Technical Specification Group Services and System Aspects
Meeting #20, Hämeenlinna, Finland, 09-12 June 2003

TSGS#20(03)0351

Source: **SA1**

Title: **CR to 22.101 on Tidy-up of Subscriber Identification requirements (Rel-5/6)**

Document for: **Approval**

Agenda Item: **7.1.3**

SA	Doc. No.	Spec	CR	Rev	Phase	Cat	Subject	Vers	New Vers	SA1 Doc.No.
SP-20	SP-030351	22.101	124	1	Rel-5	F	Alignment of Subscriber Identification requirements to current implementation	5.9.0	5.10.0	
SP-20	SP-030351	22.101	125	1	Rel-6	A	Alignment of Subscriber Identification requirements to current implementation	6.3.0	6.4.0	

CR-Form-v7

CHANGE REQUEST

⌘ **TS 22.101** **CR** **124** ⌘ **rev** **1** ⌘ Current version: **5.9.0** ⌘

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

Title:	⌘	Alignment of Subscriber Identification requirements to current implementation
Source:	⌘	Siemens
Work item code:	⌘	TEI 5
Date:	⌘	24/03/2003
Category:	⌘	**F**
Release:	⌘	Rel-5

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

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

Reason for change:	⌘	This CR aligns requirements on subscriber identification to current implementation. Chapter 11.3 of TS 22.101 is very outdated and confusing. Text was simplified and corrected to reflect the current status. This issue was noted after CR (SP-020651) was approved, which incorrectly deleted SIM references from several places in this chapter.
Summary of change:	⌘	(a) The requirements in chapter 11 (Numbering Principles), that relate to identification requirements rather than to numbering principles have been shifted to a new chapter 11a (Identification Requirements). These are 11.3 (User / USIM identification), 11.4 (Terminal Identification) and 11.5 (Home Environment / Serving Network Identification) (b) The sub-chapter "User / USIM identification" has been renamed "Subscriber Identification" This sub-chapter has been tidied up to clarify the requirements contained therein (c) The requirement for the network to be able to support UEs containing a SIM has been re-established (however, UE support of SIM is optional).
Consequences if not approved:	⌘	The standard could be understood in a way, that no SIM identification in the network is necessary.

Clauses affected:	⌘	11, new clause 11a
Other specs	⌘	Y: ☐ N: X — Other core specifications ⌘

Affected:			
		X	Test specifications
		X	O&M Specifications
Other comments:	⌘		

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

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

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

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

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 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.

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~~Void

~~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 USIM, and optionally SIM, being registered on their network. This shall require an identity scheme which uniquely identifies each 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 USIMs, and optionally SIMs, (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~~Void

~~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].~~

11.5 ~~Home Environment / Serving Network Identification~~Void

~~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 3GPP TS 22.079 [8] for some scenarios.

~~12~~11a Identification Requirements

~~12~~11a.1 Subscriber Identification

In 3GPP the identity of a subscriber is encoded in a identity module application which is contained on a UICC or on a GSM SIM card. The UICC or GSM SIM card is a removable component of the User Equipment. Three types of identity modules are used in the 3GPP system:

- Universal Subscriber Identity Module (USIM)
- IMS Subscriber Identity Module (ISIM)
- Subscriber Identity Module (SIM) according to GSM

General requirements:

- In the 3GPP system each subscriber shall be uniquely identifiable.

- The serving networks shall be able to authenticate any subscriber that roams onto their network
- If a UE, that is registered on the serving network, contains a GSM SIM card or a UICC containing a identity module application, the serving network shall be able to identify the associated home PLMN.

Note 1: UE support of GSM SIM is optional.

Note 2: See the chapter (USIM, UICC and Terminal) of the present specification for a reference, which GSM phase SIMs need to be supported by the network.

~~12~~11a.2 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].

~~12~~11a.3 Home Environment / Serving Network Identification

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.

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 (3GPP TS 22.004 [5]), may use MMI procedures specified in 3GPP TS 22.030 [6] and existing 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]

13 UICC, USIM and Terminal

This clause defines the functional characteristics and requirements of the User Service Identity Module (USIM) and ISIM (IM Services Identity Module). The USIM/ISIM are applications residing on a UICC.

13.1 The USIM/ISIM and User Profiles

13.1.1 The USIM

Every 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 USIM.

