The present invention relates to a SIM card personalization system, wherein the SIM card information can be replaced, at the time of the request of the subscriber, with an unoccupied IMSI in the HLR (50) to which the telephone number (MSISDN) belongs and which thus reduces the levels of SIM card stocks kept by the GSM operators and provides a more efficient, safer and faster service.
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, NE, SN, TD, TG), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI — with international search report (Art. 21(3))
A SIM CARD PERSONALIZATION SYSTEM

Field of the Invention

The present invention relates to a SIM card personalization system which enables safe remote changing of the subscriber identity module (SIM) information and functions during or after sales according to the requests of the subscriber.

Background of the Invention

Global System for Mobile Communications, shortly GSM, is a common mobile telephone communication protocol. The GSM networks are installed based on the global signaling system 7 protocol named as SS7. All GSM standards use cellular network and have the capability of moving from cell to cell (handover) even during roaming. GSM network is basically comprised of mobile stations, base stations and switches called network subsystems. Base stations transmit the radio signals received from air to the switches, whereby providing connection between the mobile telephone and the switch. Switches are the units which enable establishing connection from a mobile phone to a mobile phone or to fixed telephones. There are different databases for different purposes in the switches. Among these databases, the home location register (HLR) and the visitors location register (VLR), which includes the temporary subscription information required to direct the calling subscribers, are the most widely used databases. HLR (home location register) is a database, which keeps the information related to the location of the mobile phone in the country and the subscriber's ID information, and controls the data flow from or to the other telephones, and where subscription arrangements are made. A certain number of subscriber information is stored in HLRs and the number of HLRs increases according to the number of subscribers.

When a user is subscribed to the system, a SIM card is given to her/him. The SIM card (subscriber identity card) is a card, which, upon being inserted into the
When the user makes a call via a mobile phone, firstly the signalization is completed and then the call is established and a telephone conversation is held. At signalization stage, the user’s number is identified, security controls are performed, and after determining the location of the number called and whether or not the line is busy or available, the call is established. In order for the conversation to be held, the user should be within any base station service area (cell).

The call information received from the cell is downloaded by means of the base station. Among the said downloaded information are information such as IMSI (International Mobile Subscriber Identity), telephone number MSISDN (Mobile Station International Subscriber Directory Number) and the number that is called. After these information are checked in terms of security by the identification key (Ki) via the mobile telephone signalization channel, locations of the user and the number that is called are determined from the VLR and HLR databases. Following this, information related to the subscriber is viewed in the Authentication Center (AUC) database. The authentication center (AUC) is a database, which includes information related to subscribers, and which is used in confirmation and decoding phases, and which ensures user’s information security and network security. Following the security phases, it is checked if the number called is appropriate and whether there is an unoccupied channel to be allocated for that cell. After completion of all these controls, a traffic channel is provided to communicate with the number called and the conversation begins.

In order for the user to be able to login to the GSM system, s/he should subscribe to the system. Upon subscription, the user is given a SIM card. On this SIM card,
there are provided user information and information that allows the user to login to the system. When the user starts to use the SIM card, SIM card information is checked and the line is opened for communication. Where the subscription information of the user changes, the user specific information entered in the SIM card should be changed. In case of any damage to the SIM card or loss thereof, a new SIM card having the same information should be provided. A high number of SIM card stock is maintained in order to be able to deal with the said situations and to meet the demands of the subscribers having different characteristics.

At the operator's side, SIM card information is kept at the HLR database. Major operators accommodate a plurality of HLRs in order to meet the increasing number of subscribers and to distribute the interrogation load on the HLR. The International Mobile Subscriber Identities (IMSI) and the corresponding subscriber telephone numbers (MSISDN) are defined in HLR in blocks according to a certain arrangement. The HLR database, to which the interrogation to be made by MSISDN (telephone number) or IMSI (international mobile subscriber identity) will be directed, is determined according to this arrangement. The identifications of a subscriber who wants to replace her/his SIM card due to various reasons (deformation, robbery, etc.) provided that the MSISDN (telephone number) remains unchanged, should be made on the same HLR (home location register) so as to comply with the interrogation arrangement. Since no change can be made on the SIM cards in the used configuration and it can not be known in advance to which HLR database belongs the subscriber who will make a SIM card replacement request, the SIM cards belonging to all HLR databases in the system are produced in advance and kept in the stocks in order to be able to immediately respond to these types of requests. This causes large sums of SIM card investments of GSM operators not to be used and to remain idle. The fact that the information related to the idle SIM cards are entered into the HLR database in advance causes inefficient use of an expensive source.
There are certain standards for GSM systems. The inventive system developed for preventing idle SIM cards will comply with the following standards:

