3GPP TSG-SA WG2 meeting #24   **Tdoc S2-021526**
Madrid, Spain, 22nd – 26th April 2002

Title:	**IMS Identities for Rel 99/R4 UICC**
	(Response to:
	-LS from SA1 Assumptions on IMS identities and UICCs - S1-020871
	-LS from CN1 Liaison Statement on IMS Access with a R99/REL-4 USIM - N1-020875
	-LS from SA3 The use of USIMs and ISIMs for IMS- S3-020167)
Source:	SA2
To:	SA1, SA3, CN1, CN4, T3

Contact Person:
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Attachments: S2 Approved 3 CRs (S2-0211524, S2-0211525, S2-021344) & Discussion Paper for SA2 decision (S2-201004)

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1. Overall Description:

SA2 would like to thank SA1 & CN1 for the LS related to support of Pre-Rel 5 UICC access to IMS.

SA2 would like to thank SA1 on the clarification of the requirements on the public user identities in IMS (included below). SA2 agrees with these principles that SA1 has identified and developed solutions according to these in order to support pre-Rel 5 UICCs to access IMS.

"From the perspective of user's public identities:

>   1.   *If a Release 99/4 UICC is inserted in a Release 5 IMS MT then at registration the UE shall derive an appropriate identity from the IMSI and send this to the network.*
>   2.   *If a Release 5 UICC is inserted in an a Release 5 IMS MT then at registration the UE shall use the appropriate identity from the R5 UICC and send this to the network.*
>   3.   *IMSI-derived information is not kept statically within the UE especially on change of UICC*
>   4.   *IMSI-derived information is not used as a user identity in communicating from person to person (i.e. it is not used as a form of CLI)."*

In addition, SA2 would like to inform to SA3 and SA1 that within SA2 operators have required the flexibility to use IMSI-derived Public User Identity for the users. As such, the agreed CRs for 23.228 strongly recommend that IMSI-derived public user identity should be barred from being used for IMS procedures but do not mandate it.

The current solution is based on the principle that the Implicit Registration set shall be active for the IMSI-derived public user identity (termed as Temporary Public User Identity), this user identity is strongly recommended to be barred for use in IMS procedure after initial registration procedure is completed.

SA2 has included the approved CRs for stage 2 and the discussion paper that has been used to develop the total solution for other WGs consideration.

2. Actions:

To SA1, SA3

ACTION: To confirm that SA1 & SA3 do not see any problems with the strong recommendation that IMSI-derived public user identity should not be used within IMS, rather than explicitly prohibiting such use.

To CN1, CN4

ACTION:

-To develop the necessary stage 3 specifications according to stage 2 solutions attached in the CRs and the discussion paper. SA2 believes that at a minimum the following specifications are affected: 23.003, 24.228, 24.229, 29.228, and 29.229.

- SA2 recommends that CN1 & CN4 WGs jointly agree on the changes to TS 23.003 and send the appropriate Liaison statement to GSM-Association, based on the work in progress related to the Home domain name registration as described in the attached discussion paper.

To T3

ACTION: To ensure that the implications and assumptions on the UICC role to support pre-Rel 5 UICC are accurate. If there are any misunderstandings in the described procedures in the attached discussion paper, then to inform SA2 as soon as possible as a solution for this issue within Rel 5 is needed.

3. Date of Next SA2 Meetings:

Title	Date	Location	Country
SA2#25	24 – 28 June 02		Finland

Source:	**Ericsson, Nokia**
Title:	**Use of Pre-R5 USIM for IMS**
Agenda item:	8 IMS
Document for:	**DISCUSSION and DECISION**

1   Introduction

There is requirement, that it shall be possible to access IMS by using an R'99/Rel-4 UICC. There have been some discussions on how the format of the identities would look like and also there have been some security and privacy concerns on using the IMSI to define e.g. a Public User Identity. This paper tries to clarify these issues.

2   Discussion

2.1   Generation of IMS parameters

The following parameters are supposed to be stored on the ISIM/UICC and are needed to access IMS services:
- The IMS Public User Id (IMPU)
- The IMS Private User Id (IMPI)
- The domain name of the home network

If the UICC is an R'99 or Rel-4 UICC then it doesn't contain any ISIM, i.e. the parameters above must be generated.

When generating such identities the following should be taken into account:
- Existing data e.g. USIM or related data should be used so that the user can be uniquely identified within IMS
- "Plastic roaming" should be possible and easy
- The IMPI and IMPU should uniquely identify the user
- The existing security and privacy level should not be changed
- If possible existing procedures and parameters should be reused

There have been discussions on generating IMS parameters by different means such as using the IPv6 address, IMEI, by user input etc. Using the IPv6 address as base for IMS parameters is discouraged as the IPv6 address is likely to change when activating/deactivating PDP contexts. Also, HSS do not normally keep the IPv6 address of the user for stateless and stateful address configuration and static IP addresses are not recommended by IETF. Due to the requirement of "plastic roaming" it is not recommended to use the IMEI as it identifies the user equipment only. And if possible we must avoid the need for user configuration. Also note that Cx/Dx queries will require support of uniquely identifying the user based on IMPU/IMPI and use of IPv6 would not be possible in such cases.

