

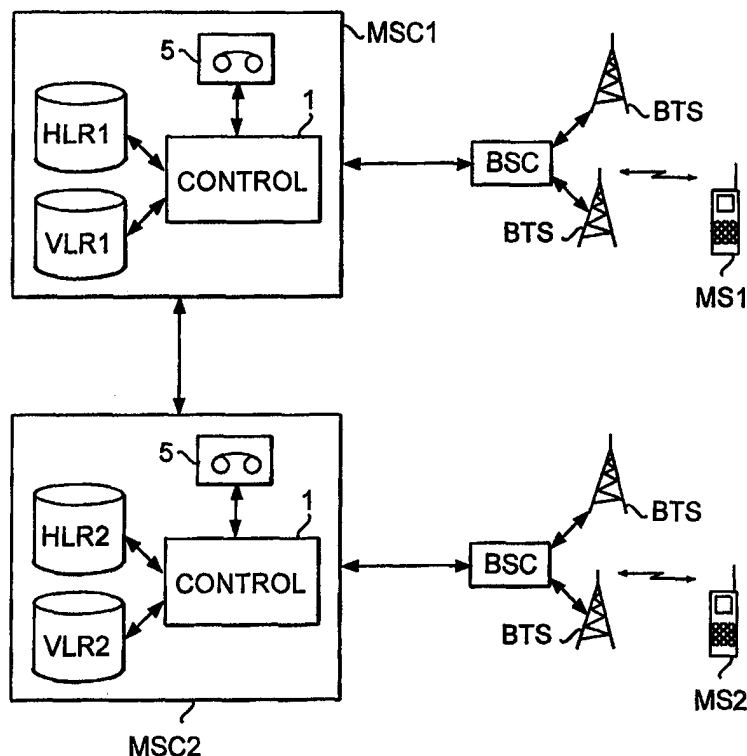


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(21) International Application Number: PCT/FI97/00751 (22) International Filing Date: 3 December 1997 (03.12.97) (30) Priority Data: 964856 4 December 1996 (04.12.96) FI (71) Applicant (for all designated States except US): NOKIA TELECOMMUNICATIONS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI). (72) Inventor; and (75) Inventor/Applicant (for US only): PALOVIITA, Sakari [FI/FI]; Kanervatie 31 B 4, FIN-00730 Helsinki (FI). (74) Agent: KOLSTER OY AB; Iso Roobertinkatu 23, P.O. Box 148, FIN-00121 Helsinki (FI).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, 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, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>In English translation (filed in Finnish).</i>

(54) Title: METHOD OF FORWARDING VOICE MESSAGES TO A SUBSCRIBER**(57) Abstract**

The present invention relates to a mobile telephone system comprising subscriber stations (MS1, MS2), a first mobile services switching centre (MSC1) and a corresponding subscriber register (HLR1) wherein data are maintained concerning the subscriber stations (MS1, MS2) communicating with the first mobile services switching centre (MSC1). To forward voice messages to the subscriber in such a way that they will be understood more reliably and easily, a language code is stored for each subscriber station (MS1, MS2) in the subscriber register (HLR1), the language code indicating the language in which the voice messages are to be forwarded to said subscriber station. In addition, the first mobile services switching centre (MSC1) comprises means (1, 5) for forwarding voice messages to the subscriber station (MS1) in the language indicated by the language code received from the subscriber register (HLR1).



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METHOD OF FORWARDING VOICE MESSAGES TO A SUBSCRIBER

The present invention relates to a method of forwarding voice messages to a subscriber in a mobile telephone system, the system comprising a subscriber register arranged in connection with a mobile services switching
5 centre for maintaining subscriber-specific information. The invention also relates to a mobile telephone system comprising subscriber stations, a first mobile services switching centre and a corresponding subscriber register for maintaining the data concerning subscriber stations associated with the first mobile services switching centre. The invention further relates to a mobile
10 services switching centre comprising a subscriber register for maintaining subscriber station data concerning subscriber stations associated with the mobile services switching centre, a visitor location register for maintaining data concerning subscriber stations associated with other mobile services switching centres and which are located within the coverage area of the mobile switch-
15 ing centre at a particular moment, memory means wherein predetermined voice messages are stored, and control means for forwarding the voice messages stored in the memory means to the subscriber stations.

