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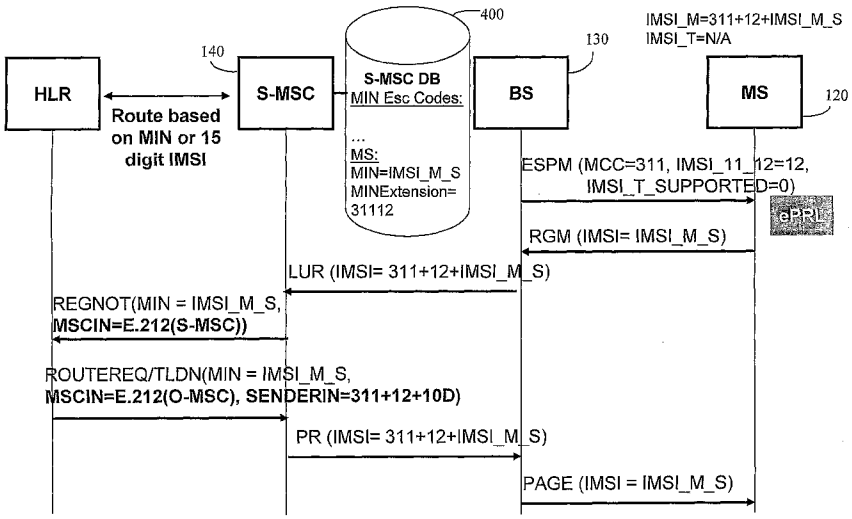
(54) **Title:** A METHOD FOR PROVIDING ROAMING USING A MOBILE IDENTIFICATION NUMBER BASED ON AN INTERNATIONAL MOBILE STATION IDENTITY



(57) **Abstract:** In one aspect of the instant invention, a method is provided for controlling roaming in a communications system. The method comprises storing a 15-digit MIN-based-IMSI in the mobile device. The 15-digit MIN-based-IMSI is comprised of a 10-digit Mobile Identification Number (MIN) and a 15- digit Home Network Identifier (HNI). Generally, the communications system uses the 15-digit MIN- based-IMSI to control roaming. However, the mobile device transmits only the 10-digit MIN in response to the mobile device being within a home network. To form the 15-digit universal identifier, the home network appends its HNI to the received MIN. When the mobile device is outside of its home network, the mobile device transmits the entire 15-digit universal identifier.

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A METHOD FOR PROVIDING ROAMING USING A MOBILE IDENTIFICATION NUMBER BASED ON AN INTERNATIONAL MOBILE STATION IDENTITY

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

This invention relates generally to telecommunications, and, more particularly, to wireless communications.

2. DESCRIPTION OF THE RELATED ART

In the field of wireless telecommunications, such as cellular telephony, a system typically includes a plurality of base stations distributed within an area to be serviced by the system. Various users within the area, fixed or mobile, may then access the system, and, thus, other interconnected telecommunications systems, via one or more of the base stations. Typically, a mobile device maintains communications with the system as the mobile device passes through an area by communicating with one and then another base station, as the user moves. The mobile device may communicate with the closest base station, the base station with the strongest signal, the base station with a capacity sufficient to accept communications, *etc.*

Many mobile devices are programmed by a service provider with a 10-digit, unique subscription identifier called a Mobile Identification Number (MIN). In particular, service providers in the United States utilize MIN, rather than the International Mobile Subscriber Identity (IMSI). The MIN may be used by the service provider to validate, provide customized service, and bill correctly. However, there are several shortcomings associated with the use of MIN. For example, with the explosion of cellular telephony, the number of unique MINs is in danger of being exhausted. Further, there is no international standard for MIN usage, and thus, international roaming standards do not support MIN. A mobile device using IMSI cannot roam to a cellular system that only employs MIN and mobile device using MIN cannot roam into a cellular system that only employs IMSI because routing based on MIN is not supported.

SUMMARY OF THE INVENTION

The present invention is directed to overcoming, or at least reducing, the effects of one or more of the problems set forth above.

In one aspect of the instant invention, a method is provided. The method comprises receiving at least a portion of an identifier from a mobile device wherein the identifier is comprised of a mobile identification number (MIN) and a home network identifier (HNI). The MIN and HNI are stored. Both the MIN and HNI are used for routing calls from a base station to the mobile device in response to the

mobile device roaming. Only the MIN is used for routing calls from the base station to the mobile device in response to the mobile device being in a home network.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention may be understood by reference to the following description taken in conjunction with the accompanying drawings, in which like reference numerals identify like elements, and in which:

Figure 1 is a block diagram of a typical communications system in which the instant invention may be employed;

Figure 2A is a stylistic representation of an IMSI numbering scheme that employs at least some aspects of the instant invention and may be used in the communications system of Figure 1;

Figure 2B is a stylistic representation of the IMSI numbering scheme used in the United States today; and

Figures 3 and 4 are flow diagrams stylistically illustrating messages exchanged between the various components of the communications system of Figure 1 based on at least some aspects of the instant invention in which a variety of mobile devices may seek to communicate with a variety of service providers.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and are herein described in detail. It should be understood, however, that the description herein of specific embodiments is not intended to limit the invention to the particular forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

Illustrative embodiments of the invention are described below. In the interest of clarity, not all features of an actual implementation are described in this specification. It will of course be appreciated that in the development of any such actual embodiment, numerous implementation-specific decisions may be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which may vary from one implementation to another. Moreover, it will be appreciated that such a development effort might be complex and time-consuming, but may nevertheless be a routine undertaking for those of ordinary skill in the art having the benefit of this disclosure.