The IMSI on the USIM is the only parameter that uniquely identifies the USIM/user and is the best candidate to base the generation of IMS parameters on. However, the IMSI should not be exposed more than necessary and is currently only sent once in clear text over the air interface. After that a temporary (P-TMSI) identity is used and ciphering is also possible. The part of the IMSI that shouldn't be exposed is the user part of the IMSI, i.e. the MSIN. That is, the MCC and the MNC could be used to generate the domain name of the home network (see chapter Format of IMS parameters for more details). IMPI is also to be kept unexposed as far as possible and is only used during the registration, i.e. not sent out of the IMS domain, i.e. there should be no problem to base the generated IMPI on the IMSI.

The IMPU is to be used for routing and must be included in e.g. INVITE's. Therefore the IMPU to be used for routing cannot be based on the IMSI.

However, CN1 has specified procedures to allow implicit registration. The same procedures are also used for network initiated re-authentication, i.e. the UE is mandated to support these procedures and they can be used to obtain some IMPU(s) that can be used for routing. Chapter 2.2 tries to clarify how the implicit registration feature is used to obtain the additional IMPU(s).

2.2 Getting IMPU for routing using implicit registration procedure

The following flow shows how a temporary IMPU (TIMPU), which is generated from an IMSI, is used during a registration to obtain the IMPU1 and IMPU2 that are to be used in sessions. Following implications foreseen:

The temporary IMPU (TIMPU) used for registration will remain in use until SUBSCRIBE/NOTIFY mechanism is used by the UE to receive the actual IMPU(s).

2) There is a (very) short period in time - between REGISTER and NOTIFY -, where the user is registered, but cannot initiate a session .The S-CSCF can support sessions as soon as the set of implicitly registered public Ids are received in the S-CSCF.

3) Besides REGISTER, SUBSCRIBE, NOTIFY, all other methods must not use the temporary IMPU (e.g. INFO).

4) Special handling is required in the UE. E.g. it must not display the temporary IMPU to the user and must not use the temporary IMPU for session handling.

5) The temporary IMPU must not be printed on a business card. It shall not be displayed in any way or allowed to be used for session handling.

6) Re-Registrations: Due to the fact that re-registrations require a Request-URI with a domain name, it has to be derived from the IMSI. Therefore, re-registrations use all the temporary parameters, the same as an initial registration, except for the TIMPU.
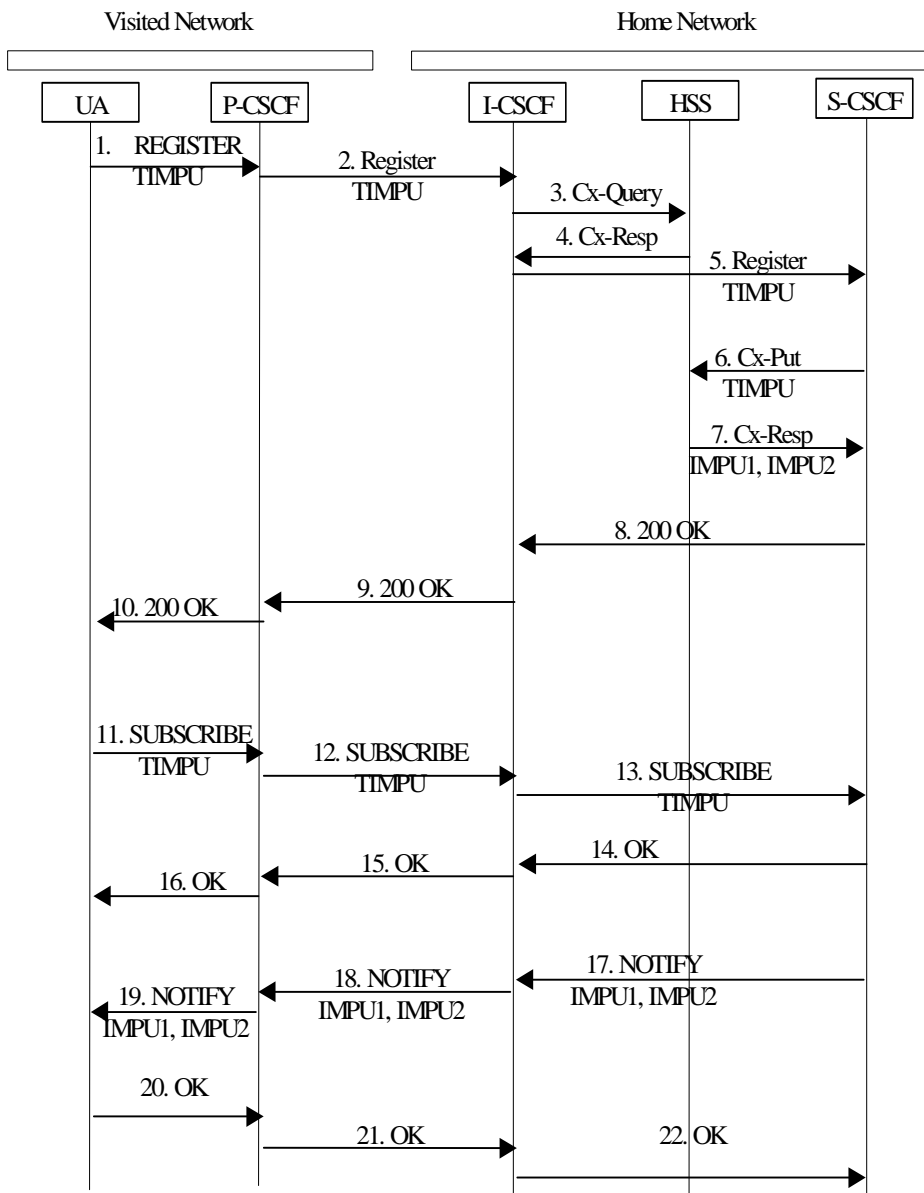
1-2. The REGISTER contains the TIMPU that is generated based on the IMSI

3-5. The HSS uses the TIMPU as a key to the database and finds that the TIMPU is the same as the IMPI. The HSS TIMPU is already set as barred for routing.

