	
SP-05	SP-99441	S1-99841	22.060	002		R99	B	The function that gives the notification of the server IP address from the GPRS network to the subscriber.	3.0.0	3.1.0	
SP-05	SP-99441	S1-99802	22.060	003		R99	B	Introduction of Barring for GPRS	3.0.0	3.1.0	
SP-05	SP-99479	S1-99620	22.060	004		R99	D	Editorial changes for alignment	3.0.0	3.1.0	
SP-05	SP-99479	S1-99665	22.060	005		R99	D	Editorial changes for alignment	3.0.0	3.1.0	
SP-06	SP-99525	S1-991010	22.060	006		R99	B	Support of Mobile IP in release 99	3.1.0	3.2.0	
SP-06	SP-99525	S1-991044	22.060	007		R99	C	Deletion of Anonymous Service	3.1.0	3.2.0	
SP-06	SP-99525	S1-991049	22.060	008		R99	B	GPRS & SMS-CB Interworking	3.1.0	3.2.0	
SP-07	SP-000059	S1-000117	22.060	009		R99	F	Restructuring to improve clarity and align with Stage 2 description for Release 99	3.2.0	3.3.0	
SP-07	SP-000060	S1-000113	22.060	010		R99	F	Support of encryption in GPRS mobile stations	3.2.0	3.3.0	
SP-07	SP-000071	S1-000161	22.011	014		R00	B	Network Selection	3.2.0	4.0.0	
SP-08	SP-000197	S1-000342	22.060	013		R00	F	Deletion of IHOSS (Point to Point Octet Stream Service)	4.0.0	4.1.0	
SP-08	SP-000197	S1-000344	22.060	015		R00	F	Removal of X.25 support from Release 99.	4.0.0	4.1.0	
SP-08	SP-000197	S1-000366	22.060	017		R00	F	Clarification of support of registration to external networks	4.0.0	4.1.0	
SP-10	SP-000542	S1-000782	22.060	019		Rel-4	A	Removal of PTM-G service	4.1.0	4.2.0	TEI4
SP-10	SP-000542	S1-000842	22.060	020		Rel-4	C	Push Service	4.1.0	4.2.0	FS-Push
SP-13	SP-010442	S1-010898	22.060	021	1	Rel-5	B	Introduction of High Speed Downlink Packet Access	4.2.0	5.0.0	HSDPA

Document history		
V3.0.0	July 1999	Transferred to TSG SA at ETSI SMG#29. Under TSG TSG SA Change Control.
V3.1.0	October 1999	Inclusions of CRs at SA#05.
V3.2.0	December 1999	Inclusions of CRs at SA#06.
V4.0.0	March 2000	Inclusion of CRs approved at SA #07 to create version 4.0.0.
V4.1.0	June 2000	Inclusion of CRs approved at SA #08 to create version 4.1.0.
V4.2.0	January 2001	Inclusion of CRs approved at SA #10.
V.5.0.0	October 2001	Inclusion of CRs approved at SA #13 to create version 5.0.0

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.057** **CR 009** ⌘ ev **-** ⌘ Current version: **5.2.0** ⌘

Spec Title: **Mobile Execution Environment (MExE); Service description, Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**A**
Release:	⌘	Rel-5

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

3GPP TS 22.057 V5.2.0 (2001-10)

Technical Specification

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

3rd Generation Partners

Technical Specification Group Services and System Aspects; Mobile Execution Environment (MExE); Service description, Stage 1 (Release 5)

Keywords
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Contents

Foreword

This Technical Specification has been produced by the 3GPP.

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

Version x.y.z

where:

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

1 Scope

This TS defines the stage one description of the Mobile Execution Environment (MExE). Stage one is an overall service description, primarily from the subscriber's and service providers' points of view, and does not deal with the details of the human interface itself.

This TS includes information applicable to network operators, service providers and terminal, switch and database manufacturers.

This TS contains the core requirements for a Mobile Execution Environment (MExE) which are sufficient to provide a complete service.

It is highly desirable however, that technical solutions for a Mobile Execution Environment (MExE) should be sufficiently flexible to allow for possible enhancements. Additional functionalities not documented in this TS may implement requirements which are considered outside the scope of this TS. This additional functionality may be on a network-wide basis, nation-wide basis or particular to a group of users. Such additional functionality shall not compromise conformance to the core requirements of the service.

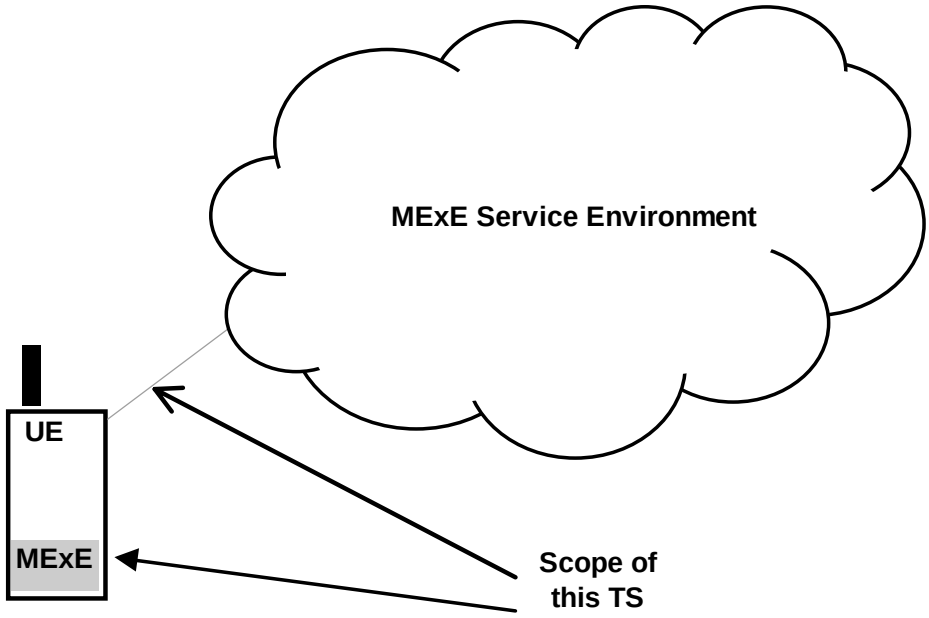


Figure 1: Scope of this TS

As indicated in Figure 1, the scope of this TS encompasses the MExE functionality in the UE, interaction with the MExE service environment. The MExE service environment is not necessarily restricted to the PLMN, and nodes providing MExE services (i.e. MExE servers) may also exist outside the PLMN. Aspects of the support provided by MExE servers within the MExE service environment (such as charging aspects, security level classification etc.) are covered by this specification, but not the MExE servers themselves.

~~MExE requirements are considered to be applicable to both GSM and UMTS systems.~~

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

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

[2] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this TS the following definitions apply:

applet: a small programme that is intended not to be run on its own, but rather to be embedded inside another application

application: MExE information in the form of software, scripts, applications, associated resources (e.g. libraries) and/or data

content: data and/or information associated with, or independent of, a particular application which may be presented to or collected from a user

MExE Classmark: a MExE Classmark identifies a category of MExE UE supporting MExE functionality with a minimum level of processing, memory, display and interactive capabilities. Several MExE Classmarks may be defined to differentiate between the functionalities offered by different MExE UEs. A MExE application or applet defined as being of a specific MExE Classmark indicates that it is supportable by a MExE UE of that Classmark.

MExE server: a node supporting MExE services in the MExE service environment

MExE service: a service enhanced (or made possible) by MExE technology

MExE service environment: Depending on the configuration of the PLMN, the operator may be able to offer support to MExE services in various ways. Examples of possible sources are from traditional 3GPP network~~GSM~~ nodes, IN nodes, operator-specific nodes, operator-franchised nodes and services provider nodes, together with access to nodes external (i.e. vendor-specific) to the PLMN depending on the nature of the MExE service. These nodes are considered to constitute the MExE service environment. The MExE service environment shall support direct MExE UE to MExE UE interaction of MExE services.

MExE service provider: an organisation which delivers MExE services to the subscriber. This is normally the PLMN operator, but could be an organisation with MExE responsibility (which may have been delegated by the PLMN operator).

MExE subscriber: the owner of a subscription who has entered into an agreement with a MExE service provider for MExE services. Access to MExE services though other types of networks is out of scope of this specification.

subscriber: the term subscriber in the context of this TS refers to a MExE subscriber

user: the user of an MExE UE , who may or may not be the subscriber.

3.2 Abbreviations

For the purposes of this TS the following abbreviations apply:

API	Application Programming Interface
CS	Circuit Switched
FFS	For Further Study
IN	Intelligent Network
ME	Mobile Equipment

MExE	Mobile Execution Environment
MMI	Man Machine Interface
UENO	Network Operator
PLMN	Public Land Mobile Network
SIM	Subscriber Identity Module
UE	User Equipment
USIM	Universal Subscriber Identity Module
SP	Service Provider

Further related abbreviations are given in GSM 01.04 [1] and TR 21.905 [2].

4 Description

MExE provides a standardised execution environment in an UE, and an ability to negotiate its supported capabilities with a MExE service provider, allowing applications to be developed independently of any UE platform. The UE (consisting of the ME and SIM/USIM) can then be targetted at a range of implementations for MExE from small devices with low bandwidth, limited displays, low processor speeds, limited memory, MMI etc., to sophisticated with a complete MExE execution environment.

The introduction of MExE execution environment into UEs is a significant step forward in their evolution. The ability of UEs to support MExE applications represents an extension of UEs' capabilities. In order to allow current and future technologies to exploit and benefit from this, a standardised means of negotiating the UEs' and network's capabilities is supported. This negotiation will permit the mutual exchange of capabilities between the UE and the MExE server, and possibly include the service profile of the user and capabilities of the network. The negotiation may take place at service initiation, or on a dynamic basis.

A network can be a transport bearer for the negotiation, interaction and transferring of applications, applets and content with the UE, however it need not necessarily be the provider of the MExE services with which the UE's execution environment is interacting with. The network may also be the intermediary between two UEs which are engaged in a MExE service with each other, with the network effectively supplying the "pipe" and not playing a MExE rôle in the connection.

Network nodes, nodes external to the network, or even UEs may be the entities which interacts with the UE's execution environment.

5 Compatibility of MExE UE's and applications

5.1 MExE classmarks

Given the wide ranging hardware capabilities of MExE UEs, together with the development of MExE applications and applets, a MExE classification shall be supported to determine their respective capability and compatibility. The MExE classification shall apply both to UEs and applications and applets.

The objective is to:

- classify the capabilities of a MExE UE to support MExE applications and applets; and
- identify the class of MExE UE on which a MExE application and applet may be supported.

The concept of a MExE Classmark is introduced to manage the MExE UE and MExE application and applet classification and compatibility. The MExE Classmark is distinct and unrelated to the existing UE Classmark. The use of MExE Classmarks shall be supported during the capability negotiation between the MExE service provider and the MExE UE.

5.2 UE MExE classmarks

A given MExE Classmark shall identify a category of MExE UE supporting MExE functionality with a minimum level of processing, memory, display and interactive capabilities.

Specification of different MExE Classmarks enables use of a variety of technologies to support MExE functionality.

A given MExE Classmark identifies support by a MExE UE for a defined level of MExE functionality. This does not necessarily imply support of other MExE Classmarks. A MExE UE may support multiple MExE Classmarks.

The minimum level of capabilities for each MExE Classmark is beyond the scope of this Stage 1 service description. As UE development evolves and more sophisticated devices (or indeed simpler devices) become available, further UE MExE Classmarks shall be definable to identify UE's capable of supporting improved (or additional) MExE functionality.

A given MExE UE Classmark identifies support by a MExE UE for a defined level of MExE functionality, but does not necessarily imply support of other levels of MExE Classmark. A MExE UE may also support multiple MExE Classmarks.

5.3 Application and applet MExE classmarks

MExE applications and applets will be developed to execute in one or more classes of MExE UE's. In order for MExE applications and applets to be properly supported by a MExE UE, the application and applet shall identify the minimum functional capabilities required of a MExE UE, as defined by the UE's MExE Classmark.

MExE applications and applets shall be designated by the same classes of MExE UE's on which they may be executed. Examples of the classification of MExE applications and applets are as follows:-

- a MExE Application can be defined as a MExE Classmark 1 application;

  the application is identified as suitable for execution on MExE Classmark 1 UE's only.

- a MExE Application can be defined as a MExE Classmark 2 application;

  the application is identified as suitable for execution on MExE Classmark 2 MS's only.

- a MExE Application can be defined as a MExE Classmark 1 and Classmark 2 application;

  the application is identified as suitable for execution on MExE Classmark 1 and Classmark 2 UE's only.

The above example list is neither complete nor exhaustive.

If a MExE application or applet is capable of being supported by other classes of MExE UE's (with reduced or enhanced capabilities), it is the responsibility of the MExE service provider to re-classify the MExE application or applet accordingly.

MExE applications and applets defined by a MExE service provider to a given class of MExE UE, shall be supportable by all MExE UE's of that class regardless of MExE UE manufacturer. MExE applications and applets shall operate on differing MExE UE of the same MExE UE class without modification.

It shall be possible for MExE service providers to make the same MExE applications and applets available in the network for different classes of MExE UE. It is desirable that applications and applets are backward compatible within a given technology and for a given UE Classmark; however such backward compatibility is out of scope of this specification.

6 General MExE requirements

6.1 High level MExE requirements

The high level requirements of MExE are as follows:

- the means for MExE service provider specific services to be supported by all UEs of a particular class (i.e. the need for a common set of APIs and development tools), and accessible across a range of networks;
- provide the user with a more sophisticated user interfaces (e.g. browser-like) with a rich variety of MMI concepts to control and invoke services (i.e. softkeys, icons, voice recognition etc.);
- the user's and MExE service providers capability to control the "look and feel" of applications and applets;
- the ability of the user to personalise the user interface;
- the ability of the user to personalise services and individual media components of a multimedia service;
- provide support of a wide variety of applications and applets;
- provide the means for MExE service providers to authenticate MExE subscribers;
- provide the user access to Internet and Intranet based applications and applets (via both standard Internet and Wireless optimised protocols);
- the means to transfer applications, applets and content automatically or on demand to a MExE UE from a MExE service provider, and upgrade existing applications across the network;
- the means to support direct MExE UE to MExE UE interaction of MExE services;
- the need for an inherent security architecture such that both the MExE UE and MExE server sides of a connection are authenticated (possibly by a brokerage server), and have access to a range of encryption and security functions in order to maintain the security and integrity of the network. The MExE service provider shall maintain security of subscribers personal data and network data, with all aspects relating to network security being centred on the SIM/USIM;
- the ability for the MExE service provider to charge subscribers for MExE service provider provided MExE services, at connect time, when downloading, or on usage;
- the means for MExE service provider specific applications and applets on the MExE UE to communicate with applications in the MExE service environment using industry standard protocols (e.g. a MExE server etc);
- the ability to provide information to MExE service providers (e.g. location information of UE' for use with location dependent services);
- the means for MExE service providers and their applications and applets to determine MExE UE capabilities (i.e. MExE Classmark, technology, supported bearers according to network capabilities and network subscription etc.). (This shall be used by MExE servers to adapt application and applet transfer to MExE UE capabilities, and shall be used by applications and applets whilst running to adapt their behaviour to the UE's capabilities.);
- the opportunity for MExE service providers to apply expertise and software developed for other platforms;
- provision of APIs and tools to develop MExE services which are applicable for MExE UE';
- the means for the user to manage (i.e. identify version, delete, modify, save etc.) the applications, applets and content on the MExE UE;
- the means for the user to control acceptance (i.e. by Security Level, level of trust etc.) of applications, applets and content transferred to the MExE UE. (It shall be possible for the user to finely control a trusted application or applet's access rights on the MExE UE, such as reading/writing/deletion of files stored on the MExE UE);
- the means for MExE applications to perform some AT command functionality without compromise to security of MExE as defined in clause 8;
- the means for authentication certificates associated with applications to be managed and stored in the SIM/USIM;
- the ability for a MExE application to negotiate the QoS, and the ability to indicate to a MExE application changes in the QoS;
- the ability of MExE applications to be notified that handover is about to occur, is occuring or has occurred;

- the means for MExE UE manufacturers to download and upgrade their existing codec in a MExE UE. A generic mechanism to download other proprietary software into the execution environment of the UE shall be available to the manufacturer. The downloading of platform independent MExE applications, such as streaming audio, that support multimedia capabilities shall also be possible;

- the means for data to be synchronised between the MExE UE and the MExE service environment;

- the ability to support IP multimedia services;

- the ability to discover services offered by the Home Environment, valued added service providers with associated with the Home Environment, and third parties.

Some of the above requirements are subsequently elaborated.

6.2 Requirements description from the user's standpoint

MExE provides an improvement in the capabilities of a UE, as well as an extended range of services available to the user from, or via, the network. The user shall have

- user interface configuration management; and

- service management;

of the services offered to him by MExE.

6.2.1 User interface configuration management

User interface configuration management refers to the behaviour of the MExE UE, and the ability of the user to modify the MExE UE to behave in the manner he is accustomed to, or wishes the MExE UE to, present itself to the user. It does not refer to the services which interact with the network, but the way in which the MExE UE interacts with the user.

Users expect MExE UEs to offer an increasing range of capabilities which need not be ubiquitously present on each MExE UE, depending on the technological limitations of the MExE UE. The user shall be able to manage the user interface configuration of the MExE UE. For example, some user's may require a voice-controlled MMI, whilst others may have the need for a specialised presentation on the MExE UE display or preset function keys regardless of the application or applet which is running. Management of the user interface configuration will permit a user to move from MExE UE to MExE UE and exploit the technological capabilities of each class of MExE UE, with the use of varying services downloaded from the network, as required.

The user shall be able to identify (either directly or indirectly) the user interface configuration he wishes to add, modify or delete on his MExE UE, and shall be offered the means of doing this. This management may be performed, for example, by a configuration capability profile.

In taking this action, it shall be possible to determine whether the user interface configuration is already resident on the ME, or whether it requires to be obtained from the SIM/USIM or the network. The modifications which may be requested by the user could result in, for example, differing display characteristics being employed, redefinition of keys, modification of the "look and feel" of the user interface, touch screen facility, extensions to existing functions or the capability to automate some functions.

The control of the "look and feel" of MExE applications and applets to customise their level of functionality and appearance may be possible by the MExE service provider, network operator (where the MExE service provider is not the network operator) and the user. The aspects of the application or applet which may be customisable are determined by the MExE service provider as an integral part of the MExE application or applet.

The user interface configuration management which is specific to the ME shall be stored on the ME, and user interface configuration management which is generic to ME's may be stored in the network or on the SIM/USIM.

The definition of the user interface configuration management which may be offered to the user is outside the scope of this service description.

6.2.2 Service management

MExE shall provide the ability to customise the range of services offered to the subscriber. The subscriber's ability to configure the services available on the MExE UE shall be dynamic, as the range of services required may differ depending on the network, time and location that the user finds himself in. For example, a subscriber may require access to services offering financial support when attending a business meeting, however later in the day he may need access to travel information and booking facilities when re-arranging his travel home.

MExE shall be able to support the handling of individual media components of an IP multimedia service in a user profile, and not necessarily handle all media components of a multimedia session in the same way.

A common address across all PLMN supporting MExE shall be available, from which the user shall be able to request the range of MExE services available he is registered in, if the PLMN supports MExE. The downloading of services may be autonomously controlled by the MExE UE to update existing service access on the MExE UE, or to download new services. The management of these services may be defined by the subscriber directly or under the control of the MExE UE's capabilities organised on the MExE UE (i.e. a user may be particularly interested in unified messaging services, and require the availability of such services to be made available to him).

The user shall be able to determine and manage which MExE applications, applets and content may be transferred to the MExE UE (i.e. in terms of their security level, source of the applications etc.), determine and manage which MExE applications, applets and content are currently resident and usable on the MExE UE (e.g. when roaming some services may not be available to the user), and delete MExE applications, applets and content on the MExE UE.

The definition of the applications, applets and content which may be offered to the user is outside the scope of this specification.

6.3 Requirements description from the MExE service provider's standpoint

6.3.1 Transfer of applications, applets and content

A common mechanism shall be available to perform the transfer of applications, applets and content between MExE UEs' and the MExE service provider.

The common transfer mechanism shall permit applications, applets and content (according to the appropirate MExE Sercurity Level) to be transferred to the MExE UE.

It shall be possible for the MExE service provider to:

- transfer applications, applets and content between the MExE UE and the MExE service provider (which may be initiated by either party);
- request the version of applications, applets and content on the MExE UE;
- identify the MExE UE' capabilities;
- support a request from the MExE UE for information on the (local) services which may be transferred from the network.

Some of these functions may be used by the MExE service provider either individually, or together to automatically update previously transferred services.

6.3.2 Node types

The introduction of MExE shall enable an expansion of services available to the user from various network node types.

The MExE UE shall be able to communicate with the various network node types in the MExE service environment, allowing access to intelligent nodes to process service requests from the MExE UE.

Applications in the MExE service environment may interact with, or execute as agents of, an MExE UE application using industry standard protocols. Such interaction does not fall within the scope of MExE, however any MExE UE

application that does interact with applications in the MExE service environment must respect the privacy of user data.

6.3.3 Subscriber data

Subscription to MExE services shall be logically separate to subscription of network services. A subscriber may have a MExE subscription to multiple MExE service providers. It may also be possible for the subscriber to interrogate such subscription registration (with a suitable means of authorisation), depending on PLMN support.

6.3.4 Roaming subscribers

Roaming MExE subscribers shall be able, as far as possible, to access their normal MExE services in their HPLMN.

As usual when roaming, it cannot be ensured that the VPLMN can provide the subscriber access to the same MExE services (e.g. applications, applets and content) as he is accustomed to. However, in the VPLMN additional MExE services may be available, depending on network capabilities. Service continuity when roaming is dependent on the availability of the services in the VPLMN, and is outside the scope of this specification.

The operation of the transferred applications, applets and content may be location dependent, and their behaviour when in an different location is outside the scope of this specification.

The following forms of MExE subscriber roaming are identified:-

- roaming between networks (HPLMN to VPLMN);
- roaming between visited networks (VPLMN to VPLMN);
- regional roaming within a network (within the HPLMN or VPLMN).

There may be a need to distinguish between the above types of roaming from a MExE services management perspective, as the operation of location dependent MExE services may be affected when the MExE subscriber roams beyond the boundaries of a PLMN or region.

7 MExE bearer requirements

Bearers available to MExE applications depend on those supported by the MExE UE that are available.

Wherever available, MExE UE applications shall be supported by bearers from ~~GSM, UMTS~~3GPP system and other technologies (e.g. circuit switched, packet switched, high speed data links provided by digital broadcast infrastructure). MExE applications shall be able to use these bearers in an asymmetric fashion.

8 MExE protocols requirements

In order for MExE to be supported over the network, a set of standardised protocols is required to support interaction between the MExE UE and the MExE service environment.

As this specification is not required to propose a specific technology, it identifies the MExE protocols requirements from the service subscriber's and user's standpoint. The MExE protocols refers to any protocol layer above the ~~GSM/UMTS~~3GPP system bearers, which interfaces between the MExE service environment and the MExE UE.

The functional capabilities, information flows, signalling system protocols and switching functions needed to implement the service described in this Stage 1 specification will be identified by subsequent specifications at the Stage 2 and Stage 3 levels.

The high level MExE protocols requirements are identified in the subsequent subclauses.