Turning now to the drawings, and specifically referring to Figure 1, a communications system 100 is illustrated, in accordance with one embodiment of the present invention. For illustrative purposes, the

communications system 100 of Figure 1 is a Code Division Multiple Access (CDMA) system, although it should be understood that the present invention may be applicable to other systems that support data and/or voice communications. The communications system 100 allows one or more mobile devices 120 to communicate with a data network 125, such as the Internet, and/or a Publicly Switched Telephone Network (PSTN) 128 through one or more base stations 130. The mobile device 120 may take the form of any of a variety of devices, including cellular phones, personal digital assistants (PDAs), laptop computers, digital pagers, wireless cards, and any other device capable of accessing the data network 125 and/or the PSTN 128 through the base station 130.

In one embodiment, a plurality of the base stations 130 may be coupled to a Radio Network Controller (RNC) 138 by one or more connections, such as T1/EI lines or circuits, ATM circuits, cables, optical digital subscriber lines (DSLs), and the like. Those skilled in the art will appreciate that a plurality of RNCs 138 may be utilized to interface with a large number of base stations 130. Generally, the RNC 138 operates to control and coordinate the base stations 130 to which it is connected. The RNC 138 of Figure 1 generally provides replication, communications, runtime, and system management services. The RNC 138, in the illustrated embodiment handles calling processing functions, such as setting and terminating a call path and is capable of determining a data transmission rate on the forward and/or reverse link for each user 120 and for each sector supported by each of the base stations 130.

Each of the RNCs 138 is coupled to one of a plurality of Mobile Switching Centers (MSCs) 140. The MSCs 140 are generally responsible for providing look-up information regarding call routing for the mobile device 120. Generally, as discussed in greater detail below, the MSC 140 uses the Mobile Station IDentity (MSID) provided by the mobile device 120 to control call routing.

The MSC 140 is also coupled to a Core Network (CN) 150 via a connection, which may take on any of a variety of forms, such as T1/EI lines or circuits, ATM circuits, cables, optical digital subscriber lines (DSLs), and the like. Generally the CN 150 operates as an interface to the data network 125 and/or to the PSTN 128. The CN 150 performs a variety of functions and operations, such as user authentication, however, a detailed description of the structure and operation of the CN 150 is not necessary to an understanding and appreciation of the instant invention. Accordingly, to avoid unnecessarily obfuscating the instant invention, further details of the CN 150 are not presented herein.

The data network 125 may be a packet-switched data network, such as a data network according to the Internet Protocol (IP). One version of IP is described in Request for Comments (RFC) 791, entitled "Internet Protocol," dated September 1981. Other versions of IP, such as IPv6, or other connectionless, packet-switched standards may also be utilized in further embodiments. A version of IPv6 is described in RFC 2460, entitled "Internet Protocol, Version 6 (IPv6) Specification," dated December 1998. The data network 125 may also include other types of packet-based data networks in further embodiments.

Examples of such other packet-based data networks include Asynchronous Transfer Mode (ATM), Frame Relay networks, and the like.

As utilized herein, a "data network" may refer to one or more communication networks, channels, links, or paths, and systems or devices (such as routers) used to route data over such networks, channels, links, or paths.

Thus, those skilled in the art will appreciate that the communications system 100 facilitates communications between the mobile devices 120 and the data network 125 and/or the PSTN 128. It should be understood, however, that the configuration of the communications system 100 of Figure 1 is exemplary in nature, and that fewer or additional components may be employed in other embodiments of the communications system 100 without departing from the spirit and scope of the instant invention.

Unless specifically stated otherwise, or as is apparent from the discussion, terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, refer to the action and processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical, electronic quantities within the computer system's registers and memories into other data similarly represented as physical quantities within the computer system's memories or registers or other such information storage, transmission or display devices.

Those skilled in the art will appreciate that in the United States, each of the mobile devices 120 has historically used a unique Mobile Station IDentity (MSID) that is comprised of a Mobile Identification Number (MIN). In existing standards, the MIN is 10-digits long. MIN is assigned and administered by a MIN Block Administrator for wireless service providers in North America and an International Roaming MIN Administrator for wireless service providers outside North America. Under existing standards, each mobile device 120 is allowed to be programmed with two identifiers. One identifier is a 15-digit "true IMSI" and the other is a "MIN-based-IMSI" consisting of a 10-digit MIN preceded by a 5-digit "default" network identifier that is not unique and, therefore, can't be used for routing. In one embodiment of the instant invention, the true IMSI is not programmed into each mobile device 120, or at least is not employed by the instant invention. Rather, only the MIN-based-IMSI field of the mobile device 120 is used in routing calls in one embodiment of the instant invention.

Referring now to Figure 2A, in one embodiment of the instant invention, the MIN-based-IMSI takes the form of a 15-digit number: a 3-digit Mobile Country Code (MCC) 200 and a 2-digit Mobile Network Code (MNC) 202, which together form a 5-digit Home Network Identifier (HNI) 204. The Mobile Station Identification Number (MSIN) 206 located in the least significant 10-digits of the MIN-based-IMSI is formed from the conventional 10-digit MIN 206. This scheme for establishing the IMSI differs from current standards for IMSI in North America, as shown in Figure 2B, in that the current standard for North America does not generally allow for a 5-digit HNI 214, and the HNI 204 in this

embodiment of the invention contains information that is assigned and actually identifies the mobile device's home network from the MCC 200 and the MNC 202.

