Title: METHOD AND COMMUNICATION NETWORK FOR PROVIDING ANNOUNCEMENTS IN PREFERRED LANGUAGE WHILE ROAMING

Abstract: Communication network and method for providing communication facilities for a plurality of users. The communication network comprises an announcement generating element (14) for sending network related messages to any of the users. A further network element is connected to the announcement generating element, the further network element being arranged for determining a preferred language for a specific user (10) of the plurality of users, and sending network related messages to the specific user (10) in the preferred language.
METHOD AND COMMUNICATION NETWORK FOR PROVIDING ANNOUNCEMENTS IN PREFERRED LANGUAGE WHILE ROAMING

Field of the invention

The present invention relates to providing network messages in a user's home language while roaming. In particular, the present invention relates to a method for providing network related messages in a communication network such as a mobile telephony network, the communication network being arranged to provide communication facilities for a plurality of (mobile) users. Furthermore, the present invention relates to a communication network for providing communication facilities for a plurality of (mobile) users.

Prior art

In known telecommunication systems, network messages or announcements are provided in the local language of the network. Some users of the network may not be able to understand these messages. This is especially the case for roaming users from other networks. As a result, a user will redial and hear the same announcement, or the user will try and associate with another network available in that area. In both cases, revenue is lost for the operator of the network.

Summary of the invention

The present invention seeks to provide a method that will allow a user of a terminal in a mobile network to understand any network related messages, and as a result will improve the efficiency of use of the network.

According to the present invention, a method according to the preamble defined above is provided, in which the method comprises determining a preferred language for a specific user, and sending network related messages to the specific user in the preferred language. By making the language of the network messages dependent on a specific user, the problem as discussed above may be eliminated. Network related messages may include, but are not limited to, network welcome messages, warning messages ('The number you have dialed is busy, please try later'), or voicemail messages ('This is the voicemail of John, please speak after the beep'). The plurality of users may comprise a first group of users and a second group of roaming users. The present invention is especially useful for a roaming user, i.e. a user with a mobile
terminal being used in the coverage area of a (visited) network different from its own associated network. However, also users of the network for whom the (standard) language of the network is not their mother tongue may benefit from this invention.

In an embodiment of the present invention, the preferred language is determined based on data available in the communication network. This allows to automatically determine the desired language of the user of the specific terminal, without any human intervention.

The preferred language may in a further embodiment of the present invention be determined on basis of an identification of the specific user, such as a Mobile Subscriber ISDN (MSISDN) number or an International Mobile Subscriber Identification (IMSI). These identification data are part of data being exchanged in a mobile network when the specific terminal is associated with that network, and thus readily available.

In a further embodiment, the preferred language is determined on basis of data received from a home network associated with the specific terminal, upon registration of the specific terminal in the communication network. In GSM networks, data is requested by a visited network from the home network of the subscriber once the specific terminal associates with the visited network, and data concerning the preferred language may be easily added to that data by the home network.

A preferred language indicator associated with the specific user may be stored in a local database of the communication network in a further embodiment. Thus, the preferred language of a specific user is known. The local database may be part of the HLR or Gateway Location Register (GLR) of the visited network. It may be stored in the local database for the period of time in which the specific terminal is serviced by the visited network, or alternatively, the period of time may extend longer, to enable a direct correct use of language when the specific terminal visits at a later time.

In an even further embodiment, the present method may further comprise storing the language indicator upon receiving a selection reply from the specific terminal, e.g. as a reply to an SMS welcome message. Alternatively, a specific terminal may send an SMS message with an indication of the desired language to a dedicated number in the visited network, or a call to a dedicated number for a specific language choice may be made.
In a further aspect, the present invention relates to a communication network according to the preamble defined above, the communication network comprising an announcement generating element for sending network related messages to any of the plurality of users, and a further network element connected to the announcement generating element, the further network element being arranged for determining a preferred language for a specific user of the plurality of users, and sending network related messages to the specific terminal in the preferred language. In further embodiments, the communication network comprises further network elements, such as a local database, in which one or more network elements are arranged to execute the various method embodiments, as described in the dependent claims.