The present invention relates to providing voice messages to a subscriber in a mobile telephone system. The fact that the mobile telephone
20 systems allow a subscriber station to move within the areas of several countries has brought about language problems especially when voice messages are forwarded to the subscriber station.

In known mobile telephone systems, as for example in the GSM system (Global System for Mobile Communications), voice messages to be
25 forwarded to the subscriber stations are generated by the mobile services switching centre within the area of which the subscriber station is located (whereto the subscriber station has last performed a location update). In other words, if a mobile station associated with a Finnish operator is located for example within the area of a mobile services switching centre maintained by a
30 French operator, the voice message is generated in a language selected by the French operator. To understand an announcement forwarded in a foreign language can, naturally, be difficult.

The object of the invention is to solve the problem described above and to provide a solution enabling voice messages to be forwarded to a sub-
35 scriber in such a way that the voice messages will be understood more easily and more reliably by the subscriber. This object is achieved by the method of

the invention, characterized by storing a subscriber-specific language code indicating the language in which the subscriber wants to hear the messages addressed to him in said subscriber register arranged in connection with the mobile services switching centre, and by forwarding the voice messages to the
5 subscriber in the language indicated by the language code stored in the subscriber register.

The invention also relates to a mobile telephone system wherein the method of the invention can be utilized. The mobile telephone system of the invention is characterized in that a language code is stored for each subscriber station in the subscriber register, the language code indicating the language in which the voice messages are to be forwarded to said subscriber station, and that the first mobile services switching centre comprises means for forwarding a voice message to the subscriber station in the language indicated by the language code received from the subscriber register.

15 The invention further relates to a mobile services switching centre, by which the method of the invention can be applied and which can be applied in the mobile telephone system of the invention. The mobile services switching centre of the invention is characterized in that a predetermined language code is stored for each subscriber in the subscriber register and in the visitor location register, that the same voice messages are stored in several different languages in the memory means, and that the control means are arranged to receive the language code concerning a specific subscriber station from the
20 subscriber register or from the visitor location register and to forward the voice message stored in the memory means to said subscriber station in the language corresponding to the language code.

The invention is based on the idea that when a language code corresponding to a subscriber's language preference is stored in advance for each subscriber station in the memory means, the subscriber's language preference can be taken into account when voice messages are later forwarded to
30 the subscriber station. By storing the language code together with other subscriber data in the same register, the language code can be easily retrieved and forwarded to other parts of the system with other subscriber data. Thus, the most significant advantage of the solution of the invention is that the voice messages can be forwarded to the subscriber in the language preferred and
35 understood by him, the subscriber definitely being able to understand the

voice message forwarded to him. Consequently, the language of a voice message is no longer dependent on the language preferred by the local operator.

In a preferred embodiment of the system of the invention, several alternative language codes are stored for each subscriber in the order of preference given by the subscriber in a subscriber register. The mobile services switching centre which forwards voice messages to said subscriber station then selects from the languages suitable to be employed the one said subscriber has ranked highest in the order of preference. This ensures that if the mobile services switching centre is not able to forward voice messages in the language preferred most by the subscriber, it can select some other language the subscriber is able to understand.

The preferred embodiments of the method, mobile telephone system and mobile services switching centre of the invention are disclosed in the attached dependent claims 2, 4 to 6 and 8.

The invention will be described in more detail below by way of example with closer reference to the accompanying figures, of which

Figure 1 shows a flow diagram of a first preferred embodiment of the method of the invention,

Figure 2 shows a block diagram of a first preferred embodiment of the mobile telephone system of the invention, and

Figure 3 illustrates the forwarding of language codes between different parts of the system.