Additionally, the MIN 206 corresponds to and may be used as the MIN for the mobile device 120 when the home network of the mobile device supports the use of MINs 206. It is anticipated that in one embodiment of the instant invention, each service provider will have authority to administer their own MINs. That is, each service provider is allowed to assign MINs 206 without regard to other service providers. Thus, those skilled in the art will appreciate that within the instant invention it is possible for two service providers to assign identical MINs 206 to two different mobile devices 120. However, as discussed in greater detail below, the two mobile devices 120 will have non-identical HNIs 204, yielding a 15-digit IMSI that is unique throughout the world. As the entire 15-digit IMSI is presented by a roaming mobile device 120 when it first attempts to access a serving system, the serving system can use the HNI to identify a roaming subscriber and the roaming subscriber's home service provider.

Those skilled in the art will appreciate that this numbering scheme will alleviate the near-term exhaustion of 10-digit MINs 206 currently facing the industry. Additionally, when a mobile device 120 is within its home network, it may continue to use its 10-digit MIN, rather than is 15-digit IMSI, as the 10-digit MIN 206 is sufficient to uniquely identify each mobile device 120 within its home network

Some of the beneficial results from this numbering scheme include the fact that existing CDMA operations will support efficient use of the air interface by virtue of its ability to continue using the 10-digit MIN for its subscribers. Additionally, ANSI41 Call Delivery (receiving a Routing Request and paging the mobile to deliver the call) can continue to operate properly as long as the HLR provides a sender identification number (SENDERIN) in the format of an IMSI, with an assigned HNI, along with the IMSI_M_S_ (or MIN) for the phone with each intersystem operation message to the S-MSC 140.

Further, since the proposed numbering scheme eliminates the use of 6-digit HNIs, modifications to enhanced Preferred Roaming List (ePRL) is not required. Use of the ePRL requires (a) the base station to broadcast a 5-digit HNI for the potential serving system to identify itself and (b) the mobile device 120 to use this 5-digit HNI to select a serving system to access by comparing it to a priority listing of 5-digit HNIs for preferred roaming partners programmed into the mobile device 120. The 5-digit HNI is broadcast over the air by the base station 130 inside an Extended System Parameter Message (ESPM). With a 5-digit HNI inside the ESPM, mobile ePRLs with 5-digit HNIs do not need to be reprogrammed. Likewise, modifications to IS-2000 to support 6-digit HNIs and modifications IS-683 to provision mobiles over-the-air with a modified ePRL are not required.

Referring now to Figures 3 and 4, flow diagrams stylistically illustrate messages exchanged between the various components of the system 100 in a variety of scenarios in which a variety of mobile devices 120 may seek to communicate with a variety of service providers. For example, Figure 3

represents message flow that occurs when the mobile device 120 is communicating with its home network, whereas Figure 4 represents message flow that occurs when the mobile device 120 is communicating with a non-home network, or when the mobile device is roaming.

Referring first to Figure 3, a mobile device (MS) 120 that has only a MIN-based-IMSI (IMSI_M=311+12+IMSI_M_S) is attempting to communicate with a base station (BS) 130 of its home service provider, as indicated by its Extended System Parameter Message (ESPM) signaling, which has HNI set to 31112. The base station 130 is also signaling in the ESPM that a true 15-digit IMSI is not supported in the mobile application protocol by the serving MSC 140 (IMSI_T_SUPPORTED=0). In this scenario, the mobile device 120 recognizes that it is communicating with its home service provider because the received HNI matches its internally stored HNI, and thus, the mobile device 120 delivers a registration message that contains only the 10-digit MIN portion of its IMSI (RGM (IMSI=IMSI_M_S)). Those skilled in the art will appreciate that under the current standard, the mobile device 120 would always sends a less efficient 15-digit response that would include a 5-digit HNI value of MCC+00 (e.g. 31000 in the US). This is a default or non-assigned HNI value which is available for use by all service providers in a country in their subscriber's mobile devices. As such, MCC+00 does not uniquely identify a service provider and would not be used in an ePRL, an HNI in the ESPM, or for message routing. Thus, the HNI broadcast in the ESPM would never match the HNI of the IMSI_M in the mobile device 120 and the mobile device 120 would always send 15 digits to the base station 130.

