



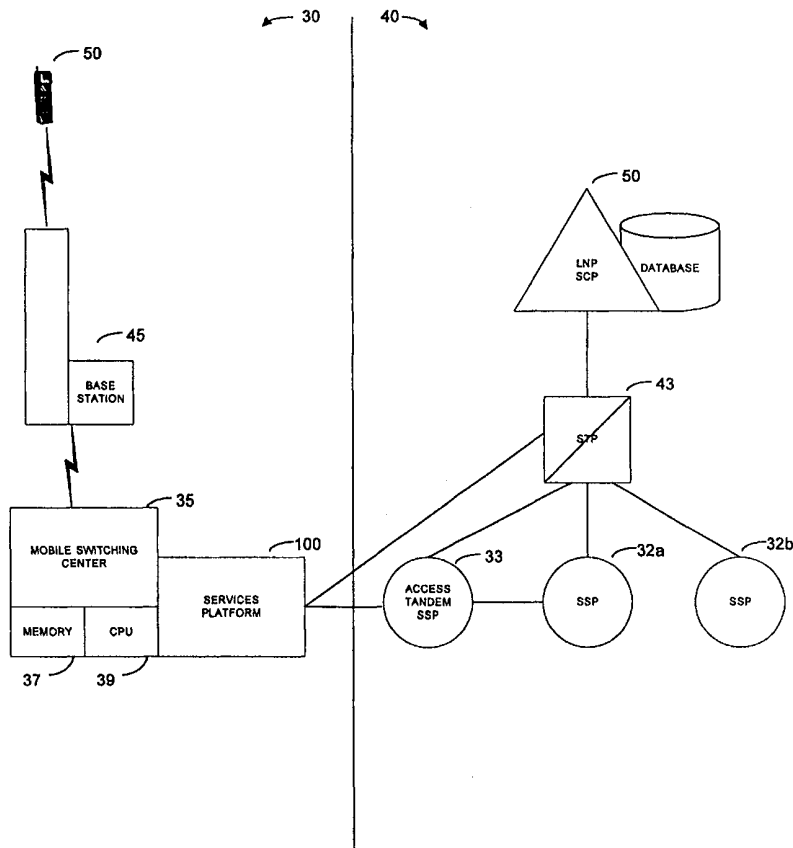
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁷ : H04Q 7/38, 3/00</p>	<p>A1</p>	<p>(11) International Publication Number: WO 00/13453 (43) International Publication Date: 9 March 2000 (09.03.00)</p>
<p>(21) International Application Number: PCT/US99/18608 (22) International Filing Date: 16 August 1999 (16.08.99) (30) Priority Data: 09/140,302 26 August 1998 (26.08.98) US (71) Applicant: BELLSOUTH INTELLECTUAL PROPERTY CORPORATION [US/US]; Suite 501, 824 Market Street, Wilmington, DE 19801 (US). (72) Inventor: KOSTER, Karl, H.; 5880 Pinebrook Road, Atlanta, GA 30328 (US). (74) Agents: TOCUPS, Nora, M. et al.; Kilpatrick Stockton LLP, Suite 2800, 1100 Peachtree Street, Atlanta, GA 30309-4530 (US).</p>	<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p>	

(54) Title: METHOD AND SYSTEM FOR ROUTING CALLS TO A WIRELESS TELECOMMUNICATIONS SERVICES PLATFORM

(57) Abstract

A method and system for routing calls to a wireless platform uses local number portability searches to achieve advanced intelligent network capabilities. The method and system of the present invention "ports" wireless subscriber numbers to a number for a platform providing a specific service. When a caller dials the subscriber's wireless number, a switch determines whether the number is portable. Since the number has been ported, the switch launches a query to a local number portability service control point to obtain additional routing instructions. The service control point accesses a local number portability database to determine the proper routing number. The new routing number allows calls to be routed to a service platform in the wireless network. The service control point transfers the routing number to the switch which then translates the routing number to a directory number for the platform. The call is then routed to the platform.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Türkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

METHOD AND SYSTEM FOR ROUTING CALLS TO A WIRELESS TELECOMMUNICATIONS SERVICES PLATFORM

5

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention is directed to wireless telecommunications and, more particularly, to a method and system for routing calls to a platform that performs wireless telecommunications services for wireless subscribers.