The USIM shall be used to provide security features.

For access to services, provided by PS or CS CN domains, a valid USIM shall be required.

The USIM shall be able to support SIM Application Toolkit as specified in 3GPP TS 22.038 [3].

The USIM shall reside on a UICC, 3GPP specifications shall adopt both of the GSM SIM card physical formats. Other formats may also be supported. USIM specific information shall be protected against unauthorised access or alteration.

It shall be possible to update USIM specific information via the air interface, in a secure manner.

Access to the IMS services shall be possible using 3GPP release 99 and release 4 UICCs.

Annex A describes a number of features that may optionally be supported by the UE and thus USIM.

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 GERAN only Terminals

In Release 5 and later, terminals supporting only GERAN shall support USIM.

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.

13.1.5 The ISIM

Access to the IMS services shall be possible using an ISIM application.

The ISIM shall be sufficient for providing the necessecary security features for the IMS and IMS only.

The ISIM shall reside on a UICC. ISIM specific information shall be protected against unauthorised access or alteration.

It shall be possible to update ISIM specific information via the air interface, in a secure manner.

In Rel5 the ISIM application shall require the presence of a USIM application on the same UICC.

13.2 The UICC

Access to services via 3GPP system with a single UICC shall be possible.

13.2.1 The UICC and Applications other than the USIM or ISIM

It shall be possible for the UICC to host other applications in addition to the USIM or ISIM, 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 UICC applications are: USIM, ISIM, 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.

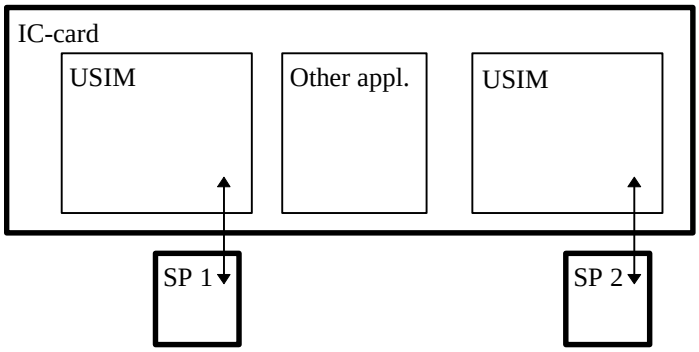

Figure 3 Example of a Multifunction UICC

13.3 Terminals and Multiple UICCs

A single terminal may support the use of multiple UICC (e.g with applications like USIM 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, the requirements of 11.1.4 shall apply.

If the UICC with the active USIM is removed from the mobile terminal during a call (except for emergency calls), the call shall be terminated immediately. If the UICC with an active ISIM is removed during an IMS session the IMS session shall be terminated.

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 USIM. Optional support of GSM phase 2, 2+, 3GPP Release 99 and Release 4 SIM cards [32]. Phase 1, 5V SIM cards shall not be supported. Support for the SIM is optional for the UE, however, if it is supported, all the mandatory requirements for SIM shall be supported in the UE;

  Note: There is no Release 5 specification for the SIM, and therefore references to "SIM" apply to earlier releases.

- 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 UE 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/USIM, 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 UE.

15 Relationship between subscription and service delivery

15.1 Subscription

A subscription describes the commercial relationship between the subscriber and the service provider.

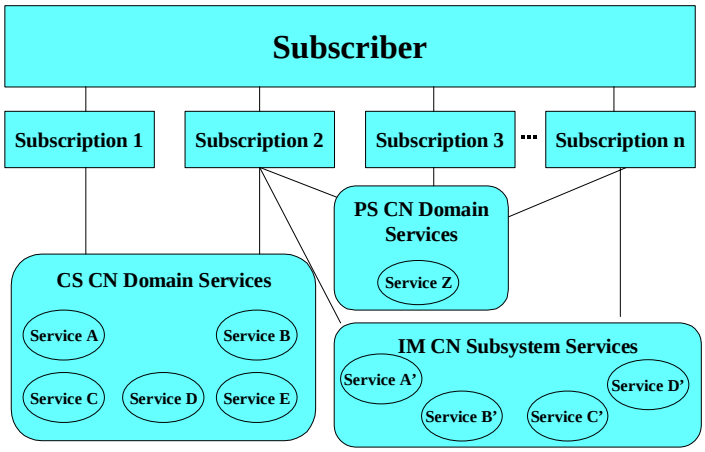

Figure 4: Subscriber, subscription and services relationship

A subscription to anoperator 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. Subscription to IP Multimedia Services shall be dependent on a subscription to PS CN Domain services.