Referring still to Figure 3, the base station 130 prepends its 5-digit HNI (31112 in this example) and forwards a 15-digit IMSI in a Location Updating Request (LUR) to the serving MSC 140. Because the serving MSC 140 in this scenario does not support a 15 digit IMSI for mobile identification in the mobile application protocol, it stores the HNI portion of the IMSI as a MINExtension in its database 400. The MINExtension is needed for subsequent call delivery. The serving MSC 140 then forwards a Registration Notification (REGNOT) with the MIN portion of the IMSI to a Home Location Register (HLR) located within the network or system 100. The Registration Notification message is routed to the HLR through the network using either the MIN or 15-digit IMSI as the address for intra-system signaling. The serving MSC 140 sends an MSC Identification Number (MSCIN) (E.212 GT address) in a registration message to the HLR. The registration message identifies the serving MSC 140 as having an E.212 global title address to support international roaming and 15 digit mobile identifiers. The HLR stores the serving MSC GT address (MSCIN) to subsequently route messages to the serving MSC 140. For example, when the HLR receives notification of an inbound call to the mobile device 120 registered at the serving MSC 140, it sends a ROUTEREQ message to the serving MSC 140 using the MSCIN received in the registration message as the routing address. Because the serving MSC 140 sent the MSCIN in the registration message, the HLR responds by sending a Sender Identification Number (SENDERIN) (HNI + 10 digits of the HLR) to the serving MSC 140. The HNI of the HLR sent in the SENDERIN should be the same as the HNI of the mobile device 120 served by HLR. The serving MSC 140 prepends the HNI (31112 in this

case) received in the SENDERIN to the MIN to uniquely identify the mobile device 120 within the MSC 140.

When a call for the mobile device 120 arrives from the network 100 to the serving MSC 140 in the form of ROUTERREQ/TLDN(MIN=IMSI_M_S, MSCIN=E.212(O-MSC), SENDERIN=311+12+10d), the serving MSC 140 prepends the 5-digit HNI received in the SENDERIN (31112) to the MIN in order to form a 15-digit IMSI. This 15-digit IMSI is needed to match the 15-digit IMSI sent by the mobile device 120 when it registered. This IMSI was stored in the serving MSC database 400 as a MIN and MINExtension (5-digit HNI from the mobile device 120). The serving MSC 140 forms a Paging Request (PR) by prepending the mobile device's MINExtension to the MIN (IMSI_M_S), which is forwarded to the base station 130. The base station 130 then issues a page to the mobile station 120 using only the 10-digit IMSI_M_S since this mobile device 120 is at home. This is a more efficient use of the air interface for an mobile device 120 at home than if a 15-digit IMSI were used for the page.

Referring now to Figure 4, a roaming mobile device (MS) 120 that has only a MIN-based-IMSI set with an HNI value of 31234 is attempting to communicate with a base station (BS) 130 of a non-home service provider, as indicated by its ESPM signaling, which has HNI set to 31112 (the HNI for the mobile device 120 is set to 31234). The non-home service provider base station 130 is also signaling in the ESPM that true IMSI is not supported (IMSI_T_SUPPORTED=0) in the mobile application protocol by the serving MSC 140. The mobile device 120 sends a 15-digit registration message to the base station 130 formed from the MIN-based IMSI (IMSI_M=312+34+IMSI_M_S). The base station 130 delivers a 15-digit Location Updating Request (LUR) based on the same MIN-based-IMSI (LUR(IMSI_M=312+34+IMSI_M_S)). Again, because the serving MSC 140 does not support a true 15-digit IMSI for mobile identification in the mobile application protocol, it stores the HNI portion of the IMSI as a MINExtension in the serving MSC database 400 for subsequent call delivery. The serving MSC 140 then forwards a Registration Notification (REGNOT) with the MIN portion of the IMSI to a Home Location Register (HLR) located within the network or system 100. The Registration Notification message is routed to the HLR through the network using the 15-digit IMSI for inter-system signaling. The serving MSC 140 also sends an MSC Identification Number (MSCIN) (E.212 GT address) in the registration message to the HLR. The registration message identifies the serving MSC 140 as having an E.212 global title address to support international roaming. The HLR stores the serving MSC GT address (MSCIN) to subsequently route messages to the serving MSC 140. In response to receiving an MSCIN from the serving MSC 140, the HLR then sends a Sender Identification Number (SENDERIN) (HNI + 10 digits of the HLR) to the serving MSC 140 in subsequent messages to the serving MSC 140 about this mobile device 120. The HNI of the HLR sent in the SENDERIN is the same as the HNI of mobile device 120 served by HLR.

When a call for the mobile device 120 arrives from the network 100 to the serving MSC 140 in the form of ROUTERREQ/TLDN(MIN=IMSI_M_S, MSCIN=E.212(O-MSC),

SENDERIN=312+34+10d), the serving MSC 140 prepends the 5-digit HNI received in the SENDERIN (31234) to the MIN in order to form a 15-digit IMSI. This 15-digit IMSI is needed to match the 15-digit IMSI sent by the mobile device when it registered. This IMSI was stored in the serving MSC database 400 as a MIN and MINExtension (5-digit HNI from the mobile device 120). The serving MSC 140 forms a Paging Request (PR) by prepending the mobile's MINExtension to the MIN (IMSI_M_S), which is forwarded to the base station 130. The base station 130 then issues a page to the mobile station 120 using the 15-digit IMSI_M since this mobile device 120 is not at home.

Those skilled in the art will appreciate that the various system layers, routines, or modules illustrated in the various embodiments herein may be executable control units. The control units may include a microprocessor, a microcontroller, a digital signal processor, a processor card (including one or more microprocessors or controllers), or other control or computing devices. The storage devices referred to in this discussion may include one or more machine-readable storage media for storing data and instructions. The storage media may include different forms of memory including semiconductor memory devices such as dynamic or static random access memories (DRAMs or SRAMs), erasable and programmable read-only memories (EPROMs), electrically erasable and programmable read-only memories (EEPROMs) and flash memories; magnetic disks such as fixed, floppy, removable disks; other magnetic media including tape; and optical media such as compact disks (CDs) or digital video disks (DVDs). Instructions that make up the various software layers, routines, or modules in the various systems may be stored in respective storage devices. The instructions when executed by the control units cause the corresponding system to perform programmed acts.