2. Background

Providing immediate access to home and work from remote locations, cellular, PCS, and wireless telephones have become increasingly popular. No longer prohibitively expensive, cell phones are used by a wide range of consumers. Presently, there are over 75 million cellular customers ("subscribers") worldwide. Predictions show that over 300 million customers will be using cellular systems by the year 2,000. Cell phones and systems that are being introduced to the market have advanced features, services, and cost advantages over the older cellular technologies.

Wireless service providers ("WSPs") offer their subscribers several options for improving their wireless telecommunications services. Certain services were created as added conveniences for the subscriber. Other services were created to reduce overall costs to the subscriber and/or the WSP. Three of the most popular services are the Follow Me service, the Pre-Paid Calling service, and the Calling Party Pays service.

The Follow Me service (a.k.a. "Single Number Service") allows a subscriber to be called at any time of the day using a single telephone number. The subscriber provides a schedule to the WSP, indicating the subscriber's usual whereabouts during the day. For instance, the subscriber may indicate that he is in his office during the morning hours, in his car during certain afternoon hours, and at home during the evening hours. In addition, the subscriber provides the directory numbers for each location. The WSP stores this information

and the associated directory numbers for each location in a dedicated platform. The subscriber is then given a new Follow Me directory number that is associated with the platform providing the Follow Me services. When this number is called, the call is directed to the Follow Me platform which then locates the customer in real-time using the predefined
5 schedule and telephone number (at his home, at his office, etc...).

Pre-Paid Calling allows a caller to purchase cellular service in discrete time increments. The subscriber purchases a certain number of minutes of cellular service from the WSP. The WSP provides a new directory number to the subscriber that is associated with a platform providing the Pre-Paid Calling services. Callers who dial this new are routed to
10 the platform which stores information about the subscriber's account status. If the subscriber has time remaining in his account, the platform connects the call to the subscriber. If the subscriber has no time remaining in his account, the caller is informed of the subscriber's account status and the call is disconnected.

Calling Party Pays service allows a subscriber to request that callers pay for calls
15 made to his wireless phone. The caller is provided a directory number for all Calling Party Pays calls. When callers dial the directory number, they are directed to a dedicated Calling Party Pays platform that asks the caller if she would like to pay for the call. If the caller responds in the affirmative, the call is connected to the caller. If the caller declines to pay, the call is disconnected.

20 While each of these services provide greater flexibility to the caller, they each have drawbacks as well. First, each service requires the provisioning of a new directory number that routes a caller to an adjunct platform. As the number of cellular subscribers increases and these services become more ubiquitous, the number of required directory numbers will increase as well.

25 The imposition of local number portability ("LNP") also poses problems for such services. LNP is designed to allow subscribers to switch (or "port") their directory numbers to another service providers within their area. Thus, service providers are required to provide an infrastructure for routing calls from their network to the network of the new service provider. With services that use adjunct platforms, the new number allocated for the platform
30 must remain with the subscriber if the subscriber decides to change service providers.

Currently, wireless providers do not have the sufficient mechanisms for routing ported calls to the adjunct platform.

One solution to this problem would be the implementation of wireless Advanced Intelligent Network (“AIN”) capabilities (sometimes referred to as Wireline Intelligent Networks). Currently, wireline AIN allows calls to be quickly and efficiently routed to other locations within the network. AIN uses a group of switches, transfer points, and service control points (“SCPs”) coupled to computer databases to make decisions regarding calls and route the calls to their proper destination. In addition, AIN uses a group of “triggers” that cause network components to behave differently and route calls differently than expected.