8.1 Optimised Wireless Access

A primary goal of MExE is to provide access to Internet and Intranet services, the standard Internet applications, security and transport protocols shall be one possible set of MExE protocols which is supported. It is noted that these protocols may not cover all the requirements identified in this specification for all classes of ME's.

A set of application, security and transport protocols optimised for wireless access, and compliant to MExE requirements, shall be specified and form part of the MExE standards.

MExE UE's shall be able to support either or both of these sets of protocols.

8.2 Wireless network independence

The upper layers of the MExE protocols shall be independent of the type of underlying wireless network so that applications and applets do not need to take into account the specific nature of networks. In particular, lower layers shall provide a generic access API to network bearers so that application and applet developers do not have to cater for the supported underlying bearers. It shall be possible for applications and applets to request specific bearer services and be notified accordingly if they are not available.

The transport layer of the MExE protocols may however be adapted to support the specific features of the underlying bearers. The MExE protocols shall have the ability to use all the underlying bearer services which the MExE UE is capable of supporting.

8.3 Scaleable and extendible protocols

The MExE protocols shall support a scaleable and extendible environment for application and applet development in mobile communication devices. It shall provide a set of generic, non-UE or service-dependent, features. Scaleability of the MExE protocols applies to both the MExE UE (e.g. where simple devices do not require the extensive protocols support possibly required by more sophisticated devices) and the network.

The MExE protocols shall support both low bandwidth bearers (e.g. SUE, USSD etc.) as well as medium bandwidth bearers (e.g. anything up to 64kb/s~~, HSCSD, UMTS~~). The introduction of new bearers shall be supported, allowing applications and applets to automatically benefit from their capabilities.

The MExE protocols shall support existing servers and applications and applets, and provide a stable platform for future application development.

8.4 Service independence

The MExE protocols shall be independent of the services communicated over the protocols. The modification in the range of services, or addition of new services, offered over the network shall not be restricted by the MExE protocols.

8.5 Network node type independence

The MExE protocols shall be independent of the network node type(s) being communicated with over the protocols. The MExE protocols shall support the evolution of network node types in a PLMN.

8.6 Enquiry and notification of MExE capabilities

The MExE protocols shall support a generic technology-independent means for the notification by the MExE UE to a MExE server, or enquiry from the MExE server to the MExE UE, of the supported MExE capabilities consisting of:

- MExE Classmark (mandatory, MExE server to MExE UE);

  the supported class of MExE UE;

- MExE technology (mandatory, MExE server to MExE UE);

  the supported types of MExE UE technology to support MExE services;

- terminal characteristics (optional, MExE UE from MExE server, following MExE server enquiry);

  further details of the supportable characterstics (i.e. screen size, MMI capabilities, supportable bearer services, toolkits etc. as constrained by the network, terminal, subscription and user preferences).

In existing networks it may not be possible to determine the network capabilities (i.e. supported bearers) and subscription options of the subscriber.

The above notification by the MExE UE or the MExE server are supported at service initiation, dynamically during the provision of such a service, and following a change in the quality of service (i.e. following a handover, change of network, degradation of service, change in quality of service).

The notification mechanism shall flexibly support notification of the MExE UE, and be able to accommodate future evolution of MExE UE equipment.

8.7 UE request of services information

The MExE protocols shall support a notification from the PLMN or a request from the MExE UE to the PLMN, for information on the (local) services which may be transferred from the PLMN. The information from the PLMN may take the form of listing the services, or references to a PLMN entity (either internal or external to the PLMN) where the available services may be determined.

8.8 Support of transfer protocols

The MExE protocols shall support the capability to transfer new applications and applets to the MExE UE as required. The protocols shall support both user initiated and MExE server initiated transfer of several types of data (content description pages, procedural logic, images, libraries etc.), and be able to indicate the type of data being transferred.

Each specific MExE technology shall be support a a standardised transfer mechanism for that MExE technology.

9 UE application execution environment requirements

9.1 UE platform independence

In order to support the objectives of MExE, the ME and SIM/USIM is required to have an architecture capable of supporting applications, applets and content in a standardised execution environment, independently of the MExE UE manufacturer.

As this specification is not required to propose a specific technology, it identifies the common platform requirements from the service subscriber's and user's standpoint.

The limitations of small devices may result in the provision of the full application execution environment only being available in sophisticated devices.

The high level execution environment requirements are identified in the subsequent subclauses.

9.2 Document mark-up language and other coding formats

In order to cater for a wide variety of ME's with different display and input capabilities, support for both the standard Internet mark-up language and a content description language optimised for small display devices of low bandwith bearers shall be defined with the MExE specifications. Both languages may be implemented on any MExE UE. Standardised ways of coding content (i.e. images, phonebook, calendar etc.) shall be defined, however the support of such standardised content coding is optional.

In order to facilitate global use of MExE services, a standardised range of character sets for MExE services requires to be defined, and the capabilities of the user and applications to use them.

9.3 MExE APIs

MExE APIs may be defined covering aspects (e.g. Network APIs, Non-network API's, Terminal APIs etc.) within a given MExE Classmark of MExE UE (ME an/or SIM/USIM), and the MExE UE shall support a core API to support the execution of MExE applications and applets. The core API is a the minimal set of API that is present on all MExE UE's, providing the MExE execution environment in which applications and applets can execute, and is known as the Core MExE API. The Core MExE API consists of generic and ~~GSM/UMTS~~3GPP specific aspects.

Applications and applets which have been designed to execute in this Core MExE API environment (and the optional MExE APIs subsequently identified), will provide additional functions to the MExE UE.

In addition to the Core MExE API on an MExE UE, standardised MExE API extensions such as Network API (e.g. access to session control services, SUE etc.), Non-network ~~GSM/UMTS~~3GPP-defined services API (e.g. security aspects, SIM/USIM phonebook etc.), Terminal API (e.g. power management, access to alerting function, phonebook, MMI, smartcard access etc.),shall be subsequently defined and may be supported by the MExE UE in order to further exploit the system capabilities.

The standardised MExE API extensions shall include access to mobility information.

10 Charging requirements

The use of MExE services shall, at MExE service provider determination, be subject to charging.

There are several forms of charging which shall be available to the MExE service provider. It shall be possible for the MExE service provider to charge in the following instances:

- subscription;

  the subscriber's registration to use MExE services may be subject to a charge;

- service transfer;

  the transfer of services and/or information to a subscriber's MExE UE may be subject to a charge;

- service upgrading;

  the upgrading of previously transferred services to a subscriber's MExE UE may be subject to a charge (automated upgrading of services may be subject to a different charge);

- service usage;

  the usage of transferred services by a subscriber's MExE UE may be subject to a charge (possibly use either internal to, or external to, the MExE UE);

- roaming ;

  the usage of MExE services by a subscriber's MExE UE when roaming may be subject to additional charges;

A standardised means of transferring (indicative and/or final) charging information (for the use of MExE services) from the MExE service provider to the MExE UE shall be defined.

The usage of the bearer service may be subject to a charge (i.e. possibly time-based, volume-based, event-based etc.) by the network operator.

Normal service charges may additionally apply when using MExE services and incurring the above charges.

Other charging requirements may be identified in due course.

11 Security requirements

This clause consists of:

- a sub-clause giving the principles behind security for MExE. These are not requirements as such but the principles behind the requirements;
- a sub-clause specifying specific requirements that MExE implementations must adhere to;
- a sub-clause specifying the security domain classifications for MExE executables.

11.1 Security Principles

The ME and the data therein are the property of the user. The user is also responsible for the payment of chargeable events involving her UE, and will be seen as the party responsible for any events (whether chargeable or not) involving her UE. Therefore the user shall have full control over all chargeable and non-chargeable events initiated by her UE ("event" includes responses made by the UE to external events, e.g. the acceptance by the UE of an incoming session). This control can be exercised either by the giving of explicit permission at the time of the event or by the giving of implicit permission to the events by the agreement to an event schedule listed clearly in a user profile.

The user shall be able to request the logging of specific network events initiated by MExE UE applications/applets.

The privacy of user data in the UE is of paramount importance.

The SIM/USIM and operator controlled areas within the terminal are the property of the network operator. The network operator shall therefore have full control over access to the SIM/USIM and operator controlled area The operator shall also have full control over data, excluding personal user data, transmitted to or from the SIM/USIM and the operator controlled terminal area and all events initiated by the SIM/USIM or operator controlled area ("event" includes responses made to external events, e.g. the response to a command sent from the ME).

As the user cannot know the capabilities of any MExE executables transferred from a MExE service environment before transfer, the UE MExE environment shall ensure that transferred MExE executables cannot compromise the above principles.

11.2 Security Requirements

For MExE executables of security operator, manufacturer and user trusted domains , as defined in clause 11.3, it shall be possible to authenticate the identity of the body that authorised the application, applet or content.

There shall be a secure, unforgable means for assigning the security domains defined in section 11.3 to the MExE executables transferable from the MExE service environment.

The certification of authorisation associated with MExE executables transferable from the MExE service environment shall be transferred with the certified material.

The MExE UE shall be able to verify the security domain, as defined in section 11.3, of MExE executables transferred from the MExE service environment.

The verification process in the UE itself shall not compromise the security of the functionality and content in the UE

Transferred material that fails verification shall not be installed and shall be deleted by the terminal as soon as possible.

MExE executables that cannot be verified due to the absence of required verification information in the UE, shall be considered as untrusted material, as defined in section 11.3.

The events that MExE executables are given permission by the user to initiate shall be securely recorded in the user profile.

There shall be mechanisms within the MExE UE for ensuring that applications cannot have access to UE functionality and content beyond that allowed by their security domain, as defined in section 11.3.

It shall be possible to for the user to downgrade MExE executables of operator, manufacturer or user trusted domain status to untrusted status, at installation or at any other time.

The MExE UE shall be able to detect if MExE executables transferred from the MExE service environment have been modified since they were assigned a security level.

MExE executables shall not be transferred to a MExE UE without the explicit permission of the UE user immediately prior to transfer or implicit permission via the user profile.

Applications and applets transferred to a MExE UE shall not be able to initiate events without the explicit permission of the UE user immediately prior to event initiation or implicit permission via the user profile.

The user profile data for transfer and event initiation cannot be changed without the explicit agreement of the user.

The user shall be able to abort or suspend any on-going session that has been set up automatically by an application.

The integrity of the SIM or USIM and other security mechanisms shall not be compromised by the introduction of MExE services.

The user shall be able to request the logging of specific network events initiated by MExE UE applications/applets.

MExE UE applications/applets shall not be able to send command RUN GSM ALGORITHM to the SIM.

11.3 Security domain classifications

The security domain of MExE executables shall be graded according to the measure of authorisation which they have been designated. The following 3 (the “sandbox” in which untrusted MExE executables runs is not considered to be a domain) domains shall be supported for MExE executables:

- MExE Security Operator Domain (used by the HPLMN operator);

  MExE executables designated at this security domain have been authorised by the network operator (i.e. HPLMN),

- MExE Security Manufacturer Domain (system MExE executables);

  MExE executables designated at this security domain have been authorised by the MExE UE manufacturer.

- MExE Security User Trusted Domain (trusted applications, applets and content);

  MExE executables MExE executables designated at this security domain have been written by user trusted software developers and verified as user trusted domain material (but not with regard to their content) via organisations such as certification authorities.

- MExE Security Untrusted (untrusted applications, applets and content);

  Untrusted MExE executables have not been supplied with an associated authorisation, or the authorisation cannot be verified due to the absence of required verification information in the MExE UE.

12 Interworking with other network features

All services available in the network shall continue to be offered in addition to MExE. This includes the basic services, supplementary services and network features.

It shall be network-determined whether specific MExE services supplement, co-operate with, or supersede the network available services, when a user is subscribed to MExE and has transferred the specific MExE service.

The interworking characteristics of individual MExE services with other network features is outside the scope of this specification.

13 Network interworking

All services offered in co-operation with other networks shall continue to be offered in combination with MExE. This includes the basic services, supplementary services and network features.

The interworking characteristics of individual MExE services with other networks is outside the scope of this specification.

Annex A (informative): Example MExE services

Overview

In addition to the use of standardised network services (e.g. call forwarding, call barring, CCBS, call diversion etc.), MExE provides additional capabilities to control telephony events and manipulate standardised network services in a user-friendly manner.

A MExE handset provides the generic capability to negotiate and interact with services (in the form of applications and content) in servers, other handsets and internet/intranet WebPages etc. Further, MExE provides standardised execution environments to which 3rd party software developers may write services to execute directly in the MExE handsets.

MExE provides the user with a more sophisticated user interfaces (e.g. browsers) with a rich variety of MMI concepts to personalise, control and invoke services (e.g.. softkeys, icons, voice recognition etc.). Additionally downloaded services provide users with the capability to control the "look and feel" of services.

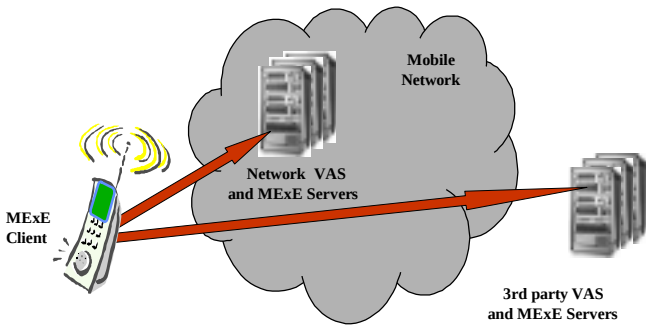
MExE also brings security to the support of 3rd party services in the wireless handset. With security domains reserved for network operators, handset manufacturers, and third parties , the source and content of downloaded services may be authenticated by the MExE client. The provision of such a security model enables the user to control whether services are installed, configure which functions may be performed by services, and to identify the extent of permissions granted to services. The protection of user data and resources help prevent attacks from potentially fraudulent services.

This annex gives an overview of how new 3rd generation services may be supported by MExE handsets, and gives some examples of possible services that may be supported on them. The ability to support some services may depend on the physical handset resources available to the MExE services, the classmark of the MExE client, and handset manufacturers may provide a range of handsets aimed at supporting different types of services.

Access to MExE services

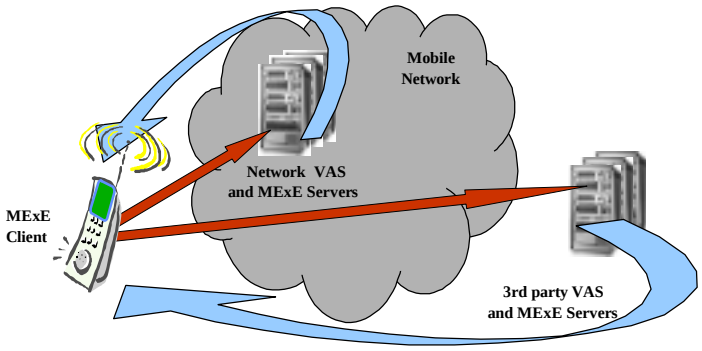
There are several ways in which these new 3rd generation MExE services may be supported, and the following scenarios give an overview of the possible scenarios.

- **services execute on remote servers**



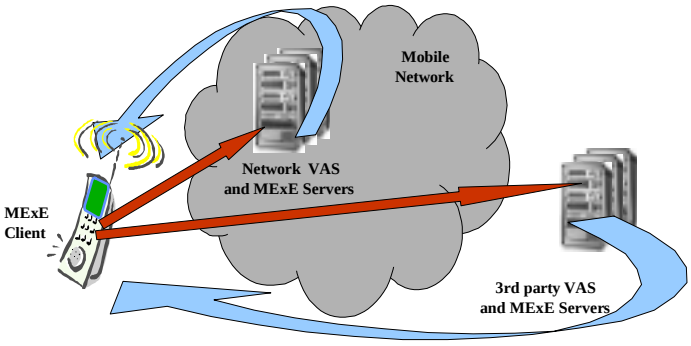
The services are provisioned and execute on remote servers, WebPages etc., to which the MExE client establishes a connection. The MExE client uses the services as provided by those remote servers. The MExE client effectively receives content (i.e. secured personal financial information) from the remote application which is presented to the user in the MExE client.

- **application downloaded into the MExE client**



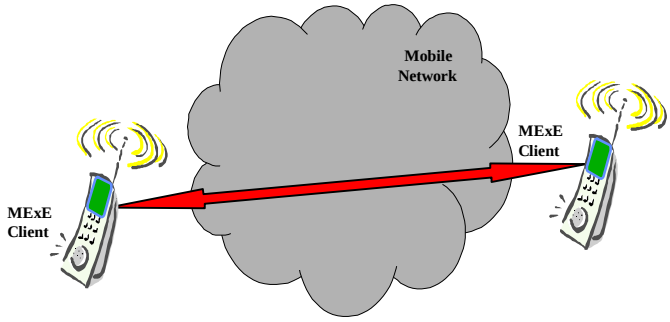
The services are provisioned and execute on remote servers, to which the MExE client establishes a connection. The MExE client downloads an application which acts as a local browser to interact with the remotely provided service. The user interacts with and uses the remote servers via the downloaded application. An example of such a service would be access to an internet/intranet page.

- **service downloaded into the MExE handset**



The services are available from remote servers, to which the MExE client establishes a connection. The MExE user downloads whichever services he desires from the remote servers, and installs, provisions and configures them on the MExE client. These services execute directly on the handset, without necessarily relying on servers to support the service. An example of such a service would be a game.

- **MExE handset to MExE handset services**



MExE handsets may wish to establish connections with each other to provide, receive and use interactive services. This direct MExE client to MExE client interaction of MExE services and any combination of the preceding scenarios may have been used to download services to the MExE client. These services may execute directly on the handset, without necessarily relying on servers to support the service. An example of such a service would be interactive games, sharing of calendar information, etc..

Example MExE services

Once they have been downloaded, these MExE services may then be configured, personalised and executed on the MExE handset by the user. A MExE handset may support a diverse range of services, providing a dynamic and evolutionary set of facilities to users. The support of this unlimited range of new services, will convert a mobile handset from being a device which simply makes and receives calls and messages, into a multifunctional leisure and business device.

An analogy may be made with a personal computer, where the user can install and configure any type of application that he so chooses, establish multimedia call sessions, and convert the laptop into a multi-facited device (e.g. slideshow presenter, videobox, music jukebox, arcade games machine, protocol analyser, e-mail, messaging and information server etc.). In fact, MExE may simply be considered to be similar to a small computer supporting wireless telecommunications capabilities.

Manufacturers are expected to produce MExE devices with different levels of resources, memory and processing power to exploit the growing number of applications and market niches.

The list of possible services that may be supported by a MExE client is virtually unlimited, and the following are example services that could be supported by a MExE client.

Applications

Applications may be downloaded and installed on the MExE client to provide a wide range of standalone services.

The user downloads and installs the software into the MExE client, configuring and installing it as required. Examples of such applications are phonebooks, diaries, planners providing similar functionality to current popular handheld PDA devices. Likewise, games may also be downloaded and installed providing similar functionality to current popular handheld games devices and other entertainment and leisure services.

Additionally, interactive working with other devices and servers (i.e. on-line gaming, gambling, messaging etc.) could also be generically supported.

Browsers

Applications may be downloaded and installed on the MExE client to support browser functionality already experienced by many users today with personal computers. Examples of this are internet and e-mail browsers.

Web browsing

A MExE client can be used by the user as an internet/intranet web browser by downloading and installing a web browser.

Just like the internet browser on a personal computer at home or in the office, the user is able to access the internet/intranet. Similar to accessing the internet via a personal computer, the user is able to surf the web viewing pages, images, animation and download content using standard internet HTTP and HTML protocols. By interaction with the installed web browser, the user is also able to customise his web browser to present the internet/intranet to the user in his accustomed way.

E-mail

A user can convert his MExE client into an e-mail handler by downloading and installing an e-mail browser.

Working the same way as an e-mail browser on his desk bound personal computer, the user is able to send and receive messages on the move. As with existing personal computer implementations e-mails with audio, visual and textual attachments may be exchanged with an e-mail server, using the standard e-mail SMTP, POP3 and IMAP4 protocols. Directly supported by the e-mail browser on the MExE client, the user may personalise his e-mail service and manage e-mails on remote e-mail servers.

Players

Players are a specialised type of application which the user may install on the MExE client. These players enable content to presented to the user in a specific manner, depending on the content format. Audio and video players are examples of such specialised applications.

Music players

A MExE client may also be used by the user as a portable music player by downloading and installing a music player application.

Once the music player application is installed, the user is then able to download music content using popular music formats available from the internet or third party servers.

Similar to the player applications already available on the internet and personal computers today, the user may be able to play popular music formats like MP3. Further, specialised music contentmay also be played by downloading and installing the appropriate compliant player.

By downloading and installing a music player, the user is able to obtain functionality from the MExE client similar to current popular handheld music devices.

Video players

Similar to the music player, a MExE client may also be used by the user as a portable video player by downloading and installing an appropriate video player application.

Once the video player application is installed, the user is then able to download video content using popular music formats like MPEG4 available from the internet or third party servers.

Annex B (informative): Change history

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**Work Item**
Jun 1999			22.057			R99		Transferred to 3GPP SA1	8.0.0	3.0.0	
SP-05	SP-99479	S1-99619	22.057	001		R99	D	Editorial changes for alignment	3.0.0	3.0.1	
SP-09	SP-000381	S1-000626	22.057	002		R4	D	Mobile Execution Environment	3.0.1	4.0.0	
SP-09	SP-000388	S1-000428	22.057	004		R4	D	MExE Release 2000	3.0.1	4.0.0	
SP-09	SP-000388	S1-000428	22.057	005		R4	B	MExE Classmark updates	3.0.1	4.0.0	
SP-09	SP-000388	S1-000628	22.057	003		R5	B	MExE support of multimedia services	3.0.1	5.0.0	
SP-11	SP-010043	S1-010202	22.057	006		Rel-5	B	MeXE service discovery	5.0.0	5.1.0	MEXE-ENHANC
SP-13	SP-010440	S1-010629	22.057	007		Rel-5	F	Generic requirements for support of multiple MExE classmarks	5.1.0	5.2.0	MEXE-ENHANC

CR-Form-v4

CHANGE REQUEST

⌘ **SpecNumber** **CR** **008** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **Mobile Execution Environment (MExE); Service description, Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

3G TS 22.057 V4.~~0~~1.0 (~~2000~~2002-~~10~~03)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Mobile Execution Environment (MExE);
Service description, Stage 1
(Release 4)

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Contents

Foreword

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

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

Version x.y.z

where:

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

1 Scope

This TS defines the stage one description of the Mobile Execution Environment (MExE). Stage one is an overall service description, primarily from the subscriber's and service providers' points of view, and does not deal with the details of the human interface itself.

This TS includes information applicable to network operators, service providers and terminal, switch and database manufacturers.

This TS contains the core requirements for a Mobile Execution Environment (MExE) which are sufficient to provide a complete service.

It is highly desirable however, that technical solutions for a Mobile Execution Environment (MExE) should be sufficiently flexible to allow for possible enhancements. Additional functionalities not documented in this TS may implement requirements which are considered outside the scope of this TS. This additional functionality may be on a network-wide basis, nation-wide basis or particular to a group of users. Such additional functionality shall not compromise conformance to the core requirements of the service.