The particular embodiments disclosed above are illustrative only, as the invention may be modified and practiced in different but equivalent manners apparent to those skilled in the art having the benefit of the teachings herein. Furthermore, no limitations are intended to the details of construction or design herein shown, other than as described in the claims below. Consequently, the method, system and portions thereof and of the described method and system may be implemented in different locations, such as the wireless unit, the base station, a base station controller and/or mobile switching center. Moreover, processing circuitry required to implement and use the described system may be implemented in application specific integrated circuits, software-driven processing circuitry, firmware, programmable logic devices, hardware, discrete components or arrangements of the above components as would be understood by one of ordinary skill in the art with the benefit of this disclosure. It is therefore evident that the particular embodiments disclosed above may be altered or modified and all such variations are considered within the scope and spirit of the invention. Accordingly, the protection sought herein is as set forth in the claims below.

CLAIMS

WE CLAIM:

1. A method, comprising:

receiving at least a portion of an identifier from a mobile device wherein the identifier is comprised of a mobile identification number (MIN) and a home network identifier (HNI);

storing the MIN and HNI;

using the MIN and HNI for routing calls from a base station to the mobile device in response to the mobile device roaming; and

using the MIN for routing calls from the base station to the mobile device in response to the mobile device being in a home network.

2. A method, as set forth in claim 1, wherein receiving the identifier further comprises receiving an international mobile subscriber identity (IMSI) comprised of the MIN and HNI in response to the mobile device roaming.

3. A method, as set forth in claim 2, further comprising a base station sending a Location Updating Request (LUR) to a serving Mobile Switching Center (MSC), wherein the LUR includes the mobile device HNI and the mobile device MIN in response to the mobile device roaming.

4. A method, as set forth in claim 3, wherein storing the MIN and HNI further comprises storing the MIN and the HNI in a database associated with the serving MSC.

5. A method, as set forth in claim 4, wherein storing the MIN and the HNI in the database associated with the serving MSC further comprises storing the HNI as a MIN Extension.

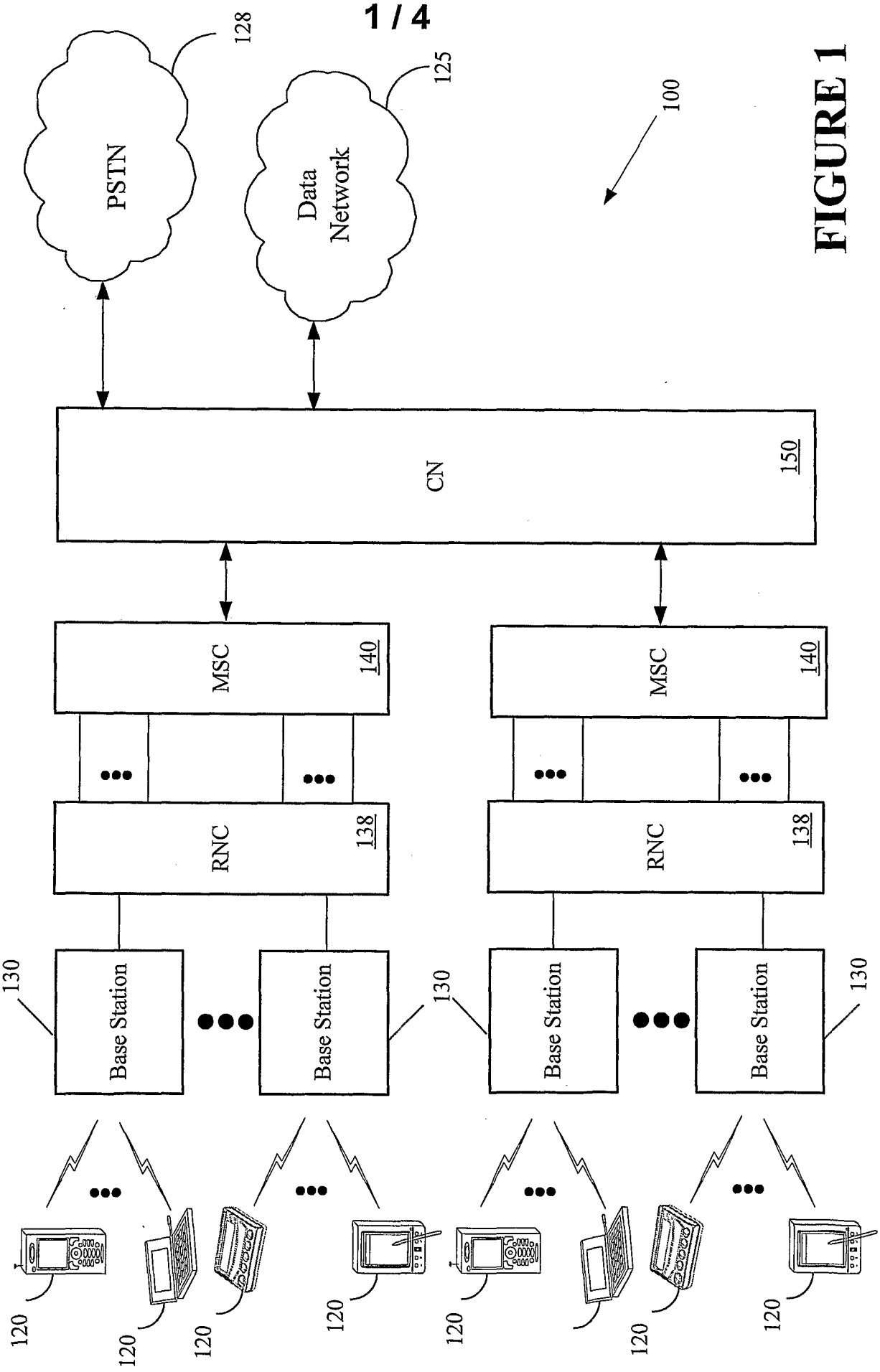
6. A method, as set forth in claim 3, further comprising the serving MSC sending a registration message to a Home Location Register (HLR) wherein the registration message includes the MIN and an Identification Number of the MSC (MSCIN).