- 3G Security Algorithm Set [3GPP TS 35.205,.206,.207,.208]
- International standard related to electronic identification cards [ISO/IEC-7816]
- Specification of the Subscriber Identity Module - Mobile Equipment (SIM-ME) interface [3GPP TS 51.01 1]
- Technical realization of Short Message Service Center [3GPP TS 03.40]
- Security Mechanisms for the SIM Application Toolkit [3GPP TS 03.48]

Card identification procedure can be performed by using COMP-128 or Milenage [3GPP TS 35.205,.206,.207,.208] depending on the card profile. According to the SIM card profile, the mechanisms of command, data encryption (data encryption standard, cipher, block chaining, electronic codebook, etc.) or checksum generation may differ from each other. The methods indicated in specification 3GPP TS 03.48 will be used for generating and encrypting the transmitted commands according to the SIM card profiles.

Mobile Equipment (SIM-ME) interface [3GPP TS 11.14] will be used as the mechanism for transmitting the SIM card update commands to the card. This transmission mechanism provides that the SIM card commands are sent in the form of Short Message Service Transfer Protocol Data Unit (SMS-TPDU) indicated in the specification 3GPP TS 03.40. Thus, by means of the transmission module realized within the scope of the project, depending on the system configuration, the commands will be able to be transmitted to the SIM card by the IP bearer and the card readers or by using the short message service center and SMS bearer.
The United States patent document US6934391, in the state of the art, discloses subscriber identity modules in a communication network. In this system, the data including the first subscription information can be replaced by the second subscription information. In this system, it is provided that the IMSIs (international mobile subscriber identity) are carried between HLRs. (home location register). Hence, there is no saving in the card stock. Furthermore, return of the information sent via IP is at least one day in this system and this is a fairly long and undesirable period of time.

The United States patent document US2006063564, another application in the state of the art, discloses a model allowing use of the old mobile number in case of replacement of the SIM card. In this system, the first subscription information can be used for the new SIM card. During this process, without using a pre-assigned SIM card, information of the first SIM card is assigned for the new card. But in this technique the ADM code and Ki key on the card are changed for SIM replacement. The fact that this information is conveyed via any network causes a security gap. In addition, no information is provided related to how the OPc value depending on the Ki key required for the encryption algorithms of the third generation cards will be updated. Hence it does not provide a solution for third generation networks.

The International patent document WO9701253, another application in the state of the art, discloses a communication network having a replaceable SIM card. In this system, the SIM comprising the initial subscription information is cancelled and the new information is activated by the HLR. But this technique does not mention about efficient use of IMSIs and thus HLRs or saving in card stock.

The United States patent document US2005075137, another application in the state of the art, discloses an easy method of SIM card exchange for subscribers of a digital communication network. In this system, deactivation of the old SIM card and activation of the new SIM card are completed by a confirmation process
carried out between the subscriber and the server. But in this technique, the old and new cards should be used together for replacement of the SIM. In case of the failure of the old card, this system will be inoperative. Furthermore, this system does not disclose efficient use of IMSIs and thus HLRs or saving in card stock.

The United States patent document US628586981, another application in the state of the art, discloses SIM card replacement in mobile communication network. In this system, a model is disclosed for cancelling the old SIM card and activating the new SIM card. However in this technique, it is not mentioned about personalization of the card at the last step whereby removing HLR dependence and reducing the number of cards in stock.

Summary of the Invention

The objective of the present invention is to provide a SIM card personalization system wherein, the SIM card information can be replaced, at the time of the request of the subscriber, with an unoccupied IMSI (international mobile subscriber identity) in the HLR (home location register) database to which the telephone number (MSISDN) belongs.