In an even further aspect, the present invention relates to a computer program product comprising computer executable code, which when loaded on a network element having a processor and associated memory elements, in which the network element is part of a communication network, provides the communication network with the functionality of one of the present method embodiments. The computer program product may be provided on a separate carrier, e.g. an optical disc or semiconductor memory, or may be uploaded directly to the relevant network element(s).

Short description of drawings

The present invention will be discussed in more detail below, using a number of exemplary embodiments, with reference to the attached drawings, in which:

Fig. 1 schematically shows part of a network according to an embodiment of the present invention;

Fig. 2 shows a graphical representation of data flows according to an embodiment of the present invention; and

Fig. 3 schematically shows the interaction between a home network and a visited network according to a further embodiment of the present invention.

Detailed description of exemplary embodiments

With reference to Fig. 1, a first embodiment of the present invention will be described. In Fig. 1, a roaming mobile station 10 is shown, which is located in the coverage area of a mobile communication network (Visited Public Land Mobile
Network, VPLMN). Most of the time, the mobile station 10 would be operated by a user in its own mobile communication network, or Home Public Land Mobile Network (HPLMN). The mobile communication network comprises a mobile switching center (MSC) 11 that is able to establish communication with the mobile station 10.

Furthermore, the mobile communication network comprises a service control point (SCP 13), which is a platform for executing and controlling intelligent network (IN) services. A service switching function (SSF) 12 is present, usually as a part of the MSC 11, for providing a relay function between the MSC 11 and SCP 13 for IN services. Furthermore, an announcement generating device 14 is present which may combine a number of functions, including an Announcement Service Terminal, a Digital speech phrasing function and a Random access memory (AST-DR). The announcement generating device 14 may be part of the MSC 11, but may also be provided as a separate network unit, or as part of another network unit. In this embodiment, also a language database 15 is present, in this case connected to the SCP 13.

According to embodiments of the present invention, when a user 10 registers with a visited GSM network (VPLMN, e.g. in a foreign country), the network identifies the roaming subscriber 10 with the country code of her MSISDN (Mobile Station ISDN). This is then used for the playing of the network-generated announcement in the subscriber's home language. When a subscriber re-registers in the network at a later visit, the information collected in the earlier visit is used to determine the subscriber's preferred language.

Some of the typical network generated announcements are "please check the number you have dialled", "the network is busy, please try later". Network busy is also available as a standard tone but also as an announcement. Also some networks play an announcement in the local language, such as "you will now be connected to the voice mailbox of 06 516 13 444; please leave a message after the beep", or "Please wait, your call is being forwarded". The local voicemail box may be arranged to play the message "This is the voicemail box of family Smith, please leave a message after the beep. ".

Linking this service to Call Completion type of applications, where the end-user does not need to call back but the network generates the call, can further enhance the user experience.
When call establishment in the MSC 11 fails, e.g. due to dialling an incorrect number, the B-number analysis in the MSC 11 generates a failure code. Based on the failure code, an IN service is triggered for the roaming subscriber 10. The IN service then checks the language code of the roaming subscriber 10 and plays the relevant announcement. Checking the language code of the subscriber 10 is done by querying the language database 15, as described above.

The method and system embodiments of the present invention provide a better network utilization, by preventing that a roaming subscriber 10 receives the same announcement when the roaming subscriber 10 does not understand the first announcement and redials. This would result in utilization of network resources without revenue. Also, it is prevented that a roaming subscriber 10 leaves the network for another network hoping for a better, more understandable announcement.

In an embodiment of the present invention, error messages "in the call set up", "during a call" and "at the end of a call" are used to trigger an IN service, e.g. in the form of a Route Select Failure (RSF) event or other failure code. The information from this message is used to define what the IN service will do, for example, what message to play. The call that the inbound roaming subscriber (from mobile station 10) establishes, results in an ISDN User Part (ISUP) initial address message (IAM) 20 from the MSC 11. This message may result in an error message 21 (ISUP Release message), e.g. Route Select Failure (RSF). The RSF message may occur inside the MSC 11 or outside the MSC 11, the latter case being shown in Fig. 1. The MSC 11 now wants to play an announcement to the calling subscriber 10, informing her that the call could not be established and that she should check the number and dial again. Since the calling subscriber 10 is recognized as an inbound roaming subscriber (based on her MSISDN or on her international mobile subscriber identity, IMSI), the MSC 11 uses a failure code that has the effect that the call is routed to the SSF 12 in the MSC 11. The SSF 12 could also be located outside the MSC 11, i.e. in a switching service platform (SSP).