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

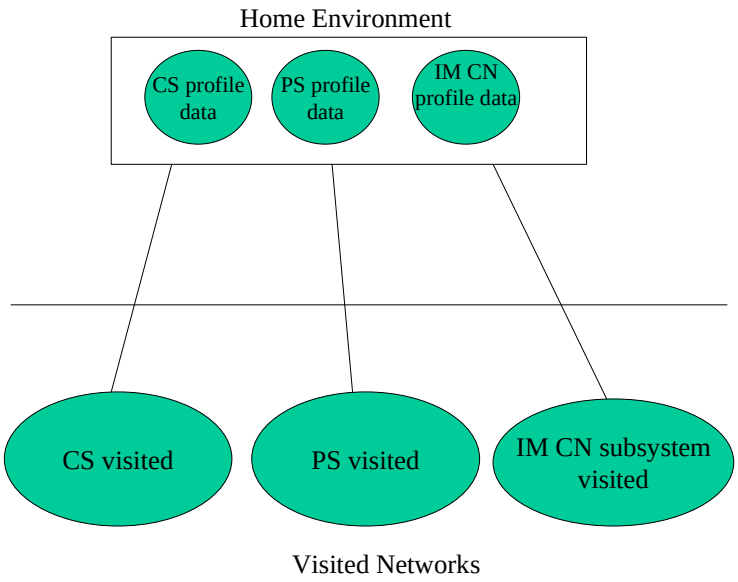

Figure 5: Roaming requiremetns

- 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 3GPP TS 22.129 [9].

19 Network Selection

Network selection procedures are defined in 3GPP TS 22.011 [11].

Other procedures may be offered by the UE.

20 Security

Security matters are considered in 3GPP TS 21.133 [15] and 3GPP TS 33.120 [16].

CR-Form-v7

CHANGE REQUEST

⌘ **TS 22.101** **CR** **125** ⌘ **rev** **1** ⌘ Current version: **6.3.0** ⌘

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

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Rel-6 (Release 6)

Reason for change:	⌘	This CR aligns requirements on subscriber identification to current implementation. Chapter 11.3 of TS 22.101 is very outdated and confusing. Text was simplified and corrected to reflect the current status. This issue was noted after CR (SP-020651) was approved, which incorrectly deleted SIM references from several places in this chapter.
Summary of change:	⌘	(a) The requirements in chapter 11 (Numbering Principles), that relate to identification requirements rather than to numbering principles have been shifted to a new chapter 11a (Identification Requirements). These are 11.3 (User / USIM identification), 11.4 (Terminal Identification) and 11.5 (Home Environment / Serving Network Identification) (b) The sub-chapter "User / USIM identification" has been renamed "Subscriber Identification" This sub-chapter has been tidied up to clarify the requirements contained therein (c) The requirement for the network to be able to support UEs containing a SIM has been re-established (however, UE support of SIM is optional).
Consequences if not approved:	⌘	The standard could be understood in a way, that no SIM identification in the network is necessary.

Clauses affected:	⌘	11, new clause 11a
Other specs	⌘	Y: ☐ N: X — Other core specifications ⌘

Affected:			
		X	Test specifications
		X	O&M Specifications
Other comments:	⌘		

How to create CRs using this form:

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

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

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

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

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).

When the UE is connected via a I-WLAN, the addressing shall be based on Network Access Identifier (NAI) format (user@realm) as defined in RFC 2486 [33].

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 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.

11.1.2 Requirements for PS CN domain

None identified.

11.1.3 Requirements for IM CN subsystem

It shall be possible to offer number portability for E.164 numbers within IM CN subsystem. For further information see 3GPP TS 22.066 [7].

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~~Void

~~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 USIM, and optionally SIM, being registered on their network. This shall require an identity scheme which uniquely identifies each 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 USIMs, and optionally SIMs, (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~~Void

~~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].~~

11.5 ~~Home Environment / Serving Network Identification~~Void

~~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 3GPP TS 22.079 [8] for some scenarios.