Another objective of the invention is to provide a SIM card personalization system which saves the GSM operators from the obligation of keeping idle SIM cards for each HLR database and which enables HLR identifications to be made without human intervention and by doing so, enhances security.

A further objective of the invention is to provide a SIM card personalization system which can operate without requiring renewal of the Ki information which is the identification information on the card.
Another objective of the invention is to provide a SIM card personalization system, which, by supporting G-Milenage algorithm, prevents card duplication process and can be used safely by the 3G operators.

Yet another objective of the invention is to provide a SIM card personalization system which enables the users to be able to view not only the telephone numbers (MSISDN) in one sales point but the numbers in all pools concurrently and to make a selection among these numbers.

**Detailed Description of Invention**

The SIM card personalization system provided to achieve the objectives of the present invention is illustrated in the accompanying drawings, in which:

- Figure 1 is the schematic view of the SIM card personalization system.
- Figure 2 is the view of the steps of the pre-personalization process.
- Figure 3 is the view of the steps of the final personalization process performed via the vendor's terminal.
- Figure 4 is the view of the steps of the final personalization process performed in the subscriber's mobile device via GSM connection.

The parts shown in the figures are each given reference numerals as follows:

1. SIM card personalization system
10. Producer
20. Subscriber identity module (SIM card)
30. Subscriber Register and Monitor Unit (AKTB)
40. SIM Logistics Unit (SL)
50. Home location register unit (HLR)
60. SIM card personalization unit (SKPM)
61. Different profiles unit (SCPC OTA)
70. Subscriber process center
80. Vendor's terminal (POS)
90. Short message service center (SMSC)

The inventive SIM card personalization system (1) essentially comprises
- at least one subscriber register and monitor unit (30) and SIM logistics unit (40)
where the SIM card (20) information received from the producer (10) is entered
and which enable the said information to be continuously updated and whereby
the number of SIM cards (20) in the stock to be monitored,
- at least one HLR (50) which keeps the subscriber's identification information,
carries out subscription arrangements and enables control of the data flow with the
other telephones,
- at least one POS (80) and at least one SMSC (90) which enable the SIM card
(20) related requests received from the subscriber center (70) to be transmitted to
the SKPM (60),
- at least one SCPC OTA (61) where different types of SIM card (20) profiles are
kept,
- at least one SKPM (60) which enables to evaluate the requests received from the
subscriber center (70), to generate commands accordingly and to write the
information into the SIM card (20) via POS (80) or SMSC (90).

The personalization process is the process of associating the SIM card (10) with
the subscriber-specific information. The personalization process is comprised of
two sub-processes taking place in SKPM (60):

• Pre-personalization: Creating in the SIM card (20) the directory and files
specified in the technical specification 3GPP TS 51.01 1, in line with the
choices of the operator.
• Final personalization: Updating the files which are created in the SIM card (20) during pre-personalization with individual information pertaining to the subscriber.

The subscriber register and monitor unit (AKTB) (30) continuously checks the number of SIM cards (20) present in the SIM card personalization system (1) according to the data received from the subscriber center (70) and SKPM (60), and determines whether or not there occurs a need for supply thereof. There should be the preferred number of SIM cards (20) in the system (1). In the case that the number of SIM cards (20) drops below the preferred quantity, SL (40) generates a request for SIM card (20) and communicates it to the producer (10). The producer (10) prepares the requested SIM cards (20) and sends them to the AKTB (30) and SL (40). Along with these cards (20), SIM card (20) serial numbers (ICCID), international mobile subscriber identities (IMSI), telephone numbers (MSISDN) and Ki key identification information are also transmitted to the AKTB (30) and SL (40). SL (40) saves this information also to SKPM (60). The information pertaining to the requested, sold and in-stock SIM cards is kept in AKTB (30).