6. The S-CSCF includes the TIMPU in the Cx query to HSS

7. Implicit registration is active for IMPU1 and IMPU2. The HSS includes the IMPU1, IMPU2 and TIMPU in the response. However, the TIMPU is set as barred for routing

8-10. S-CSCF considers the IMPU1, IMPU2 and TIMPU to be registered, but the TIMPU is set as barred for routing. That is, S-CSCF will not allow it to be used in originating or terminating sessions.

11-13. The UE subscribes to its own registration state using the TIMPU

14-16. The S-CSCF accepts the request even though the TIMPU is not to be considered as registered

17-19. The S-CSCF replies with the registered IMPU1 and IMPU2, i.e. the TIMPU is not included

20-22. The UE stores the registered IMPU1 and IMPU2 and accepts the notification

The UE displays the IMPU1 and IMPU2 for the user. IMPU1 and IMPU2 can now be used to initiate a session. The TIMPU shall not be displayed to the user. It is the IMPU1 and IMPU2 that are written on the business card etc.
Note that, after step 22, UE should use the IMPUs received from the network for session set up processes.
In general, barring an IMPU to have IMS access should be a function applying to all IMPUs and as such shall be included in the Cx reference point as part of service profile of an IMPU.
This function includes that the UE shall not receive this barred IMPU back when Subscribe/Notify mechanism is used, and the IMPU shall not be sent to any AS either, then there is no need for S-CSCF to differentiate between TIMPU and IMPU.

2.3   Format of IMS parameters

2.3.1   Domain Name

If a new Domain Name is allocated for 3GPP then it would be possible to use the first "5 or 6" digits of the IMSI for part of the domain name, i.e. the MCC (Mobile Country Code) and the MNC (Mobile Network Code). An example of such a domain name would then be e.g. 234.150.3gppnetwork.org. The new domain name appended (i.e. 3gppnetwork.org) is only an example and would have to be registered at e.g. IANA, possible through GSM Association. It is suggested that the new domain name is a Second Level Domain (SLD) sorted under a generic Top Level Domain e.g. ".org".
Note that any new domain name should not be restricted for use for sole purpose of handling ISIM-less case. In general, operators shall be able to use the same domain name for ISIM and ISIM-less cases.

The details of how to specify the Domain Name could be discussed. A number of different possibilities exist. Two of them are described below, using the domain name 3gppnetwork.org, MCC = 234 and MNC = 150:

1. mnc.mcc.3gppnetwork.org, example: 150.234.3gppnetwork.org
2. digit6.digit6.digit4.digit3.digit2.digit1.3gppnetwork.org, example: 6.5.4.3.2.1.3gppnetwork.org

Stage 3 work should clarify if optimisations are needed e.g. to minimise number of DNS entries, but approach 1 seems to be straightforward and does satisfy our needs.

Also if the MNC is only 2 digits, e.g. 15 (and the first MSIN digit is "0"):

1. 15.234.3gppnetwork.org
2. 150.234.3gppnetwork.org
3. 0.15.234.3gppnetwork.org

Here it is seen that some optimisation and recommendation could be valuable. It is proposed that approach 1 should be used, as the UE will know from the Administrative Data (EF_{AD}) on the USIM (which is mandatory, see TS 31.102) that the MNC will have two digits. If the UE wouldn't know how many digits the MNC is composed of then approach 3 would have been the best, as the DNS structure could then be optimised.

Also, it may be beneficial to add another level after the 3gppnetwork.org, e.g. "imsi" or something else if there is a desire not to explicitly state "imsi". This would make the use of the domain more future proof and avoid unnecessary checks, e.g. if the first entry is 3 digits etc. The Domain name would then be of the form mnc.mcc.xxxx.3gppnetwork.org, e.g. 150.234.imsi.3gppnetwork.org. The drafted text for 23.003 is currently based on the assumption that no additional level is added.

2.3.2 IMPI

The IMPI is only being sent during the registration phase, i.e. there is no privacy issue by using the whole IMSI as a base for generating the IMPI. The format shall be a NAI as specified in RFC2486 i.e. "user@domain". The "user"-part can be based on the whole IMSI and the domain part can be based on the MCC and MNC part of IMSI together with a new domain name as suggested in chapter 2.3.1 above.

Also, to make it easier to identify (e.g. in the HSS) the IMPI based on the IMSI it could be beneficial to add a string e.g. "IMSI" in front of the user part. The drafted text for 23.003 is currently based on the assumption that "IMSI" is not added in front of the user part, as other parts of this special IMPI can be used to identify it being based on an IMSI.