7. A method, as set forth in claim 6, further comprising the HLR sending a routing request signal to the serving MSC wherein the routing request signal comprises the MIN, the MSCIN, and a sender identification number associated with the HLR.

8. A method, as set forth in claim 7, further comprising the serving MSC sending a paging request signal to the base station wherein the paging request signal comprises the MIN and HNI of the mobile device.

9. A method, as set forth in claim 1, wherein receiving the identifier further comprises receiving an international mobile subscriber identity (IMSI) comprised of the MIN in response to the mobile device being in a home network.

10. A method, as set forth in claim 1, wherein using the MIN for routing calls from the base station to the mobile device in response to the mobile device being in the home network further comprises paging the mobile device using only the MIN in response to the mobile device being in the home network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MSC
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RNC
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RNC
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Base Station
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FIGURE 1

FIGURE 2A

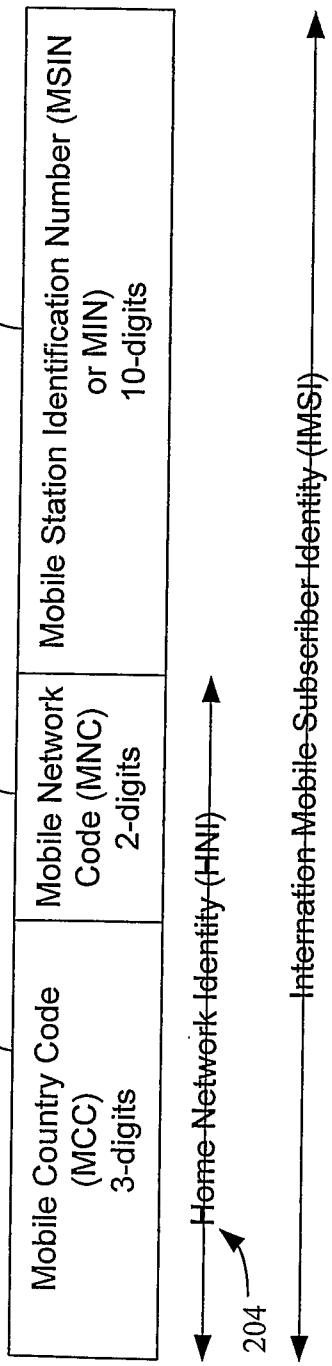
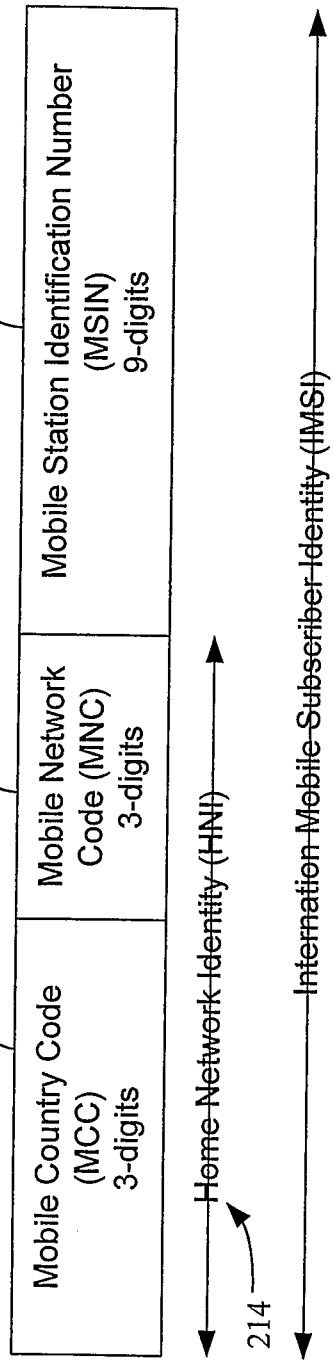
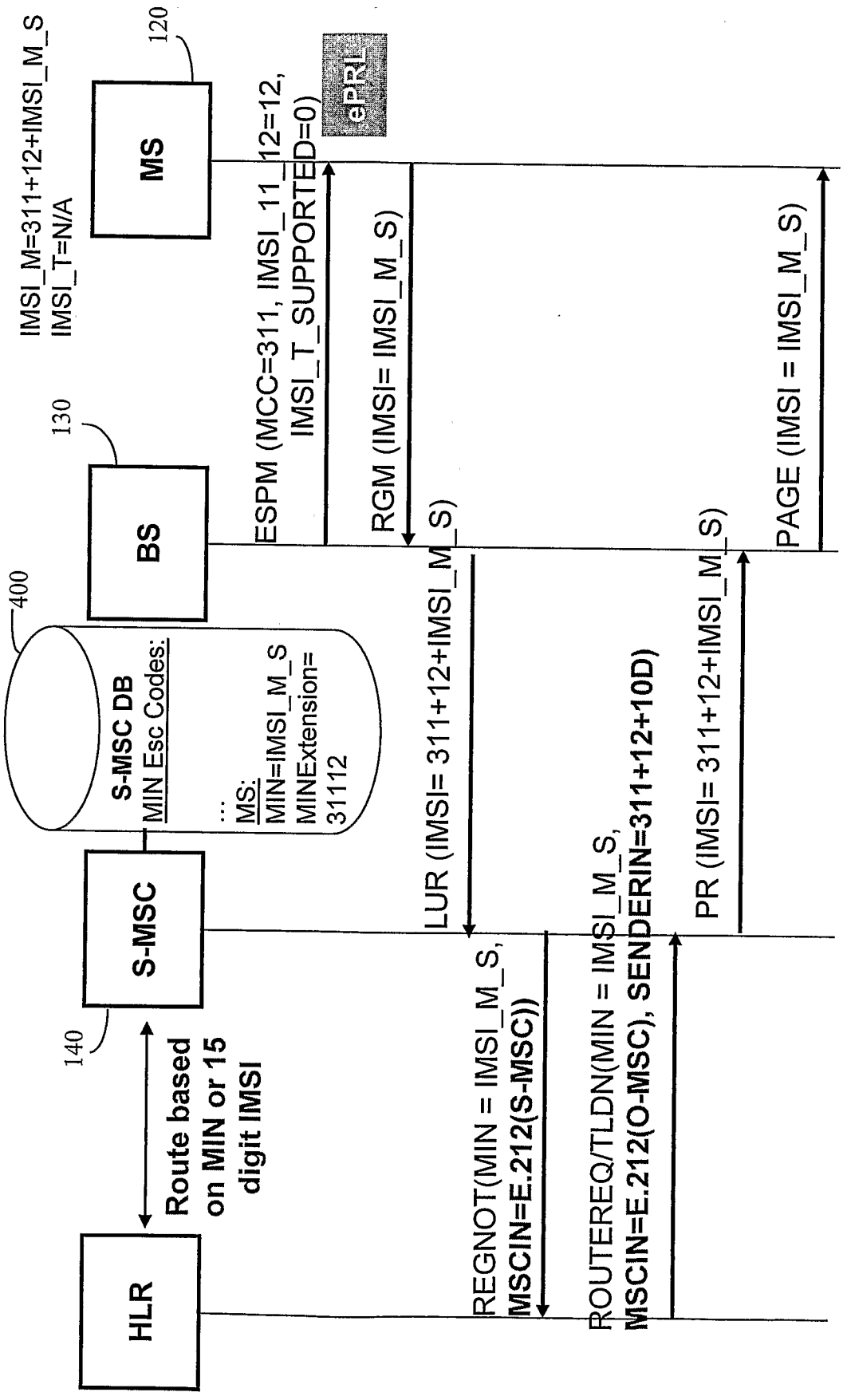


FIGURE 2B

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BS
130
RGM (IMSI= IMSI_M_S)
PAGE (IMSI = IMSI_M_S)
400
S-MSC DB
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...
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PR (IMSI= 311+12+IMSI_M_S)
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140
REGNOT(MIN = IMSI_M_S, MSCIN=E.212(S-MSC))
ROUTEREQ/TLDN(MIN = IMSI_M_S, MSCIN=E.212(O-MSC), SENDERIN=311+12+10D)
Route based on MIN or 15 digit IMSI
HLR