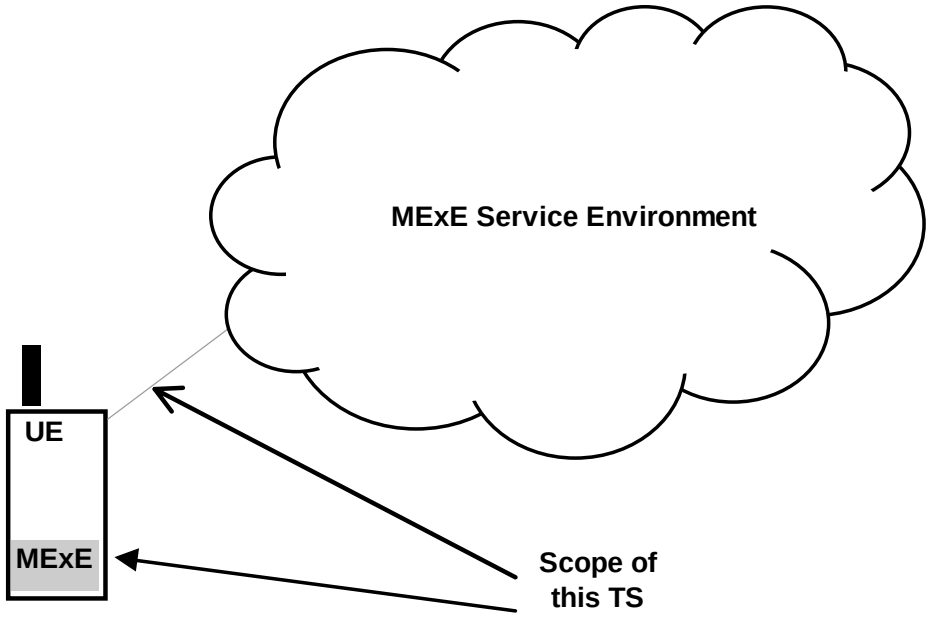


Figure 1: Scope of this TS

As indicated in Figure 1, the scope of this TS encompasses the MExE functionality in the UE, interaction with the MExE service environment. The MExE service environment is not necessarily restricted to the PLMN, and nodes providing MExE services (i.e. MExE servers) may also exist outside the PLMN. Aspects of the support provided by MExE servers within the MExE service environment (such as charging aspects, security level classification etc.) are covered by this specification, but not the MExE servers themselves.

~~MExE requirements are considered to be applicable to both GSM and UMTS systems.~~

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

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

[2] TR 21.905: "Vocabulary for 3GPP Specifications".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this TS the following definitions apply:

applet: a small programme that is intended not to be run on its own, but rather to be embedded inside another application

application: MExE information in the form of software, scripts, applications, associated resources (e.g. libraries) and/or data

content: data and/or information associated with, or independent of, a particular application which may be presented to or collected from a user

MExE Classmark: a MExE Classmark identifies a category of MExE UE supporting MExE functionality with a minimum level of processing, memory, display and interactive capabilities. Several MExE Classmarks may be defined to differentiate between the functionalities offered by different MExE UEs. A MExE application or applet defined as being of a specific MExE Classmark indicates that it is supportable by a MExE UE of that Classmark.

MExE server: a node supporting MExE services in the MExE service environment

MExE service: a service enhanced (or made possible) by MExE technology

MExE service environment: Depending on the configuration of the PLMN, the operator may be able to offer support to MExE services in various ways. Examples of possible sources are from traditional 3GPP network ~~GSM~~ nodes, IN nodes, operator-specific nodes, operator-franchised nodes and services provider nodes, together with access to nodes external (i.e. vendor-specific) to the PLMN depending on the nature of the MExE service. These nodes are considered to constitute the MExE service environment. The MExE service environment shall support direct MExE UE to MExE UE interaction of MExE services.

MExE service provider: an organisation which delivers MExE services to the subscriber. This is normally the PLMN operator, but could be an organisation with MExE responsibility (which may have been delegated by the PLMN operator).

MExE subscriber: the owner of a subscription who has entered into an agreement with a MExE service provider for MExE services. Access to MExE services though other types of networks is out of scope of this specification.

subscriber: the term subscriber in the context of this TS refers to a MExE subscriber

user: the user of an MExE UE , who may or may not be the subscriber.

3.2 Abbreviations

For the purposes of this TS the following abbreviations apply:

API	Application Programming Interface
CS	Circuit Switched
FFS	For Further Study
IN	Intelligent Network
ME	Mobile Equipment

MExE	Mobile Execution Environment
MMI	Man Machine Interface
UENO	Network Operator
PLMN	Public Land Mobile Network
SIM	Subscriber Identity Module
UE	User Equipment
USIM	Universal Subscriber Identity Module
SP	Service Provider

Further related abbreviations are given in GSM 01.04 [1] and TR 21.905 [2].

4 Description

MExE provides a standardised execution environment in an UE, and an ability to negotiate its supported capabilities with a MExE service provider, allowing applications to be developed independently of any UE platform. The UE (consisting of the ME and SIM/USIM) can then be targetted at a range of implementations for MExE from small devices with low bandwidth, limited displays, low processor speeds, limited memory, MMI etc., to sophisticated with a complete MExE execution environment.

The introduction of MExE execution environment into UEs is a significant step forward in their evolution. The ability of UEs to support MExE applications represents an extension of UEs' capabilities. In order to allow current and future technologies to exploit and benefit from this, a standardised means of negotiating the UEs' and network's capabilities is supported. This negotiation will permit the mutual exchange of capabilities between the UE and the MExE server, and possibly include the service profile of the user and capabilities of the network. The negotiation may take place at service initiation, or on a dynamic basis.

A network can be a transport bearer for the negotiation, interaction and transferring of applications, applets and content with the UE, however it need not necessarily be the provider of the MExE services with which the UE's execution environment is interacting with. The network may also be the intermediary between two UEs which are engaged in a MExE service with each other, with the network effectively supplying the "pipe" and not playing a MExE rôle in the connection.

Network nodes, nodes external to the network, or even UEs may be the entities which interacts with the UE's execution environment.

5 Compatibility of MExE UE's and applications

5.1 MExE classmarks

Given the wide ranging hardware capabilities of MExE UEs, together with the development of MExE applications and applets, a MExE classification shall be supported to determine their respective capability and compatibility. The MExE classification shall apply both to UEs and applications and applets.

The objective is to:

- classify the capabilities of a MExE UE to support MExE applications and applets; and
- identify the class of MExE UE on which a MExE application and applet may be supported.

The concept of a MExE Classmark is introduced to manage the MExE UE and MExE application and applet classification and compatibility. The MExE Classmark is distinct and unrelated to the existing UE Classmark. The use of MExE Classmarks shall be supported during the capability negotiation between the MExE service provider and the MExE UE.

5.2 UE MExE classmarks

A given MExE Classmark shall identify a category of MExE UE supporting MExE functionality with a minimum level of processing, memory, display and interactive capabilities.

The following MExE classmarks are defined:-

- MExE Classmark 1

  This classmark supports small devices, typically with limited display, processor and memory resources.

- MExE Classmark 2

  This classmark supports contemporary sophisticated devices, typically with enhanced display, processor and memory resources.

- MExE Classmark 3

  This classmark supports platforms for resource constrained, connected devices.

The minimum level of capabilities for each MExE Classmark is beyond the scope of this Stage 1 service description. As UE development evolves and more sophisticated devices (or indeed simpler devices) become available, further UE MExE Classmarks shall be definable to identify UE's capable of supporting improved (or additional) MExE functionality.

A given MExE UE Classmark identifies support by a MExE UE for a defined level of MExE functionality, but does not necessarily imply support of other levels of MExE Classmark. A MExE UE may also support multiple MExE Classmarks.

5.3 Application and applet MExE classmarks

MExE applications and applets will be developed to execute in one or more classes of MExE UE's. In order for MExE applications and applets to be properly supported by a MExE UE, the application and applet shall identify the minimum functional capabilities required of a MExE UE, as defined by the UE's MExE Classmark.

MExE applications and applets shall be designated by the same classes of MExE UE's on which they may be executed. Examples of the classification of MExE applications and applets are as follows:-

- a MExE Application can be defined as a MExE Classmark 1 application;

  the application is identified as suitable for execution on MExE Classmark 1 UE's only.

- a MExE Application can be defined as a MExE Classmark 2 application;

  the application is identified as suitable for execution on MExE Classmark 2 MS's only.

- a MExE Application can be defined as a MExE Classmark 1 and Classmark 2 application;

  the application is identified as suitable for execution on MExE Classmark 1 and Classmark 2 UE's only.

The above example list is neither complete nor exhaustive.

If a MExE application or applet is capable of being supported by other classes of MExE UE's (with reduced or enhanced capabilities), it is the responsibility of the MExE service provider to re-classify the MExE application or applet accordingly.

MExE applications and applets defined by a MExE service provider to a given class of MExE UE, shall be supportable by all MExE UE's of that class regardless of MExE UE manufacturer. MExE applications and applets shall operate on differing MExE UE of the same MExE UE class without modification.

It shall be possible for MExE service providers to make the same MExE applications and applets available in the network for different classes of MExE UE. It is desirable that applications and applets are backward compatible within a given technology and for a given UE Classmark; however such backward compatibility is out of scope of this specification.

6 General MExE requirements

6.1 High level MExE requirements

The high level requirements of MExE are as follows:

- the means for MExE service provider specific services to be supported by all UEs of a particular class (i.e. the need for a common set of APIs and development tools), and accessible across a range of networks;
- provide the user with a more sophisticated user interfaces (e.g. browser-like) with a rich variety of MMI concepts to control and invoke services (i.e. softkeys, icons, voice recognition etc.);
- the user's and MExE service providers capability to control the "look and feel" of applications and applets;
- the ability of the user to personalise the user interface;
- the ability of the user to personalise services;
- provide support of a wide variety of applications and applets;
- provide the means for MExE service providers to authenticate MExE subscribers;
- provide the user access to Internet and Intranet based applications and applets (via both standard Internet and Wireless optimised protocols);
- the means to transfer applications, applets and content automatically or on demand to a MExE UE from a MExE service provider, and upgrade existing applications across the network;
- the means to support direct MExE UE to MExE UE interaction of MExE services;
- the need for an inherent security architecture such that both the MExE UE and MExE server sides of a connection are authenticated (possibly by a brokerage server), and have access to a range of encryption and security functions in order to maintain the security and integrity of the network. The MExE service provider shall maintain security of subscribers personal data and network data, with all aspects relating to network security being centred on the SIM/USIM;
- the ability for the MExE service provider to charge subscribers for MExE service provider provided MExE services, at connect time, when downloading, or on usage;
- the means for MExE service provider specific applications and applets on the MExE UE to communicate with applications in the MExE service environment using industry standard protocols (e.g. a MExE server etc);
- the ability to provide information to MExE service providers (e.g. location information of UE' for use with location dependent services);
- the means for MExE service providers and their applications and applets to determine MExE UE capabilities (i.e. MExE Classmark, technology, supported bearers according to network capabilities and network subscription etc.). (This shall be used by MExE servers to adapt application and applet transfer to MExE UE capabilities, and shall be used by applications and applets whilst running to adapt their behaviour to the UE's capabilities.);
- the opportunity for MExE service providers to apply expertise and software developed for other platforms;
- provision of APIs and tools to develop MExE services which are applicable for MExE UE';
- the means for the user to manage (i.e. identify version, delete, modify, save etc.) the applications, applets and content on the MExE UE;
- the means for the user to control acceptance (i.e. by Security Level, level of trust etc.) of applications, applets and content transferred to the MExE UE. (It shall be possible for the user to finely control a trusted application or applet's access rights on the MExE UE, such as reading/writing/deletion of files stored on the MExE UE);
- the means for MExE applications to perform some AT command functionality without compromise to security of MExE as defined in clause 8;

- the means for authentication certificates associated with applications to be managed and stored in the SIM/USIM;

- the ability for a MExE application to negotiate the QoS, and the ability to indicate to a MExE application changes in the QoS;

- the ability of MExE applications to be notified that handover is about to occur, is occuring or has occurred;

- the means for MExE UE manufacturers to download and upgrade their existing codec in a MExE UE. A generic mechanism to download other proprietary software into the execution environment of the UE shall be available to the manufacturer. The downloading of platform independent MExE applications, such as streaming audio, that support multimedia capabilities shall also be possible;

- the means for data to be synchronised between the MExE UE and the MExE service environment.

Some of the above requirements are subsequently elaborated.

6.2 Requirements description from the user's standpoint

MExE provides an improvement in the capabilities of a UE, as well as an extended range of services available to the user from, or via, the network. The user shall have

- user interface configuration management; and

- service management;

of the services offered to him by MExE.

6.2.1 User interface configuration management

User interface configuration management refers to the behaviour of the MExE UE, and the ability of the user to modify the MExE UE to behave in the manner he is accustomed to, or wishes the MExE UE to, present itself to the user. It does not refer to the services which interact with the network, but the way in which the MExE UE interacts with the user.

Users expect MExE UEs to offer an increasing range of capabilities which need not be ubiquitously present on each MExE UE, depending on the technological limitations of the MExE UE. The user shall be able to manage the user interface configuration of the MExE UE. For example, some user’s may require a voice-controlled MMI, whilst others may have the need for a specialised presentation on the MExE UE display or preset function keys regardless of the application or applet which is running. Management of the user interface configuration will permit a user to move from MExE UE to MExE UE and exploit the technological capabilities of each class of MExE UE, with the use of varying services downloaded from the network, as required.

The user shall be able to identify (either directly or indirectly) the user interface configuration he wishes to add, modify or delete on his MExE UE, and shall be offered the means of doing this. This management may be performed, for example, by a configuration capability profile.

In taking this action, it shall be possible to determine whether the user interface configuration is already resident on the ME, or whether it requires to be obtained from the SIM/USIM or the network. The modifications which may be requested by the user could result in, for example, differing display characteristics being employed, redefinition of keys, modification of the “look and feel” of the user interface, touch screen facility, extensions to existing functions or the capability to automate some functions.

The control of the “look and feel” of MExE applications and applets to customise their level of functionality and appearance may be possible by the MExE service provider, network operator (where the MExE service provider is not the network operator) and the user. The aspects of the application or applet which may be customisable are determined by the MExE service provider as an integral part of the MExE application or applet.

The user interface configuration management which is specific to the ME shall be stored on the ME, and user interface configuration management which is generic to ME’s may be stored in the network or on the SIM/USIM.

The definition of the user interface configuration management which may be offered to the user is outside the scope of this service description.

6.2.2 Service management

MExE shall provide the ability to customise the range of services offered to the subscriber. The subscriber's ability to configure the services available on the MExE UE shall be dynamic, as the range of services required may differ depending on the network, time and location that the user finds himself in. For example, a subscriber may require access to services offering financial support when attending a business meeting, however later in the day he may need access to travel information and booking facilities when re-arranging his travel home.

A common address across all PLMN supporting MExE shall be available, from which the user shall be able to request the range of MExE services available he is registered in, if the PLMN supports MExE. The downloading of services may be autonomously controlled by the MExE UE to update existing service access on the MExE UE, or to download new services. The management of these services may be defined by the subscriber directly or under the control of the MExE UE's capabilities organised on the MExE UE (i.e. a user may be particularly interested in unified messaging services, and require the availability of such services to be made available to him).

The user shall be able to determine and manage which MExE applications, applets and content may be transferred to the MExE UE (i.e. in terms of their security level, source of the applications etc.), determine and manage which MExE applications, applets and content are currently resident and usable on the MExE UE (e.g. when roaming some services may not be available to the user), and delete MExE applications, applets and content on the MExE UE.

The definition of the applications, applets and content which may be offered to the user is outside the scope of this specification.

6.3 Requirements description from the MExE service provider's standpoint

6.3.1 Transfer of applications, applets and content

A common mechanism shall be available to perform the transfer of applications, applets and content between MExE UEs' and the MExE service provider.

The common transfer mechanism shall permit applications, applets and content (according to the appropirate MExE Sercurity Level) to be transferred to the MExE UE.

It shall be possible for the MExE service provider to:

- transfer applications, applets and content between the MExE UE and the MExE service provider (which may be initiated by either party);
- request the version of applications, applets and content on the MExE UE;
- identify the MExE UE' capabilities;
- support a request from the MExE UE for information on the (local) services which may be transferred from the network.

Some of these functions may be used by the MExE service provider either individually, or together to automatically update previously transferred services.

6.3.2 Node types

The introduction of MExE shall enable an expansion of services available to the user from various network node types.

The MExE UE shall be able to communicate with the various network node types in the MExE service environment, allowing access to intelligent nodes to process service requests from the MExE UE.

Applications in the MExE service environment may interact with, or execute as agents of, an MExE UE application using industry standard protocols. Such interaction does not fall within the scope of MExE, however any MExE UE

application that does interact with applications in the MExE service environment must respect the privacy of user data.

6.3.3 Subscriber data

Subscription to MExE services shall be logically separate to subscription of network services. A subscriber may have a MExE subscription to multiple MExE service providers. It may also be possible for the subscriber to interrogate such subscription registration (with a suitable means of authorisation), depending on PLMN support.

6.3.4 Roaming subscribers

Roaming MExE subscribers shall be able, as far as possible, to access their normal MExE services in their HPLMN.

As usual when roaming, it cannot be ensured that the VPLMN can provide the subscriber access to the same MExE services (e.g. applications, applets and content) as he is accustomed to. However, in the VPLMN additional MExE services may be available, depending on network capabilities. Service continuity when roaming is dependent on the availability of the services in the VPLMN, and is outside the scope of this specification.

The operation of the transferred applications, applets and content may be location dependent, and their behaviour when in an different location is outside the scope of this specification.

The following forms of MExE subscriber roaming are identified:-

- roaming between networks (HPLMN to VPLMN);
- roaming between visited networks (VPLMN to VPLMN);
- regional roaming within a network (within the HPLMN or VPLMN).

There may be a need to distinguish between the above types of roaming from a MExE services management perspective, as the operation of location dependent MExE services may be affected when the MExE subscriber roams beyond the boundaries of a PLMN or region.

7 MExE bearer requirements

Bearers available to MExE applications depend on those supported by the MExE UE that are available.

Wherever available, MExE UE applications shall be supported by bearers from 3GPP system ~~GSM, UMTS~~ and other technologies (e.g. high speed data links provided by digital broadcast infrastructure). MExE applications shall be able to use these bearers in an asymmetric fashion.

8 MExE protocols requirements

In order for MExE to be supported over the network, a set of standardised protocols is required to support interaction between the MExE UE and the MExE service environment.

As this specification is not required to propose a specific technology, it identifies the MExE protocols requirements from the service subscriber's and user's standpoint. The MExE protocols refers to any protocol layer above the 3GPP system ~~GSM/UMTS~~ bearers, which interfaces between the MExE service environment and the MExE UE.

The functional capabilities, information flows, signalling system protocols and switching functions needed to implement the service described in this Stage 1 specification will be identified by subsequent specifications at the Stage 2 and Stage 3 levels.

The high level MExE protocols requirements are identified in the subsequent subclauses.

8.1 Optimised Wireless Access

A primary goal of MExE is to provide access to Internet and Intranet services, the standard Internet applications, security and transport protocols shall be one possible set of MExE protocols which is supported. It is noted that these protocols may not cover all the requirements identified in this specification for all classes of ME's.

A set of application, security and transport protocols optimised for wireless access, and compliant to MExE requirements, shall be specified and form part of the MExE standards.

MExE UE's shall be able to support either or both of these sets of protocols.

8.2 Wireless network independence

The upper layers of the MExE protocols shall be independent of the type of underlying wireless network so that applications and applets do not need to take into account the specific nature of networks. In particular, lower layers shall provide a generic access API to network bearers so that application and applet developers do not have to cater for the supported underlying bearers. It shall be possible for applications and applets to request specific bearer services and be notified accordingly if they are not available.

The transport layer of the MExE protocols may however be adapted to support the specific features of the underlying bearers. The MExE protocols shall have the ability to use all the underlying bearer services which the MExE UE is capable of supporting.

8.3 Scaleable and extendible protocols

The MExE protocols shall support a scaleable and extendible environment for application and applet development in mobile communication devices. It shall provide a set of generic, non-UE or service-dependent, features. Scaleability of the MExE protocols applies to both the MExE UE (e.g. where simple devices do not require the extensive protocols support possibly required by more sophisticated devices) and the network.

The MExE protocols shall support both low bandwidth bearers (e.g. SUE, USSD etc.) as well as medium bandwidth bearers (e.g. anything up to 64kb/s~~, HSCSD, UMTS~~). The introduction of new bearers shall be supported, allowing applications and applets to automatically benefit from their capabilities.

The MExE protocols shall support existing servers and applications and applets, and provide a stable platform for future application development.

8.4 Service independence

The MExE protocols shall be independent of the services communicated over the protocols. The modification in the range of services, or addition of new services, offered over the network shall not be restricted by the MExE protocols.

8.5 Network node type independence

The MExE protocols shall be independent of the network node type(s) being communicated with over the protocols. The MExE protocols shall support the evolution of network node types in a PLMN.

8.6 Enquiry and notification of MExE capabilities

The MExE protocols shall support a generic technology-independent means for the notification by the MExE UE to a MExE server, or enquiry from the MExE server to the MExE UE, of the supported MExE capabilities consisting of:

- MExE Classmark (mandatory, MExE server to MExE UE);

  the supported class of MExE UE;

- MExE technology (mandatory, MExE server to MExE UE);

  the supported types of MExE UE technology to support MExE services;

- terminal characteristics (optional, MExE UE from MExE server, following MExE server enquiry);

  further details of the supportable characterstics (i.e. screen size, MMI capabilities, supportable bearer services, toolkits etc. as constrained by the network, terminal, subscription and user preferences).

In existing networks it may not be possible to determine the network capabilities (i.e. supported bearers) and subscription options of the subscriber.

The above notification by the MExE UE or the MExE server are supported at service initiation, dynamically during the provision of such a service, and following a change in the quality of service (i.e. following a handover, change of network, degradation of service, change in quality of service).

The notification mechanism shall flexibly support notification of the MExE UE, and be able to accommodate future evolution of MExE UE equipment.

8.7 UE request of services information

The MExE protocols shall support a notification from the PLMN or a request from the MExE UE to the PLMN, for information on the (local) services which may be transferred from the PLMN. The information from the PLMN may take the form of listing the services, or references to a PLMN entity (either internal or external to the PLMN) where the available services may be determined.

8.8 Support of transfer protocols

The MExE protocols shall support the capability to transfer new applications and applets to the MExE UE as required. The protocols shall support both user initiated and MExE server initiated transfer of several types of data (content description pages, procedural logic, images, libraries etc.), and be able to indicate the type of data being transferred.

Each specific MExE technology shall be support a a standardised transfer mechanism for that MExE technology.

9 UE application execution environment requirements

9.1 UE platform independence

In order to support the objectives of MExE, the ME and SIM/USIM is required to have an architecture capable of supporting applications, applets and content in a standardised execution environment, independently of the MExE UE manufacturer.

As this specification is not required to propose a specific technology, it identifies the common platform requirements from the service subscriber's and user's standpoint.

The limitations of small devices may result in the provision of the full application execution environment only being available in sophisticated devices.

The high level execution environment requirements are identified in the subsequent subclauses.

9.2 Document mark-up language and other coding formats

In order to cater for a wide variety of ME's with different display and input capabilities, support for both the standard Internet mark-up language and a content description language optimised for small display devices of low bandwith bearers shall be defined with the MExE specifications. Both languages may be implemented on any MExE UE. Standardised ways of coding content (i.e. images, phonebook, calendar etc.) shall be defined, however the support of such standardised content coding is optional.

In order to facilitate global use of MExE services, a standardised range of character sets for MExE services requires to be defined, and the capabilities of the user and applications to use them.