For instance, the terminating attempt (“TAT”) trigger would be useful in routing wireless service calls to the proper platform. The TAT trigger causes a switch in the network to pause during call processing and obtain call routing instructions from an SCP. The SCP may access a database to determine the proper routing instructions. The SCP may then transmit a message back to the switch indicating the final destination of the call. Thus, in the wireless environment, the call could ultimately be routed to the proper platform despite local number portability requirements.

Unfortunately, AIN is very expensive to implement in a wireline network. A wireless version of AIN would likely be expensive to implement and would require a large financial undertaking by a wireless service provider.

20

SUMMARY OF THE INVENTION

The present invention provides a method and system for emulating certain AIN capabilities in a wireless environment without the need for wireless AIN elements. Specifically, the method and system of the present invention allows a wireless service provider to route calls to a service platform using local number portability elements and functionality. Thus, the service provider is not forced to provide additional directory numbers to subscribers. Since new numbers aren’t provided, the problems associated with the porting of those numbers are also eliminated.

In a preferred embodiment of the present invention, wireless telecommunications services that use a platform having a unique NPA-NXXX may use local number portability

30

capabilities in their own network as well as other network's to effect the routing required for the service. More particularly, the wireless service provider "ports" directory numbers of service subscribers to platforms within its own network. When a caller dials the subscriber, the local switch for the caller (whether wireline or wireless) suspends call processing to
5 determine whether the number has been ported. First, the switch examines a table to determine the portability of the number. Since the number has been "ported" by the wireless service provider, the switch queries a local number portability service control point. The SCP accesses a database to determine the local routing number for the "new" number. The SCP then returns a local routing number corresponding to the platform for the service.

10 The platform may be coupled to an end office in the PSTN. Alternatively, the platform may be coupled to a mobile switch in the mobile network. In either event, the call is routed to the platform, which then performs the desired service. If the service is a Follow Me service, for example, the platform accesses records in a database and performs an algorithm to determine the most likely location of the subscriber. The platform then routes the call to the
15 directory number of that location.

Since most wireline service providers are under an obligation to perform LNP functions for ported wireless numbers, this ensures that calls originating from other carriers will be directly routed to the adjunct platform without intelligent processing capabilities normally performed by the wireless service provider.

20 Accordingly, it is an object of the present invention to provide a method and system for routing calls to a wireless services platform that does not require the implementation of wireless AIN.

It is a further object of the present invention to provide a method and system for routing calls to a wireless services platform that emulates advanced intelligent network
25 functionality.

It is an additional object of the present invention to provide a method and system for routing calls to a wireless services platform that uses the existing local number portability infrastructure.

It is yet another object of the present invention to provide a method and system for routing calls to a wireless services platform that does not require the provision of additional directory numbers.

Additional objects and advantages of the invention will be set forth in part in the description which follows and in part will be obvious from the description or may be learned by practice of the invention. The objects and advantages of the invention will be realized and attained by means of the elements and combinations particularly pointed out in the appended claims.

10

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a block diagram of a wireless network coupled to a PSTN network, according to the present invention

FIGURE 2 is a block diagram of cellular telephone unit.

FIGURE 3 is a flow chart illustrating steps occurring during a call from a PSTN line to the wireless subscriber's directory number.

DETAILED DESCRIPTION

Reference will now be made in detail to the invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

FIGURE 1 is a block diagram of a wireless network 30 coupled to a PSTN network 40, according to the present invention. The mobile network includes at least one mobile switching center ("MSC") 35, one or more wireless base stations 45, and a cellular telephone unit 50 of a subscriber. The mobile switching center 35 monitors the location and call quality of mobile telephones and switches the mobile telephone call between cell sites and the public switched telephone network ("PSTN") 40. The MSC 35 receives the dialed digits, creates and interprets call processing tones, and routes the call paths. The MSC 35 includes controllers, switching assembly, communications links, operator terminal, and subscriber database information. The controllers guide the MSC 35 through the creation and

30

interpretation of commands to and from the base stations 45. A switching assembly routes voice connections from the cell sites to each other or to the PSTN. An operator terminal allows operations, administration and maintenance of the system. The subscriber database contains customer-specified features and billing records. The MSC 35 may include
5 additional components as well, including a processor 37 and a memory 39. The base station 45 is a controlling transmitting/receiving station that provides service to cellular telephone units within cell sites. Individual cellular telephone units 50 may utilize a single base station 45 to communicate with the MSC 35.