2.3.3 IMPU

The format of the IMPU shall be a SIP URL as specified in RFC2543 (soon RFC3261), but the IMPU is possibly sent out of the 3GPP operator's domain. If the IMPU is derived from the IMSI this must not be allowed. As discussed in chapter 2.2 above it is possible to avoid sending from the IMSI generated TIMPU out of the 3GPP network. Also, ciphering can be active between the UE and the RNC, i.e. the IMSI will not be sent in clear text over the air interface. To avoid unnecessary conversions it would be beneficial to use the generated IMPI as a temporary IMPU, i.e. TIMPU.

3   Proposal

The following are proposed:
* It is proposed to send a liaison to GSM Association to ask them to initiate the registration of e.g. "3gppnetwork.org" in IANA or to inform 3GPP if there exists a domain name that can be reused with a next level differentiation based on a service, for example IMSI as described in this document.
* Agree on the companion CR for 23.228
* Recommend the draft text below for 23.003 and send a liaison to CN4 &CN1. The LS will ask CN WG4s to adopt the intention of the draft text for 23.003 and make necessary modification in a CR to 23.003. CN4 shall also evaluate the impacts on the specs for Cx/Dx interfaces and ensure the changes are made in 29.228 & 29.229. .
* In addition, request CN1 to incorporate the functionality into 24.228/24.229.

Draft proposed text for 23.003 based on the discussion paper N1-020608 from Vodafone:

x.x   Numbering, addressing and identification within the IP Multimedia core network Subsystem (IMS)

This chapter describes the format of the parameters needed to access the IM CN Subsystem. For further information on the use of the parameters see TS 23.228.

x.x.1 Home Network Domain Name

The home network domain name shall be in the form of an Internet domain name, e.g. operator.com, as specified in IETF documentation.

In case there is no ISIM application, the home network domain name shall be derived from the IMSI as described below in the following steps:
1.   Remove any non-digit characters from the IMSI, leaving a string of 15 or less digits.
2.   Take the first 5 or 6 digits and separate them into MCC and MNC with ".".
3.   Reverse the order of the MCC and MNC5.   Append the result with ".3gppnetwork.org"

An example of how it will look is as follows:
IMSI in use: 234150999999999
Where
MCC: 234
MNC: 150

MSIN: 999999999
Home Domain Name:150.234.3gppnetwork.org

x.x.2 Private User Identity (IMPI)

The Private User Identity shall take the form of an NAI (RFC2486) and has the form user@domain.

In case the IMPI is not known, because of lack of ISIM application, the IMPI is derived from the IMSI.

The following steps show how to build the IMPI out of the IMSI:

1.   Remove any non-digit characters from the IMSI, leaving a string of 15 or less digits.
2.   Use the result from step 1, i.e. the whole string of digits, as the user part of the IMPI
3.   The first digits of the IMSI, i.e. MNC and MCC will be converted into a domain name, as described in section x.x.1.

The result will be an IMPI of the form imsi@mnc.mcc.3gppnetwork.org. For example: If the IMSI is 234150999999999 (MCC = 234, MNC = 15), the IMPI then takes the form 234150999999@15.234.3gppnetwork.org

x.x.3 Public User Identity (IMPU)

The Public User Identity shall take the form of a SIP URI, see RFC3261. A SIP URI shall take the form "sip:user@domain".

In case there is no ISIM application to host the IMPU, a temporary IMPU shall be derived based on the IMSI as it per IMPI. The "user@domain" part shall then be equal to the IMPI, which is described in chapter x.x.2. That is, the IMPI will be appended to the string "sip:".
With the same example as in chapter x.x.2 the temporary IMPU will be
"sip:234150999999@15.234.3gppnetwork.org".

3GPP TSG-SA2#24 Meeting
Madrid, Spain, 22-26 April 2002

Tdoc S2-0201344

CR-Form-v4

CHANGE REQUEST

| ⌘ | **23.228** CR **155** | ⌘ | **1** | ⌘ | Current version: | **5.4.1** | ⌘ |

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Proposed change affects: ⌘ (U)SIM ☐   ME/UE ☐   ISIM ☐   Core Network **X**

Title: ⌘	Clarifying function of barring IMPU as a function	
Source: ⌘	Ericsson, Nokia, Dynamicsoft, Siemens	
Work item code: ⌘	IMS-CCR	**Date:** ⌘ 22/04/02
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: ⌘	Clarify that it shall be possible to bar an IMPU from access to sessions in the IMS domain, without such possibility, the solution to support pre-Rel 5 UICC (without ISIM) requires a more complex solution. In addition, it is understood that such function is necessary even without the ISIM-less scenario, as there may be cases where an IMPU is part of the ISIM application within the UICC. The user/operator does not want to use this IMPU for some reason and a simple way of preventing should follow the same principle as described in case of ISIM-less case.
Summary of change: ⌘	Add indication per IMPU barring info that will prevent an IMPU to be used for session, this is applied after Registration has been completed.
Consequences if not approved: ⌘	Preventing IMPUs from being used even when the IMPUs must not be allowed for sessions.

Clauses affected: ⌘	4.6.3 , 5.2.1
Other specs **Affected:** ⌘	**X** Other core specifications ⌘ 24.228, 24.229, 29.228, 29.229
	☐ Test specifications
	☐ O&M Specifications
Other comments: ⌘	This solution is used to develop the Pre-Rel 5 IMS user access (ISIM-less UICC), see contributions related to this (S2-021004, S2-021005).