The pre-personalization process, which is performed before the SIM cards (20) reach the subscriber center (70) and thus the customer, is carried out with the following steps:

— determining the SIM card (20) stock level and generating a request (200),
— determining the ICCID and temporary IMSIs and communicating them to the producer (10) (201),
— determining the subscriber number categories (202),
— saving the ICCID and IMSI information of the cards (20) received from the producer (10) to SKPM (60) and AKTB (30) (203),
— transmitting to the SKPM (60) the keys required for authentication and file updating of the SIM card (20) (204).
In these steps, which are performed in the pre-personalization process, SL (40) determines the need for SIM cards (20). According to this need, it prepares the ICCID (SIM card serial number) and IMSI (international mobile subscriber identity) numbers and communicates this list of needs to the producer (10). AKTB (30) divides the numbers included in this list of needs into categories. When doing so, it evaluates whether the numbers can easily be remembered and if they have distinguishing features or not. After dividing the numbers into categories, AKTB (30) saves these numbers on the SKPM (60). Then it saves the ICCID and IMSI information of the cards (20) received from the producer (10) on the SKPM (60) and transmits the verification keys (Ki) written on the SIM card (20) by the producer (10) and the data encryption and checksum keys required for file updating are sent to the SKPM (60).

After pre-personalization process is completed, the SIM cards (20) are sent to the subscriber center (70). When any subscriber or a user wanting to subscribe makes a request at the subscriber center (70) for replacing the SIM card (20) or for a new telephone number, the final personalization process begins.

The final personalization process can be performed in two different ways, via vendor's terminal (80) or via SMSC (90). In the final personalization process carried out via the vendor's terminal (80), IMSI and subscriber information are written in the SIM card (20) by means of the vendor's terminal (80) via IP bearer, whereby the mobile number is activated. Whereas in the final personalization process performed via SMSC (90), IMSI and subscriber information are written in the SIM card (20) by means of the IMSI file updating message transmitted via the SMS bearer.

The final personalization process performed via the vendor's terminal (80) is carried out with the following steps,
determining the telephone number (MSISDN) and transmitting the information belonging to the card (20) to SKPM (60) (300),
— SKPM (60) verifying the sent SIM card (20) information (301),
— SKPM (60) obtaining and saving the true IMSI code via HLR (302),
— updating on the AKTB (30) the information about the SIM card (20) being used (303),
— updating the true IMSI code on the SIM card (20) (304),
— completing or cancelling the process (305).

The final personalization performed with the above given steps is completed by means of a vendor's terminal (80) or a vendor's terminal (80) capable of writing into the SIM cards (20). A subscriber or a user who will become a subscriber makes a request to the subscriber center (70) for SIM card replacement or for a new telephone number. After the subscriber selects the desired telephone number, the SIM card (20) is inserted in the vendor's terminal (POS or PC). Hence, the telephone number (MSISDN), ICCID and the process type is transmitted to SKPM (60). SKPM (60) verifies the SIM card (20) according to the SIM card (20) profile (e.g. COMP-128, Milenage). This way it is distinguished that the used SIM card (20) is genuine and protection is provided against SIM card (20) duplication. This process is carried out as follows.

During subscription process, the ICCID information in the SIM card (20) is sent to the SKPM (60) for authentication. SKPM (60) finds the ICCID and the corresponding Ki value in the database. SKPM (60) generates a random (RAND) number and encrypts this number with Ki value to obtain a new value (RES_1). When generating RES_1, it uses COMP-128 or Milenage algorithms depending on the SIM card (20) profile. SKPM (60) sends the RUN GSM ALGO command to the SIM card (20) via IP by means of the RAND parameter that it has generated. The SIM card (20) encrypts the RAND number with the Ki value thereon (RES_2) and sends it to SKPM (60). SKPM (60) compares the value
(RES_1) that it has produced with the value (RES_2) sent by the SIM card (20); if they are equal, it is figured out that the card is the genuine card of the operator.