FIGURE 2 is a block diagram of cellular telephone unit 50, in accordance with a
10 preferred embodiment of the present invention. Cellular telephone 50 includes processor 52 capable of processing messages received by cellular telephone unit 100 using known hardware and according to known methods. To make each mobile telephone unique, several types of information is stored in its internal memory. This memory is called a Number Assignment Module 53. The NAM contains a Mobile Identification Number ("MIN") 58,
15 which identifies the mobile cellular unit 50. The mobile cellular unit 50 further includes additional circuitry 54 for transmitting and receiving data.

As illustrated in FIGURE 1, the PSTN 40 includes several Advanced Intelligent Network ("AIN") elements. For brevity, only a basic explanation of AIN is provided herein. Where the network 30 operates or is composed differently in an important aspect from that
20 which would be understood by those skilled in the art, additional details are provided herein. For further information regarding AIN technology and aspects thereof, the interested reader is referred to U.S. Patent No. 5,430,719, to Weisser, which is incorporated herein by reference.

The PSTN 40 includes a variety of interconnected network elements. A group of such network elements includes the plurality of end offices which are indicated as service
25 switching points ("SSPs" or "switches") 32a, 32b in FIGURE 1. An SSP typically includes switch functionality, but also includes other functionality so as to communicate with other AIN elements as those skilled in the art understand. Voice connections between the PSTN 40 and the mobile network 30 are made through an access tandem SSP 33. The tandem office 33 is used to connect and switch circuits between and among other end offices. Each SSP 32a,
30 32b serves a designated group of calling lines, and thus, the SSP that serves a particular calling line may be referred to as its serving switch. Data connections between the PSTN 40

and the mobile network 30 are made through a signaling transfer point 43. The STP 43 is a telephone network switching point that routes control messages to other switching points.

The PSTN further includes functionality for determining the portability of local directory numbers. Specifically, the PSTN 40 includes an LNP SCP database 50 coupled to one ore more SSPs through a signal transfer point 43. Local Number Portability ("LNP") allows a subscriber to change service providers and/or geographic location while retaining the same directory number. The subscriber retains this directory number despite a new recipient switch serving the subscriber's phone. When acting as originating switches, all SSPs in the network perform digit analysis on the dialed digits to determine whether the number has been ported. If the number has been ported, the SSP launches a query to the LNP SCP 50 based on the dialed digits. The LNP SCP 50 stores one or more LNP routing tables that indicate the routing number for the recipient switch. The LNP SCP 120 returns a response to the SSP indicating the routing number of the recipient switch. The originating switch analyzes the data, translates the data if necessary, and routes the call to the recipient switch. The recipient switch (SSP) then completes the call between end users.

Cellular subscribers in the mobile network may purchase various services from the cellular service provider. For example, subscribers may purchase Follow-Me services that allow a caller to be reached at any time during the day, based upon a predetermined schedule. To provide such services, the MSC 35 further includes a platform 100 for the service. The platform 100 is a computer and subscriber database containing each customer's MIN to uniquely identify each customer. The platform 100 uses certain criteria, such as the time of day and caller activation to redirect calls to a subscriber's home number, mobile number, or work number. The platform 100 performs an algorithm to determine the most likely location of the subscriber at any given time of day. Each subscriber is normally provided a separate directory number for the service. The directory number is the number that is called to reach the subscriber at different hours of the day. The directory number is a unique NPA-NXX for the platform 100. Although a Follow Me service is described, it should be apparent to one of ordinary skill in the arts that the principles described herein are equally applicable to other services that direct calls to a unique NPA-NXX for a specific platform.