9.3 MExE APIs

MExE APIs may be defined covering aspects (e.g. Network APIs, Non-network API's, Terminal APIs etc.) within a given MExE Classmark of MExE UE (ME an/or SIM/USIM), and the MExE UE shall support a core API to support the execution of MExE applications and applets. The core API is a the minimal set of API that is present on all MExE UE's, providing the MExE execution environment in which applications and applets can execute, and is known as the Core MExE API. The Core MExE API consists of generic and 3GPP ~~GSM/UMTS~~ specific aspects.

Applications and applets which have been designed to execute in this Core MExE API environment (and the optional MExE APIs subsequently identified), will provide additional functions to the MExE UE.

In addition to the Core MExE API on an MExE UE, standardised MExE API extensions such as Network API (e.g. access to call control services, SUE etc.), Non-network 3GPP ~~GSM/UMTS~~ defined services API (e.g. security aspects, SIM/USIM phonebook etc.), Terminal API (e.g. power management, access to alerting function, phonebook, MMI, smartcard access etc.),shall be subsequently defined and may be supported by the MExE UE in order to further exploit the system capabilities.

The standardised MExE API extensions shall include access to mobility information.

10 Charging requirements

The use of MExE services shall, at MExE service provider determination, be subject to charging.

There are several forms of charging which shall be available to the MExE service provider. It shall be possible for the MExE service provider to charge in the following instances:

- subscription;

  the subscriber's registration to use MExE services may be subject to a charge;

- service transfer;

  the transfer of services and/or information to a subscriber's MExE UE may be subject to a charge;

- service upgrading;

  the upgrading of previously transferred services to a subscriber's MExE UE may be subject to a charge (automated upgrading of services may be subject to a different charge);

- service usage;

  the usage of transferred services by a subscriber's MExE UE may be subject to a charge (possibly use either internal to, or external to, the MExE UE);

- roaming ;

  the usage of MExE services by a subscriber's MExE UE when roaming may be subject to additional charges;

A standardised means of transferring (indicative and/or final) charging information (for the use of MExE services) from the MExE service provider to the MExE UE shall be defined.

The usage of the bearer service may be subject to a charge (i.e. possibly time-based, volume-based, event-based etc.) by the network operator.

Normal service charges may additionally apply when using MExE services and incurring the above charges.

Other charging requirements may be identified in due course.

11 Security requirements

This clause consists of:

- a sub-clause giving the principles behind security for MExE. These are not requirements as such but the principles behind the requirements;
- a sub-clause specifying specific requirements that MExE implementations must adhere to;
- a sub-clause specifying the security domain classifications for MExE executables.

11.1 Security Principles

The ME and the data therein are the property of the user. The user is also responsible for the payment of chargeable events involving her UE, and will be seen as the party responsible for any events (whether chargeable or not) involving her UE. Therefore the user shall have full control over all chargeable and non-chargeable events initiated by her UE ("event" includes responses made by the UE to external events, e.g. the acceptance by the UE of an incoming call). This control can be exercised either by the giving of explicit permission at the time of the event or by the giving of implicit permission to the events by the agreement to an event schedule listed clearly in a user profile.

The user shall be able to request the logging of specific network events initiated by MExE UE applications/applets.

The privacy of user data in the UE is of paramount importance.

The SIM/USIM and operator controlled areas within the terminal are the property of the network operator. The network operator shall therefore have full control over access to the SIM/USIM and operator controlled area The operator shall also have full control over data, excluding personal user data, transmitted to or from the SIM/USIM and the operator controlled terminal area and all events initiated by the SIM/USIM or operator controlled area ("event" includes responses made to external events, e.g. the response to a command sent from the ME).

As the user cannot know the capabilities of any MExE executables transferred from a MExE service environment before transfer, the UE MExE environment shall ensure that transferred MExE executables cannot compromise the above principles.

11.2 Security Requirements

For MExE executables of security operator, manufacturer and user trusted domains , as defined in clause 11.3, it shall be possible to authenticate the identity of the body that authorised the application, applet or content.

There shall be a secure, unforgable means for assigning the security domains defined in section 11.3 to the MExE executables transferable from the MExE service environment.

The certification of authorisation associated with MExE executables transferable from the MExE service environment shall be transferred with the certified material.

The MExE UE shall be able to verify the security domain, as defined in section 11.3, of MExE executables transferred from the MExE service environment.

The verification process in the UE itself shall not compromise the security of the functionality and content in the UE

Transferred material that fails verification shall not be installed and shall be deleted by the terminal as soon as possible.

MExE executables that cannot be verified due to the absence of required verification information in the UE, shall be considered as untrusted material, as defined in section 11.3.

The events that MExE executables are given permission by the user to initiate shall be securely recorded in the user profile.

There shall be mechanisms within the MExE UE for ensuring that applications cannot have access to UE functionality and content beyond that allowed by their security domain, as defined in section 11.3.

It shall be possible to for the user to downgrade MExE executables of operator, manufacturer or user trusted domain status to untrusted status, at installation or at any other time.

The MExE UE shall be able to detect if MExE executables transferred from the MExE service environment have been modified since they were assigned a security level.

MExE executables shall not be transferred to a MExE UE without the explicit permission of the UE user immediately prior to transfer or implicit permission via the user profile.

Applications and applets transferred to a MExE UE shall not be able to initiate events without the explicit permission of the UE user immediately prior to event initiation or implicit permission via the user profile.

The user profile data for transfer and event initiation cannot be changed without the explicit agreement of the user.

The user shall be able to abort or suspend any on-going call that has been set up automatically by an application.

The integrity of the SIM or USIM and other security mechanisms shall not be compromised by the introduction of MExE services.

The user shall be able to request the logging of specific network events initiated by MExE UE applications/applets.

MExE UE applications/applets shall not be able to send command RUN GSM ALGORITHM to the SIM.

11.3 Security domain classifications

The security domain of MExE executables shall be graded according to the measure of authorisation which they have been designated. The following 3 (the “sandbox” in which untrusted MExE executables runs is not considered to be a domain) domains shall be supported for MExE executables:

- MExE Security Operator Domain (used by the HPLMN operator);

  MExE executables designated at this security domain have been authorised by the network operator (i.e. HPLMN),

- MExE Security Manufacturer Domain (system MExE executables);

  MExE executables designated at this security domain have been authorised by the MExE UE manufacturer.

- MExE Security User Trusted Domain (trusted applications, applets and content);

  MExE executables MExE executables designated at this security domain have been written by user trusted software developers and verified as user trusted domain material (but not with regard to their content) via organisations such as certification authorities.

- MExE Security Untrusted (untrusted applications, applets and content);

  Untrusted MExE executables have not been supplied with an associated authorisation, or the authorisation cannot be verified due to the absence of required verification information in the MExE UE.

12 Interworking with other network features

All services available in the network shall continue to be offered in addition to MExE. This includes the basic services, supplementary services and network features.

It shall be network-determined whether specific MExE services supplement, co-operate with, or supersede the network available services, when a user is subscribed to MExE and has transferred the specific MExE service.

The interworking characteristics of individual MExE services with other network features is outside the scope of this specification.

13 Network interworking

All services offered in co-operation with other networks shall continue to be offered in combination with MExE. This includes the basic services, supplementary services and network features.

The interworking characteristics of individual MExE services with other networks is outside the scope of this specification.

Annex A: Example MExE services (Informative)

Overview

In addition to the use of standardised network services (e.g. call forwarding, call barring, CCBS, call diversion etc.), MExE provides additional capabilities to control telephony events and manipulate standardised network services in a user-friendly manner.

A MExE handset provides the generic capability to negotiate and interact with services (in the form of applications and content) in servers, other handsets and internet/intranet WebPages etc. Further, MExE provides standardised execution environments to which 3rd party software developers may write services to execute directly in the MExE handsets.

MExE provides the user with a more sophisticated user interfaces (e.g. browsers) with a rich variety of MMI concepts to personalise, control and invoke services (e.g.. softkeys, icons, voice recognition etc.). Additionally downloaded services provide users with the capability to control the "look and feel" of services.

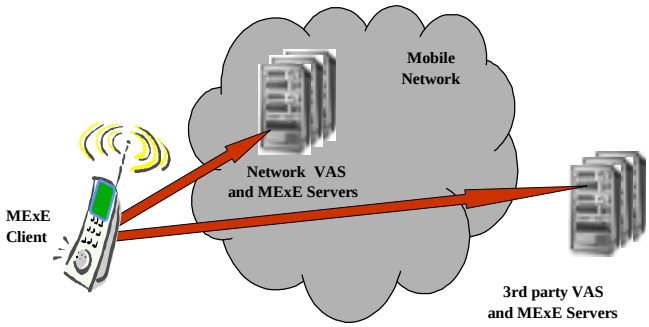
MExE also brings security to the support of 3rd party services in the wireless handset. With security domains reserved for network operators, handset manufacturers, and third parties , the source and content of downloaded services may be authenticated by the MExE client. The provision of such a security model enables the user to control whether services are installed, configure which functions may be performed by services, and to identify the extent of permissions granted to services. The protection of user data and resources help prevent attacks from potentially fraudulent services.

This annex gives an overview of how new 3rd generation services may be supported by MExE handsets, and gives some examples of possible services that may be supported on them. The ability to support some services may depend on the physical handset resources available to the MExE services, the classmark of the MExE client, and handset manufacturers may provide a range of handsets aimed at supporting different types of services.

Access to MExE services

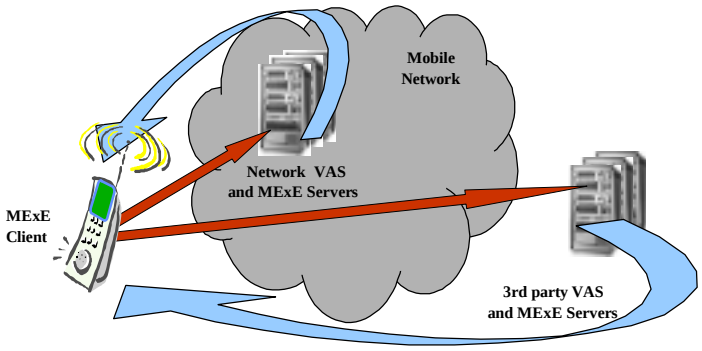
There are several ways in which these new 3rd generation MExE services may be supported, and the following scenarios give an overview of the possible scenarios.

- **services execute on remote servers**



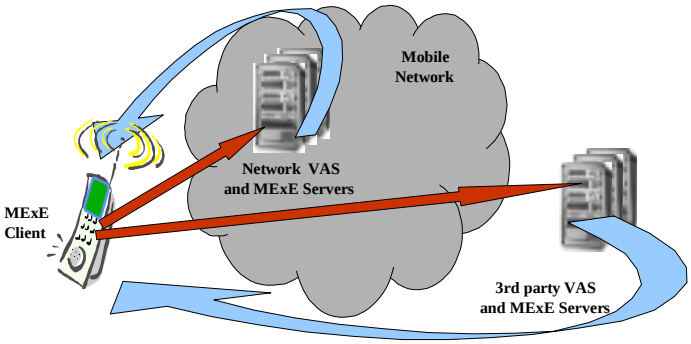
The services are provisioned and execute on remote servers, WebPages etc., to which the MExE client establishes a connection. The MExE client uses the services as provided by those remote servers. The MExE client effectively receives content (i.e. secured personal financial information) from the remote application which is presented to the user in the MExE client.

- **application downloaded into the MExE client**



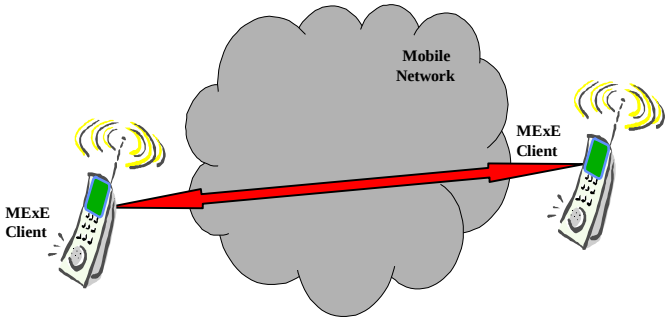
The services are provisioned and execute on remote servers, to which the MExE client establishes a connection. The MExE client downloads an application which acts as a local browser to interact with the remotely provided service. The user interacts with and uses the remote servers via the downloaded application. An example of such a service would be access to an internet/intranet page.

- **service downloaded into the MExE handset**



The services are available from remote servers, to which the MExE client establishes a connection. The MExE user downloads whichever services he desires from the remote servers, and installs, provisions and configures them on the MExE client. These services execute directly on the handset, without necessarily relying on servers to support the service. An example of such a service would be a game.

- **MExE handset to MExE handset services**



MExE handsets may wish to establish connections with each other to provide, receive and use interactive services. This direct MExE client to MExE client interaction of MExE services and any combination of the preceding scenarios may have been used to download services to the MExE client. These services may execute directly on the handset, without necessarily relying on servers to support the service. An example of such a service would be interactive games, sharing of calendar information, etc..

Example MExE services

Once they have been downloaded, these MExE services may then be configured, personalised and executed on the MExE handset by the user. A MExE handset may support a diverse range of services, providing a dynamic and evolutionary set of facilities to users. The support of this unlimited range of new services, will convert a mobile handset from being a device which simply makes and receives calls and messages, into a multifunctional leisure and business device.

An analogy may be made with a personal computer, where the user can install and configure any type of application that he so chooses, establish multimedia call sessions, and convert the laptop into a multi-facited device (e.g. slideshow presenter, videobox, music jukebox, arcade games machine, protocol analyser, e-mail, messaging and information server etc.). In fact, MExE may simply be considered to be similar to a small computer supporting wireless telecommunications capabilities.

Manufacturers are expected to produce MExE devices with different levels of resources, memory and processing power to exploit the growing number of applications and market niches.

The list of possible services that may be supported by a MExE client is virtually unlimited, and the following are example services that could be supported by a MExE client.

Applications

Applications may be downloaded and installed on the MExE client to provide a wide range of standalone services.

The user downloads and installs the software into the MExE client, configuring and installing it as required. Examples of such applications are phonebooks, diaries, planners providing similar functionality to current popular handheld PDA devices. Likewise, games may also be downloaded and installed providing similar functionality to current popular handheld games devices and other entertainment and leisure services.

Additionally, interactive working with other devices and servers (i.e. on-line gaming, gambling, messaging etc.) could also be generically supported.

Browsers

Applications may be downloaded and installed on the MExE client to support browser functionality already experienced by many users today with personal computers. Examples of this are internet and e-mail browsers.

Web browsing

A MExE client can be used by the user as an internet/intranet web browser by downloading and installing a web browser.

Just like the internet browser on a personal computer at home or in the office, the user is able to access the internet/intranet. Similar to accessing the internet via a personal computer, the user is able to surf the web viewing pages, images, animation and download content using standard internet HTTP and HTML protocols. By interaction with the installed web browser, the user is also able to customise his web browser to present the internet/intranet to the user in his accustomed way.

E-mail

A user can convert his MExE client into an e-mail handler by downloading and installing an e-mail browser.

Working the same way as an e-mail browser on his desk bound personal computer, the user is able to send and receive messages on the move. As with existing personal computer implementations e-mails with audio, visual and textual attachments may be exchanged with an e-mail server, using the standard e-mail SMTP, POP3 and IMAP4 protocols. Directly supported by the e-mail browser on the MExE client, the user may personalise his e-mail service and manage e-mails on remote e-mail servers.

Players

Players are a specialised type of application which the user may install on the MExE client. These players enable content to presented to the user in a specific manner, depending on the content format. Audio and video players are examples of such specialised applications.

Music players

A MExE client may also be used by the user as a portable music player by downloading and installing a music player application.

Once the music player application is installed, the user is then able to download music content using popular music formats available from the internet or third party servers.

Similar to the player applications already available on the internet and personal computers today, the user may be able to play popular music formats like MP3. Further, specialised music contentmay also be played by downloading and installing the appropriate compliant player.

By downloading and installing a music player, the user is able to obtain functionality from the MExE client similar to current popular handheld music devices.

Video players

Similar to the music player, a MExE client may also be used by the user as a portable video player by downloading and installing an appropriate video player application.

Once the video player application is installed, the user is then able to download video content using popular music formats like MPEG4 available from the internet or third party servers.

Annex B:
Change history

Change history										
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**
Jun 1999			22.057			R99		Transferred to 3GPP SA1	8.0.0	3.0.0
SP-05	SP-99479	S1-99619	22.057	001		R99	D	Editorial changes for alignment	3.0.0	3.0.1
SP-09	SP-000381	S1-000626	22.057	002		R4	D	Mobile Execution Environment	3.0.1	4.0.0
SP-09	SP-000388	S1-000428	22.057	004		R4	D	MExE Release 2000	3.0.1	4.0.0
SP-09	SP-000388	S1-000428	22.057	005		R4	B	MExE Classmark updates	3.0.1	4.0.0

History

Document history		
V3.0.0	July 1999	Transferred to TSG SA at ETSI SMG#29. Under TSG TSG SA Change Control.
V3.0.1	October 1999	Inclusion of CRs at SA#05.
V4.0.0	October 2000	Inclusion of CRs at SA#09 to create Release 4 version.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.042** **CR 003** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **Network Identity and Timezone (NITZ); Service description, Stage 1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

1 Scope

The present document describes the feature Network Identity and Timezone (NITZ) for CS Domain.

This feature provides the means for serving PLMNs to transfer current identity, time, Daylight Saving Time and the local timezone to Mobile Stations (MS)s, and for the MSs to store and use this information. This enhances roaming by permitting accurate indication of PLMN identities that are either newer than the Mobile Equipment (ME) or have changed their name since the ME was sold. Additionally time, Daylight Saving Time and timezone information can be utilised by MEs as desired.

2 References

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

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

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols - Stage 3".

[3] 3GPP TS 23.038: "Alphabets and Languages".

3 Definitions and abbreviations

In addition to the following definitions, abbreviations used in the present document are listed in TR 21.905 [1].

NITZ	The feature Network Identity and Timezone as described in the present document.
UCS2	Universal Character Set 2
UT	Universal Time
LTZ	Local Time Zone, the offset from UT applying in that locality, including any adjustments for summer time, etc.
DST	Daylight Saving Time. Adjustment for summer time.

4 Description

The feature Network Identities and Timezone shall make it possible for a serving PLMN to transfer its current identity, universal time, DST and LTZ to MSs, and for the MS to store and use this information. Each one of these elements is optional. The feature significantly enhances roaming as itenables the accurate indication of network identities that are either newer than the ME or have changed their name since the ME was manufactured or sold. Additionally time and timezone information can be utilised by MEs as desired.

When using the default character set (see TS 23.038 [3]), the serving PLMN shall make both a "short" and a "long" name available to the MS. As an alternative or, in addition, to the default character set, the serving PLMN can make a name available in UCS2. The MS shall be free to choose one of these names depending upon its own characteristics and/or limitations, such as those of its display.

NOTE: Guidance is sought, particularly from non-European operators, as to whether long and short name is required in UCS2 format.

The Network Operator may change the network identity at any time. However the change of network identity need not force immediate transfer of information to the MS.

As a network option, it shall be possible to send universal time (UT) by the network. Time information shall include: Year, Month, Day, Hour, Minute, Second, Timezone and DST. The expected accuracy of the time information is in the order of minutes.

NOTE: Universal time indicates the time at which this information element (see TS 24.008 [2]) may have been sent by the network. Thus it can be assumed that the accuracy of the time information when it arrives at the MS is usually within a couple minutes.

The serving PLMN shall make Local Time Zone (LTZ) available to the MS as an offset from Universal Time in units of 15 minutes.

When the LTZ is compensated for DST (summertime), the serving PLMN shall provide a DST parameter to indicate this. The adjustment for DST can be +1h or +2h.

For PLMNs which cover more than one timezone, it is assumed that the Network Operator will arrange for boundaries between subsets of the PLMN service area to be approximately aligned with timezone boundaries. When an MS changes Local Time Zone the PLMN is not required to immediately transfer new time zone information. Similarly the PLMN will transfer the LTZ changes arising from summer/winter adjustments when convenient to the network operator.

The MS will implement the new time zone information at an appropriate time following receipt.

The information passed to MSs supporting the NITZ feature is controlled by the serving PLMN Operator through administrative interaction. The interface necessary to support this administrative interaction is outside the scope of the present document.

5 Applicability

Network Identity and Timezone is both an optional network feature and an optional MS feature.

The NITZ feature is not intended to replace the existing method of PLMN Indication, nor is it intended to discharge the administration and maintenance of the associated MoU Permanent Document, SE13.

6 Normal procedure

6.1 Transfer of NITZ information

Network name, time, DST and timezone information can be transferred from the serving PLMN to the MS:

1) Upon registering on the network.
2) When the MS geographically relocates to a different Local Time Zone.
3) When the network changes its Local Time Zone, e.g. between summer and winter time.
4) When the network changes its identity.
5) At any time during a signalling connection with mobile station.

Transfer of relevant information shall not unduly consume scarce network resources.

6.2 Use of NITZ information

Relevant information shall be presented to the MS user at the earliest opportunity.

It is expected that the MS will display the most up to date information transferred to it.

Switching off the MS should not cause the updated name of the network(s) to be deleted.

Removal of the SIM/USIM should not cause the updated name of the network(s) to be deleted.

However, the number of different network identities retained in the ME is a manufacturer issue.

Usage of time information in MS is a ME manufacturer issue. For example, time information can be utilised to time stamp transactions for logging purposes.

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.030** **CR 010** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **Man-Machine Interface (MMI) of the User Equipment (UE)** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

2 References

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

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

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.004: "General on supplementary services".

[3] 3GPP TS 22.011: "Service accessibility".

[4] 3GPP TS 22.016: "International Mobile station Equipment Identities (IMEI)".

[5] 3GPP TS 22.083: "Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

[6] 3GPP TS 22.084: "MultiParty (MPTY) supplementary services - Stage 1".

[7] 3GPP TS 22.090: "Stage 1 description of Unstructured Supplementary Service Data (USSD)".

[8] 3GPP TS 23.038: "Alphabets and language".

[9] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols – Stage 3".

[10] 3GPP TS 24.080: "Mobile radio interface layer 3 supplementary services specification Formats and coding".

[11] 3GPP TS 29.002: "Mobile Application Part (MAP)".

[12] 3GPP TS~~GSM 0~~2<u>.0</u>81: "Line Identification Supplementary Services – Stage 1".

[13] ITU-T Recommendation E.164: "Numbering plan for the ISDN era".

[14] ITU-T Recommendation E.121: "Pictograms and symbols to assist users of the telephone service".

[15] 3GPP TS 22.072: "Call Deflection; Stage 1".

[16] 3GPP TS 22.091: "Explicit Call Transfer Supplementary Service; Stage 1".

[17] 3GPP TS 22.093: "Call Completion to Busy Subscriber (CCBS); Stage 1".

[18] 3GPP TS 22.101: "Service principles".

[19] 3GPP TS 22.001: "Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLMN)".

[20] 3GPP TS 22.094: "Follow Me Service description - Stage 1".

[21] 3GPP TS 22.135: "Multicall supplementary service Stage 1".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following definition applies:

Directory Number: A string consisting of one or more of the characters from the set {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, *, #, a, b, c} associated with a nature of address indicator and number plan indicator. When using the public MMI for the control of supplementary services however, * and # cannot be part of any SC or SI field.

NOTE 1: No such restriction on the SC and SI fields exists when using other (e.g. menu-driven) MMI for the control of supplementary services.

NOTE 2: When using the public MMI, certain limitations on the use of one and two digit directory numbers may apply. The use of other MMI can remove these restrictions.

NOTE 3: This definition is not intended to require the support of all these characters in the MMI itself.