1.1

*****First change *****

4.6.3   Serving-CSCF

The Serving-CSCF (S-CSCF) performs the session control services for the UE. It maintains a session state as needed by the network operator for support of the services. Within an operator's network, different S-CSCFs may have different functionalities. The functions performed by the S-CSCF during a session are:

Registration

- May behave as a Registrar as defined in RFC 3261 [12] or subsequent versions, i.e. it accepts registration requests and makes its information available through the location server (eg. HSS).

Session-related and session-unrelated flows

- Session control for the registered endpoint's sessions. It shall reject IMS communication to/from public user identity(s) that are barred for IMS communications after completion of registration, as described in subclause 5.2.1.

- May behave as a Proxy Server as defined in RFC 3261 [12] or subsequent versions, i.e. it accepts requests and services them internally or forwards them on, possibly after translation.

- May behave as a User Agent as defined in RFC 3261 [12] or subsequent versions, i.e. it may terminate and independently generate SIP transactions.

- Interaction with Services Platforms for the support of Services

- Provide endpoints with service event related information (e.g. notification of tones/announcement together with location of additional media resources, billing notification)

- On behalf of an originating endpoint (i.e. the originating subscriber/UE)

    - Obtain from a database the Address of the I-CSCF for the network operator serving the destination subscriber from the destination name of the terminating subscriber (e.g. dialled phone number or SIP URL), when the destination subscriber is a customer of a different network operator, and forward the SIP request or response to that I-CSCF.

    - When the destination name of the terminating subscriber (e.g. dialled phone number or SIP URL), and the destination subscriber is a customer of the same network operator, forward the SIP request or response to an I-CSCF within the operator's network.

    - Depending on operator policy, forward the SIP request or response to another SIP server located within an ISP domain outside of the IM CN subsystem.

    - Forward the SIP request or response to a BGCF for call routing to the PSTN or CS Domain.

- On behalf of a destination endpoint (i.e. the terminating subscriber/UE)

    - Forward the SIP request or response to a P-CSCF for a MT procedure to a home subscriber within the home network, or for a subscriber roaming within a visited network where the home network operator has chosen not to have an I-CSCF in the path

    - Forward the SIP request or response to an I-CSCF for a MT procedure for a roaming subscriber within a visited network where the home network operator has chosen to have an I-CSCF in the path.

    - Modify the SIP request for routing an incoming session to CS domain according to HSS and service control interactions, in case the subscriber is to receive the incoming session via the CS domain.

    - Forward the SIP request or response to a BGCF for call routing to the PSTN or the CS domain.

Charging and resource utilisation:

- Generation of CDRs.

*****Second change *****

5.2.1 Requirements considered for registration

The following points are considered as requirements for the purpose of the registration procedures.

1. The architecture shall allow for the Serving-CSCFs to have different capabilities or access to different capabilities. E.g. a VPN CSCF or CSCFs in different stages of network upgrade.

2. The network operator shall not be required to reveal the internal network structure to another network. Association of the node names of the same type of entity and their capabilities and the number of nodes will be kept within an operator's network. However disclosure of the internal architecture shall not be prevented on a per agreement basis.

3. A network shall not be required to expose the explicit IP addresses of the nodes within the network (excluding firewalls and border gateways).

4. It is desirable that the UE will use the same registration procedure(s) within its home and visited networks.

5. It is desirable that the procedures within the network(s) are transparent to the UE, when it register with the IM CN subsystem.

6. The Serving-CSCF understands a service profile and the address of the functionality of the Proxy-CSCF.

7. The HSS shall support the possibility to bar a public user identity from being used for IMS communications. The S-CSCF shall enforce these barring rules for IMS. Examples of use for the barring function are as follows:

    -Currently it is required that at least one public user identity shall be stored in the ISIM application. In case the user/operator wants to prevent this public user identity from being used for IMS communications, it shall be possible to do so in the network without affecting the ISIM application directly.

    -In order to support pre-Rel 5 UICC accessing IMS services, a temporary public user identity is generated using IMSI. It is strongly recommended that the temporary public user identity be set to barred for IMS procedures.

3GPP TSG-SA2#24 Meeting　　　　　　　　　　　　　　　*Tdoc S2-021524*
Madrid, Spain, 22-26 April 2002

CR-Form-v4

CHANGE REQUEST

⌘　　　**23.228 CR 153**　⌘　　　**2-**　⌘　Current version: **5.4.1** ⌘

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Proposed change affects: ⌘　(U)SIM ☐　ME/UE **X**　　　　　ISIM ☐　Core Network **X**

Title: ⌘	Deriving IMS parameters from the USIM
Source: ⌘	Ericsson, Siemens, Nokia, Dynamicsoft
Work item code: ⌘	IMS-CCR　　　　　　　　　　　***Date:*** ⌘ 22/04/2002

Category: ⌘ **F**	***Release:*** ⌘ Rel-5

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   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: ⌘	There is a requirement to be able to use pre-R5 UICC for accesing IMS services.
Summary of change: ⌘	Added a requirement that Public Id, Private ID and Home Network domain will be derived from USIMs IMSI, if ISIM application isn't in the UICC. Added a clarification that the USIM data used to derive the Private Id shall uniquely identify the user. Also, added statement that the temporary Public Id derived from the IMSI shall not be exposed to the user and only used during registration to get other identities that are implicitly registered. The S-CSCF shall prevent the temporary Public Id from being used for sessions and any other IMS processes. Finally, added statement that implicit registration shall be active when a temporary Public Id is registered.
Consequences if not approved: ⌘	It will not be possible to use pre-R5 UICC to access IMS services.