In the present invention, the subscriber is not provided a new directory number. Instead, the wireless service provider ports the subscriber's cellular telephone number to the

NPA-NXX for the service platform. Since this platform is owned by the wireless service provider, the service provider is essentially porting the number to itself. The wireless service provider notifies the PSTN service provider that the subscriber's directory number is portable. The PSTN service provider updates its network by creating an entry in all SSP
5 tables to indicate the portability of the number. In addition, the PSTN service provider creates an entry in the LNP SCP routing tables. The entry includes the subscriber's wireless directory number and maps the wireless directory number to the NPA-NXX directory number for the platform 100.

FIGURE 3 is a flow chart illustrating steps occurring during a call from a PSTN line
10 to the wireless subscriber's directory number. In step 302, the caller dials the subscriber's wireless directory number. In step 304, the switch for the caller checks a local table to determine whether the number is portable. Since the service provider has "ported" the number to itself, the number is listed in the table as portable. In step 308, the switch sends a query to the LNP SCP to determine where the call should be routed. In step 310, the LNP
15 SCP examines its internal databases to determine the new service provider and the routing instructions. The wireless service provider has provided a local routing number for the platform to the PSTN service provider. In step 312, the LNP SCP sends a message back to the switch containing the routing instructions for the service platform.

In step 314, the switch connects the call to the platform. The platform may then
20 perform additional processing and routing. For example, a Follow Me platform would perform the necessary algorithm to determine the most likely location of the caller. Next, the platform would route the call to that directory number.

Having thus described a method and system for routing calls in a wireless network, it
25 should be apparent to those skilled in the art that certain advantages have been achieved. It should also be appreciated that various modifications, adaptations, and alternative embodiments thereof, including its use with Pre-Paid Calling and Caller Pays platforms, for example, may be made within the scope and spirit of the present invention. The invention is further defined by the following claims:

CLAIMSWhat is Claimed is:

- 5 1. A method for routing a call through a platform for delivering a wireless telecommunications service, the method comprising the steps of:
- storing a wireless directory number of a subscriber in a local number portability database;
- mapping the wireless directory number to a directory number of the wireless platform;
- 10 querying the local number portability database when a call is made to the subscriber's wireless directory number;
- retrieving the directory number of the platform; and
- routing the call to the wireless platform.
2. The method for routing a call, as recited in Claim 1, further comprising the steps
- 15 of:
- transmitting the call to a switch;
- querying a table in the switch to determine whether the directory number is portable.
3. The method for routing a call, as recited in Claim 1, wherein the platform is coupled to an end office.
- 20 4. The method for routing a call, as recited in Claim 1, wherein the platform is coupled to a mobile switching office.
5. The method for routing a call, as recited in Claim 1, wherein the step of retrieving the directory number further comprises the steps of:
- returning a local routing number; and
- 25 translating the local routing number into a directory number for the platform.

6. The method for routing a call, as recited in Claim 1, further comprising the steps of:

determining, in the platform, a directory number for locating a wireless subscriber;

and

5 routing the call to the wireless subscriber using the located directory number.

7. A method for routing a call through a platform for delivering a wireless telecommunications service, the method comprising the steps of:

determining whether a dialed number is portable;

querying a local number portability database if the number is portable;

10 determining, in the local number portability database, a routing number for the platform;

transmitting the routing number to a switch;

translating the routing number to a directory number; and

routing the call to the platform.

15 8. The method for routing a call, as recited in Claim 7, further comprising the steps of:

determining, in the platform, a directory number for locating a wireless subscriber;

and

routing the call to the wireless subscriber using the located directory number.

20 9. The method for routing a call, as recited in Claim 1, wherein the platform is coupled to an end office.

10. The method for routing a call, as recited in Claim 1, wherein the platform is coupled to a mobile switching office.

11. A system for providing a wireless telecommunications service to a wireless subscriber, the system comprising:

a platform for providing the wireless telecommunications service, the platform including at least one processor and at least one memory unit.

5 a switch storing a table containing a plurality of portable wireless directory numbers, including a directory number of the wireless subscriber; and

a local number portability database storing the wireless directory number of the subscriber and a corresponding routing number for the platform;

10 wherein a call to a portable wireless directory number causes the switch to query to the database, and wherein the database returns a routing number to be translated by the switch and routed to the platform.