Figure 1 shows a flow diagram of a first preferred embodiment of the method of the invention.

In block A, the operator stores the language codes concerning said subscriber station in the order of preference given by a subscriber in a subscriber register. Alternatively, the subscriber can feed said language codes to the system by using the keyboard of his subscriber station after calling to a predetermined service number. In this case, said language codes will also be stored in the subscriber register.

In block B, a mobile services switching centre forwards a predetermined voice message to the subscriber station by first receiving the language codes stored in the order of preference in the subscriber register. In some cases the mobile services switching centre receives the language codes through a visitor location register wherein they are temporarily stored while the subscriber moves within the coverage area of some other mobile services

switching centre. When the language codes are received, the mobile services switching centre starts checking whether it can employ one of the languages preferred by the subscriber. The checking begins with the language code that is highest ($n=1$) in the order of preference.

- 5 In block C, the mobile services switching centre checks whether it can employ the language in position n in the order of preference. If not, the routine proceeds to block D.

 In block D it is checked whether the language code in position n is the last language code. If so, the routine proceeds to block F, and the voice
10 message is given in the default language of the mobile services switching centre, i.e. for example in Finnish when the mobile services switching centre in question is maintained by a Finnish operator.

- In contrast, if it is detected in block D that there are language codes not yet checked for the subscriber station, the routine proceeds through block
15 E back to block C to check a new language code.

 If it is detected in block C that the language corresponding to the language code being checked is employed by the mobile services switching centre, the routine proceeds to block G where the voice messages are given to the subscriber station by employing said language.

- 20 Figure 2 shows a block diagram of a first preferred embodiment of the mobile telephone system of the invention. The cellular radio system presented in Figure 2 can be any known mobile telephone system, although in the following it is by way of example assumed that the system in question is the GSM system.

- 25 The part of the mobile telephone system presented in Figure 2 comprises a first and a second mobile services switching centre MSC1 and MSC2 (Mobile Switching Centre), both forwarding calls through base station controllers BSC (Base Station Controller) and base stations BTS to mobile stations MS1 and MS2 located within their coverage area. The mobile services
30 switching centres MSC1 and MSC2 can be maintained by different operators, for example the first mobile services switching centre can be maintained by a Finnish operator and the second mobile services switching centre MSC2 by a French operator.

- The first and the second mobile services switching centres MSC1
35 and MSC2 each comprises a subscriber register HLR1 and HLR2 wherein data are maintained concerning subscriber stations associated with the mobile

services switching centres. Furthermore, in accordance with the invention, the language codes for each subscriber station are stored in the order of preference given by the subscriber in the subscriber registers HLR1 and HLR2. For example the language codes: 1, 2, 10 and 8 can be stored for one subscriber
5 in the subscriber register HLR1. In that case the subscriber wants to hear the voice messages addressed to him preferably in language 1 (e.g. Finnish). If, however, Finnish cannot be employed, the subscriber wants to hear the voice messages in language 2 (e.g. Swedish). If this language cannot be employed either, the subscriber wants to hear the voice message in language 10 (e.g.
10 English), and so forth.

Furthermore, the first and the second mobile services switching centres comprise visitor location registers VLR1 and VLR2. In these registers, the switching centres maintain data concerning the subscriber stations which are associated with some other mobile services switching centre, but which
15 are temporarily located within the area covered by said switching centre. For example the mobile station MS2 is associated with the mobile services switching centre MSC1, but in the case in Figure 2 it is located within the area covered by the switching centre MSC2, and it has thus performed a location update to the mobile services switching centre MSC2 in a manner known per
20 se. Thus, the data concerning said subscriber station are found in the subscriber register HLR1 of its own mobile services switching centre MSC1, and also in the visitor location register VLR2 of the mobile services switching centre MSC2. In accordance of the invention, the language codes of the subscriber station are stored together with other data concerning the subscriber
25 station in the visitor location register VLR2.

