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(56) Documents Cited
   EP 1061715 A2   EP 0526832 A2
   JP 080186856 A   JP 080163639 A
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(54) Abstract Title
   International calling method for mobile phone

(57) A method for dynamically simplifying an international call in a cellular phone utilizes a conversion table for storing system codes of a plurality of network companies worldwide and their international access codes and a phone record for storing a plurality of telephone numbers having international access codes respectively of different called parties in the database thereof to let the cellular phone be able to determine current location area while calling in international roaming and find the correct international access code from conversion table in accordance with system code received from an approximate network company for replacing the international access code in the telephone number searched from phone record. The cell may be processed after the location determination, and the full number called displayed. Also may be used with PDAs with cellular facility.
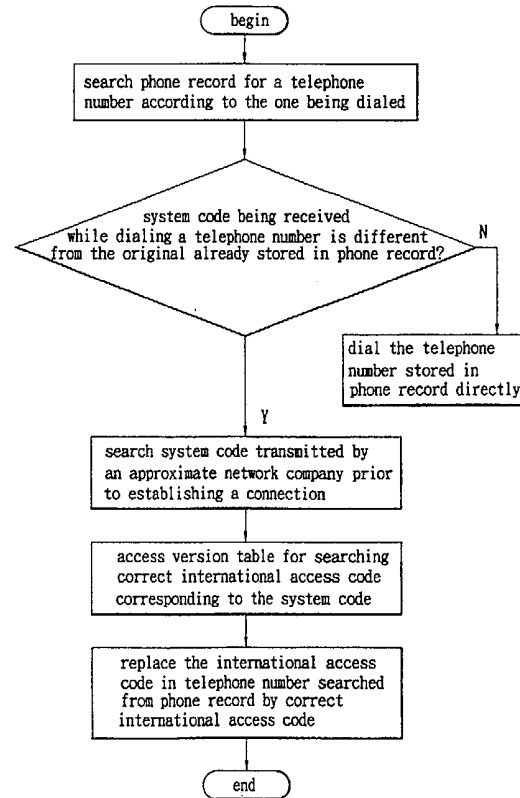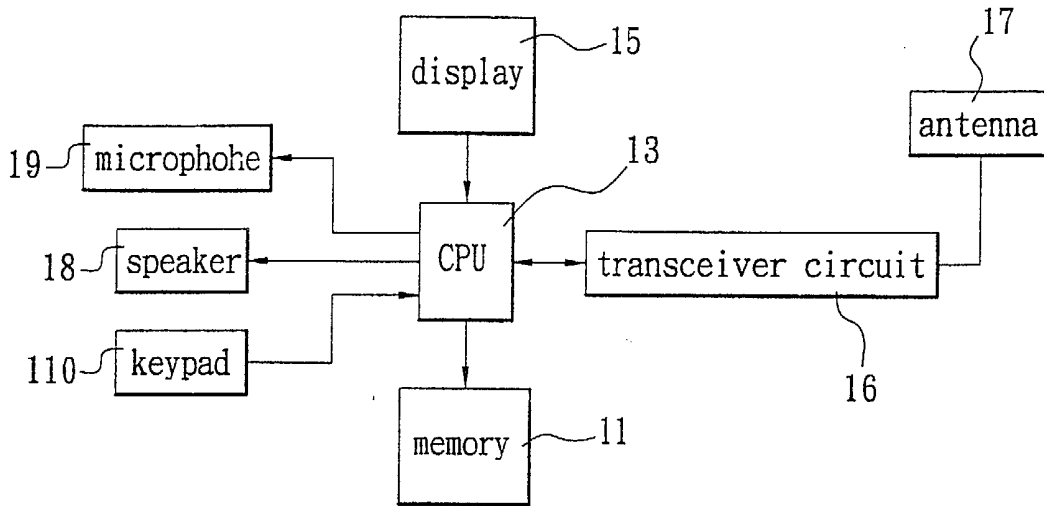