After the SIM card (20) information is verified, SKPM (60) supplies the true (permanent) IMSI code via HLR (50) and then saves the IMSI and Ki value of the card on HLR (50). As the Ki value of the card is written in HLR (50) automatically without getting out of the operator and without human intervention, this critical information is protected with care and system safety is enhanced. With this scenario, movement or replacement of the OPc information defined in third generation cards is not required. The IMSI information defined by the producer during pre-personalization related to the ICCID and MSISDN numbers is updated by SKPM (60) at the AKTB (30) with the new IMSI defined at the last point. Since SKPM (60) can distinguish the communication media of the requests received from the vendor's terminal (80) or the mobile phone, it continues the process with the communication media (in this case the card writer in the POS (80)) from which the request is coming. SKPM (60) converts the IMSI update command indicated in the SIM card (20) by ISO/IEC-7816 into an SMS content in accordance with the technical specification 3GPP TS 03.48, and sends it to the subscriber terminal (70). The SIM card (20) verifies the sender from the content of this message and saves the true IMSI thereon permanently. After the true IMSI is written, the confirmation message received from the SIM card (20) is sent to SKPM (60). SKPM (60) completes or cancels the process according to the said message received from the SIM card (20). This completion or cancellation is performed in HLR (50) or AKTB (30).

The final personalization process performed via the SMSC (90) is carried out by the following steps.

— generating temporary IMSI (400), (it is generated by SL (40) during pre-
personalization and sent to the producer)
— connecting to the GSM network by the temporary IMSI (401),
— sending message to SKPM (60) (402),
— saving the true IMSI on the SIM card (20) (403),
— updating the SIM card (20) and the subscriber information (404),
— completing or cancelling the process (405).

In the final personalization process carried out via SMSC (90) with the above given steps, the temporary IMSI, ICCID, MSISDN information for the SIM card (20) are joined via SKPM (60) with the true IMSI supplied from HLR (50). When the subscriber connects to the GSM network with the newly bought or replacement SIM card (20), HLR (50) evaluates this request. HLR (50) produces a message to inform SKPM (60) that the subscriber has been connected to the GSM network. SKPM (60) saves the true IMSI number to the SIM card (20) via SMSC (90). MSSIDN, ICCID and IMSI information of the subscriber are updated on AKTB (30) and HLR (50). After the true IMSI information is written on the SIM card (20), the message related to the current process arrives to SKPM (60). SKPM (60) completes or the cancels the process according to the said message received from the SIM card (20).

The final personalization process can be completed in two different ways by being performed via the vendor's terminal (80) or the SMSC (90).

The inventive SIM card personalization system (1) generates SIM card (20) and HLR (50) information upon application of the customer. Upon request of the customer, the SIM card (20) and HLR (50) information are updated. Hence, the requirement of keeping a stock of SIM cards (20) prepared according to possible different types of subscribers will be eliminated.

In the inventive system (1), authentication of the SIM cards (20) whose information will be changed is carried out. This way, updating of the SIM cards (20) which do not belong to the concerned operator is prevented.
The inventive system (1) operates in integration with the ICCID, IMSI, MSISDN stock information belonging to the SIM cards in the GSM operators. AKTB (30) continuously monitors the critical stock levels and gives an alert.

In the inventive system (1), although the SIM card (20) commands are standardized with ISO-7816 document, more than one command is defined which perform the same function. For example, in accordance with SIM card (20) personalization, IMSI update can be performed by using the command UPDATE BINARY" or "UPDATE RECORD". Likewise, again in accordance with the personalization, the mechanisms of command, data encryption (Data Encryption Standard, Cipher, Block Chaining, Electronic Codebook, etc.) or checksum generation may differ from each other. Thus different SIM card (20) profiles are defined in SCPC OTA (61).

In the inventive system (1), STK for SIM - Mobile Equipment interface [GSM 11—14] will be used as the mechanism for transmission of IMSI update commands to the SIM card (20). This interface enables transmission of SIM card (20) specific messages (SMS) to the subscriber's device. The said transmission mechanism provides that the SIM card (20) commands are sent in the form of Short Message Service Transfer Protocol Data Unit (SMS-TPDU). Hence, by means of a transmission module to be incorporated to the inventive system (1), depending on the system configuration, the commands can be sent to the SIM card (20) via card readers or Short Message Service Center (SMSC).

In the inventive system (1), the methods specified in the specification 3GPP TS 03.48 (the protocol which describes the required standards of the SMS and cell broadcast contents) will be used for generation and encryption of commands transmitted according to SIM card (20) profiles. In order to generate commands according to the profiles, the key information is received from the SCPC OTA (61) database. Hence, the SCPC OTA (61) unit storing the key information should be secure.
The inventive system (1) allows generation of SIM card (20) and HLR (50) information upon application of the customer and as the SIM card (20) and HLR (50) information are updated upon request of the customer, allows the customers to select MSISDN from pools of different categories.