When the mobile services switching centre MSC2 forwards a voice message to the mobile station MS2, a control unit 1 will first receive the language codes of the mobile station MS2 from the visitor location register VLR2 in the order of preference. Next, the language which is highest in the order of
30 preference and which can be employed by the mobile services switching centre MSC2, is selected by the control unit as the language to be employed. When the language is selected, the control unit 1 retrieves the voice message in the selected language from a memory 2 and forwards it to the mobile station MS2. Thus, the memory 2, which can be any kind of a known memory such as
35 a memory circuit, a disk storage or even a recorder, contains the same voice messages in several different languages.

Figure 3 illustrates the forwarding of language codes between different parts of the system. In the GSM system, the data stored in the subscriber register HLR1 are transferred from the subscriber register HLR1 to the visitor location register VLR2 of another mobile services switching centre by a
5 MAP-INSERT-SUBSCRIBER-DATA message S1 in accordance with GSM specifications 09.02. In accordance with the invention, a field is added to said message by which language codes are also forwarded together with other subscriber data.

In connection with a call, all the language codes of the subscriber
10 are transferred together with other subscriber data from the visitor register VLR2 to the mobile services switching centre MSC2. In the GSM system, the subscriber data are transferred to the mobile services switching centre MSC2 by a MAP-COMplete-CALL message in accordance with GSM specifications 09.02. In accordance with the invention, a field is added to said message by
15 which language codes are also forwarded together with other subscriber data.

If, unlike in the case in Figure 3, a voice message is forwarded to a subscriber station "associated" with the mobile services switching centre, language codes are forwarded to the mobile services switching centre in a corresponding manner as described above by using the MAP-COMplete-CALL
20 message with the exception that the message originates from the subscriber register (HLR) and not from the visitor location register (VLR).

It is obvious that the above description and the related figures are only intended to illustrate the present invention. A variety of modifications and variations will be apparent to those skilled in the art without deviating from the
25 scope and spirit of the invention disclosed in the appended claims.

CLAIMS:

1. A method of forwarding voice messages to a subscriber in a mobile telephone system, the system comprising a subscriber register arranged in connection with a mobile services switching centre for maintaining subscriber-specific information, **characterized** by
- 5 storing a subscriber-specific language code indicating the language in which the subscriber wants to hear the messages addressed to him in said subscriber register arranged in connection with the mobile services switching centre, and by
- 10 forwarding the voice messages to the subscriber in the language indicated by the language code stored in the subscriber register.
2. A method as claimed in claim 1, **characterized** by
- storing several language codes in the order of preference given by the subscriber in the subscriber register, and
- 15 forwarding voice messages to the subscriber in an available language whose language code is highest in the order of preference.
3. A mobile telephone system comprising subscriber stations (MS1, MS2), a first mobile services switching centre (MSC1) and a corresponding subscriber register (HLR1) for maintaining the data concerning subscriber stations (MS1, MS2) associated with the first mobile services switching centre (MSC1), **characterized** in
- 20 that a language code is stored for each subscriber station (MS1, MS2) in the subscriber register (HLR1), the language code indicating the language in which the voice messages are to be forwarded to said subscriber station, and
- 25 that the first mobile services switching centre (MSC1) comprises means (1, 5) for forwarding a voice message to the subscriber station (MS1) in the language indicated by the language code received from the subscriber register (HLR1).
- 30 4. A mobile telephone system as claimed in claim 3, **characterized** in
- that several language codes are stored for each subscriber station (MS1, MS2) in the order of preference in the subscriber register (HLR1), and
- that the first mobile services switching centre (MSC1) comprises
- 35 means for forwarding the voice message to the subscriber station (MS1) in a language that is available to the mobile services switching centre and whose

language code stored in the subscriber register (HLR1) is highest in the order of preference, or in the default language of the mobile services switching centre (MSC1) if no language corresponding to the language code stored for the subscriber station (MS1) in the subscriber register (HLR1) is available to
5 the mobile services switching centre.