FIG. 2

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FIG. 1

```
                    ┌─────────┐
                    │  begin  │
                    └─────────┘
                         │
                         ▼
        ┌──────────────────────────────────────┐
        │ search phone record for a telephone   │
        │ number according to the one being     │
        │ dialed                                │
        └──────────────────────────────────────┘
                         │
                         ▼
                ◇ system code being received ◇
        ◇ while dialing a telephone number is different ◇    N
        ◇ from the original already stored in phone record? ◇──────┐
                         │                                         │
                         │ Y                                       ▼
                         │              ┌──────────────────────────────┐
                         │              │ dial the telephone            │
                         │              │ number stored in              │
                         │              │ phone record directly         │
                         │              └──────────────────────────────┘
                         ▼
        ┌──────────────────────────────────────┐
        │ search system code transmitted by     │
        │ an approximate network company prior  │
        │ to establishing a connection          │
        └──────────────────────────────────────┘
                         │
                         ▼
        ┌──────────────────────────────────────┐
        │ access version table for searching    │
        │ correct international access code      │
        │ corresponding to the system code      │
        └──────────────────────────────────────┘
                         │
                         ▼
        ┌──────────────────────────────────────┐
        │ replace the international access      │
        │ code in telephone number searched     │
        │ from phone record by correct          │
        │ international access code             │
        └──────────────────────────────────────┘
                         │
                         ▼
                    ┌─────────┐
                    │   end   │
                    └─────────┘
```
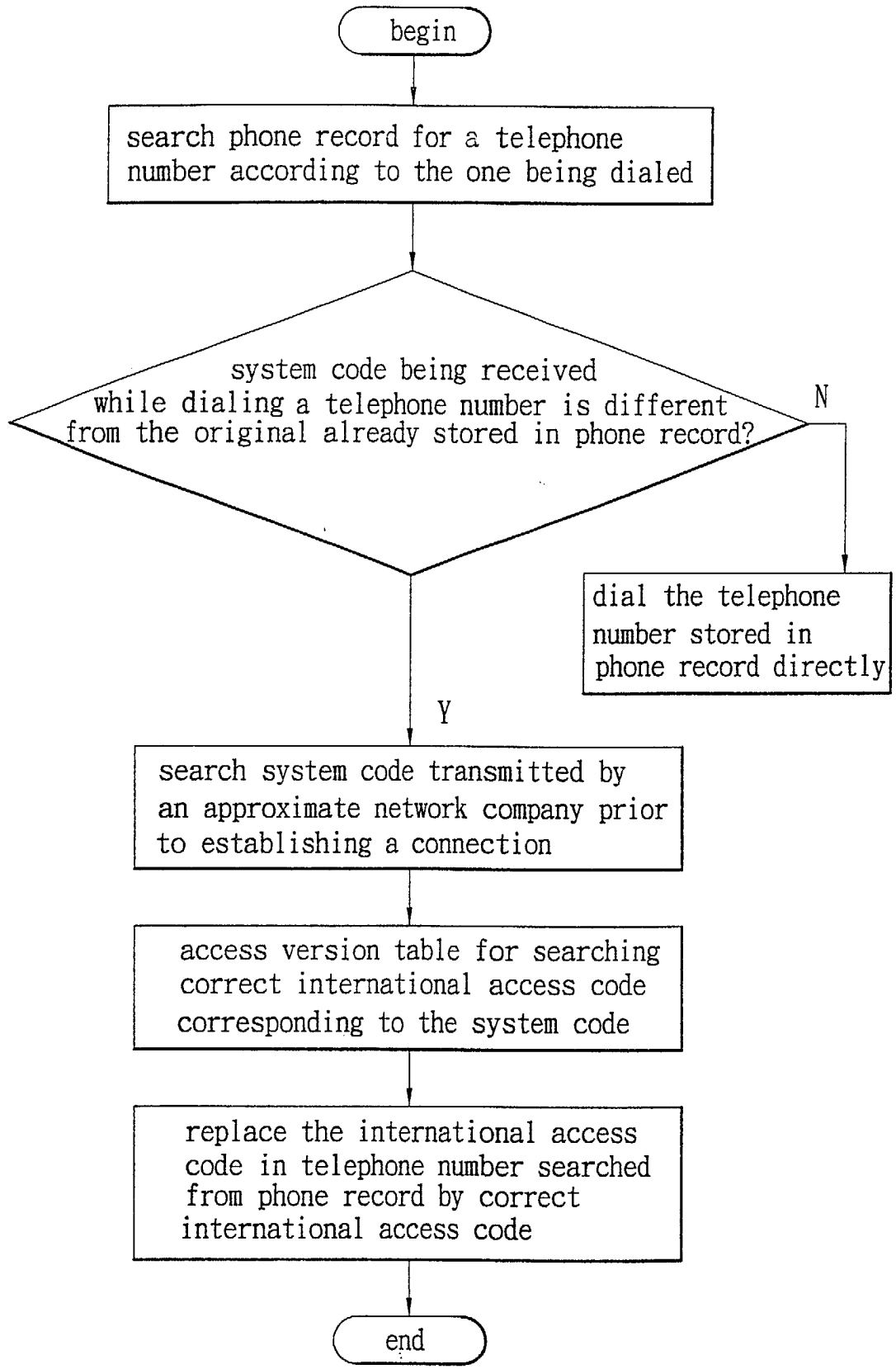
FIG. 2