11a Identification Requirements

11a.1 Subscriber Identification

In 3GPP the identity of a subscriber is encoded in a identity module application which is contained on a UICC or on a GSM SIM card. The UICC or GSM SIM card is a removable component of the User Equipment. Three types of identity modules are used in the 3GPP system:

- Universal Subscriber Identity Module (USIM)
- IMS Subscriber Identity Module (ISIM)
- Subscriber Identity Module (SIM) according to GSM

General requirements:

- In the 3GPP system each subscriber shall be uniquely identifiable.

- The serving networks shall be able to authenticate any subscriber that roams onto their network
- If a UE, that is registered on the serving network, contains a GSM SIM card or a UICC containing a identity module application, the serving network shall be able to identify the associated home PLMN.

Note 1: UE support of GSM SIM is optional.

Note 2: See the chapter (USIM, UICC and Terminal) of the present specification for a reference, which GSM phase SIMs need to be supported by the network.

11a.2 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].

11a.3 Home Environment / Serving Network Identification

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.

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 (3GPP TS 22.004 [5]), may use MMI procedures specified in 3GPP TS 22.030 [6] and existing 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]

13 UICC, USIM and Terminal

This clause defines the functional characteristics and requirements of the User Service Identity Module (USIM) and ISIM (IM Services Identity Module). The USIM/ISIM are applications residing on a UICC.

13.1 The USIM/ISIM and User Profiles

13.1.1 The USIM

Every 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 USIM.

The USIM shall be used to provide security features.

For access to services, provided by PS or CS CN domains, a valid USIM shall be required. Optionally, SIM according to GSM phase 2, GSM phase 2+, 3GPP release 99, 3GPP release 4 specifications may be supported.

The USIM shall be able to support SIM Application Toolkit as specified in 3GPP TS 22.038 [3].

The USIM shall reside on a UICC, 3GPP specifications shall adopt both of the GSM SIM card physical formats. Other formats may also be supported. USIM specific information shall be protected against unauthorised access or alteration.

It shall be possible to update USIM specific information via the air interface, in a secure manner.

Access to the IMS services shall be possible using 3GPP release 99 and release 4 UICCs.

Access via a I-WLAN shall be possible using earlier releases (than the current release) of the UICC or using a SIM.

Annex A describes a number of features that may optionally be supported by the UE and thus USIM.

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 GERAN only Terminals

In Release 5 and later, terminals supporting only GERAN shall support USIM.

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.

13.1.5 The ISIM

Access to the IMS services shall be possible using an ISIM application.

The ISIM shall be sufficient for providing the necessecary security features for the IMS and IMS only.

The ISIM shall reside on a UICC. ISIM specific information shall be protected against unauthorised access or alteration.

It shall be possible to update ISIM specific information via the air interface, in a secure manner.

In Rel5 the ISIM application shall require the presence of a USIM application on the same UICC.

13.2 The UICC

Access to services via 3GPP system or via an I-WLAN with a single UICC shall be possible.

13.2.1 The UICC and Applications other than the USIM or ISIM

It shall be possible for the UICC to host other applications in addition to the USIM or ISIM, 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 UICC applications are: USIM, ISIM, 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.

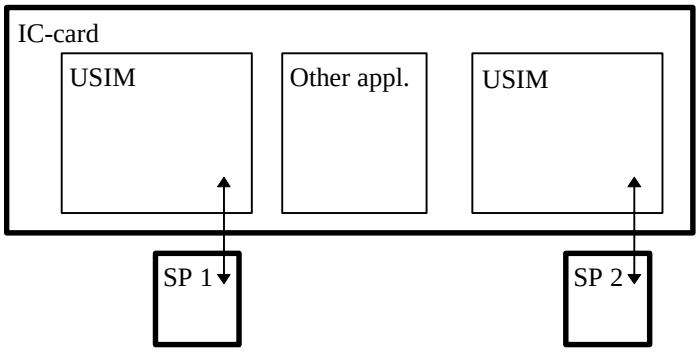

Figure 3 Example of a Multifunction UICC

13.3 Terminals and Multiple UICCs

A single terminal may support the use of multiple UICC (e.g with applications like USIM 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, the requirements of 11.1.4 shall apply.