5. A mobile telephone system as claimed in claims 3 or 4, the system comprising at least a second mobile services switching centre (MSC2) and a corresponding visitor location register (VLR2) for maintaining data concerning subscriber stations (MS2) associated with the first mobile services
10 switching centre (MSC1) and located in the coverage area of the second mobile services switching centre (MSC2) at a particular moment, **characterized in**

that the visitor location register (VLR2) comprises means for receiving and storing the language code or language codes in the order of
15 preference, the language code or the language codes being stored for a given subscriber station (MS2) in the subscriber register (HLR1), and

that the second mobile services switching centre (MSC2) comprises means for forwarding a voice message to the subscriber station (MS2) in a language that is available to the mobile services switching centre (MSC2) and
20 whose language code is highest in the order of preference, or in a default language of the mobile services switching centre (MSC2), if no language corresponding to the language code stored for the subscriber station in the visitor location register (VLR2) is available to the mobile services switching centre.

25 6. A system as claimed in claim 5, **characterized in** that said mobile telephone system is the GSM system, that the subscriber register (HLR1) is the HLR register of the first mobile services switching centre (MSC1), that the visitor location register (VLR2) is the VLR register of the second mobile services switching centre (MSC2), that the HLR register is
30 arranged to forward the language codes stored for the subscriber station to the VLR register in connection with a MAP-INSERT-SUBSCRIBER-DATA message in accordance with GSM specifications 09.02, and that the VLR register is arranged to forward the language codes stored for the subscriber station to the mobile services switching centre in connection with a MAP-
35 COMPLETE-CALL message in accordance with GSM specifications 09.02.

7. A mobile services switching centre (MSC1) comprising

a subscriber register (HLR1) for maintaining subscriber station data concerning subscriber stations (MS1, MS2) associated with the mobile services switching centre,

a visitor location register (VLR1) for maintaining data concerning
5 subscriber stations associated with other mobile services switching centres and which are located within the coverage area of the mobile services switching centre at a particular moment,

memory means (5) wherein predetermined voice messages are stored, and

10 control means (1) for forwarding the voice messages stored in the memory means to the subscriber stations (MSC1), **characterized** in

that a predetermined language code is stored for each subscriber in the subscriber register (HLR1) and in the visitor location register (VLR1),

that the same voice messages are stored in several different
15 languages in the memory means (5), and

that the control means (1) are arranged to receive the language code concerning the specific subscriber station (MS1) from the subscriber register (HLR1) or from the visitor location register (VLR1) and to forward the voice message stored in the memory means (5) to said subscriber station
20 (MS1) in the language corresponding to the language code.

8. A mobile services switching centre as claimed in claim 7, **characterized** in that several language codes are stored for each subscriber station (MS1) in the order of preference in the subscriber register (HLR1) and in the visitor location register (HLR1), and that

25 the control means (1) are arranged to receive said language codes from the subscriber register (HLR1) or from the visitor location register (VLR1) and to forward a voice message to the subscriber station (MS1) in the language available to the mobile services switching centre (MSC1) and whose corresponding language code is highest in the order of preference of the
30 subscriber station (MS1), or in the default language of the mobile services switching centre (MSC1), if no language corresponding to the language code stored for the subscriber station in the subscriber register (HLR1) or in the visitor location register (VLR1) is available to the mobile services switching centre.