DIALING METHOD FOR
DYNAMICALLY SIMPLIFYING INTERNATIONAL CALL IN CELLULAR PHONE

The present invention relates to cellular phones and more particularly to a dialing method for dynamically simplifying an international call in a cellular phone.

Cellular phones have been popular worldwide in recent years due to its portability, multifunction, and inexpensive unit price as a communication device for social or business purpose. Further, as compared to conventional wire telephones cellular phones have advantages in certain fields such as convenience in an outdoor environment and portability. However, the functionalities of cellular phone have not been perfect. For example in an international roaming, a successful cellular phone call is made possible only after a calling party knows the international access code of a called party in advance, i.e., calling party has to dial international access code and the called party's telephone number (including national code, area code and number) sequentially. In another example of making conversations with different people located in different countries, the searching process for corresponding international access codes and operation thereof are more complex and time consuming. This really bothers cellular phone user, thus causing inconvenience. Hence, there is a need to solve above problems associated with international roaming initiated by cellular phones. Moreover, it is desirable to provide a novel cellular phone which is capable of performing a dialing method for dynamically simplifying an international call in a convenient effective manner in order to overcome the above drawbacks of prior art.

It is therefore an object of the present invention to provide a method for dynamically simplifying an international call in a cellular phone comprising the steps of storing system codes of a plurality of network companies worldwide and international access codes in a conversion table in a database of a memory of the cellular phone and storing a plurality of telephone numbers (including international access code, national code, area code and number) of different called parties in a

phone record in the database after the communications thereof being finished; searching for the telephone number stored in the phone record according to a phone numbers (with or without an international access code) being dialed; determining whether the international access code of an approximate network company associated with the current location area of the phone number being dialed is different from the original location area of the same telephone number while being stored in the phone record; if different, accessing the conversion table in memory and searching for a correct international access code in accordance with system code received from the network company in the current location area; replacing the international access code in the telephone number searched from the phone record by the correct international access code being searched.; and showing the telephone number having the correct international access code on a display of the cellular phone.

The invention will now be described further by way of example with reference to the accompanying drawings in which:-

FIG. 1 is a block diagram of electronic elements of a cellular phone for effecting an international call according to the invention; and

FIG. 2 is a flow chart of a dialing method for dynamically simplifying an international call in the FIG. 1 cellular phone.

The invention is directed to a dialing method for dynamically simplifying an international call in a cellular phone. The cellular phone comprises a database in a memory 11 thereof having a conversion table for storing system codes of major network companies worldwide and their international access codes, and a phone record for storing telephone numbers, each including international access code, national code, area code and number, after being dialed by a user of cellular phone.

According to the invention, the cellular phone will store international access code, national code, area code and number of a telephone number after it has been dialed and the communication thereof is finished. While in an international roaming, user can input a telephone number dialed before with or without an international

access code and the cellular phone will search phone record and find the telephone number having the international access code ever being dialed. A central processing unit (CPU) 13 of cellular phone will then determine whether the international access code of an approximate network company associated with the current location area of this calling is different from the international access code of network company associated with the original location area of storing the same telephone number into cellular phone. If different, the CPU 13 may accordingly access conversion table in memory 11 and search for international access code from conversion table in accordance with system code received from the approximate network company in the current location area, and replace the international access code in the telephone number searched from the phone record by the international access code being searched. Then telephone number with the correct international access code is automatically shown on display 15 of the user's cellular phone and is dialed out for calling the called party. In brief, a successful call is made as a cellular phone user simply dials a called party's telephone number in phone record. This greatly reduces steps in effecting an international call in cellular phone. By utilizing this method, problem associated with prior art in international roaming, i.e., complex and time consuming regarding searching process for corresponding international access code and area code and operation thereof, etc. are substantially eliminated.