3.2 Abbreviations

For the purposes of the present document, the abbreviations listed in TR 21.905 [18] apply.

4 General

4.1 Basic philosophy

The basic idea behind the present document is that it should give a minimum level of requirements, with emphasis on items which are seen as important from a usage point of view. This means, that the requirements are mainly dealing with standardized control procedures of access to services i.e. call establishment, invocation of supplementary services and so on.

The requirements on the physical layout of input and output features are kept to a minimum to allow for differentiated types of UEs and to ease the introduction of future developments in the area of MMI. The standardized control procedures describe the sequence of real actions to be taken by the users. However, since the requirements on the physical input features are minimal the control procedures may differ between UEs depending on the solution of the manufacturers. The "bridge" between these requirements is however that the same logical actions have to be taken by the user. That is, the user has to provide the same information for the call control and signalling no matter what the method is. This is also valid if an automatic device is used for carrying out the same actions. The logical procedures are therefore defined and standardized in the present document.

Optionally, the user may set the ME to disable some or all of the MMI functions defined in the present document. This setting shall only apply when the same SIM/USIM is in use otherwise the ME shall enable the standard MMI.

5 Physical user input features

5.1 General

This clause gives the requirements or guidelines for the MMI of the input related UE features. Basic requirements on these features are given in TS 22.101 [18].

5.2 MMI related to UE features

* Country/PLMN selection:

The method is manufacturer optional.

* International Access Function ("+" key):

and

* Keypad:

The physical means of entering the characters 0-9, +, * and # (i.e. the SELECT function) may be keypad, voice input device, DTE or other, but there must be means to enter this information.

The relationship on the keypad between the numbers and letters (where used) is important when mnemonic dialling may be used. The following relationship is therefore preferred though optional.

1		6	MNO
2	ABC	7	PQRS
3	DEF	8	TUV
4	GHI	9	WXYZ
5	JKL	0	

* ACCEPT, SEND and END functions:

The physical means to perform these functions may be keypad, voice input device, DTE or other, but there must be means to perform these functions. ACCEPT and SEND may use the same means.

* Setting of called Number Fields (Type of Number), use of the "+" key function:

Users may enter a called number in two formats, called here International or Open. The Type of Number (TON) may be set to other values if required, but the procedure for this is not defined here.

"International format":

This is entered by starting with a "+" followed by country code, even for national calls. This method is preferred for roaming and international calls, and highly desirable for storage of short codes or for call-forwarding.

This sets the TON to "International" - see TS 24.008 [9].

"Open format":

This is when the "+" is not entered, and the number is entered in the normal way for that network. The number may require a prefix or escape code as normal, for example for entering the international access code or national access code (often "0").

This sets the TON to "Unknown" - see TS 24.008 [9]. (This is **not** the "National" case, which does not permit prefix or escape digits).

Care should be taken with this format, since the dialled number will only be correct in a given network, and may be wrong when roaming. Caution must be applied when using stored numbers or call-forwarding.

* Setting of Called Number Fields (Number Plan Indicator):

The default Number Plan Identification (NPI) shall be ITU-T E.164 [13] if all the digits are in the range 0-9 and the NPI shall be "unknown" if other number information is included. However, if the user selects (or has selected) a particular NPI (procedure not defined) then that NPI shall be used.

* Entry of Bearer Capability Information Elements (BCIE):

This is required in order to indicate information such as whether it is a voice or data call, facsimile, synchronous or asynchronous etc. The method for entering this information is of mobile manufacturer's option. For those User Equipment offering only telephony (and emergency calls), the default BCIE shall be for telephony (or emergency call). For User Equipment supporting non-voice services, there shall be means to set the BCIE

required, by reading the appropriate field in the SIM/USIM and possibly otherwise. This field may be associated with or independent of the called number.

6 Procedures

6.1 General

This clause defines the MMI of the service access procedures, and supplementary service control procedures. These procedures are defined as logical procedures and in general no mandatory methods are specified. In order to make the descriptions continuous and clear requirements in TS 22.101 [18] have been included or are referenced. The mapping between the MMI procedures and the call control entity is specified in TS 24.008 [9].

6.2 UE access

The UE access procedure is comprised of the initial actions the user has to take before calls can be established or received. This procedure includes e.g. insertion of subscriber-card and entering the PIN-code.

As there exist different types of UE and as requirements in other ~~GSM~~3GPP specifications allow different options the UE access procedure may differ between User Equipment. The method for describing the UE access procedures is by using a Mealy-graph, see annex A.

The graph shows the UE access for simple UE e.g. hand-held and they may be different for more complex stations. It should also be noted that the exact sequences of events are not described, these may be chosen by the manufacturers.

6.3 Definition of functions

The following functions are applicable and mandatory for the logical procedures for Mobile originated and terminated calls and for the control of Supplementary Services:

ACCEPT: Acceptance of a mobile terminated call.

SELECT: Entry of information.

SEND: Transmission of the entered information to the network.

INDICATION: Call progress indications. Other indications may be given in addition throughout the procedure.

END: Termination of or disconnection from the call. The execution of the END-function may be caused by either party involved in the call by e.g. termination, loss of coverage, invalidation of payment.

6.4 Call Control

6.4.1 General

Voice calls to and from a User Equipment shall be controlled in accordance with the procedures described below. "Data calls" are expected to be controlled in a similar way but are not here specified.

6.4.2 Voice calls

The voice call is either a normal telephony call or an emergency call.

6.4.2.1 Mobile originated calls

The following sequence of functions shall be used:

SELECT: Entry of called address information.

SEND: Transmission of the called address.

INDICATION: Call progress indications.

END: Termination of the call.

6.4.2.2 Emergency calls

With User Equipment supporting Telephony, it shall be possible to place an emergency call as specified in TS 22.101 [18].

6.4.2.3 Mobile terminated calls

The following sequence of functions shall be used:

INDICATION: Alert to the user that she is being called.

ACCEPT: Acceptance of the incoming call by the user.

INDICATION: Call progress indications.

END: Termination of the call.

User Determined User Busy (UDUB): If, on being alerted by an incoming call, the called user enters "0 SEND", this shall set UDUB for that call, which shall either invoke call forwarding on busy, if active and operative, or else present BUSY to the calling party.

6.5 Supplementary Services Control

6.5.1 General

The supplementary services shall be controlled in accordance with the procedures described below. All User Equipment with MMI shall be able to be controlled in this way, to minimize the confusion of users using different types of User Equipment (quite likely, due to the use of the SIM IC card or UICC) and to permit the introduction by a PLMN operator of new supplementary services, not defined at the time of the design of a User Equipment. These procedures are based on those recommended by ETSI/HF and ITU-T Recommendation E.131.

The specified MMI shall be supported by the L3 signalling between the UE and the MSC, see TS 24.080 [10].

In addition to these specified MMI procedures the UE may be equipped with additional enhanced MMI procedures (e.g. dedicated keys, menu procedures...), left to the discretion of the manufacturer. These procedures shall also be converted in accordance with TS 24.080 [10].

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

6.5.6.2 Calling Line Identification Presentation (CLIP)

The CLIP Supplementary Service is defined in TS~~GSM~~ 2~~0~~2.0~~8~~1[12]

6.6.6.2.1 Presentation of Information

If CLIP has been provisioned for the subscriber and the UE is capable of displaying the line identification then for each MT call the UE should either:

display the calling line identity; or

display the reason why the line identity is not available as indicated by the Presentation Indicator.

6.5.6.3 Follow Me (FM)

The Follow Me Feature is defined in TS 22.094 [20]. FM control procedures make use of USSD.

6.6 SIM/USIM interfaces

6.6.1 Entry of PIN and PIN2

After insertion of the IC card while the UE is switched on, or when the UE is switched on while the IC card is inserted, or when the UE is switched on in the case of a plug-in SIM, an indication is given to the user that the PIN must be entered, unless the PIN is not applicable.

If the user wishes to perform a function protected by PIN2, an indication shall be given to the user that PIN2 must be entered.

The PIN or PIN2 being entered is not revealed in any way. The PIN or PIN2 check is performed by entering the # function.

6.6.2 Change of PIN or PIN2

The following procedure permits the user to change the PIN or PIN2 in the SIM/USIM:

PIN: **04*OLD_PIN*NEW_PIN*NEW_PIN#

PIN2: **042*OLD-PIN2*NEW_PIN2*NEW_PIN2#

Note that the SEND function is not used in these procedures.

An indication is given to the user showing whether this procedure was successful.

6.6.3 Unblocking of PIN or PIN2

The following procedure permits the user to unblock the PIN or PIN2:

PIN: **05*PIN_UNBLOCKING_KEY*NEW_PIN*NEW_PIN#

PIN2: **052*PIN2_UNBLOCKING_KEY*NEW_PIN2*NEW_PIN2#

Note that the SEND function is not used in these procedures.

The new PIN or PIN2 must be entered whether or not it is intended to change the PIN or PIN2. An indication is given to the user showing whether this procedure was successful.

6.6.4 Reading the abbreviated dialling code

An abbreviated dialling code shall be able to be read using the following procedure:

N(N)(N)#

Alternative additional procedures are also permitted.

6.6.5 Status information - return codes

The SIM/USIM gives status information, as responses to instructions. Some of the possible return codes are deeply related to the user's actions and should therefore be indicated to her.

It is mandatory to give the user the appropriate indication (respectively) when the following codes appear:

~~code~~ ~~description~~;

~~92 40~~ ~~Memory Problem (eg. Update impossible)~~;

~~98 04~~ ~~Access conditions not fulfilled (eg. secret code verify rejected)~~;

~~98 40~~ ~~Unsuccessful CHV verification, no attempt left (eg. Secret code locked)~~;

~~6F XX~~ ~~Technical problem with no diagnostic given. However, if this code is returned by the SIM/USIM in response to an ENVELOPE (SMS-PP DOWNLOAD) or ENVELOPE (CELL BROADCAST DOWNLOAD) or similar message, then no indication shall be given to the user, since in this case the code is not related to a user action.~~

The status information indication can be a dedicated lamp, text-string or others, as long as it is unambiguously made available to the user via the MMI.

As regards all other codes, it is left to the manufacturers' discretion whether and how the user shall be informed.

6.7 Presentation of IMEI

The following procedure shall instruct the ME to display its IMEI:

*#06#

The procedure shall be accepted and performed with and without an inserted SIM/USIM. The ME shall then display the 14 digits of the IMEI (not including the spare digit), the Check Digit and optionally the Software Version Number as defined in TS 22.016 [4] (as a single string, in that order).

Annex A (normative): UE access mealy graph

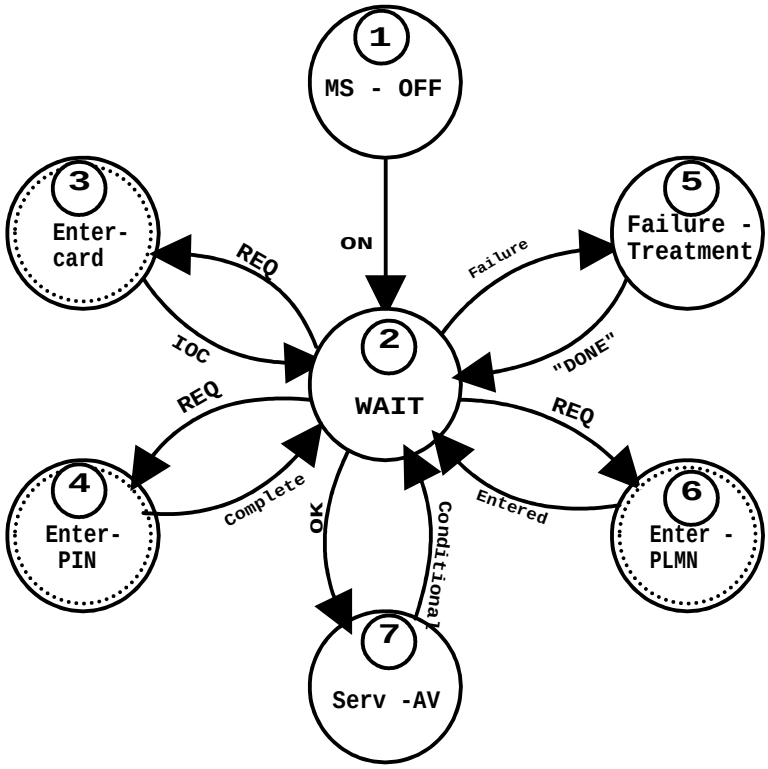


Figure A.1: Mealy-graph for the UE access procedure

Assumptions and requirements:

1) Emergency calls shall be possible in all states, except in state 1.
2) Power-off should cause transition to state 1 from all other states.
3) The actions to be taken in state 5 is not defined.
4) Realization of the dotted states (3, 4 and 6) depends upon the network requirements and the type of UE.

Description of the states of the UE access procedure

1)	UE-OFF:	The UE is in OFF-condition. This means that the equipment is not active as an UE in a PLMN.
2)	WAIT:	Waiting for the completion of the UE access conditions, which are related to the type of UE and to the PLMN, where in the UE is roaming (e.g. location updating).
3)	ENTER CARD:	Request for entering of the subscriber card, (e.g. when no built in SIM module is available).
4)	ENTER PIN:	Request for entering of the correct PIN.
5)	FAILURE TREATMENT:	Waiting for removal the actual failure condition.
6)	ENTER PLMN:	Request for selection of PLMN.
7)	SERV-AV:	The UE is in a ready state. PLMN services are available to the user.

Description of the transitions between UE access states

ON:	The equipment becomes active as an UE in a PLMN.
REQ:	A request for user activity.
IOC:	Insertion of a subscriber card with SIM/USIM-module.
COMPLETE:	The PIN has been entered.
ENTERED:	A PLMN choice has been done.
FAILURE:	A failure condition has occurred in any other state during the UE access procedures.
CONDITIONAL:	One of the conditions the UE is waiting for in WAIT state has been lost. The UE goes back to the WAIT state.
"DONE":	The UE access failure condition has been corrected.
OK:	All the conditions the UE is waiting for in the WAIT state are accomplished.

Annex B (normative): Codes for defined Supplementary Services

Table B.1: Input information for handling of defined Supplementary Services

	Supplementary Service	Service Code	SIA	SIB	SIC
22.067					
	eMLPP	75 and 75n		where n=0-4	
22.072					
	CD	66			
22.081					
	CLIP	30	-	-	-
	CLIR	31	-	-	-
	COLP	76	-	-	-
	COLR	77	-	-	-
In temporary mode, to suppress CLIR for a single call, enter: " * 31 # <called number> SEND "					
In temporary mode, to invoke CLIR for a single call enter: " # 31 # <called number> SEND "					
22.082					
	CFU	21	DN	BS	-
	CF Busy	67	DN	BS	-
	CF No Reply	61	DN	BS	T
	CF Not Reachable	62	DN	BS	-
all CF		002	DN	BS	T
all conditional CF		004	DN	BS	T
22.083					
	WAIT	43	BS	-	-
		see section 4.5.5			
	HOLD	see section 4.5.5			
22.084					
	MPTY	see section 4.5.5			
22.087					
	UUS Service 1	361	R	-	-
	UUS Service 2	362	R	-	-
	UUS Service 3	363	R	-	-
	all UUS Services	360	R	-	-
If UUS shall be activated when originating a call, enter: " * 36X * R # <called number> SEND" (X is indicating the requested UUS service)					

Table B.1 (concluded): Input information for handling of defined Supplementary Services

Supplementary Service	Service Code	SIA	SIB	SIC
22.088				
BAOC	33	PW	BS	-
BAOIC	331	PW	BS	-
BAOIC exc home	332	PW	BS	-
BAIC	35	PW	BS	-
BAIC roaming	351	PW	BS	-
all Barring Serv.	330	PW	BS	-
Outg. Barr. Serv.	333	PW	BS	
Inc. Barr. Serv.	353	PW	BS	
22.091				
ECT	96		see section 4.5.5	
22.093				
CCBS	37	n where n=1-5	See Section 4.5.5	
22.094				
FM	214		See Section 3.5.6.3	
22.096				
CNAP	300	-	-	-
22.097				
MSP	59n	PW	where n=1-4	
22.135				
MC	88		Nbr_user Where Nbr_user=1-Nbr_SB	

DN = Directory Number;
PW = Password (see subclause 4.5.4);
BS = Basic Service Group (if required) - see annex C;
T = No Reply Condition Timer (5-30 seconds);
R = UUS required option.
SI required Y = Yes;
N = No;
- = Not applicable.

Nbr_user = maximum number of simultaneous CS bearers as defined by the within the limits given by Nbr_SB.

Nbr_SB = maximum number of simultaneous CS bearers defined by Multicall subscription.

The value for N_{br}_SB shall in the range from 2 up to 7.

Details about Nbr_user and Nbr_SB specified in TS22.135 Multicall. [21]

"UUS required" option

For the "UUS required" option two values are defined:

R = 0 UUS not required;
R = 1 UUS required.

NOTE: If the "UUS required" option is requested for a call, the call will only be established if the requested UUS capabilities are available.

If the "UUS required" option is not contained in an activation request UUS shall be activated without the UUS required option.

Annex C (normative): Codes for Tele- and bearer services

Tele- and Bearer Service Supplementary Information codes (SIb).

Alternate and speech/data services are included with the equivalent data service.

Basic Service group number (note)	Telecommunication Service	MMI Service Code
1 to 12	All tele and bearer services	no code required
	Teleservices	
1 to 6, 12	All teleservices	10
1	Telephony	11
2 to 6	All data teleservices	12
6	Facsimile services	13
2	Short Message Services	16
1, 3 to 6, 12	All teleservices except SMS	19
12	Voice group services	
	Voice Group Call Service (VGCS)	17
	Voice Broadcast Service (VBS)	18
	Bearer Service	
7 to 11	All bearer services	20
7	All async services	21
8	All sync services	22
8	All data circuit sync	24
7	All data circuit async	25
13	All GPRS bearer services	99

NOTE: See TS 22.004 [2] for definition of Basic Service groups.

NOTE: "All GPRS bearer services" are not included in "All tele and bearer services" and "All bearer services".

The grouping implies that if e.g. code 25 is used, the Supplementary Service procedure concerned applies to all Asynchronous Data Circuit mode Bearer Services subscribed to.

Tele-and Bearer Service Supplementary Information Codes (SIb) for services not defined by 3GPP~~GSM~~

Code as defined in TS 29.002 [11]	Telecommunication Service	MMI Service Code
PLMN specific teleservices:		
11010000	All PLMN specific teleservices	50
11010001	PLMN specific teleservice 1	51
11010010	PLMN specific teleservice 2	52
11010011	PLMN specific teleservice 3	53
11010100	PLMN specific teleservice 4	54
11010101	PLMN specific teleservice 5	55
11010110	PLMN specific teleservice 6	56
11010111	PLMN specific teleservice 7	57
11011000	PLMN specific teleservice 8	58
11011001	PLMN specific teleservice 9	59
11011010	PLMN specific teleservice 10	60
11011011	PLMN specific teleservice 11	61
11011100	PLMN specific teleservice 12	62
11011101	PLMN specific teleservice 13	63
11011110	PLMN specific teleservice 14	64
11011111	PLMN specific teleservice 15	65
PLMN specific bearer services:		
11010000	All PLMN specific bearer services	70
11010001	PLMN specific bearer service 1	71
11010010	PLMN specific bearer service 2	72
11010011	PLMN specific bearer service 3	73
11010100	PLMN specific bearer service 4	74
11010101	PLMN specific bearer service 5	75
11010110	PLMN specific bearer service 6	76
11010111	PLMN specific bearer service 7	77
11011000	PLMN specific bearer service 8	78
11011001	PLMN specific bearer service 9	79
11011010	PLMN specific bearer service 10	80
11011011	PLMN specific bearer service 11	81
11011100	PLMN specific bearer service 12	82
11011101	PLMN specific bearer service 13	83
11011110	PLMN specific bearer service 14	84
11011111	PLMN specific bearer service 15	85

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.016** **CR 006** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **International Mobile station Equipment Identities (IMEI)** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

3GPP TS 22.016 V4.0.0 (2001-03)

Technical Specification

GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
International Mobile station Equipment Identities (IMEI) (Release 4)

Keywords
GSM, UMTS, addressing

3GPP

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Contents

Foreword

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Version x.y.z

where:

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

1 Scope

The present document defines the principal purpose and use of International Mobile station Equipment Identities (IMEI).

TS 23.003 describes the technical manner of numbering, addressing and identification.

~~Note: The present document covers description for GSM only. The document needs to be updated to make it applicable to 3GPP.~~

1.1 References

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

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[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.003: "Numbering, addressing and identification".

[3] ISO/IEC 7812 (1989): "Identification cards - Numbering system and registration procedure for issuer identifiers".

1.2 Definitions and abbreviations

In addition to the following, abbreviations used in the present document are listed in TS 21.905.

International Mobile Station Equipment Identity (IMEI) : An "International Mobile Station Equipment Identity" is a unique number which shall be allocated to each individual mobile station equipment in the PLMN and shall be unconditionally implemented by the MS manufacturer.

2 General

An MS can only be operated if a valid "International Mobile Subscriber Identity" (IMSI) is present. An IMSI is primarily intended for obtaining information on the use of the PLMN by subscribers for individual charging purposes.

Besides the IMSI, the implementation of IMEI is found necessary in order to obtain knowledge about the presence of specific mobile station equipment in the network, disregarding whatever subscribers are making use of these equipments.

The main objective is to be able to take measures against the use of stolen equipment or against equipment of which the use in the PLMN can not or no longer be tolerated for technical reasons.

The IMEI is incorporated in an UE~~MS~~ module which is contained within the ~~MS~~ UE~~equipment~~. The IMEI shall not be changed after the ME's final production process. It shall resist tampering, i.e. manipulation and change, by any means (e.g. physical, electrical and software).

NOTE: This requirement is valid for new GSM MEs type approved after 1st June 2002. However, this requirement is applicable to all 3GPP system compatible UEs ~~of UMTS~~ from start of production.

This implementation of each individual module should be carried out by the manufacturer who is also responsible for ascertaining that each IMEI is unique and keeping detailed records of produced and delivered MS.

3 Composition of IMEI

The composition of the IMEI shall be such that each individual mobile station equipment can be separately identified.

Information is contained in the IMEI by which the PLMN, after requesting it, can immediately decide whether or not to accept calls made by means of this equipment.

Secondly, the IMEI shall directly or indirectly contain all information which is necessary for the network operator to make relations through its administrative system to trace the equipment to its origin of production. TS 23.003 [2] describes the structure of the IMEI in detail.

The IMEI is complemented by a check digit. The check digit is not part of the digits transmitted at IMEI check occasions, as described below. The Check Digit shall avoid manual transmission errors, e.g. when customers register stolen MEs at the operators customer care desk.

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

4 Use of the equipment identity register

A network operator can make administrative use of the IMEI in the following manner:

Three registers are defined, known as "white lists", "grey lists" and "black lists". The use of such lists is at the operators' discretion.

The **white list** is composed of all **number series** of equipment identities that are permitted for use.

The **black list** contains all equipment identities that belong to equipment that need to be barred.

Besides the black and white list, administrations have the possibility to use a **grey list**. Equipments on the grey list are not barred (unless on the black list or not on the white list), but are tracked by the network (for evaluation or other purposes).

5 Procedure

It shall be possible to perform the IMEI check at any access attempt, except IMSI detach, and during an established call at any time when a dedicated radio resource is available, in accordance with the security policy of the PLMN operator.