Clauses affected: ⌘	4.3.3.1, 4.3.3.2, 4.6.3 and 5.2.1

Other specs Affected: ⌘	**X**	Other core specifications	⌘	23.003, 24.228, 24.229, 29.228, 29.229
	☐	Test specifications		
	☐	O&M Specifications		

Other comments: ⌘	Is dependent on the other CRs regarding Implicit Registration and Barring of IMPUs.

*****First change *****

4.3.3   Identification of users

There are various identities that may be associated with a user of IP multimedia services. This section describes these identities and their use.

4.3.3.1   Private user identities

Every IM CN subsystem subscriber shall have a private user identity. The private identity is assigned by the home network operator, and used, for example, for Registration, Authorisation, Administration, and Accounting purposes. This identity shall take the form of a Network Access Identifier (NAI) as defined in RFC 2486 [14]. It is possible for a representation of the IMSI to be contained within the NAI for the private identity.

- The Private User Identity is not used for routing of SIP messages.

- The Private User Identity shall be contained in all Registration requests, (including Re-registration and De-registration requests) passed from the UE to the home network.

- An ISIM application shall securely store the Private User Identity. It shall not be possible for the UE to modify the UICC's Private User Identity information.

- The Private User Identity is a unique global identity defined by the Home Network Operator, which may be used within the home network to uniquely identify the user from a network perspective.

- The Private User Identity shall be permanently allocated to a user (it is not a dynamic identity), and is valid for the duration of the user's subscription with the home network.

- The Private User Identity is used to identify the user's information (for example authentication information) stored within the HSS (for use for example during Registration).

- The Private User Identity may be present in charging records based on operator policies.

- The Private User Identity identifies the subscription (e.g. IM service capability) not the user.

- The Private User Identity is authenticated only during registration of the subscriber, (including re-registration and de-registration).

- The HSS and S-CSCF need to obtain and store the Private User Identity.

- If the UICC does not contain an ISIM application, then the private user identity shall be derived from the USIM's IMSI, which allows for uniquely identifying the user within the 3GPP operator's network. The format of the private user identity derived from the IMSI is specified in 3GPP TS 23.003 [24].

4.3.3.2   Public user identities

Every IM CN subsystem subscriber shall have one or more public user identities [8]. The public user identity/identities are used by any user for requesting communications to other users. For example, this might be included on a business card.

- Both telecom numbering and Internet naming schemes can be used to address users depending on the Public User identities that the users have.

- The public user identity/identities shall take the form of SIP URL (as defined in RFC 3261 [12] and RFC2396 [13]) or E.164 numbers.

- An ISIM application shall securely store at least one Public User Identity (it shall not be possible for the UE to modify the Public User Identity), but it is not required that all additional Public User Identities be stored on the ISIM application.

- A Public User Identity shall be registered either explicitly or implicitly before the identity can be used to originate IMS sessions and IMS session unrelated procedures.

- A Public User Identity shall be registered either explicitly or implicitly before terminating IMS sessions and terminating IMS session unrelated procedures can be delivered to the UE of the user that the Public User Identity belongs to. Subscriber-specific services for unregistered users may nevertheless be executed as described in chapter 5.12.

- It shall be possible to register globally (i.e. through one single UE request) a subscriber that has more than one public identity via a mechanism within the IP multimedia CN subsystem (e.g. by using a Service Profile). This shall not preclude the user from registering individually some of his/her public identities if needed.

- Public User Identitys are not authenticated by the network during registration.

- Public User Identities may be used to identify the user's information within the HSS (for example during mobile terminated session set-up).

If the UICC does not contain an ISIM application , then:

- A Temporary Public User identity shall be derived from the USIM's IMSI, and shall be used during initial SIP registration procedures. The Temporary public user identity shall take the form of a SIP URL (as defined in RFC 3261 [12] and RFC 2396 [13]). The format of the Temporary public user identity is specified in 3GPP TS 23.003 [24].

- A Temporary public user identity shall not be displayed to the user and shall not be used for public usage such as displaying on a business card. It is strongly recommended that the Temporary Public User Identity is set to be barred. If the Temporary Public User Identity is barred:
  - the Temporary Public User Identity shall only be used during the registration to obtain implicitly registered Public User Identities.
  - the implicitly registered public user identities shall be used for session handling, in other SIP messages and at subsequent registration processes.

- After the initial registration, the UE shall only use the implicitly registered Public User Identity(s).

- A Temporary public user identity shall only be available to the CSCF and HSS nodes.

Note that in case of Temporary Public Identity is used, the user can not initiate any sessions until the implicitly registered public identities are available in the UE.

4.3.3.3 Routing of SIP signalling within the IP multimedia subsystem

Routing of SIP signalling within the IMS shall use SIP URLs. E.164 [2] format public user identities shall not be used for routing within the IMS, and session requests based upon E.164 format public user identities will require conversion into SIP URL format for internal IMS usage.