If the UICC with the active USIM is removed from the mobile terminal during a call (except for emergency calls), the call shall be terminated immediately. If the UICC with an active ISIM is removed during an IMS session the IMS session shall be terminated.

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 USIM. Optional support of GSM phase 2, 2+, 3GPP Release 99 and Release 4 SIM cards [34]. Phase 1, 5V SIM cards shall not be supported. Support for the SIM is optional for the UE, however, if it is supported, the mandatory requirements for SIM shall be supported in the UE;

  Note: There is no Release 5 specification for the SIM, and therefore references to "SIM" apply to earlier releases.

- 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 UEto 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/USIM, 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 UE.

15 Relationship between subscription and service delivery

15.1 Subscription

A subscription describes the commercial relationship between the subscriber and the service provider.

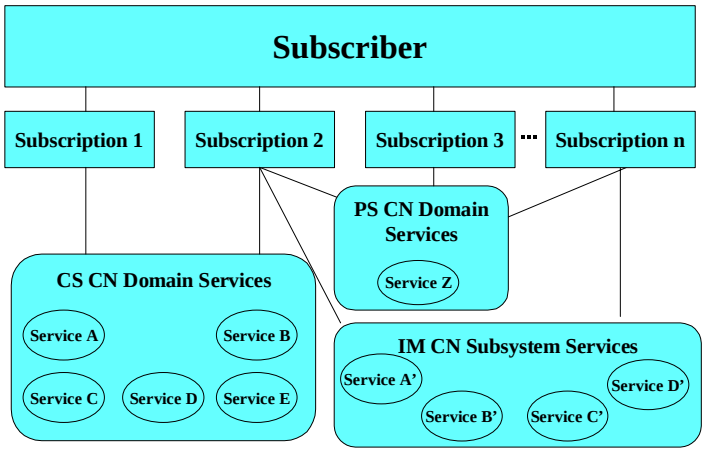

Figure 4: Subscriber, subscription and services relationship

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

- the radio access technologies over which the subscriber may access their services e.g. I-WLAN.

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.

Charging in the 3GPP system shall not be compromised when access is via an I-WLAN.

Charging and accounting solutions shall support the shared network architecture so that end users can be appropriately charged for their usage of the shared network, and network sharing partners can be allocated their share of the costs of the shared network resources.

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

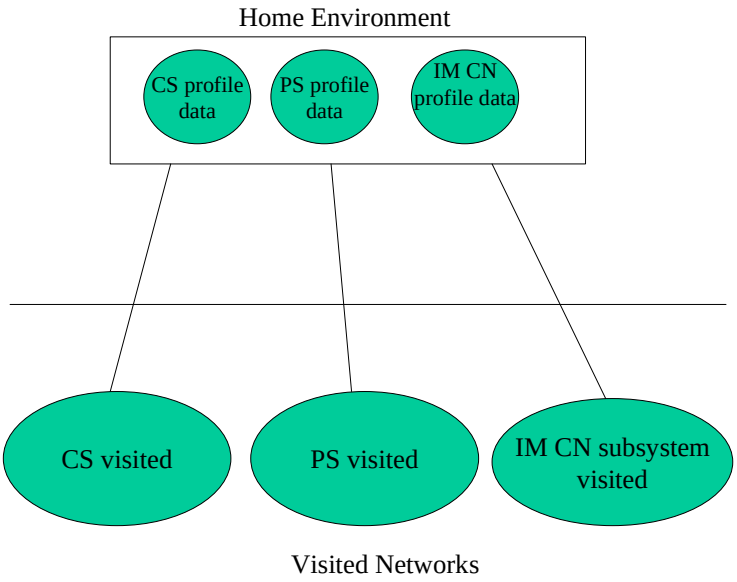

Figure 5: Roaming requirements

- 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
- Roaming from the home environment to I-WLANs is required. The I-WLAN may be part of the home environment or a visited network. The interworking shall support the case where a 3GPP operator does not operate the I-WLAN.

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 environment 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 3GPP TS 22.129 [9].

19 Network Selection

Network selection procedures are defined in 3GPP TS 22.011 [11].

Other procedures may be offered by the UE.

20 Security

Security matters are considered in 3GPP TS 21.133 [15] and 3GPP TS 33.120 [16].