The SSF 12 triggers a special "inbound subscriber announcement service" in the SCP 13. The VPLMN operator operates this SCP 13. The protocol 22 that is used between the SSF 12 and the SCP 13 may be CSI (Capability Set 1, an industry standard protocol for IN services), CSI+ (enhanced CSI), CAP (CAMEL application part, an industry standard for CAMEL services), or other types of network protocols, such as SIP (Session Initiation Protocol). The Initial Detection Point (IDP) operation that is
sent from the SSF 12 to SCP 13 contains, amongst others, the MSISDN of the calling subscriber 10. The IDP should also contain an indication of the error that occurred, so the SCP 13 knows which announcement to select. Different error conditions in the MSC 11 may lead to different entries in the IN Service Trigger (1ST) table in the SSF 12, and different entries in this table may have different Service Key values. Hence, the Service Key value in Initial DP serves as an indication of the error that occurred.

The SCP 13 queries the preferred language database 15 to get an indication of the language for this subscriber 10. Hereto, the SCP 13 provides the MSISDN (as received in Initial DP) to the database 15. In one embodiment, the database 15 uses the MSISDN as search key to select the language that is associated with this subscriber 10. The database 15 then returns a language code to the SCP 13. The SCP 13 uses the language code, together with the error indication in Initial DP, to select the announcement that shall be played. The playing of the announcement is instructed to the SSF 12 by means of existing CAP / CSI / CSI+ operations 22, such as Connect To Resource and Play Announcement.

If a subscriber 10 has not indicated a preferred language, then a default language is used, based on the leading digits of her MSISDN. This default language table may be configured in the language database 15 or in the Service Logic in the SCP 13. The following table contains an example of mapping between MSISDN leading digits and language. Note that the country indication is for background information only, it need not be provisioned in the present system.

<table>
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<tr>
<th>MSISDN leading digits</th>
<th>Country</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>Netherlands</td>
<td>Dutch</td>
</tr>
<tr>
<td>44</td>
<td>United Kingdom</td>
<td>English</td>
</tr>
<tr>
<td>91 98 200</td>
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<td>Hindi</td>
</tr>
<tr>
<td>…</td>
<td>…</td>
<td>…</td>
</tr>
</tbody>
</table>

The table contains data that is statically configured for the cases where there is a fixed relation between country code plus network code and language. India does not have number portability, hence the fixed relationship.

In Fig. 2 the steps are shown for an embodiment in which an inbound roaming subscriber 10 may be prompted to select a preferred language.
The "Location Update" trigger 25 in Fig. 2 reflects the Mobile Application Part (MAP) signalling between the home location register (HLR) in the HPLMN and the visited MSC (VMSC) in the VPLMN. The specific MAP message, Insert Subscriber Data, is intercepted by a signalling transfer point (STP) and is used to generate the trigger 25 to the language preference database 15. The trigger 25 signals to said database 15 that a particular subscriber 10, identified with IMSI or MSISDN, is registered in the visited network VPLMN. Said database 15 uses this signal to update its internal information, without any need to access the HPLMN associated with the roaming subscriber 10.

When the VPLMN operator of the inbound roaming subscriber 10 sends a welcome SMS 26, the SMS may include the option to dial a (toll-free) number to select the language. This option is in this embodiment included in the welcome SMS only for subscribers from countries with multiple languages, e.g. Canada, Belgium, and China etc. However, subscribers from other countries like UK, Germany etc. do have the possibility to select other languages also. The welcome SMS 26 includes the languages that are offered to that subscriber. The welcome SMS 26 may have the form 'Welcome to AIS in Thailand, ..., Call 0800-444 for English announcements or 0800-445 for French announcements (toll free)', and is in this form intended for a Canadian inbound roaming subscriber 10.