FIGURE 3

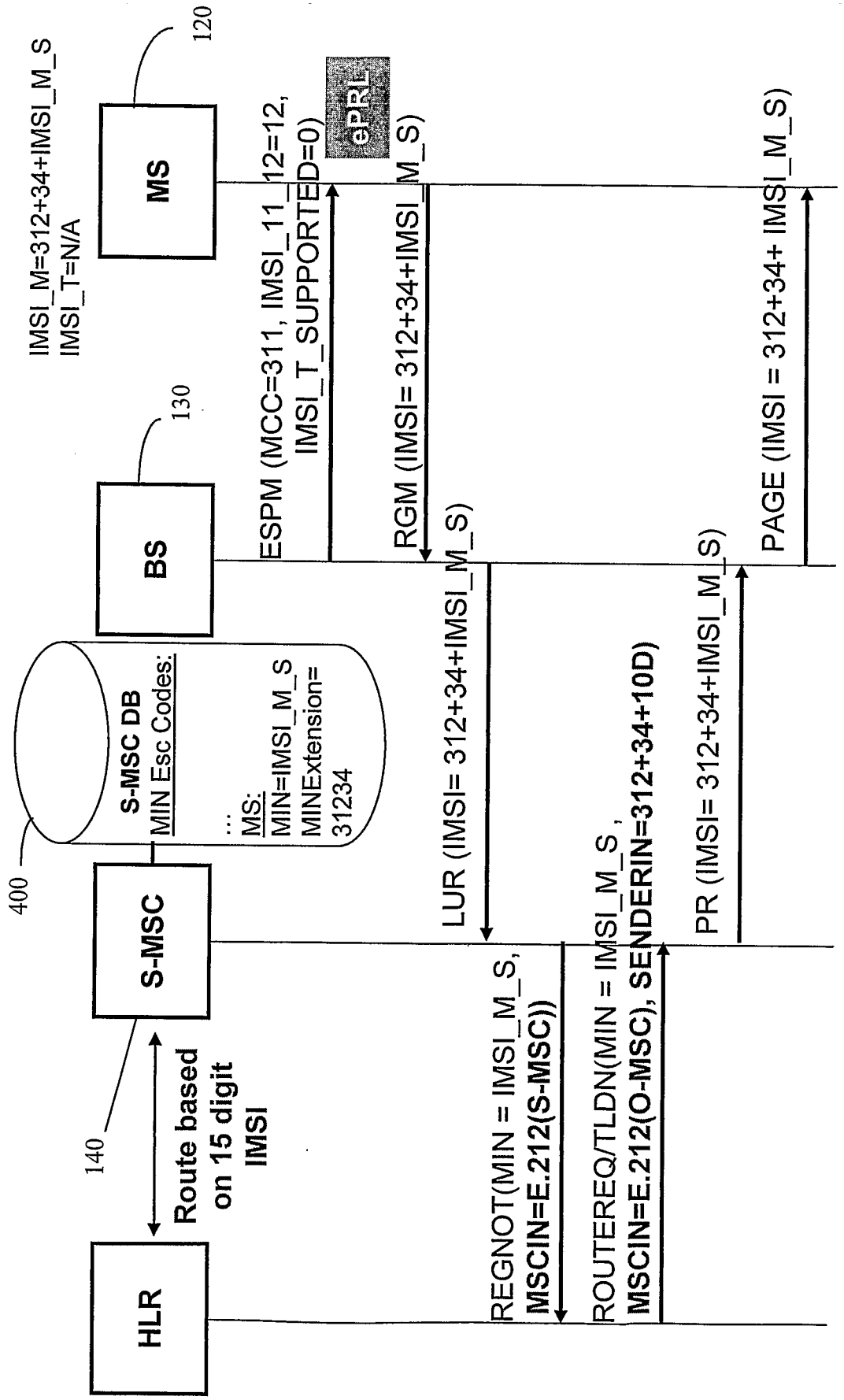
IMSI_M=312+34+IMSI_M_S
IMSI_T=N/A
MS
120
BS
130
S-MSC DB
MIN Esc Codes:
...
MS:
MIN=IMSI_M_S
MINExtension=
31234
400
S-MSC
140
Route based
on 15 digit
IMSI
HLR
ESPM (MCC=311, IMSI_11_12=12,
IMSI_T_SUPPORTED=0)
ePRL
RGM (IMSI= 312+34+IMSI_M_S)
LUR (IMSI= 312+34+IMSI_M_S)
REGNOT(MIN = IMSI_M_S,
MSCIN=E.212(S-MSC))
ROUTEREQ/TLDN(MIN = IMSI_M_S,
MSCIN=E.212(O-MSC), SENDERIN=312+34+10D)
PR (IMSI= 312+34+IMSI_M_S)
PAGE (IMSI = 312+34+ IMSI_M_S)

FIGURE 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/044178

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04Q7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04Q

Documentation 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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00/70900 A (ERICSSON TELEFON AB L M [SE]) 23 November 2000 (2000-11-23) abstract page 1, lines 6-18 page 2, line 1 - page 4, line 8 page 5, line 1 - page 6, line 18 page 8, line 3 - page 11, line 11 claims 1-21	1-10
X	EP 1 089 585 A (LUCENT TECHNOLOGIES INC [US]) 4 April 2001 (2001-04-04) abstract paragraphs [0001] - [0005], [0008], [0009], [0011] - [0015] claims 1-20	1-10

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later 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" document of particular relevance; the claimed invention cannot be considered novel 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.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 March 2007	26/03/2007

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Manuel, Grégory

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2006/044178

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/242215 A1 (CHAMBERS MICHAEL DWAYNE [US]) 2 December 2004 (2004-12-02)	1,2
A		3-10

A	ANDREW HUNTER: "MIN Based IMSI And TRUE IMSI" CDMA LATIN AMERICA OPERATORS ROAMING MEETING, [Online] 18 April 2005 (2005-04-18), pages 1-16, XP002424424 Retrieved from the Internet: URL:http://www.cdg.org/news/events/cdmaseminar/05_LatinAm/op_roam_meeting/ISSUES%20OF%20MIN%20BASED%20AND%20TRUE%20IMSI-%20QC.pdf> [retrieved on 2007-03-13] the whole document	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2006/044178

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		US 6285880 B1	04-09-2001
EP 1089585 A	04-04-2001	AU 6131300 A	05-04-2001
		CA 2320635 A1	01-04-2001
		US 6539223 B1	25-03-2003
US 2004242215 A1	02-12-2004	CN 1575022 A	02-02-2005
		JP 2004364289 A	24-12-2004