12. The system for providing a wireless telecommunications service, as recited in Claim 11, wherein the platform is coupled to an end office.

13. The system for providing a wireless telecommunications service, as recited in
15 Claim 11, wherein the platform is coupled to a mobile switching office.

14. The system for providing a wireless telecommunications service, as recited in Claim 11, wherein the platform determines a wireless directory number of a subscriber based upon information provided by the subscriber, and wherein the platform routes the call to the wireless directory number of the subscriber.

20 15. The system for providing a wireless telecommunications service, as recited in Claim 11, wherein the platform requests a caller to pay for a call to the wireless subscriber.

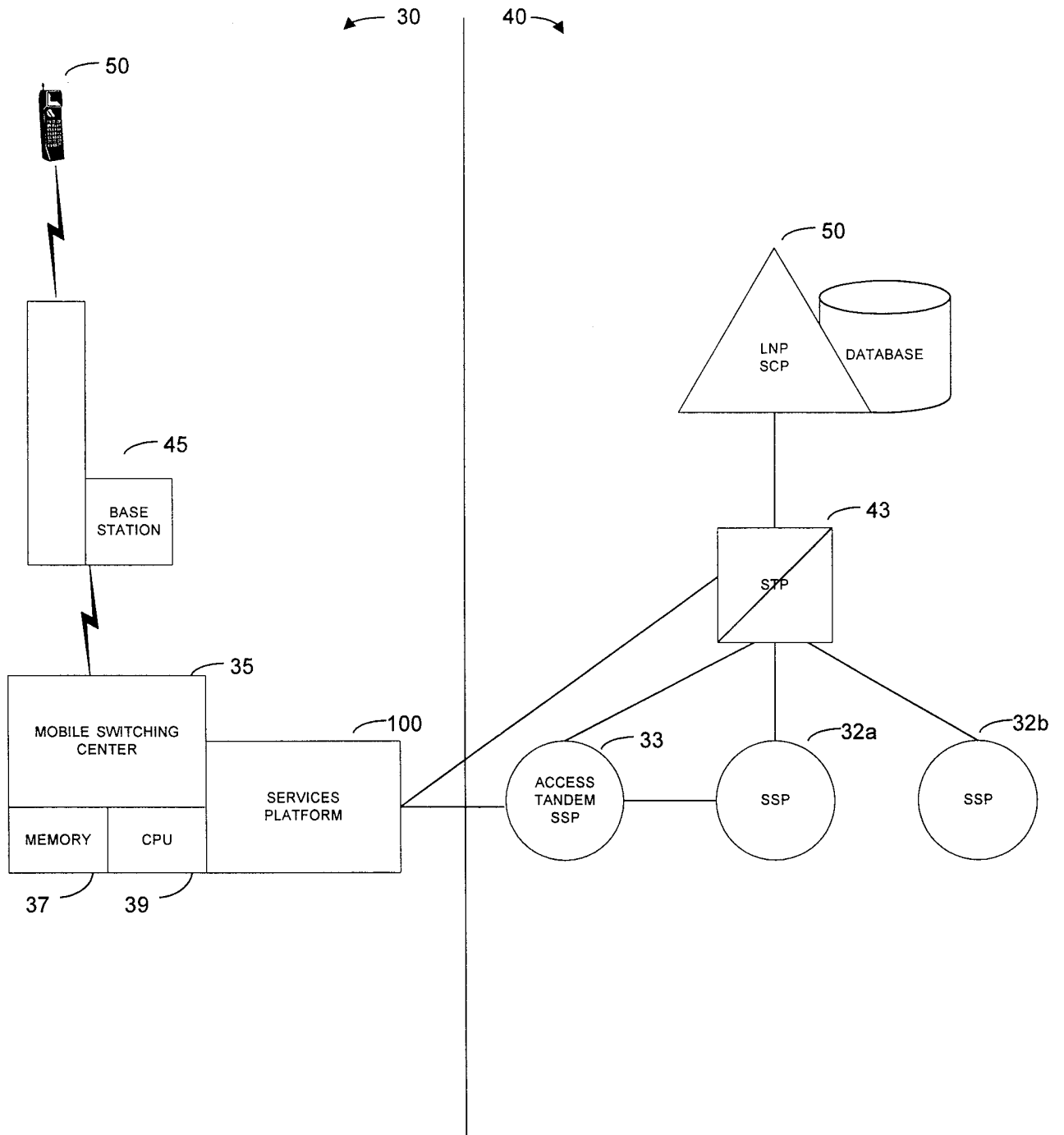


FIGURE 1

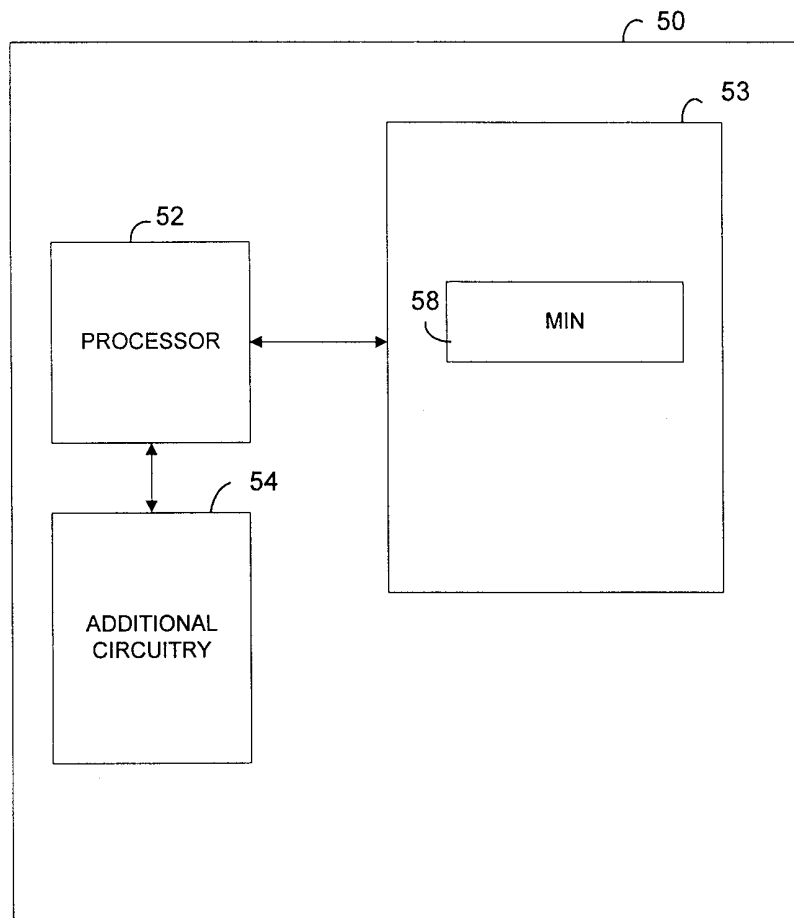