This embodiment of the present invention would in fact allow the Canadian subscriber 10 to dial other (toll-free) numbers, e.g. 0800-446 to select Spanish. However, since English and French are the main languages for this subscriber 10, there is no need to mention Spanish in the SMS. However, this embodiment facilitates that any inbound roaming subscriber 10 dials at any moment 0800-446 or any of the other designated language selection numbers, to select her preferred language. A Dutch subscriber from English origin may therefore dial 0800-444, even though that wasn't prompted in the welcome SMS 26. This option to select language at any moment should be advertised in a suitable and adequate manner.

When a subscriber dials 0800-444 (or any of the other designated language selection numbers), as indicated by numeral 27, the serving MSC 11 triggers an IN service that takes care of setting the language in the database 15. The triggering of said IN service is e.g. done in accordance with "Serving network based dialed services", as specified in CAMEL Phase 3. Alternatively, a proprietary triggering method is used.
This may be accomplished using CS1/CS1+/CAP signalling 22 between MSC 11 and SCP 13 as described in relation to the above embodiment, and further signalling 28 from SCP 13 to language database 15. Also other triggering methods may be used, e.g. using a different network protocol such as SIP.

When a subscriber 10 detaches from the MSC 11 and deregisters from the VPLMN (i.e. does not register with another MSC 11 in that VPLMN), the database 15 may retain the subscriber language indicator. When the subscriber 10 re-enters the country, the preferred language is already known. This has the following advantages:

- The VPLMN does not need to re-prompt the subscriber 10, when sending a welcome SMS 26, to select her language;
- A next welcome SMS 26 may be sent in the preferred language;
- A next welcome SMS 26 may read "welcome back to AIS in Thailand".

When a subscriber 10 has not re-registered in the network for a long time e.g. a period of 12 or 24 months, her data will be purged from the language database 15.

Fig. 3 reflects an embodiment of the concept of a language indicator, shown in schematic form. The language indicator is part of the subscriber's profile in the HLR 30 of the HPLMN. When the subscriber registers in an MSC/Visitor Location Register (VLR) 11, the HLR 30 sends a sub-set of the subscription data to that MSC/VLR 11. The subscription data that is sent to MSC/VLR 11 includes the language indicator. This indicator may be used for two purposes:

- It is retained in the MSC 11, as part of the subscription settings. The MSC 11 may use the indicator to select the preferred language when playing announcements.
- MAP signalling between HLR 30 and VLR 11 normally passes through a Signaling Transfer Point (STP) 16 in the VPLMN (indicated by reference numeral 31 and 32, respectively). The STP 16 may send a notification 33 to the language database 15. The notification includes, as a minimum, a subscriber identification such as IMSI or MSISDN, and the language indicator. The language database 15 stores this indicator.

This concept requires that the language code is internationally standardised, e.g. by 3GPP or by the ITU-T.

The language indicator may be set in the language database 15 by the following stimuli alternatives:
• If the STP 16 intercepts a MAP ISD message 31, it sends a notification 33 to the language database 15. If the MAP ISD message 31 does not include the language indicator (originating from the HLR 30), the language database 15 uses the subscriber's IMSI or MSISDN to set the preferred language.

• If the STP 16 sends a notification 33 to the language database 15 as described above, and the notification 33 contains the language indicator, retrieved from the MAP ISD message 31, then the language database 15 uses this language indicator to set the preferred language. The language identified by the language indicator takes precedence over the language that is derived from the subscriber's BVISI or MSISDN.

• If the language database 15 receives at any moment an SMS message from the subscriber 10 (via MSC 11), indicating that her preferred language is e.g. English (e.g. sending an SMS 'English' to a dedicated SMS number 888), then the language database 15 uses that indication to set the preferred language. The indication received by SMS takes precedence over both the language indication received from HLR 30 and the language that is derived from the subscriber's IMSI or MSISDN. It shall be noted that in order to take full advantage of this embodiment, the SMS should be handled in the VPLMN as a local SMS (e.g. using a predetermined number range), in order to prevent the SMS to be sent to the regular SMSC of the HPLMN.