The network shall terminate any access attempt or ongoing call when receiving any of the answers "black-listed" (i.e., on the black list) or "unknown" equipment (i.e., not on the white list) from the EIR. An indication of "illegal ME" shall in these cases be given to the user. Furthermore this is equivalent to an authentication failure hence any call establishment or any location updating is forbidden for the MS, it cannot answer to paging, it is just allowed to perform Emergency Calls. Emergency calls must never be terminated as a result of the IMEI check procedure.

6 Use of IMEI in case of emergency calls

Emergency calls can in some PLMNs be made without having to send the subscriber identity (IMSI) to the network. In this case the misuse of MS equipments after placing invalid emergency calls can be restrained by using the equipment identity.

The network request for the equipment identity is sent to the MS after the emergency call has been set-up. The procedure is the same as for normal call set-up.

7 MS Software Version Number (SVN)

A Software Version Number (SVN) field shall be provided. This allows the ME manufacturer to identify different software versions of a given type approved mobile.

The SVN is a separate field from the IMEI, although it is associated with the IMEI, and when the network requests the IMEI from the MS, the SVN (if present) is also sent towards the network.

The white list shall use the IMEI, The Black and Grey Lists may also use the SVN.

Annex A: Change history

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**WI**
Jun 1999			GSM 02 .16					Transferred to 3GPP SA1	7.0.0		
SA#04			22.016					Transferred to 3GPP SA1		3.0.0	
SP-05	SP-99479	S1-99611	22.016	001		R99	D	Editorial changes for alignment	3.0.0	3.0.1	Editorial changes
SP-06	SP-99601	P-99-777	22.016	002		R99	F	Modification of section 2 to enhance IMEI security	3.0.1	3.1.0	
SP-08	SP-000195	S1-000441	22.016	003	1	R99	F	IMEI coding	3.1.0	3.2.0	
SP-08	SP-000194	S1-000266	22.016	004		R99	F	Modification of section 2 to delete unnecessary information about phases and releases removed	3.1.0	3.2.0	
SP-11	SP-010065	S1-010258	22.016			Rel-4		Transferred to 3GPP Release 4	3.2.0	4.0.0	

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.004** **CR 005** ⌘ ev **-** ⌘ Current version: **4.0.0** ⌘

Spec Title: **General on supplementary services** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
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Date:	⌘	11/02/02
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Release:	⌘	Rel-4

Use one of the following categories:
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Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
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R98	*(Release 1998)*
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REL-4	*(Release 4)*
REL-5	*(Release 5)*

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Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

1 Scope

The purpose of the present document is to define a recommended set of supplementary services to the Teleservices and Bearer services which will be supported by a PLMN in connection with other networks as a basis for the definition of the network capabilities required.

Supplementary services not covered in TS 22.004 cannot be introduced unilaterally in any PLMN if they require modification of the signalling Specifications.

Technical realization of supplementary services is described in TS 23.011 [19] and 24.010 [21].

1.1 References

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

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[1] TR 21.905: "Vocabulary for 3GPP Specifications".

[2] TS 22.001: " Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLMN)".

[3] TS 22.002: "Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

[4] TS 22.003: " Teleservices supported by a ~~GSM~~ Public Land Mobile Network (PLMN)".

[5] TS 22.030: "Man-Machine Interface (MMI) of the Mobile Station (MS)".

[6] TS 22.067: "Enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 1".

[7] TS 02.081: "Line identification supplementary services - Stage 1".

[8] TS 22.082: "Call Forwarding (CF) supplementary services - Stage 1".

[9] TS 22.083: "Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

[10] TS 22.084: "MultiParty (MPTY) supplementary services - Stage 1".

[11] TS 22.085: "Closed User Group (CUG) supplementary services - Stage 1".

[12] TS 22.086: "Advice of Charge (AoC) supplementary services - Stage 1".

[13] TS 22.088: "Call Barring (CB) supplementary services - Stage 1".

[14] TS 22.072: "Call Deflection (CD) - Stage 1".

[15] TS 22.087: "User-to-user signalling (UUS) - Stage 1".

[16] TS 22.091: "Explicit Call Transfer (ECT) supplementary services - Stage 1".

[17] TS 22.093: "Call Completion to Busy Subscriber (CCBS) - Stage 1".

[18] TS 22.096: "Calling Name Presentation (CNAP) - Stage 1".

[19] TS 23.011: "Technical realization of supplementary services".

[20] TS 22.135: "Multicall (MC) - Stage 1".

[21] TS 24.010: "Mobile radio interface layer 3 Supplementary services specification General aspects".

[22] TS 24.080: "Mobile radio interface layer 3 supplementary services specification Formats and coding".

[23] ITU-T Recommendation I.210: "Principles of telecommunication services supported by an ISDN and the means to describe them".

[24] TS 22.101: "~~UMTS~~ Service Principles".

[25] TS 22.105: "Services and service capabilities".

[26] TS 42.068: "Voice Group Call Service (VGCS) - Stage 1".

[27] TS 42.069: "Voice Broadcast Service (VBS) - Stage 1".

********** Next modified Section **********

Annex A (normative): Applicability of Supplementary Services to Telecommunication Services

Table A.1 gives the applicability of Supplementary Services to telecommunication services.

Table A.1/TS 22.004: Applicability of SSs to telecommunication services

S	Telephony	Emergency Call	SMS PTP		SMS-CB	Fax	cct Data	GPRS	Voice Group Serv	
	TS11	TS12	TS21	TS22	TS 23	TS 6x	BS2x, BS3x	BS 70	TS 91	TS
LPP	Yes	Yes[9]				Yes	Yes		Yes	Y
D	Yes					Yes	Yes		Yes[6]	Y
LIP	Yes					Yes	Yes		Yes	Y
LIR	Yes					Yes	Yes		Yes	Y
LP	Yes					Yes	Yes		Yes	Y
LR	Yes					Yes	Yes		Yes	Y
FU	Yes					Yes	Yes		Yes[6]	Y
FB	Yes					Yes	Yes		Yes[6]	Y
NRy	Yes					Yes	Yes		Yes[6]	Y
NRc	Yes					Yes	Yes		Yes[6]	Y
W[1]	Yes					Yes	Yes		Yes[6]	Y
LD[2]	Yes								Yes[6]	Y
TY	Yes								Yes[6]	Y
UG	Yes					Yes	Yes		Yes[6]	Y
oCI	Yes					Yes	Yes			Y
CC	Yes					Yes	Yes			Y
US	Yes					Yes	Yes		[7]	
OC	Yes		Yes[3]	Yes		Yes	Yes		Yes[6]	Y
IC	Yes		Yes[3]	Yes		Yes	Yes		Yes[6]	Y
-exHC	Yes		Yes[3]	Yes		Yes	Yes		Yes[6]	Y
IC	Yes		Yes	Yes[3]		Yes	Yes		Yes[6]	Y
Roam	Yes		Yes	Yes[3]		Yes	Yes		Yes[6]	Y
CT	Yes								Yes[6]	Y
BS	Yes					Yes	Yes		Yes[10]	Ye
NP	Yes		Yes[5]	Yes[5]		Yes	Yes			
AP	Yes		[8]	[8]					Yes[3]	Y
SP	Yes		Yes	Yes		Yes	Yes		Yes	Y
C	Yes	Yes				Yes	Yes		-	

1: The applicability of Call Waiting refers to the telecommunication service of the active call and not of the waiting call. The incoming, waiting, may be of any kind.
2: If the served mobile subscriber has a call on hold, she may set up another call using the same or a different telecommunication service.
3: The SS is applicable, but generally will not be invoked.
4: For the purposes of applicability of supplementary services, the Alternate speech/unrestricted data (BS61) and speech followed by data (B belong to the BS-group of the equivalent data service.
5: Both the SMS service centre and the mobile destination can be reached by PNP numbers.
6: The SS is only applicable for dispatchers. For service subscribers the service is not applicable. More detailed description see TS 42.068 [2 TS 42.069 [27].
7: The interaction of VBS and VGCS with UUS is not defined yet in the protocol (TS 24.068 and TS 24.069).
8: Applicability of SMS PTP to CNAP is for further study.
9: The network shall apply a specific or the default priority level to emergency calls. There is no possibility to change this priority by the subsc Pre-emption of an on-going emergency call is not possible.
10: The CCBS supplementary service is only applicable for dispatchers. If a new terminating p-t-p call is set up to a dispatcher who is busy bec of an active VGCS/VBS call, it should be possible to allow the calling subscriber to apply the CCBS service. If the dispatcher initiates a VGCS/VBS call and the called group/broadcast ID has been active, then the dispatcher should be connected to the ongoing VGCS/VBS ca VGCS/VBS call to busy dispatcher, the CCBS is not applicable. For a detailed description see ~~GSM~~ TS 42.068 [26] and ~~GSM~~ TS 42.069 [2

CR-Form-v4

CHANGE REQUEST

⌘ **22.003** **CR 010** ⌘ ev **-** ⌘ Current version: **5.0.0** ⌘

Spec Title: **Circuit Teleservices supported by a Public Land Mobile Network (PLMN)** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
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Release:	⌘	Rel-5

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Other comments:	⌘	

3GPP TS 22.003 V5.0.0 (2001-12)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Circuit Teleservices supported by a Public Land Mobile Network (PLMN)
(Release 5)

Reference
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0 Scope

This Technical Specification (TS) describes and defines a recommended set of Circuit Teleservices to be supported by a PLMN in connection with other networks as a basis for defining the network capabilities required.

0.1 Normative references

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

[2] TS 22.001: " Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLMN)".

[3] TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

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

[5] TS~~GSM 04~~2.0~~6~~8 : "~~ Digital cellular telecommunications system (Phase 2+);~~ Voice Group Call Service (VGCS) - Stage 1".

[6] TS~~GSM~~ ~~2~~4~~2~~.0~~6~~9 : "~~ Digital cellular telecommunications system (Phase 2+);~~ Voice Broadcast Service (VBS) - Stage 1".

[7] TS 23.040: " Technical realization of the Short Message Service (SMS) Point-to-Point (PP)".

[8] TS 23.041 : " Technical realization of Short Message Service Cell Broadcast (SMSCB)".

[9] TS~~GSM~~ ~~2~~0~~4~~.0~~0~~8: "~~-~~Mobile radio interface layer 3 specification".

[10] TS 27.001 : " General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[11] TS 27.005: " Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".

[12] ITU-T Recommendation T.4: "Standardization of group 3 facsimile apparatus for document transmission".

[13] ITU-T Recommendation T.30: "Procedures for document facsimile transmission in the general switched telephone network".

[14] TR 21.905: "Vocabulary for 3GPP Specifications"

[15] TS 22.101: "~~UMTS~~ Service Principles".

0.2 Abbreviations

Abbreviations used in this TS are listed in ~~GSM 01.04 [1] and~~ TS 21.905[14].~~.~~

1 Framework for describing circuit teleservices supported

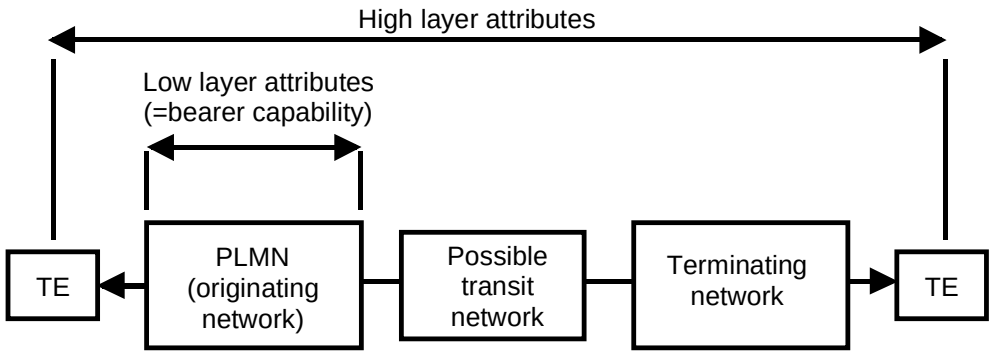
Teleservices supported by a PLMN are described by a number of attributes which are intended to be largely independent.

These attributes are described and defined in specification TS 22.001 [2].

They are grouped into three categories:

- High layer attributes;
- Low layer attributes (describing the Bearer capabilities which support the Teleservice).
  - information transfer attributes;
  - access attributes.
- General attributes.

Figure 1 shows the relationship between the different categories of services attributes, and their scope within a Teleservice.



NOTE 1: A transit network may not exist.
NOTE 2: Communication may be established from both ends in principle.

Figure 1: Relationship between the categories of services attributes and their scope within a Teleservice

2 List of the teleservice attributes

Table 1 gives the list of the attributes. For the definitions and possible values of these attributes, see TS 22.001 [2].

Table 1: List of Teleservice attributes

1. High layer capabilities	1.1 Type of user information	Dominant Teleservice attribute category
	1.2 Layer 4 protocol functions	
	1.3 Layer 5 " "	Secondary attributes
	1.4 Layer 6 " "	" "
	1.5 Layer 7 " "	
2. Low layer capabilities (describing the Bearer capability which supports the Teleservice)	2.1 Information transfer	" "
	2.1.1 Information transfer capabilities	" "
	2.1.2 Information transfer mode	" "
	2.1.3 Information transfer rate	Individual services (in the category)
	2.1.4 Structure	
	2.1.5 Establishment of communication	
	2.1.6 Communication configuration	
	2.1.7 Symmetry	
	2.2 Access (TS 22.001)	Qualifying attributes
	2.2.1 Signalling access	" "
	2.2.2 Information access	" "
	2.3 Interworking	" "
	2.3.1 Terminating network type	" "
	2.3.2 National/international interworking	Further specify the individual services
	2.3.3 Interface of terminal equipment	
3. General	3.1 Supplementary services provided	
	3.2 Quality of service	
	3.3 Operational and commercial	

3 List of teleservice categories and individual teleservices

Table 2 presents a list of all Teleservices categories and of individual Teleservices and the associated dominant and secondary attributes.

4 Description of individual teleservices

The annex contains a data sheet per Teleservice with all attributes and comments.

5 Bearer capabilities supporting teleservices

According to specification TS 22.001 [2] the Bearer Capability defines the technical features of a Teleservice as they appear to the user at the customer access point or an appropriate interface of a fixed network. The Bearer Capability is characterized by information transfer, access and interworking attributes. The same set of attributes as for a Bearer Service is used. A Bearer Capability is associated with every Teleservice.

Table 2: Teleservice categories and Teleservices

Dominant attribute	**Category of teleservice**		**Individual Teleservice**		
Type of user in- formation	No	Name	No	Name	
Speech	1	Speech trans-mission	11 12	Telephony Emergency Calls	
Short message	2	Short message service	21 22 23	Short message MT/PP Short message MO/PP Cell Broadcast Service	
Facsimile	6	Facsimile trans - mission	61	Alternate speech and facsimile group 3	T[1] NT[2]
			62	Automatic Facsimile group 3	T[1] NT[2]
Speech	9	Voice Group service[3]	91 92	Voice Group Call Service Voice Broadcast Service	

Note 1: The transparent facsimile services apply to GERAN only.

Note 2: The non-transparent facsimile services apply to UTRAN only.

Note 3: The Voice Group Services, TS 91 and TS 92 apply to GERAN only.

Annex A (normative): Description of individual Teleservices

NOTE 1: Within the PLMN the "Information transfer rate" attribute is not indicated.

A.1 Individual Teleservices

A.1.1 Telephony

Teleservice 11, Telephony							
ATTRIBUTES	1. HLC	1.1 Type or user information			speech		
		1.2 Layer 4 protocol functions			-		
		1.3 Layer 5 protocol functions			-		
		1.4 Layer 6 protocol functions			-		
		1.5 Layer 7 protocol functions			-		
	2. LLC	2.1 Inform transfer	2.1.1 Information transfer capability		speech (digital representation)		
			2.1.2 Information transfer mode		circuit		
			2.1.3 Information transfer rate		not applicable		
			2.1.4 Structure		not applicable		
			2.1.5 Establishment of connection		demand MO MT		
			2.1.6 Communication configuration		point-to-point		
			2.1.7 Symmetry		bidirectional symmetry		
		2.2 Access at UE	2.2.1 Signalling access		manual		
			2.2.2 Information access (TS 22.001)	rate	full rate/half rate		
				interface			
		2.3 Inter-working	2.3.1 Visible network type		PSTN/ISDN/ -PLMN		
			2.3.2 National/Internat. interworking		international/national		
			2.3.3 Interface of TE to terminating		2 wire, analogue	4 wire S (B+B+D)	ME
	3. Gen	3.1 Supplementary service provided			TS 22.004		
		3.2 Quality of service					

Comments:

This service provides the transmission of speech information and audible signalling tones of the PSTN/ISDN. In the PLMN and the fixed network processing technique appropriate for speech such as analogue transmission, echo cancellation and low bit rate voice encoding may be used. Hence, bit integrity is not assured.

1) Transparency for telephone signalling tones is provided.

2) Transparency for voice band facsimile signals is not mandatory. (Appropriate bearer services see TS 22.002 [3].)

3) Transparency for end to end speech encryption is not mandatory. If a user needs to apply this technique an appropriate bearer service (TS 22.002 [3]) can be used.

4) Transmission of DTMF is provided in the mobile to fixed direction (e.g. for controlling voice mail boxes) during any time of an established call.

5) In A/Gb mode of operation (GERAN) speech teleservices may be provided using the Full Rate (full rate, version 1), Enhanced Full Rate (full rate, version 2), Half Rate (half rate, version 1), Adaptive Multirate (AMR) or

Wideband Adaptive Multirate (AMR-WB) speech codecs. The default speech codec to provide speech service in this case is Full Rate.

6) In Iu mode of operation (UTRAN and GERAN) speech teleservices may be provided using the Adaptive Multirate (AMR) or Wideband Adaptive Multirate (AMR-WB) speech codecs. The default speech codec to provide speech service in this case is AMR.

A.1.2 Emergency calls

Teleservice 12, Emergency calls						
	1.	1.1 Type or user information			speech	
A	HLC	1.2 Layer 4 protocol functions			-	
T		1.3 Layer 5 protocol functions			-	
T		1.4 Layer 6 protocol functions			-	
R		1.5 Layer 7 protocol functions			-	
I	2.	2.1	2.1.1 Information transfer capability		speech (digital representation)	
B	LLC		2.1.2 Information transfer mode		circuit	
U		Inform	2.1.3 Information transfer rate		not applicable	
T		transfer	2.1.4 Structure		not applicable	
E			2.1.5 Establishment of connection		demand MO MT	
S			2.1.6 Communication configuration		point-to-point	
			2.1.7 Symmetry		bidirectional symmetry	
		2.2	2.2.1 Signalling access		manual	
		Access	2.2.2 Information access	rate	full rate/half rate	
		at UE	(TS 22.001)	interface		
		2.3	2.3.1 Visible network type		PSTN	ISDN
		Inter-	2.3.2 National/Internat. interworking		national	
		working	2.3.3 Interface of TE to terminating Ntwk.		2 wire	4 wire
	3.	3.1 Supplementary service provided			TS 22.004 (see note 3)	
	Gen	3.2 Quality of service				

Comments:

1) A standardized access method throughout all PLMNs is mandatory. See TS 22.101[15] for further information on emergency call requirements.

2) It shall be an option of the network operator whether to accept emergency calls coming from user equipment which do not transmit an IMSI or a TMSI.

3) Emergency calls supersede all constraints imposed by supplementary services or user equipment features used for other Tele or Bearer services. The lock state of the UE is overridden by the SOS-procedure.

4) Emergency calls will be routed to the emergency services in accordance with national regulations.

5) In order to help identifying callers in cases of misuse databases in the PLMN may be accessed to retrieve the identity of the calling UE.

A.1.3 Short Message Service (SMS)

A.1.3.1 Short message service MT/PP

Teleservice 21, Short Message MT point-to-point 1), 2)					
	1.	1.1 Type or user information			short message, ≤ 160 characters
A		1.2 Layer 4 protocol functions			
T		1.3 Layer 5 protocol functions			see TS23.040
T		1.4 Layer 6 protocol functions			see TS 23.040
R		1.5 Layer 7 protocol functions			see TS 23.040
I	2.	2.1	2.1.1 Information transfer capability		not applicable
B			2.1.2 Information transfer mode		not applicable
U		Inform	2.1.3 Information transfer rate		not applicable
T		transfer	2.1.4 Structure		not applicable
E			2.1.5 Establishment of connection		not applicable
S			2.1.6 Communication configuration		not applicable
			2.1.7 Symmetry		not applicable
		2.2	2.2.1 Signalling access		see TS 27.005
		Access	2.2.2 Information access	rate	not applicable
		at UE	(TS 22.001)	interface	
		2.3	2.3.1 Visible network type		not applicable 3)
		Inter-	2.3.2 National/Internat. interworking		not applicable 3)
		working	2.3.3 Interface of TE to terminating Ntwk.		not applicable 3)
	3.	3.1 Supplementary service provided			TS 22.004
	Gen	3.2 Quality of service			

Comments:

1) This service provides the transmission of a short message from a message handling system (service centre) to a user equipment. The service centre is functionally separated from the PLMN.

2) After reception an acknowledgement message should be sent back.

3) There is only an interworking between the PLMN and SMS Service Centre (SMS-SC). Connections from the fixed network to the SMS-SC are out of the scope of the 3GPP specifications.

4) The information transfer attributes refer to the connection-oriented services (ISDN, Bluebook Q.931). The Short Message Service is not a connection orientated service, hence the transfer attributes here are not applicable.

5) SMS MT/PP teleservice can be provided via both the CS and PS domains.

A.1.3.2 Short message service MO/PP

Teleservice 22, Short Message MO point-to-point 1), 2)					
	1.	1.1 Type or user information			short message, ≤ 160 characters
A		1.2 Layer 4 protocol functions			
T		1.3 Layer 5 protocol functions			see TS 23.040
T		1.4 Layer 6 protocol functions			see TS 23.040
R		1.5 Layer 7 protocol functions			see TS 23.040
I	2.	2.1	2.1.1 Information transfer capability		not applicable
B			2.1.2 Information transfer mode		not applicable
U		Inform	2.1.3 Information transfer rate		not applicable
T		transfer	2.1.4 Structure		not applicable
E			2.1.5 Establishment of connection		not applicable
S			2.1.6 Communication configuration		not applicable
			2.1.7 Symmetry		not applicable
		2.2	2.2.1 Signalling access		see TS 27.005
		Access	2.2.2 Information access	rate	not applicable
		at UE	(TS 22.001)	interface	
		2.3	2.3.1 Visible network type		not applicable 3)
		Inter-	2.3.2 National/Internat. interworking		not applicable 3)
		working	2.3.3 Interface of TE to terminating Ntwk.		not applicable 3)
	3.	3.1 Supplementary service provided			TS 22.004
	Gen	3.2 Quality of service			

Comments:

1) This service provides the transmission of a short message from a user equipment to a message handling system (service centre). The service centre is functionally separated from the PLMN.

2) After reception an acknowledgement message is sent back.

3) There is only an interworking between the PLMN and SMS Service Centre (SMS-SC). Connections from the fixed network to the SMS-SC are out of the scope of the 3GPP specifications.

4) The information transfer attributes refer to the connection-oriented services (ISDN, Bluebook Q.931). The Short Message Service is not a connection orientated service, hence the transfer attributes here are not applicable.

5) Information from the following sources at the UE might be transmitted:

   - a pre-recorded message in a store;
   - a number from the dialling key pad;
   - information from an external keyboard or terminal equipment connected to the ME.

6) SMS MO/PP teleservice can be provided via both the CS and PS domains.