4.3.3.4 Relationship of private and public user identities

The home network operator is responsible for the assignment of the private user identifier, and public user identifiers; other identities that are not defined by the operator may also exist.
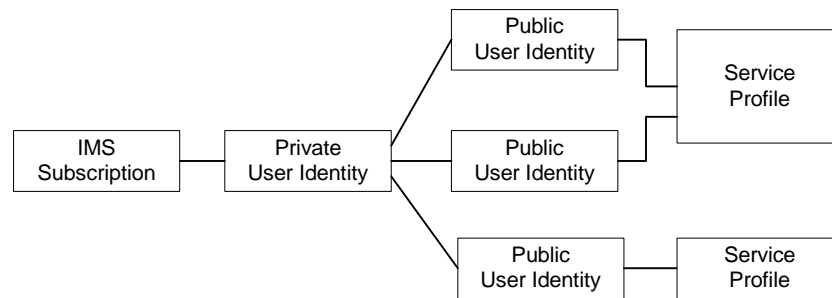
Figure 4.5: Relationship of the private user identity and public user identities

All Public user identities that are associated with the same Service Profile should have the same set of services. Public user identities that are associated with a different Service Profile could have a different set of services. Each Public user identity is only associated with a single Service Profile.

All Service Profiles that share the same Private user identity are associated to the same S-CSCF. Later releases may allow different Service Profiles that share the same Private user identity to be associated with different S-CSCFs.

An ISIM application shall securely store the home domain name of the subscriber. It shall not be possible for the UE to modify the information from which the home domain name is derived.

If the UICC does not have an ISIM application, then, the home domain name shall be derived from the Mobile Country Code and Mobile Network Code fields of the USIM's IMSI. The format of the home domain name is specified in 3GPP TS 23.003 [24].

The storage location of the Private User Identity, Public User Identity and home domain name for a standalone SIP Client could be stored on the ISIM.

It is not a requirement for a user to be able to register on behalf of another user or for a device to be able to register on behalf of another device or for combinations of the above for the IM CN subsystem for this release.

*****Second change *****

5.2   Application level registration procedures

The following sub-sections address requirements and information flows related to registration in the IP multimedia subsystem. Assumptions that apply to the various information flows are listed as appropriate.

5.2.1   Requirements considered for registration

The following points are considered as requirements for the purpose of the registration procedures.

1. The architecture shall allow for the Serving-CSCFs to have different capabilities or access to different capabilities. E.g. a VPN CSCF or CSCFs in different stages of network upgrade.

2. The network operator shall not be required to reveal the internal network structure to another network. Association of the node names of the same type of entity and their capabilities and the number of nodes will be kept within an operator's network. However disclosure of the internal architecture shall not be prevented on a per agreement basis.

3. A network shall not be required to expose the explicit IP addresses of the nodes within the network (excluding firewalls and border gateways).

4. It is desirable that the UE will use the same registration procedure(s) within its home and visited networks.

5. It is desirable that the procedures within the network(s) are transparent to the UE, when it register with the IM CN subsystem.

6. The Serving-CSCF understands a service profile and the address of the functionality of the Proxy-CSCF.

7. When a Temporary Public Identity has been used to register an IMS user, the implicit registration will ensure that the UE, P-CSCF & S-CSCF have public user Identity(s) for all IMS procedures after the initial registration has been completed

CR-Form-v4

CHANGE REQUEST

⌘   **23.228 CR** 154   ⌘ ev **2** ⌘ Current version: **5.4.1** ⌘

*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 **X**   Radio Access Network ☐   Core Network **X**

Title: ⌘	Clarification of the function "Implicit Registration"
Source: ⌘	Ericsson, Nokia, Dynamicsoft, Siemens
Work item code: ⌘	IMS-CCR	*Date:* ⌘	22nd April 2002

Category: ⌘ **F**	*Release:* ⌘ Rel-5

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

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

Reason for change: ⌘	Current Stage 2 spec do not clearly define what is Implicit registration
Summary of change: ⌘	Add functional definition/behaviour for Implicit registration
Consequences if not approved: ⌘	Undefined functional requirements and unclear/no guidelines for Stage 3

Clauses affected: ⌘	5.2

Other specs affected:	⌘ **X**	Other core specifications ⌘	24.229, 29.228, 29.229
		Test specifications	
		O&M Specifications	

Other comments: ⌘	

**************First CHANGE******************

3.3   Abbreviations

For the purposes of the present document the following abbreviations apply. Additional applicable abbreviations can be found in GSM 01.04 [1].