It may occur that the HPLMN operator has a limited set of available language settings in the HLR 30. E.g. a German operator allows for German, French, English and Spanish as available preferred languages in the HLR 30. When an Italian subscriber 10 holding a German subscription roams in Italy, the HLR 30 may send e.g. German as preferred language. The subscriber 10 may, however, override the setting in the language database 15 in Italy by sending an SMS indicating "Italian".

The present invention has been described above with reference to a number of exemplary embodiments. For the person skilled in the art it will be apparent that various modifications or alternatives may be provided to the elements and steps described. These are part of the scope of this invention, as defined in the appended claims. E.g. various functions in the embodiments above have been described as being executed by a particular element of the mobile communication network. It will be apparent that these functions may also be provided in other network elements, such as
dedicated network elements. Furthermore, the functions of the present invention may be provided to the network elements mentioned in the form of computer executable code. The network elements comprise a processor and associated memory elements, as known in the art. When the computer executable code is loaded on the network element the desired functionality is provided to the associated network by the network element in operation. Also, it can be envisaged that the present invention is applied in communication networks other than public land mobile networks, e.g. in public switched telephony networks or in proprietary radio communication networks.
CLAIMS

1. Method for providing network related messages in a communication network, the communication network being arranged to provide communication facilities for a plurality of users, comprising determining a preferred language for a specific user (10) of the plurality of users, and sending network related messages to the specific user (10) in the preferred language.

2. Method according to claim 1, in which the preferred language is determined based on data available in the communication network.

3. Method according to claim 1 or 2, in which the preferred language is determined on basis of an identification of the specific user (10).

4. Method according to claim 1 or 2, in which the preferred language is determined on basis of data received from a home network associated with the specific user, upon registration of the specific user in the communication network.

5. Method according to claim 3 or 4, in which a preferred language indicator associated with the specific user is stored in a local database (15) of the communication network.

6. Method according to claim 5, further comprising storing the language indicator upon receiving a selection reply from the specific terminal.

7. Communication network for providing communication facilities for a plurality of users, the communication network comprising an announcement generating element (14) for sending network related messages to any of the plurality of users, and a further network element connected to the announcement generating element, the further network element being arranged for determining a preferred language for a specific user (10) of the plurality of users, and sending network related messages to the specific user (10) in the preferred language.
8. Communication network according to claim 7, in which the further network element is arranged to determine the preferred language based on data available in the communication network.

9. Communication network according to claim 7 or 8, in which the further network element is arranged to determine the preferred language on basis of an identification of the specific user (10).

10. Communication network according to claim 7 or 8, in which the further network element is arranged to determine the preferred language on basis of data received from a home network associated with the specific user, upon registration of the specific user in the communication network.

11. Communication network according to claim 9 or 10, in which the communication network further comprises a local database (15) connected to the further network element, the further network element being arranged to store a language indicator associated with the preferred language in the local database (15).

12. Communication network according to claim 11, in which the further network element is arranged to store the language indicator upon receiving a selection reply from the specific user.

13. Computer program product comprising computer executable code, which when loaded on a network element having a processor and associated memory elements, in which the network element is part of a communication network, provides the communication network with the functionality of one of the method claims 1 through 6.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION**

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

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

H04Q H04M

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

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
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<tr>
<td>X</td>
<td>US 5 440 615 A (CACCUSO ET AL) 8 August 1995 (1995-08-08) abstract figures 1,3,4,7; column 1, lines 50-66; column 3, lines 27-46; column 5, lines 21-66</td>
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<td>Y</td>
<td>WO 98/27759 A (NOKIA TELECOMMUNICATIONS OY; PALAVITA, SAKARI) 25 June 1998 (1998-06-25) abstract figures 1-3; page 1, line 33 - page 2, line 6; page 2, line 26 - page 3, line 2; page 3, line 23 - page 4, line 19; page 4, line 34 - page 6, line 8; page 6, lines 26-29</td>
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X Further documents are listed in the continuation of Box C

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 document or for 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

**Date of the actual completion of the international search**

31 January 2006

**Date of mailing of the international search report**

08/02/2006

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Authorized officer

Moll, H-P
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<td>23 December 1998 (1998-12-23) abstract figure 2 column 3, lines 3-27</td>
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## INTERNATIONAL SEARCH REPORT

**Information on patent family members**

### Patent document cited in search report

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