A.1.3.3 Cell Broadcast Service (CBS)

Teleservice 23, Cell Broadcast Service					
	1.	1.1 Type or user information			short message, ≤ 93 characters 4)
A		1.2 Layer 4 protocol functions			
T		1.3 Layer 5 protocol functions			see TS 23.041
T		1.4 Layer 6 protocol functions			see TS 23.041
R		1.5 Layer 7 protocol functions			see TS 23.041
I	2.	2.1	2.1.1 Information transfer capability		not applicable
B			2.1.2 Information transfer mode		not applicable
U		Inform	2.1.3 Information transfer rate		not applicable
T		transfer	2.1.4 Structure		not applicable
E			2.1.5 Establishment of connection		not applicable
S			2.1.6 Communication configuration		not applicable
			2.1.7 Symmetry		
		2.2	2.2.1 Signalling access		not applicable
		Access	2.2.2 Information access	rate	not applicable
		at UE	(TS 22.001)	interface	not applicable
		2.3	2.3.1 Visible network type		2)
		Inter-	2.3.2 National/Internat. interworking		2)
		working	2.3.3 Interface of TE to terminating Ntwk.		2)
	3.	3.1 Supplementary service provided			TS 22.004
	Gen	3.2 Quality of service			

Comments:

1) This service provides the transmission of a short message from a message handling system to all user equipments in the area of a Base Station. The service centre is functionally separated from the PLMN. There is no acknowledgement message after reception.

2) An interworking only with the Cell-Broadcast Service Centre is foreseen. Connections from the fixed network to the SC are out of the scope of the 3GPP specifications.

3) The information transfer attributes refer to the connection-oriented services (ISDN, Bluebook Q.931). The Short Message Service is not a connection orientated service, hence the transfer attributes here are not applicable.

4) TS 23.041provides up to 15 concatenated "pages" of up to 93 characters each.

A.1.3.4 Short message service description

Description of:

teleservice 21, "Short message MT/PP";

teleservice 22 "Short message MO/PP"; and

teleservice 23 "Cell Broadcast Service ".

1 Introduction

The purpose of this annex is to describe the short message teleservice.

Three different types of short messages are defined, namely short message MT/PP (Mobile Terminated/Point-to-point), short message MO/PP (Mobile Originated/Point-to-point) and Cell Broadcast Service messages.

2 Definition of the short message service MT/PP and MO/PP

For both mobile originated and mobile terminated services the Service Centre acts as store and forward centre. The Service Centre is functionally separate from the PLMN although this does not preclude an integrated implementation. More than one service centre may be connected to a PLMN. Messages may be input to the service centre from a fixed network customer by means of a suitable telecommunications service either from the fixed network, e.g. speech, telex, facsimile, etc. or from a mobile network customer. The list is not intended to be comprehensive and it is entirely open to the service centre provider what telecommunication services it supports. The service centre shall then reformat the message into that provided by the short message service, for delivery to the user equipment.

For mobile originated SMS messages the SMT formats the message into that used by the SMS service and sends to the service centre (to allow interworking with ERMES also ERMES-format addresses may be sent from the UE to the SC). In general the user may use alphanumeric addresses for more user convenience. In principle the message may be intended for a subscriber on the fixed network or for another mobile subscriber. For the message to another mobile subscriber the service centre should deliver as described in this section.

The message text is limited to a length of 160 characters.

The originator does not need to know the location of the mobile subscriber to whom he wants to send a message. The message is addressed to the recipient's Directory Number.

As a part of the basic service for both MT and MO, an acknowledgement will be provided on a message by message basis to the SC (MT) or UE (MO). This acknowledgement indicates that the PLMN has successfully transferred the message to the UE (MT) or SC (MO).

Optionally, the SC may offer final delivery notification to the originator. In this case, the originator may request to have a notification returned from the SC informing her about the delivery of the Short Message to the recipient. This delivery report indicates whether this particular message has been correctly received at the receiving station or not, to the extent that the SC is able to establish this. It does not indicate whether the message has been read. If the delivery report is negative, i.e. the message has not been successfully delivered to the recipient, it shall include the failure cause.

The delivery report is sent to the originator, if reachable, as soon as the information (positive or negative) is available.

In addition, the SC may use the delivery report capabilities for other purposes, such as intermediate status reports etc.

All point-to-point short messages are either to or from the service centre. A message from one user equipment to another must pass through a service centre. This case is effectively an MO and MT message together. The two transactions are separate, though clearly related.

Point-to-point messages may be sent or received when the UE is engaged on a call (voice or data), or in idle mode. However, messages which overlap the boundary of such a call, or during a handover, may be lost, in which case they will be sent again.

The accounting between the SC and PLMN if applicable is for agreement between those parties.

The originator of a short message may notify the SC of an expiry time after which the message is no longer of value and may be deleted by the SC. During the validity period of the message, the SC shall try to deliver the message. After the expiry date the SC will take no further step to deliver the message, but its status may be kept by the SC to enable the originator to enquire the result. If the originator of the short message does not request any expiry time a standard value, e.g. 24 hours, is used.

The Service Centre may give a short message a priority status. This priority message will be attempted to be delivered irrespective of whether or not the UE has been identified as temporarily absent. Delivery of non-priority messages will not be attempted if the UE has been identified as temporarily absent.

If necessary, the originator may request the SC to perform specific operations on a previously submitted short message, such as provision/cancellation of a report or deletion of the short message.

The recipient of a short message will be informed by the message about the date and time it was submitted to the SC.

If the UE Message Store is full, the Message Store Overflow indicator is activated, and any further messages received will not be accepted. An appropriate specific non-acknowledgement message shall be returned. By help of an optional flow control mechanism further waiting short messages will be transmitted after the UE has memory available again.

3 Reply path

The reply path facility is an enhancement to the point-to-point SMS. In the mobile originated case the mobile user will request his Service Centre to guarantee to forward a single reply to his message back to him (Reply Path).

In the mobile terminated case the recipient of the Short Message will get an indication by the service centre that a reply via this Service centre will be accepted on a subscriptionless basis. The recipient may then submit a reply to this SC (within a period of time defined by the SC operator), which is then forwarded to the submitter of the original message.

No subscription with the Service centre is needed by the replying user. The costs, if any, for the reply path are allocated to the originator.

4 Definition of the Cell Broadcast Service

The cell broadcast service is a Teleservice which enables an Information Provider to submit short messages for broadcasting to a specified area within the PLMN.

The cell broadcast service is characterized by the following aspects:

- No acknowledgement is sent from the UE.
- The cell broadcast message is sent in a limited area, defined by the originator of the message, by agreement with the PLMN.
- An identifier is associated with each message. This identifier is received by the UE and used by the short message function of the UE not to store broadcast messages which are not wanted or which have already been received.
- Generally, cell broadcast messages will be sent continuously, so that all such messages are sent in turn, and then repeated. The cycle time will need to be short enough for important messages to be received by travellers moving through a group of cells.
- Cell broadcast messages are MT only. The origination of these messages is outside the scope of 3GPP specifications.
- The maximum length of each cell broadcast message will be 93 characters.
- Cell broadcast DRX mode is defined to improve the battery life for User equipment. This feature is optional.
- Reception of CBS messages for a UE is not a requirement if it is connected in the CS domain. It should be possible for a UE to receive messages if it is connected in the PS domain and no data is currently transmitted.

A.1.4 Alternate speech/facsimile G3

Teleservice 61, Alternate speech and facsimile group 3							
	1.	1.1 Type or user information			facsimile/speech		
A	HLC	1.2 Layer 4 protocol functions			Procedures according to ITU-T		
T		1.3 Layer 5 protocol functions			recommendation T.30/T4.		
T		1.4 Layer 6 protocol functions					
R		1.5 Layer 7 protocol functions					
I	2.	2.1	2.1.1 Information transfer capability		alternate speech/group 3 fax		
B	LLC		2.1.2 Information transfer mode		circuit		
U		Inform	2.1.3 Information transfer rate		up to 14400 bits/s		
T		transfer	2.1.4 Structure		not applicable		
E			2.1.5 Establishment of connection		demand (MO MT)		
S			2.1.6 Communication configuration		point-to-point		
			2.1.7 Symmetry		bidirectional symmetry		
		2.2	2.2.1 Signalling access		I.440/450 (GSM 04.08)		
		Access	2.2.2 Information access	rate	fullrate		
		at UE	(TS 22.001)	interface	2 wire analogue		
		2.3	2.3.1 Visible network type		PSTN	ISDN	PLMN
		Inter-	2.3.2 National/Internat. interworking		international/national		
		working	2.3.3 Interface of TE to terminating		2 wire, analogue/UE		
	3.	3.1 Supplementary service provided			TS 22.004		
	Gen	3.2 Quality of service					

Comments:

1) This Teleservice allows the connection of ITU-T group 3 fax apparatus (send and/or receive) to the user equipments of a PLMN. Facsimile connections may be established to/from group 3 apparatus in the PSTN, ISDN or PLMN.

2) A high quality of service even under bad radio conditions and/or in connection to/from moving vehicles is required.

3) Both speech and fax portions of the call will use a full rate. The fax portion of the call may use multiple full rate channels.

4) Subscription for TS61 includes also subscription for TS62 (refer to TS TS 22.001[2]). For this reason and in order to allow a user to change between ME supporting TS61 or TS62 both a network and a UE supporting TS61 shall also accept call set-ups for TS62. If a subscriber originates/receives a TS61 call but either the UE or the network do not support TS61 (but supports TS62), then TS61 shall be negotiated to TS62 in accordance to the rules specified in TS 27.001 [10]. If the negotiation does not succeed, then the call shall be released.

A.1.5 Automatic facsimile G3

Teleservice 62, Alternate facsimile group 3							
	1.	1.1 Type or user information			facsimile		
A	HLC	1.2 Layer 4 protocol functions			Procedures according to ITU-T		
T		1.3 Layer 5 protocol functions			recommendation T.30/T4.		
T		1.4 Layer 6 protocol functions					
R		1.5 Layer 7 protocol functions					
I	2.	2.1	2.1.1 Information transfer capability		Facsimile group 3		
B	LLC		2.1.2 Information transfer mode		Circuit		
U		Inform	2.1.3 Information transfer rate		up to 14400 bits/s		
T		Transfer	2.1.4 Structure		not applicable		
E			2.1.5 Establishment of connection		demand (MO MT)		
S			2.1.6 Communication configuration		point-to-point		
			2.1.7 Symmetry		bidirectional symmetry		
		2.2	2.2.1 Signalling access		I.440/450 (GSM 04.08)		
		Access	2.2.2 Information access	rate	Fullrate		
		At UE	(TS 22.001)	interface	2 wire, analogue		
		2.3	2.3.1 Visible network type		PSTN	ISDN	PLMN
		Inter-	2.3.2 National/Internat. interworking		international/national		
		Working	2.3.3 Interface of TE to terminating		2 wire, analogue/UE		
	3.	3.1 Supplementary service provided			TS 22.004		
	Gen	3.2 Quality of service					

Comments:

1) This teleservice supports a Facsimile Group 3 Autocalling/Autoanswering mode only.

2) This teleservice allows connection of ITU-T group 3 fax apparatus to and from the user equipments of a PLMN. Facsimile connections may be established to and from group 3 apparatus in the PSTN, ISDN or PLMN.

3) A high quality of service even under bad radio conditions and/or in connection to/from moving vehicles is required.

4) If a Network receives a call set-up for TS61 and if the subscriber in question has a subscription for TS62 only, then the network shall negotiate TS61 to TS62 in accordance to the rules specified in TS 27.001 [10]. If the negotiation does not succeed, then the call shall be released. See also item 4) in the description of TS61.

5) This teleservice may use the multislot mechanism of GERAN.

A.1.6 Voice Group Call Service

Teleservice 91, Voice Group Call Service							
	1.	1.1 Type or user Information			speech		
A	HLC	1.2 Layer 4 protocol functions			-		
T		1.3 Layer 5 protocol functions			-		
T		1.4 Layer 6 protocol functions			-		
R		1.5 Layer 7 protocol functions			-		
I	2.	2.1	2.1.1 Information transfer capability		speech (digital representation)		
B	LLC		2.1.2 Information transfer mode		circuit		
U		Inform	2.1.3 Information transfer rate		not applicable		
T		transfer	2.1.4 Structure		not applicable		
E			2.1.5 Establishment of connection		demand MO MT		
S			2.1.6 Communication configuration		multipoint		
			2.1.7 Symmetry		bidirectional symmetry		
		2.2	2.2.1 Signalling access		manual		
		Access	2.2.2 Information access	rate	full rate/half rate		
		at UE	(TS 22.001)	interface			
		2.3	2.3.1 Visible network type		PSTN/ISDN/ PLMN		
		Inter-	2.3.2 National/Internat. interworking		international/national		
		working	2.3.3 Interface of TE to terminating		2 wire, analogue	4 wire S (B+B+D)	ME
	3.	3.1 Supplementary service provided			TS~~GSM~~ ~~0~~42.068		
	Gen	3.2 Quality of service					

Comments:

This service provides for speech conversation of a predefined group of service subscribers in half duplex mode on the radio link taking into account multiple mobile service subscribers involved in the VGCS call per cell. A detailed service description is given in TS~~GSM~~ ~~0~~42.068 [5].

This teleservice shall only be provided via a GERAN.

A.1.7 Voice Broadcast Service

Teleservice 92, Voice Broadcast Service							
	1.	1.1 Type or user Information			speech		
A	HLC	1.2 Layer 4 protocol functions			-		
T		1.3 Layer 5 protocol functions			-		
T		1.4 Layer 6 protocol functions			-		
R		1.5 Layer 7 protocol functions			-		
I	2.	2.1	2.1.1 Information transfer capability		speech (digital representation)		
B	LLC		2.1.2 Information transfer mode		circuit		
U		Inform	2.1.3 Information transfer rate		not applicable		
T		transfer	2.1.4 Structure		not applicable		
E			2.1.5 Establishment of connection		demand MO MT		
S			2.1.6 Communication configuration		broadcast		
			2.1.7 Symmetry		unidirectional		
		2.2	2.2.1 Signalling access		manual		
		Access	2.2.2 Information access	rate	full rate/half rate		
		at UE	(TS 22.001)	interface			
		2.3	2.3.1 Visible network type		PSTN/ISDN/ PLMN		
		Inter-	2.3.2 National/Internat. interworking		international/national		
		working	2.3.3 Interface of TE to terminating		2 wire, analogue	4 wire S (B+B+D)	ME
	3.	3.1 Supplementary service provided			TS~~GSM~~ ~~0~~42.069		
	Gen	3.2 Quality of service					

Comments:

This service provides for the distribution of speech, generated by a service subscriber, to all or a predefined group service subscribers located in this area. A detailed service description is given in TS~~GSM~~ ~~0~~42.069 [6].

This teleservice shall only be provided via a GERAN.

Annex B:
Change history

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**WI**
Dec 1999			02.03					Transferred to 3GPP SA1	8.0.0	3.0.0	
SA#06			02.03						3.0.0		
SP-06	SP-99519	S1-991025	22.003	001		R99	D	Mainly an editorial update for GSM/3GPP use	3.0.0	3.1.0	
SP-07	SP-000069	S1-000140	22.003	002		R99	D	Editorial modification for change of SMS-CB to CBS and to correct the references	3.1.0	3.2.0	
SP-07	SP-000071	S1-000162	22.003	003		R00	B	Addition of Wideband AMR	3.1.0	4.0.0	
SP-10	SP-000687	S1-000866	22.003	004	1	Rel-4	C	Removal of TS61 and TS62 in NT mode from GSM in Rel-4 and later releases	4.0.0	4.1.0	FAX
SP-12	SP-010243	S1-010563	22.003	007		Rel-4	A	Removal of Voice Group Service	4.1.0	4.2.0	VGCS
SP-14	SP-010672	S1-011290	22.003	008		Rel-5	C	Clarification of requirements for support of codecs	4.2.0	5.0.0	AMRWB

History

Document history		

TSG-SA WG 1 (Services) meeting #15 **S1-020457**
Saalfelden, Austria, 11-15th February 2002 **Agenda Item:**

CR-Form-v4

CHANGE REQUEST

⌘ **22.003** **CR 009** ⌘ ev **-** ⌘ Current version: **4.2.0** ⌘

Spec Title: **Circuit Teleservices supported by a Public Land Mobile Network (PLMN)** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial CR to correct terms and references
Source:	⌘	SA1
Work item code:	⌘	CORRECT
Date:	⌘	11/02/02
Category:	⌘	**F**
Release:	⌘	Rel-4

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

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

Reason for change:	⌘	With the deletion of 04.08, SA1 has undertaken a clean-up of its specifications to correct the references to all TSs and has normalised the terms used therein.
Summary of change:	⌘	References have been changed where necessary.
Consequences if not approved:	⌘	Illegal references will exist in the specification set.

Clauses affected:	⌘	Various
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

0 Scope

This Technical Specification (TS) describes and defines a recommended set of Circuit Teleservices to be supported by a PLMN in connection with other networks as a basis for defining the network capabilities required.

0.1 Normative references

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

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

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

[2] TS 22.001: " Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLMN)".

[3] TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

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

[5] TS~~GSM 0~~42.0~~6~~8 : "~~ Digital cellular telecommunications system (Phase 2+); ~~Voice Group Call Service (VGCS) - Stage 1".

[6] TS~~GSM 2~~42.0~~6~~9 : "~~ Digital cellular telecommunications system (Phase 2+); ~~Voice Broadcast Service (VBS) - Stage 1".

[7] TS 23.040: " Technical realization of the Short Message Service (SMS) Point-to-Point (PP)".

[8] TS 23.041 : " Technical realization of Short Message Service Cell Broadcast (SMSCB)".

[9] ~~GSM~~ TS ~~0~~24.0~~0~~8: " Mobile radio interface layer 3 specification".

[10] TS 27.001 : " General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[11] TS 27.005: " Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".

[12] ITU-T Recommendation T.4: "Standardization of group 3 facsimile apparatus for document transmission".

[13] ITU-T Recommendation T.30: "Procedures for document facsimile transmission in the general switched telephone network".

[14] TR 21.905: "Vocabulary for 3GPP Specifications"

[15] TS 22.101: "~~UMTS~~ Service Principles".

0.2 Abbreviations

Abbreviations used in this TS are listed in ~~GSM 01.04 [1] and~~ TS 21.905[14].~~.~~

1 Framework for describing circuit teleservices supported

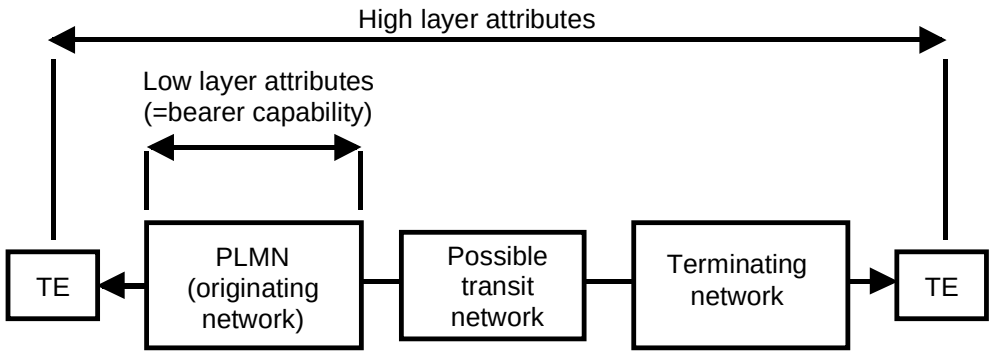
Teleservices supported by a PLMN are described by a number of attributes which are intended to be largely independent.

These attributes are described and defined in specification TS 22.001 [2].

They are grouped into three categories:

- High layer attributes;
- Low layer attributes (describing the Bearer capabilities which support the Teleservice).
  - information transfer attributes;
  - access attributes.
- General attributes.

Figure 1 shows the relationship between the different categories of services attributes, and their scope within a Teleservice.



NOTE 1: A transit network may not exist.
NOTE 2: Communication may be established from both ends in principle.

Figure 1: Relationship between the categories of services attributes and their scope within a Teleservice

2 List of the teleservice attributes

Table 1 gives the list of the attributes. For the definitions and possible values of these attributes, see TS 22.001 [2].

Table 1: List of Teleservice attributes

1. High layer capabilities	1.1 Type of user information	Dominant Teleservice attribute category
	1.2 Layer 4 protocol functions	
	1.3 Layer 5 " "	Secondary attributes
	1.4 Layer 6 " "	" "
	1.5 Layer 7 " "	
2. Low layer capabilities (describing the Bearer capability which supports the Teleservice)	2.1 Information transfer	" "
	2.1.1 Information transfer capabilities	" "
	2.1.2 Information transfer mode	" "
	2.1.3 Information transfer rate	Individual services (in the category)
	2.1.4 Structure	
	2.1.5 Establishment of communication	
	2.1.6 Communication configuration	
	2.1.7 Symmetry	
	2.2 Access (TS 22.001)	Qualifying attributes
	2.2.1 Signalling access	" "
	2.2.2 Information access	" "
	2.3 Interworking	" "
	2.3.1 Terminating network type	" "
	2.3.2 National/international interworking	Further specify the individual services
	2.3.3 Interface of terminal equipment	
3. General	3.1 Supplementary services provided	
	3.2 Quality of service	
	3.3 Operational and commercial	

3 List of teleservice categories and individual teleservices

Table 2 presents a list of all Teleservices categories and of individual Teleservices and the associated dominant and secondary attributes.

4 Description of individual teleservices

The annex contains a data sheet per Teleservice with all attributes and comments.

5 Bearer capabilities supporting teleservices

According to specification TS 22.001 [2] the Bearer Capability defines the technical features of a Teleservice as they appear to the user at the customer access point or an appropriate interface of a fixed network. The Bearer Capability is characterized by information transfer, access and interworking attributes. The same set of attributes as for a Bearer Service is used. A Bearer Capability is associated with every Teleservice.

Table 2: Teleservice categories and Teleservices

Dominant attribute	**Category of teleservice**		**Individual Teleservice**		
Type of user in- formation	No	Name	No	Name	
Speech	1	Speech trans-mission	11 12	Telephony Emergency Calls	
Short message	2	Short message service	21 22 23	Short message MT/PP Short message MO/PP Cell Broadcast Service	
Facsimile	6	Facsimile trans - mission	61	Alternate speech and facsimile group 3	T[1] NT[2]
			62	Automatic Facsimile group 3	T[1] NT[2]
Speech	9	Voice Group service[3]	91 92	Voice Group Call Service Voice Broadcast Service	

Note 1: The transparent facsimile services apply to GERAN only.

Note 2: The non-transparent facsimile services apply to UTRAN only.

Note 3: The Voice Group Services, TS 91 and TS 92 apply to GERAN only.

Annex A (normative): Description of individual Teleservices

NOTE 1: Within the PLMN the "Information transfer rate" attribute is not indicated.