AMR	Adaptive Multi-rate
API	Application Program Interface
AS	Application Server
BCSM	Basic Call State Model
BG	Border Gateway
BGCF	Breakout Gateway Control Function
BS	Bearer Service
CAMEL	Customised Application Mobile Enhanced Logic
CAP	Camel Application Part
CDR	Charging DataRecord
CN	Core Network
CS	Circuit Switched
CSCF	Call Session Control Function (??)
CSE	CAMEL Service Environment
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
ENUM	E.164 Number
GGSN	Gateway GPRS Support Node
HSS	Home Subscriber Server
I-CSCF	Interrogating-CSCF
IETF	Internet Engineering Task Force
IM	IP Multimedia
IM CN SS	IP Multimedia Core Network Subsystem
IMS	IP Multimedia Core Network Subsystem
IMSI	International Mobile Subscriber Identifier
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISDN	Integrated Services Digital Network
ISIM	IMS SIM
ISP	Internet Service Provider
ISUP	ISDN User Part
MAP	Mobile Application Part
MGCF	Media Gateway Control Function
MGF	Media Gateway Function
NAI	Network Access Identifier
OSA	Open Services Architecture
P-CSCF	Proxy-CSCF
PCF	Policy Control Function
PDN	Packet Data Network
PDP	Packet Data Protocol e.g., IP
PEF	Policy Enforcement Function
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RAB	Radio Access Bearer
RFC	Request for Comments
SCS	Service Capability Server
S-CSCF	Serving-CSCF
SGSN	Serving GPRS Support Node

SLF	Subscription Locator Function
SSF	Service Switching Function
SS7	Signalling System 7
SIM	Subscriber Identity Module
SIP	Session Initiation Protocol
SGW	Signalling Gateway
THIG	Topology Hiding Inter-network Gateway
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
URL	Universal Resource Locator
USIM	UMTS SIM

***************Second CHANGE******************

5.2 Application level registration procedures

The following sub-sections address requirements and information flows related to registration in the IP multimedia subsystem. Assumptions that apply to the various information flows are listed as appropriate.

5.2.1 Requirements considered for registration

The following points are considered as requirements for the purpose of the registration procedures.

1. The architecture shall allow for the Serving-CSCFs to have different capabilities or access to different capabilities. E.g. a VPN CSCF or CSCFs in different stages of network upgrade.

2. The network operator shall not be required to reveal the internal network structure to another network. Association of the node names of the same type of entity and their capabilities and the number of nodes will be kept within an operator's network. However disclosure of the internal architecture shall not be prevented on a per agreement basis.

3. A network shall not be required to expose the explicit IP addresses of the nodes within the network (excluding firewalls and border gateways).

4. It is desirable that the UE will use the same registration procedure(s) within its home and visited networks.

5. It is desirable that the procedures within the network(s) are transparent to the UE, when it register with the IM CN subsystem.

6. The Serving-CSCF understands a service profile and the address of the functionality of the Proxy-CSCF.

7. It shall be possible to register multiple public identities via single IMS registration procedure from the UE.

5.2.1a Implicit Registration

When an user has a set of public user identities defined to be implicitly registered via single IMS registration of one of the public user identity's in that set, it is considered to be an Implicit Registration. No single public identity shall be considered as a master to the other public user identities. Figure 5.2.1a shows a simple diagram of implicit registration and public user identities. In order to support this function, it is required that:

- HSS has the set of public user identities that are part of implicit registration.

- Cx reference point between S-CSCF and HSS shall support download of all public user identities associated with the implicit registration, during registration of any of the single public user identities within the set.

- When one of the public user identities within the set is registered, all IMPUs associated with the implicit registration are registered at the same time.

- When one of the public user identities within the set is de-registered, all public user identities that have been implicitly registered are de-registered at the same time.

- Public user identities belonging to an implicit registration set may point to different service profiles; or some of these public user identities may point to the same service profile.

- When a public user identity belongs to an implicit registration set, it can not be registered or de-registered individually without the public user identity being removed from the implicit registration list.

- All IMS related registration timers should apply to the set of implicitly registered public user identities..

- S-CSCF, P-CSCF and UE shall be notified of the set of public user identities belonging to the implicitly registered function. Session set up shall not be allowed for the implicitly registered public user identities until the entities are updated, except for the explicitly registered public user identity.

- When a public user identity is barred from IMS communications, only the HSS and S-CSCF shall have access to this public user identity,
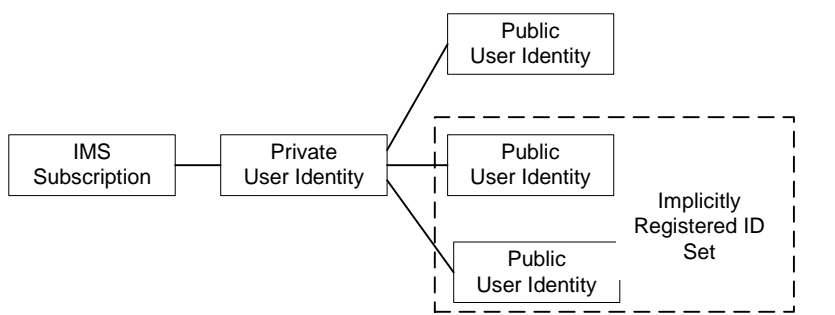

Figure 5.2.1a Relationship of public user identities when implicitly registered

5.2.1a.1 Implicit Registration for UE without ISIM

In case an UE is registering in the IMS without ISIM, it shall require the network's assistance to register atleast one public user identity, which is used for session establishment & IMS signalling. Implicit registration shall be used as part of a mandatory function for these ISIM-less UEs to register the public user identity(s). In addition to the functions defined in section 5.2.1a, the following additional functions are required for this scenario.

- The Temporary public identity shall be used for initial registration process

- It shall be defined in HSS that if the user does not have implicit registration activated then the user shall not be allowed to register in the IMS using the Temporary public user identity.

5.2.2   Registration flows

5.2.2.1   Requirements to consider for registration