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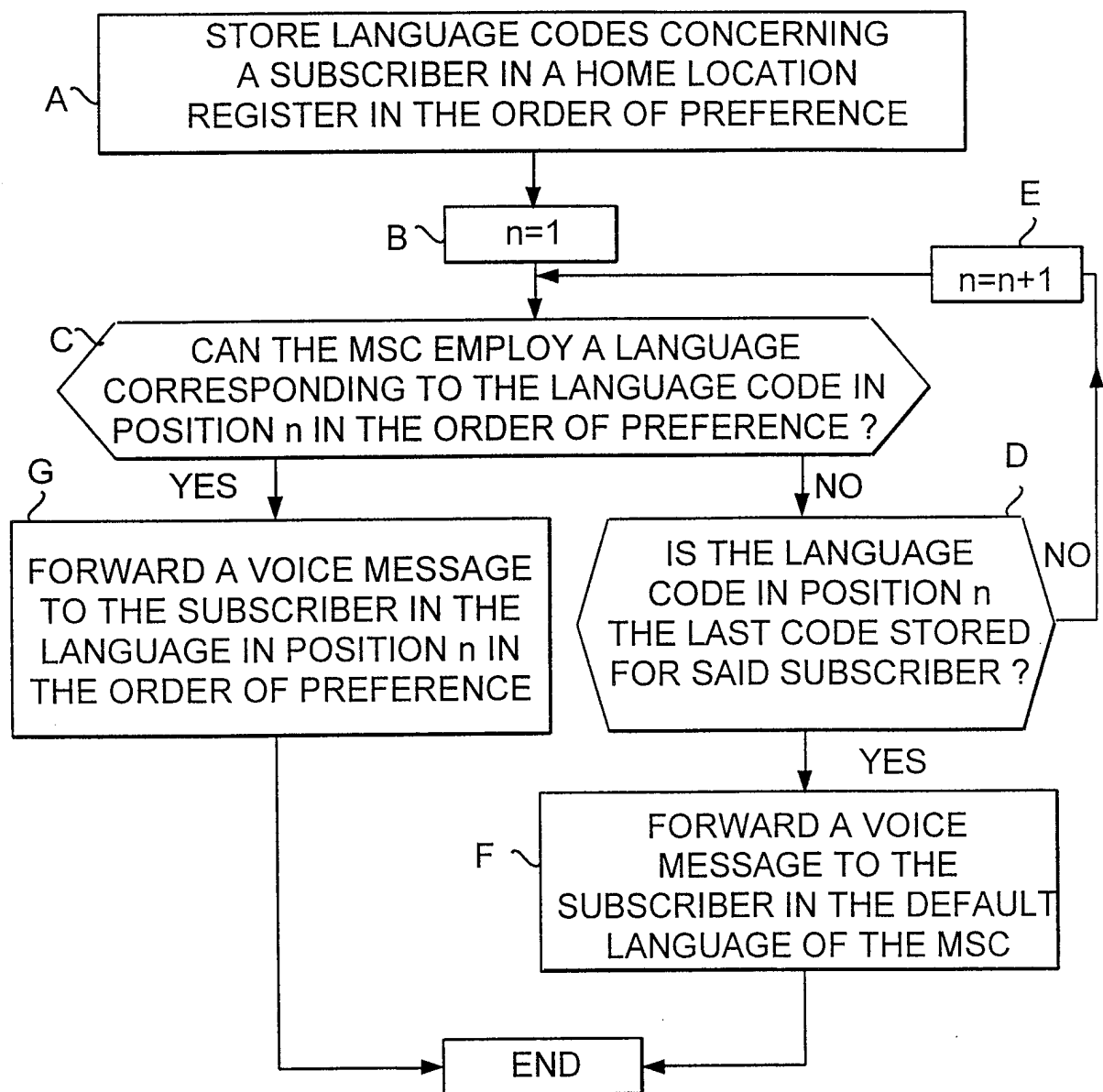