The inventive system (1) enables that information sent via IP returns concurrently, information is obtained rapidly about the continuation of the process and thus the processing periods of back office systems like HLR (50) and AKTB (30) are reduced.

The inventive system (1) prevents the SIM cards (20) not belonging to the operator from being updated by authenticating the SIM cards (20) whose information will be changed.

The inventive system (1) does not require the Ki information on the card to be renewed and prevents supporting of the G-Milenage algorithm and the card duplication processes.

Since there is no single server that accesses SMSC (90) and the Ki keys and holds them together, there is not a security gap. As the Ki value of the card is written in HLR (50) automatically without getting out of the operator and without human intervention, this information is not required to be changed on the SIM card (20). Hence, this critical information is protected with care and system safety is enhanced. In the inventive system (1), moving the OPc information varying depending on the Ki defined in third generation cards and updating thereof on the SIM card (20) are not required.
CLAIMS

1. A SIM card personalization system (1) essentially comprising
   - at least one subscriber register and monitor unit (30) and SIM logistics unit (40)
   where the SIM card (20) information received from the producer (10) is entered
   and which enable the said information to be continuously updated and whereby
   the number of SIM cards (20) in the stock to be monitored,
   - at least one HLR (50) which keeps the subscriber's identification information,
     carries out subscription arrangements and enables control of the data flow with the
     other telephones,
   - at least one POS (80) and at least one SMSC (90) which enable the SIM card
     (20) related requests received from the subscriber center (70) to be transmitted to
     the SKPM (60),
   - at least one SCPC OTA (61) where different types of SIM card (20) profiles are
     kept,
   and characterized by
   - at least one SKPM (60) which enables to evaluate the requests received from the
     subscriber center (70), to generate commands accordingly and to write the
     information into the SIM card (20) via POS (80) or SMSC (90).

2. A SIM card personalization system (1) according to Claim 1, characterized
   by at least one SKPM (60) which enables replacement of the SIM card (20)
   information, at the time of the request of the subscriber, with an unoccupied
   IMSI in the HLR (50) database to which the telephone number (MSISDN)
   belongs by means of a POS device (80) and SMSC unit (90).

3. A SIM card personalization system (1) according to Claim 1 and 2, characterized
   by at least one SKPM (60) which generates SIM card (20) and
   HLR (50) information upon application of the customer, updates the SIM card
   (20) and HLR (50) information according to the request of the customer, and
hence, eliminates the requirement of keeping a stock of SIM cards (20) prepared according to possible different types of subscribers.

4. A SIM card personalization system (1) according to any of the preceding claims characterized by at least one SKPM (60) which performs the final personalization process via the vendor's terminal (80) by carrying out the following steps,

— determining the telephone number (MSISDN) and transmitting the information belonging to the card (20) to SKPM (60) (300),
— SKPM (60) verifying the sent SIM card (20) information (301),
— SKPM (60) obtaining and saving the true IMSI code via HLR (302),
— updating on the AKTB (30) the information about the SIM card (20) being used (303),
— communicating the true IMSI code to the SIM card (20) (304),
— completing or cancelling the process (305).

5. A SIM card personalization system (1) according to any of the preceding claims characterized by at least one SKPM (60) which performs the final personalization process via SMSC (90) by carrying out the following steps,

— generating temporary IMSI (400),
— connecting to the GSM network by the temporary IMSI (401),
— sending message to SKPM (60) (402),
— saving the true IMSI on the SIM card (20) (403),
— updating the SIM card (20) and the subscriber information (404),
— completing or cancelling the process (405).

6. A SIM card personalization system (1) according to any of the preceding claims characterized by at least one SKPM (60) which enables that information sent via IP returns concurrently, information is obtained rapidly
about the continuation of the process and thus the processing periods of back office systems like HLR (50) and AKTB (30) are reduced.

7. A SIM card personalization system (1) according to any of the preceding claims characterized by at least one SKPM (60) which enables reduction of the static load on the HLR (50) by collecting the information written on the SIM card (20) on itself, without having them written on HLR (50).