FIG. 1 is a block diagram of electronic elements of a cellular phone which is capable of dynamically simplifying international call in cellular phone according to the invention. CPU 13 of cellular phone may establish a connection with a base station through transceiver circuit 16 and antenna 17. Hence, CPU 13 may receive telephone signals from the base station. The received signals are converted into sound waves prior to amplifying the same through speaker 18. Also, sound waves from microphone 19 are received by CPU 13. The received sound waves are converted into telephone signals in CPU 13 prior to transmitting to the base station through transceiver circuit 16 and antenna 17. Moreover, CPU 13 may send processed data to display 15 for showing and memory 11 for storing. In addition, CPU 13 may access data stored in memory 11. Additionally, CPU 13 may receive input alphanumeric data from keypad 110 by user.

FIG. 2 is a flow chart of a dialing process illustrating how to simplify an international call in the FIG. 1 cellular phone. After cellular phone is activated to call a called party's telephone number having an international access code, the telephone

number will be stored in the phone record while the communication is finished. Then in international roaming, when a telephone number is dialed CPU 13 of cellular phone may perform following steps. In step 1, the CPU 13 determines whether the system code of network company associated with the current location area of this calling is different from the system code of network company associated with the original location area of the same telephone number already stored in the phone record. If same, CPU 13 dials the telephone number stored in phone record directly. If different, CPU 13 receives system code transmitted by the approximate network company prior to establishing a connection therewith in order to recognize the current location area of this calling (step 2). Then CPU 13 searches conversion table therein for a correct international access code in accordance with system code received from approximate network company (step 3). Then CPU 13 replaces international access code in the telephone number searched from the phone record by the correct international access code being searched and shows the same on display 15 of the cellular phone before dialing out (step 4).

In brief, when a cellular phone user has entered into an international roaming and the cellular phone is activated to call a called party's telephone number, CPU 13 may access conversion table in memory 11 for finding correct international access code in accordance with system code received from an approximate network company, and replace international access code in the telephone number searched from phone record, and showing the same on display 15 of cellular phone. Finally, the telephone number with correct international access code is dialed out. This is a convenient and practical method for dynamically simplifying an international call in a cellular phone. By utilizing this, problems associated with prior art such as inconvenient in making a conversation among several people located in different countries, complex and time consuming regarding searching process for corresponding international access code and area code and operation thereof, etc. are substantially eliminated.

Moreover, such cellular phone may be implemented as a personal digital assistant (PDA) having a cellular phone functionality.

While the invention has been described by means of specific embodiments, numerous modifications and variations could be made thereto by those skilled in the art without departing from the scope of the invention set forth in the claims.

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CLAIMS

1.   A method for dynamically simplifying an international call in a cellular phone comprises a conversion table for storing system codes of a plurality of network companies worldwide and their international access codes and a phone record for storing a plurality of telephone numbers having international access codes respectively in a database thereof in order to let said cellular phone be able to recognize current location area in accordance with system code received from an approximate network company while calling in international roaming and find the corresponding international access code from conversion table for replacing the international access code in a telephone number searched from said phone record.

2.   The method of claim 1, wherein said cellular phone dials the telephone number stored in phone record directly after determining said current location area of calling is the same as original location area of storing telephone number into said phone record.

3.   The method of claim 1, wherein said cellular phone shows a telephone number with said correct international access code on display of the cellular phone before dialing.

4.   The method of claim 1, wherein said cellular phone is a personal digital assistant (PDA) having a cellular phone functionality.

5. A method for dynamically simplifying an international call in a cellular phone substantially as herein described with reference to and as illustrated in the accompanying drawings.

Application No: GB 0117593.4   **Examiner:** Andrew Hole

Claims searched: 1 to 5   **Date of search:** 28 February 2002

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

     UK Cl (Ed.T): H4L (LRPLS, LECCP, LECCX, LDPB, LDPPX, LESF, LEUF)

     Int Cl (Ed.7): H04Q 7/22, 7/32, 7/38

Other: Online: WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	EP 1061715 A2	(MITSUBISHI) See Embodiments 3 and 6 to 9, paragraph 107 especially.	1 to 4.
A	EP 0526832 A2	(NEC) See column 2, line 46 to column 5, line 30.	
X	JP 2001119750 A	(NTT) See PAJ abstract and WPI abstract, accession number 2001-386870.	1 at least.
X	JP 080186856 A	(HITACHI) See PAJ abstract and WPI abstract, accession number 1998-244003.	1 at least.
X	JP 080163639 A	(NTT) See PAJ abstract and WPI abstract, accession number 1996-348658.	1 at least.

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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