FIGURE 2

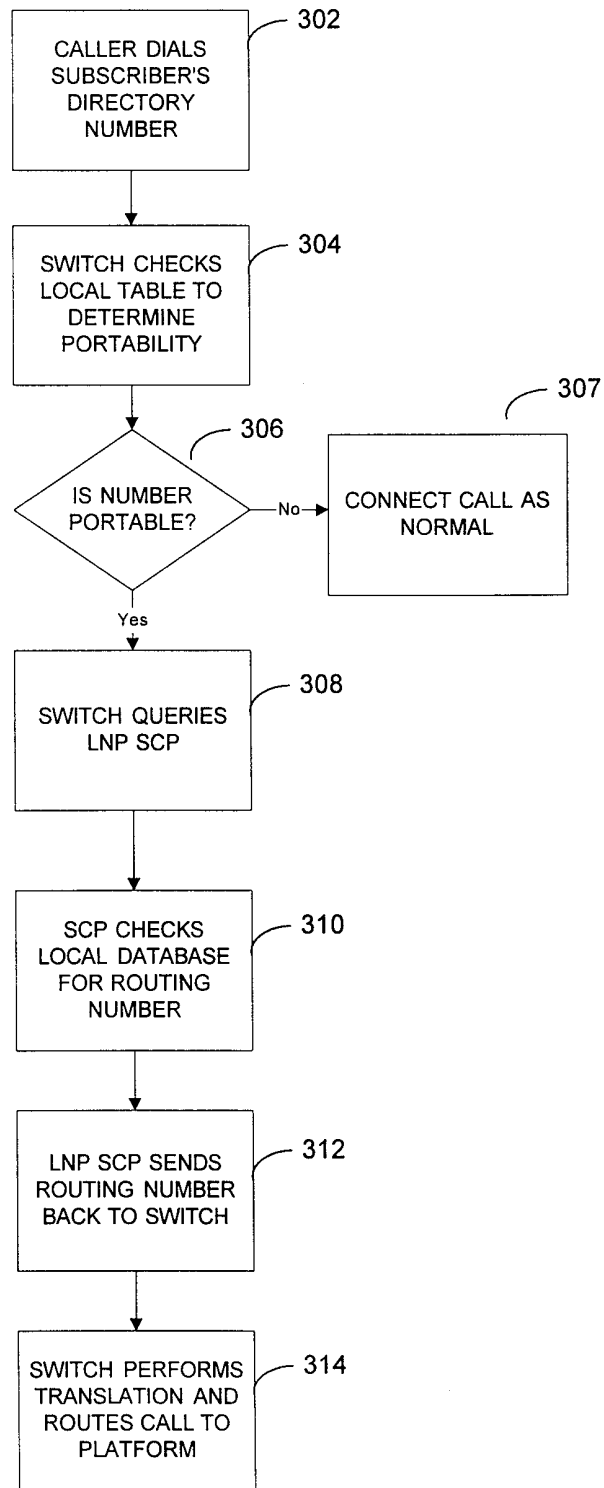


FIGURE 3

INTERNATIONAL SEARCH REPORT

Inter: nal Application No
PCT/US 99/18608

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/38 H04Q3/00

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)
IPC 7 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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 14027 A (ERICSSON GE MOBILE INC) 2 April 1998 (1998-04-02) page 7, line 33 -page 9, line 36 page 11, line 10 -page 12, line 2 -----	1-5, 7, 9-13
A	US 5 732 131 A (BELLSOUTH CORPORATION) 24 March 1998 (1998-03-24) column 7, line 54 -column 9, line 13 column 11, line 18 -column 16, line 31 -----	1-14
A	US 5 579 379 A (BEL ATLANTIC NETWORK SERVICES) 26 November 1996 (1996-11-26) column 11, line 7 -column 15, line 17 column 20, line 38 -column 23, line 13 -----	1, 7, 11, 15

Further documents are listed in the continuation of box C.

Patent family members are listed in 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

14 December 1999

20/12/1999

Name and mailing address of the ISA
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

Authorized officer

Heinrich, D

INTERNATIONAL SEARCH REPORT

information on patent family members

Inter. Patent Application No

PCT/US 99/18608

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9814027 A	02-04-1998	US 5953663 A	14-09-1999
		AU 4590697 A	17-04-1998
		DE 19782009 T	12-08-1999
		GB 2333206 A	14-07-1999

US 5732131 A	24-03-1998	AU 5163798 A	10-06-1998
		EP 0940045 A	08-09-1999
		WO 9823096 A	28-05-1998

US 5579379 A	26-11-1996	US 5469496 A	21-11-1995
		US 5353331 A	04-10-1994
		US 5506887 A	09-04-1996
		US 5664005 A	02-09-1997
		US 5610972 A	11-03-1997
		US 5758281 A	26-05-1998
		WO 9318606 A	16-09-1995