A.1 Individual Teleservices

A.1.1 Telephony

Teleservice 11, Telephony							
ATTRIBUTES	1. HLC	1.1 Type or user information			speech		
		1.2 Layer 4 protocol functions			-		
		1.3 Layer 5 protocol functions			-		
		1.4 Layer 6 protocol functions			-		
		1.5 Layer 7 protocol functions			-		
	2. LLC	2.1 Inform transfer	2.1.1 Information transfer capability		speech (digital representation)		
			2.1.2 Information transfer mode		circuit		
			2.1.3 Information transfer rate		not applicable		
			2.1.4 Structure		not applicable		
			2.1.5 Establishment of connection		demand MO MT		
			2.1.6 Communication configuration		point-to-point		
			2.1.7 Symmetry		bidirectional symmetry		
		2.2 Access at UE	2.2.1 Signalling access		manual		
			2.2.2 Information access (TS 22.001)	rate	full rate/half rate		
				interface			
		2.3 Inter-working	2.3.1 Visible network type		PSTN/ISDN/ -PLMN		
			2.3.2 National/Internat. interworking		international/national		
			2.3.3 Interface of TE to terminating		2 wire, analogue	4 wire S (B+B+D)	ME
	3. Gen	3.1 Supplementary service provided			TS 22.004		
		3.2 Quality of service					

Comments:

This service provides the transmission of speech information and audible signalling tones of the PSTN/ISDN. In the PLMN and the fixed network processing technique appropriate for speech such as analogue transmission, echo cancellation and low bit rate voice encoding may be used. Hence, bit integrity is not assured.

1) Transparency for telephone signalling tones is provided.

2) Transparency for voice band facsimile signals is not mandatory. (Appropriate bearer services see TS 22.002 [3].)

3) Transparency for end to end speech encryption is not mandatory. If a user needs to apply this technique an appropriate bearer service (TS 22.002 [3]) can be used.

4) Transmission of DTMF is provided in the mobile to fixed direction (e.g. for controlling voice mail boxes) during any time of an established call.

5) GERAN speech teleservices may be provided using the Full Rate (full rate, version 1), Enhanced Full Rate (full rate, version 2), Half Rate (half rate, version 1), Adaptive Multirate (AMR) or Wideband Adaptive Multirate (AMR-WB) speech codecs. The default speech codec to provide speech service across the GERAN is Full Rate.

6) UTRAN speech teleservices may be provided using the Adaptive Multirate (AMR) or Wideband Adaptive Multirate (AMR-WB) speech codecs. The default speech codec to provide speech service across the UTRAN is AMR.

A.1.2 Emergency calls

Teleservice 12, Emergency calls						
ATTRIBUTES	1. HLC	1.1 Type or user information			Speech	
		1.2 Layer 4 protocol functions			-	
		1.3 Layer 5 protocol functions			-	
		1.4 Layer 6 protocol functions			-	
		1.5 Layer 7 protocol functions			-	
	2. LLC	2.1 Inform transfer	2.1.1 Information transfer capability		speech (digital representation)	
			2.1.2 Information transfer mode		circuit	
			2.1.3 Information transfer rate		not applicable	
			2.1.4 Structure		not applicable	
			2.1.5 Establishment of connection		demand MO MT	
			2.1.6 Communication configuration		point-to-point	
			2.1.7 Symmetry		bidirectional symmetry	
		2.2 Access at UE	2.2.1 Signalling access		manual	
			2.2.2 Information access (TS 22.001)	rate	full rate/half rate	
				interface		
		2.3 Inter-working	2.3.1 Visible network type		PSTN	ISDN
			2.3.2 National/Internat. interworking		national	
			2.3.3 Interface of TE to terminating Ntwk.		2 wire	4 wire
	3. Gen	3.1 Supplementary service provided			TS 22.004 (see note 3)	
		3.2 Quality of service				

Comments:

1) A standardized access method throughout all PLMNs is mandatory. See TS 22.101[15] for further information on emergency call requirements.

2) It shall be an option of the network operator whether to accept emergency calls coming from user equipment which do not transmit an IMSI or a TMSI.

3) Emergency calls supersede all constraints imposed by supplementary services or user equipment features used for other Tele or Bearer services. The lock state of the UE is overridden by the SOS-procedure.

4) Emergency calls will be routed to the emergency services in accordance with national regulations.

5) In order to help identifying callers in cases of misuse databases in the PLMN may be accessed to retrieve the identity of the calling UE.

A.1.3 Short Message Service (SMS)

A.1.3.1 Short message service MT/PP

Teleservice 21, Short Message MT point-to-point 1), 2)					
	1.	1.1 Type or user information			short message, ≤ 160 characters
A		1.2 Layer 4 protocol functions			
T		1.3 Layer 5 protocol functions			see TS23.040
T		1.4 Layer 6 protocol functions			see TS 23.040
R		1.5 Layer 7 protocol functions			see TS 23.040
I	2.	2.1	2.1.1 Information transfer capability		not applicable
B			2.1.2 Information transfer mode		not applicable
U		Inform	2.1.3 Information transfer rate		not applicable
T		transfer	2.1.4 Structure		not applicable
E			2.1.5 Establishment of connection		not applicable
S			2.1.6 Communication configuration		not applicable
			2.1.7 Symmetry		not applicable
		2.2	2.2.1 Signalling access		see TS 27.005
		Access	2.2.2 Information access	rate	not applicable
		at UE	(TS 22.001)	interface	
		2.3	2.3.1 Visible network type		not applicable 3)
		Inter-	2.3.2 National/Internat. interworking		not applicable 3)
		working	2.3.3 Interface of TE to terminating Ntwk.		not applicable 3)
	3.	3.1 Supplementary service provided			TS 22.004
	Gen	3.2 Quality of service			

Comments:

1) This service provides the transmission of a short message from a message handling system (service centre) to a user equipment. The service centre is functionally separated from the PLMN.

2) After reception an acknowledgement message should be sent back.

3) There is only an interworking between the PLMN and SMS Service Centre (SMS-SC). Connections from the fixed network to the SMS-SC are out of the scope of the 3GPP specifications.

4) The information transfer attributes refer to the connection-oriented services (ISDN, Bluebook Q.931). The Short Message Service is not a connection orientated service, hence the transfer attributes here are not applicable.

5) SMS MT/PP teleservice can be provided via both the CS and PS domains.

A.1.3.2 Short message service MO/PP

Teleservice 22, Short Message MO point-to-point 1), 2)					
	1.	1.1 Type or user information			short message, ≤ 160 characters
A		1.2 Layer 4 protocol functions			
T		1.3 Layer 5 protocol functions			see TS 23.040
T		1.4 Layer 6 protocol functions			see TS 23.040
R		1.5 Layer 7 protocol functions			see TS 23.040
I	2.	2.1	2.1.1 Information transfer capability		not applicable
B			2.1.2 Information transfer mode		not applicable
U		Inform	2.1.3 Information transfer rate		not applicable
T		transfer	2.1.4 Structure		not applicable
E			2.1.5 Establishment of connection		not applicable
S			2.1.6 Communication configuration		not applicable
			2.1.7 Symmetry		not applicable
		2.2	2.2.1 Signalling access		see TS 27.005
		Access	2.2.2 Information access	rate	not applicable
		at UE	(TS 22.001)	interface	
		2.3	2.3.1 Visible network type		not applicable 3)
		Inter-	2.3.2 National/Internat. interworking		not applicable 3)
		working	2.3.3 Interface of TE to terminating Ntwk.		not applicable 3)
	3.	3.1 Supplementary service provided			TS 22.004
	Gen	3.2 Quality of service			

Comments:

1) This service provides the transmission of a short message from a user equipment to a message handling system (service centre). The service centre is functionally separated from the PLMN.

2) After reception an acknowledgement message is sent back.

3) There is only an interworking between the PLMN and SMS Service Centre (SMS-SC). Connections from the fixed network to the SMS-SC are out of the scope of the 3GPP specifications.

4) The information transfer attributes refer to the connection-oriented services (ISDN, Bluebook Q.931). The Short Message Service is not a connection orientated service, hence the transfer attributes here are not applicable.

5) Information from the following sources at the UE might be transmitted:

   - a pre-recorded message in a store;
   - a number from the dialling key pad;
   - information from an external keyboard or terminal equipment connected to the ME.

6) SMS MO/PP teleservice can be provided via both the CS and PS domains.

A.1.3.3 Cell Broadcast Service (CBS)

Teleservice 23, Cell Broadcast Service					
	1.	1.1 Type or user information			short message, ≤ 93 characters 4)
A		1.2 Layer 4 protocol functions			
T		1.3 Layer 5 protocol functions			see TS 23.041
T		1.4 Layer 6 protocol functions			see TS 23.041
R		1.5 Layer 7 protocol functions			see TS 23.041
I	2.	2.1	2.1.1 Information transfer capability		not applicable
B			2.1.2 Information transfer mode		not applicable
U		Inform	2.1.3 Information transfer rate		not applicable
T		transfer	2.1.4 Structure		not applicable
E			2.1.5 Establishment of connection		not applicable
S			2.1.6 Communication configuration		not applicable
			2.1.7 Symmetry		
		2.2	2.2.1 Signalling access		not applicable
		Access	2.2.2 Information access	rate	not applicable
		at UE	(TS 22.001)	interface	not applicable
		2.3	2.3.1 Visible network type		2)
		Inter-	2.3.2 National/Internat. interworking		2)
		working	2.3.3 Interface of TE to terminating Ntwk.		2)
	3.	3.1 Supplementary service provided			TS 22.004
	Gen	3.2 Quality of service			

Comments:

1) This service provides the transmission of a short message from a message handling system to all user equipments in the area of a Base Station. The service centre is functionally separated from the PLMN. There is no acknowledgement message after reception.

2) An interworking only with the Cell-Broadcast Service Centre is foreseen. Connections from the fixed network to the SC are out of the scope of the 3GPP specifications.

3) The information transfer attributes refer to the connection-oriented services (ISDN, Bluebook Q.931). The Short Message Service is not a connection orientated service, hence the transfer attributes here are not applicable.

4) TS 23.041provides up to 15 concatenated "pages" of up to 93 characters each.

A.1.3.4 Short message service description

Description of:

teleservice 21, "Short message MT/PP";

teleservice 22 "Short message MO/PP"; and

teleservice 23 "Cell Broadcast Service ".

1 Introduction

The purpose of this annex is to describe the short message teleservice.

Three different types of short messages are defined, namely short message MT/PP (Mobile Terminated/Point-to-point), short message MO/PP (Mobile Originated/Point-to-point) and Cell Broadcast Service messages.

2 Definition of the short message service MT/PP and MO/PP

For both mobile originated and mobile terminated services the Service Centre acts as store and forward centre. The Service Centre is functionally separate from the PLMN although this does not preclude an integrated implementation. More than one service centre may be connected to a PLMN. Messages may be input to the service centre from a fixed network customer by means of a suitable telecommunications service either from the fixed network, e.g. speech, telex, facsimile, etc. or from a mobile network customer. The list is not intended to be comprehensive and it is entirely open to the service centre provider what telecommunication services it supports. The service centre shall then reformat the message into that provided by the short message service, for delivery to the user equipment.

For mobile originated SMS messages the SMT formats the message into that used by the SMS service and sends to the service centre (to allow interworking with ERMES also ERMES-format addresses may be sent from the UE to the SC). In general the user may use alphanumeric addresses for more user convenience. In principle the message may be intended for a subscriber on the fixed network or for another mobile subscriber. For the message to another mobile subscriber the service centre should deliver as described in this section.

The message text is limited to a length of 160 characters.

The originator does not need to know the location of the mobile subscriber to whom he wants to send a message. The message is addressed to the recipient's Directory Number.

As a part of the basic service for both MT and MO, an acknowledgement will be provided on a message by message basis to the SC (MT) or UE (MO). This acknowledgement indicates that the PLMN has successfully transferred the message to the UE (MT) or SC (MO).

Optionally, the SC may offer final delivery notification to the originator. In this case, the originator may request to have a notification returned from the SC informing her about the delivery of the Short Message to the recipient. This delivery report indicates whether this particular message has been correctly received at the receiving station or not, to the extent that the SC is able to establish this. It does not indicate whether the message has been read. If the delivery report is negative, i.e. the message has not been successfully delivered to the recipient, it shall include the failure cause.

The delivery report is sent to the originator, if reachable, as soon as the information (positive or negative) is available.

In addition, the SC may use the delivery report capabilities for other purposes, such as intermediate status reports etc.

All point-to-point short messages are either to or from the service centre. A message from one user equipment to another must pass through a service centre. This case is effectively an MO and MT message together. The two transactions are separate, though clearly related.

Point-to-point messages may be sent or received when the UE is engaged on a call (voice or data), or in idle mode. However, messages which overlap the boundary of such a call, or during a handover, may be lost, in which case they will be sent again.

The accounting between the SC and PLMN if applicable is for agreement between those parties.

The originator of a short message may notify the SC of an expiry time after which the message is no longer of value and may be deleted by the SC. During the validity period of the message, the SC shall try to deliver the message. After the expiry date the SC will take no further step to deliver the message, but its status may be kept by the SC to enable the originator to enquire the result. If the originator of the short message does not request any expiry time a standard value, e.g. 24 hours, is used.

The Service Centre may give a short message a priority status. This priority message will be attempted to be delivered irrespective of whether or not the UE has been identified as temporarily absent. Delivery of non-priority messages will not be attempted if the UE has been identified as temporarily absent.

If necessary, the originator may request the SC to perform specific operations on a previously submitted short message, such as provision/cancellation of a report or deletion of the short message.

The recipient of a short message will be informed by the message about the date and time it was submitted to the SC.

If the UE Message Store is full, the Message Store Overflow indicator is activated, and any further messages received will not be accepted. An appropriate specific non-acknowledgement message shall be returned. By help of an optional flow control mechanism further waiting short messages will be transmitted after the UE has memory available again.

3 Reply path

The reply path facility is an enhancement to the point-to-point SMS. In the mobile originated case the mobile user will request his Service Centre to guarantee to forward a single reply to his message back to him (Reply Path).

In the mobile terminated case the recipient of the Short Message will get an indication by the service centre that a reply via this Service centre will be accepted on a subscriptionless basis. The recipient may then submit a reply to this SC (within a period of time defined by the SC operator), which is then forwarded to the submitter of the original message.

No subscription with the Service centre is needed by the replying user. The costs, if any, for the reply path are allocated to the originator.

4 Definition of the Cell Broadcast Service

The cell broadcast service is a Teleservice which enables an Information Provider to submit short messages for broadcasting to a specified area within the PLMN.

The cell broadcast service is characterized by the following aspects:

- No acknowledgement is sent from the UE.
- The cell broadcast message is sent in a limited area, defined by the originator of the message, by agreement with the PLMN.
- An identifier is associated with each message. This identifier is received by the UE and used by the short message function of the UE not to store broadcast messages which are not wanted or which have already been received.
- Generally, cell broadcast messages will be sent continuously, so that all such messages are sent in turn, and then repeated. The cycle time will need to be short enough for important messages to be received by travellers moving through a group of cells.
- Cell broadcast messages are MT only. The origination of these messages is outside the scope of 3GPP specifications.
- The maximum length of each cell broadcast message will be 93 characters.
- Cell broadcast DRX mode is defined to improve the battery life for User equipment. This feature is optional.
- Reception of CBS messages for a UE is not a requirement if it is connected in the CS domain. It should be possible for a UE to receive messages if it is connected in the PS domain and no data is currently transmitted.

A.1.4 Alternate speech/facsimile G3

Teleservice 61, Alternate speech and facsimile group 3							
ATTRIBUTES	1. HLC	1.1 Type or user information			facsimile/speech		
		1.2 Layer 4 protocol functions			Procedures according to ITU-T		
		1.3 Layer 5 protocol functions			recommendation T.30/T4.		
		1.4 Layer 6 protocol functions					
		1.5 Layer 7 protocol functions					
	2. LLC	2.1 Inform transfer	2.1.1 Information transfer capability		alternate speech/group 3 fax		
			2.1.2 Information transfer mode		circuit		
			2.1.3 Information transfer rate		up to 14400 bits/s		
			2.1.4 Structure		not applicable		
			2.1.5 Establishment of connection		demand (MO MT)		
			2.1.6 Communication configuration		point-to-point		
			2.1.7 Symmetry		bidirectional symmetry		
		2.2 Access at UE	2.2.1 Signalling access		I.440/450 (TS~~GSM~~ 2~~0~~4.0~~0~~8)		
			2.2.2 Information access (TS 22.001)	rate	fullrate		
				interface	2 wire analogue		
		2.3 Inter-working	2.3.1 Visible network type		PSTN	ISDN	PLMN
			2.3.2 National/Internat. interworking		international/national		
			2.3.3 Interface of TE to terminating		2 wire, analogue/UE		
	3. Gen	3.1 Supplementary service provided			TS 22.004		
		3.2 Quality of service					

Comments:

1) This Teleservice allows the connection of ITU-T group 3 fax apparatus (send and/or receive) to the user equipments of a PLMN. Facsimile connections may be established to/from group 3 apparatus in the PSTN, ISDN or PLMN.

2) A high quality of service even under bad radio conditions and/or in connection to/from moving vehicles is required.

3) Both speech and fax portions of the call will use a full rate. The fax portion of the call may use multiple full rate channels.

4) Subscription for TS61 includes also subscription for TS62 (refer to TS TS 22.001[2]). For this reason and in order to allow a user to change between ME supporting TS61 or TS62 both a network and a UE supporting TS61 shall also accept call set-ups for TS62. If a subscriber originates/receives a TS61 call but either the UE or the network do not support TS61 (but supports TS62), then TS61 shall be negotiated to TS62 in accordance to the rules specified in TS 27.001 [10]. If the negotiation does not succeed, then the call shall be released.

A.1.5 Automatic facsimile G3

Teleservice 62, Alternate facsimile group 3							
	1.	1.1 Type or user information			facsimile		
A	HLC	1.2 Layer 4 protocol functions			Procedures according to ITU-T		
T		1.3 Layer 5 protocol functions			recommendation T.30/T4.		
T		1.4 Layer 6 protocol functions					
R		1.5 Layer 7 protocol functions					
I	2.	2.1	2.1.1 Information transfer capability		Facsimile group 3		
B	LLC		2.1.2 Information transfer mode		Circuit		
U		Inform	2.1.3 Information transfer rate		up to 14400 bits/s		
T		Transfer	2.1.4 Structure		not applicable		
E			2.1.5 Establishment of connection		demand (MO MT)		
S			2.1.6 Communication configuration		point-to-point		
			2.1.7 Symmetry		bidirectional symmetry		
		2.2	2.2.1 Signalling access		I.440/450 (TS~~GSM 0~~2.0~~0~~8)		
		Access	2.2.2 Information access	rate	Fullrate		
		At UE	(TS 22.001)	interface	2 wire, analogue		
		2.3	2.3.1 Visible network type		PSTN	ISDN	PLMN
		Inter-	2.3.2 National/Internat. interworking		international/national		
		Working	2.3.3 Interface of TE to terminating		2 wire, analogue/UE		
	3.	3.1 Supplementary service provided			TS 22.004		
	Gen	3.2 Quality of service					

Comments:

1) This teleservice supports a Facsimile Group 3 Autocalling/Autoanswering mode only.

2) This teleservice allows connection of ITU-T group 3 fax apparatus to and from the user equipments of a PLMN. Facsimile connections may be established to and from group 3 apparatus in the PSTN, ISDN or PLMN.

3) A high quality of service even under bad radio conditions and/or in connection to/from moving vehicles is required.

4) If a Network receives a call set-up for TS61 and if the subscriber in question has a subscription for TS62 only, then the network shall negotiate TS61 to TS62 in accordance to the rules specified in TS 27.001 [10]. If the negotiation does not succeed, then the call shall be released. See also item 4) in the description of TS61.

5) This teleservice may use the multislot mechanism of GERAN.

A.1.6 Voice Group Call Service

Teleservice 91, Voice Group Call Service							
	1.	1.1 Type or user Information			speech		
A	HLC	1.2 Layer 4 protocol functions			-		
T		1.3 Layer 5 protocol functions			-		
T		1.4 Layer 6 protocol functions			-		
R		1.5 Layer 7 protocol functions			-		
I	2.	2.1	2.1.1 Information transfer capability		speech (digital representation)		
B	LLC		2.1.2 Information transfer mode		circuit		
U		Inform	2.1.3 Information transfer rate		not applicable		
T		transfer	2.1.4 Structure		not applicable		
E			2.1.5 Establishment of connection		demand MO MT		
S			2.1.6 Communication configuration		multipoint		
			2.1.7 Symmetry		bidirectional symmetry		
		2.2	2.2.1 Signalling access		manual		
		Access	2.2.2 Information access	rate	full rate/half rate		
		at UE	(TS 22.001)	interface			
		2.3	2.3.1 Visible network type		PSTN/ISDN/ PLMN		
		Inter-	2.3.2 National/Internat. interworking		international/national		
		working	2.3.3 Interface of TE to terminating		2 wire, analogue	4 wire S (B+B+D)	ME
	3.	3.1 Supplementary service provided			TS~~GSM~~ ~~4~~02.0~~6~~8 [5]		
	Gen	3.2 Quality of service					

Comments:

This service provides for speech conversation of a predefined group of service subscribers in half duplex mode on the radio link taking into account multiple mobile service subscribers involved in the VGCS call per cell. A detailed service description is given in TS~~GSM~~ ~~0~~42.068 [5].

This teleservice shall only be provided via a GERAN.

A.1.7 Voice Broadcast Service

Teleservice 92, Voice Broadcast Service							
	1.	1.1 Type or user Information			speech		
A	HLC	1.2 Layer 4 protocol functions			-		
T		1.3 Layer 5 protocol functions			-		
T		1.4 Layer 6 protocol functions			-		
R		1.5 Layer 7 protocol functions			-		
I	2.	2.1	2.1.1 Information transfer capability		speech (digital representation)		
B	LLC		2.1.2 Information transfer mode		circuit		
U		Inform	2.1.3 Information transfer rate		not applicable		
T		transfer	2.1.4 Structure		not applicable		
E			2.1.5 Establishment of connection		demand MO MT		
S			2.1.6 Communication configuration		broadcast		
			2.1.7 Symmetry		unidirectional		
		2.2	2.2.1 Signalling access		manual		
		Access	2.2.2 Information access	rate	full rate/half rate		
		at UE	(TS 22.001)	interface			
		2.3	2.3.1 Visible network type		PSTN/ISDN/ PLMN		
		Inter-	2.3.2 National/Internat. interworking		international/national		
		working	2.3.3 Interface of TE to terminating		2 wire, analogue	4 wire S (B+B+D)	ME
	3.	3.1 Supplementary service provided			TS~~GSM~~ ~~0~~42.069 [6]		
	Gen	3.2 Quality of service					

Comments:

This service provides for the distribution of speech, generated by a service subscriber, to all or a predefined group service subscribers located in this area. A detailed service description is given in TS~~GSM~~ ~~0~~42.069 [6].

This teleservice shall only be provided via a GERAN.

Annex B:
Change history

Change history											
TSG SA#	**SA Doc.**	**SA1 Doc**	**Spec**	**CR**	**Rev**	**Rel**	**Cat**	**Subject/Comment**	**Old**	**New**	**WI**
Dec 1999			02.03					Transferred to 3GPP SA1	8.0.0	3.0.0	
SA#06			02.03						3.0.0		
SP-06	SP-99519	S1-991025	22.003	001		R99	D	Mainly an editorial update for GSM/3GPP use	3.0.0	3.1.0	
SP-07	SP-000069	S1-000140	22.003	002		R99	D	Editorial modification for change of SMS-CB to CBS and to correct the references	3.1.0	3.2.0	
SP-07	SP-000071	S1-000162	22.003	003		R00	B	Addition of Wideband AMR	3.1.0	4.0.0	
SP-10	SP-000687	S1-000866	22.003	004	1	Rel-4	C	Removal of TS61 and TS62 in NT mode from GSM in Rel-4 and later releases	4.0.0	4.1.0	FAX
SP-12	SP-010243	S1-010563	22.003	007		Rel-4	A	Removal of Voice Group Service	4.1.0	4.2.0	VGCS

History

Document history		