8. A SIM card personalization system (1) according to any of the preceding claims characterized by at least one SKPM (60) which performs authentication of the SIM cards (20) whose information will be changed, whereby preventing updating of the SIM cards (20) which do not belong to the operator.

9. A SIM card personalization system (1) according to any of the preceding claims, wherein the IMSI, MSISDN and SIM card (20) stocks are independent from each other, and characterized by at least one AKTB (30) which gives an alert in case the said numbers exceed the preferred limits.

10. A SIM card personalization system (1) according to any of the preceding claims characterized by at least one AKTB (30) which performs the pre-personalization process before the SIM cards (20) arrive at the subscriber center (70) and thus at the customer, by carrying out the following steps

— determining the SIM card (20) stock level and generating a request (200),
— determining the ICCID and temporary IMSIs and communicating them to the producer (10) (201),
— determining the subscriber number categories (202),
— saving the ICCID and IMSI information of the cards (20) received from the producer (10) to SKPM (60) and AKTB (30) (203),
— transmitting to the SKPM (60) the keys required for authentication and file updating of the SIM card (20) (204).

11. A SIM card personalization system (1) according to any of the preceding claims characterized in that it does not require renewal of the Ki information on the card.

12. A SIM card personalization system (1) according to any of the preceding claims characterized in that it supports G-Milenage algorithm whereby preventing card duplication processes.

13. A SIM card personalization system (1) according to any of the preceding claims characterized by at least one SKPM (60) which enables generation of SIM card (20) and HLR (50) information upon application of the customer and as the SIM card (20) and HLR (50) information are updated upon request of the customer, allows the customers to select MSISDN from pools of different categories for the new subscription.
Figure 2

determining the SIM card (20) stock level and generating a request

200

determining the ICCID and temporary IMSIs and communicating them to the producer (10)

201

determining the subscriber number categories

202

saving the ICCID and IMSI information SKPM (60) and AKTB (30)

203

transmitting the keys written into the SIM card (20) to the SKPM (60)

204

Figure 3

determining the MSISDN and transmitting the information belonging to the card (20) to SKPM (60)

300

SKPM (60) verifying the sent SIM card (20) information

301

obtaining and saving the true IMSI code via HLR

302

updating on the AKTB (30) the information about the SIM card (20) being used

303

updating the true IMSI code on the SIM card (20)

304

completing or cancelling the process

305
Figure 4

400: generating temporary IMSI
401: connecting to the GSM network by the temporary IMSI
402: sending message to SKPM (60)
403: saving the true IMSI on the SIM card (20)
404: updating the SIM card (20) and the subscriber information
405: completing or cancelling the process
## INTERNATIONAL SEARCH REPORT

### A. CLASSIFICATION OF SUBJECT MATTER

<table>
<thead>
<tr>
<th>INV.</th>
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According to International Patent Classification (IPC) or to both national classification and IPC

### B. FIELDS SEARCHED

- H04W8/28
- H04W12/06
- G07F7/10
- G06F17/30

Minimum documentation searched (classification system followed by classification symbols)

- H04W
- G07F
- G06F

Document station searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and where practical search terms used)

- EPO-Internal
- WPI Data
- COMPENDEX
- INSPEC

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>WO 97/01253 A (MCI COMMUNICATIONS CORP (US)) 9 January 1997 (1997-01-09) cited in the application abstract page 7, line 14 - page 12, line 4 figures 1,2 -----</td>
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Further documents are listed in the continuation of Box C

See patent family annex

- ^Lowercase document defining the general state of the art which is not considered to be of particular relevance
- ^Uppercase document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- ^X Later document of particular relevance the claimed invention cannot be considered new or cannot be considered to involve an inventive step when the document is taken alone
- ^Y Document of particular relevance the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents such combination being obvious to a person skilled in the art
- ^K Document member of the same patent family

Date of the actual completion of the international search: 6 November 2009

Date of mailing of the international search report: 17/11/2009

Name and mailing address of the ISA:
European Patent Office P B 5818 Patentlaan 2
NL - 2280 HN RIVIERA
Tel (+31-70) 340-2040
Fax (+31-70) 340-3016

Authorized officer: "Bengi, Kemal"

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