FIG. 1

2/2

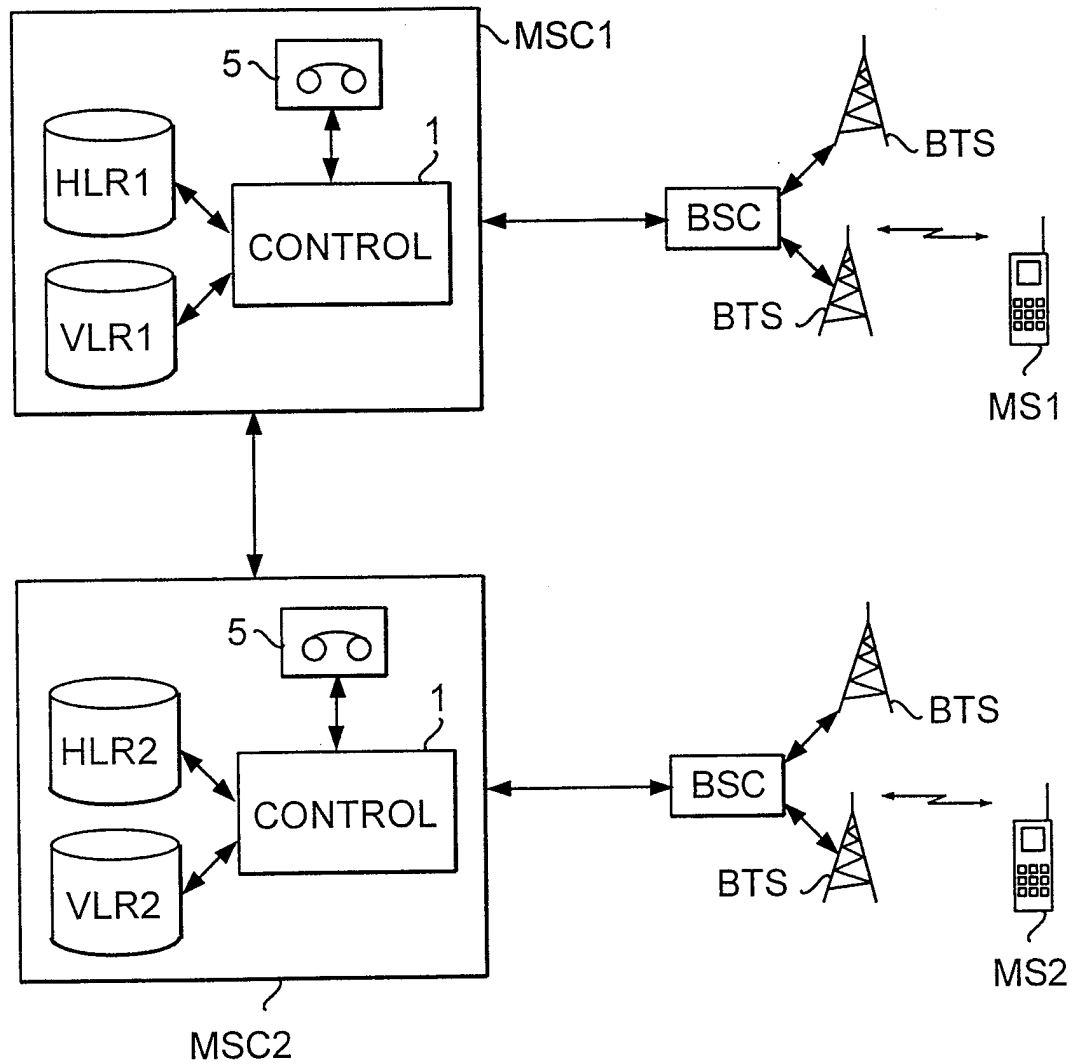


FIG. 2

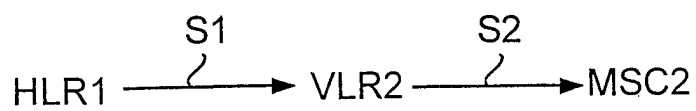


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 97/00751

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04Q 7/22, H04M 3/50

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)

IPC6: H04M, H04Q

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

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EPAT, WPI, JAPIO

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	US 5517561 A (JAMES P. REDDEN), 14 May 1996 (14.05.96), column 10, line 57 - line 67 --	1-8
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A	US 5384831 A (CARROLL W. CRESWELL ET AL), 24 January 1995 (24.01.95) --	1-8

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Date of the actual completion of the international search

5 May 1998

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 97/00751

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

02/04/98

International application No.
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