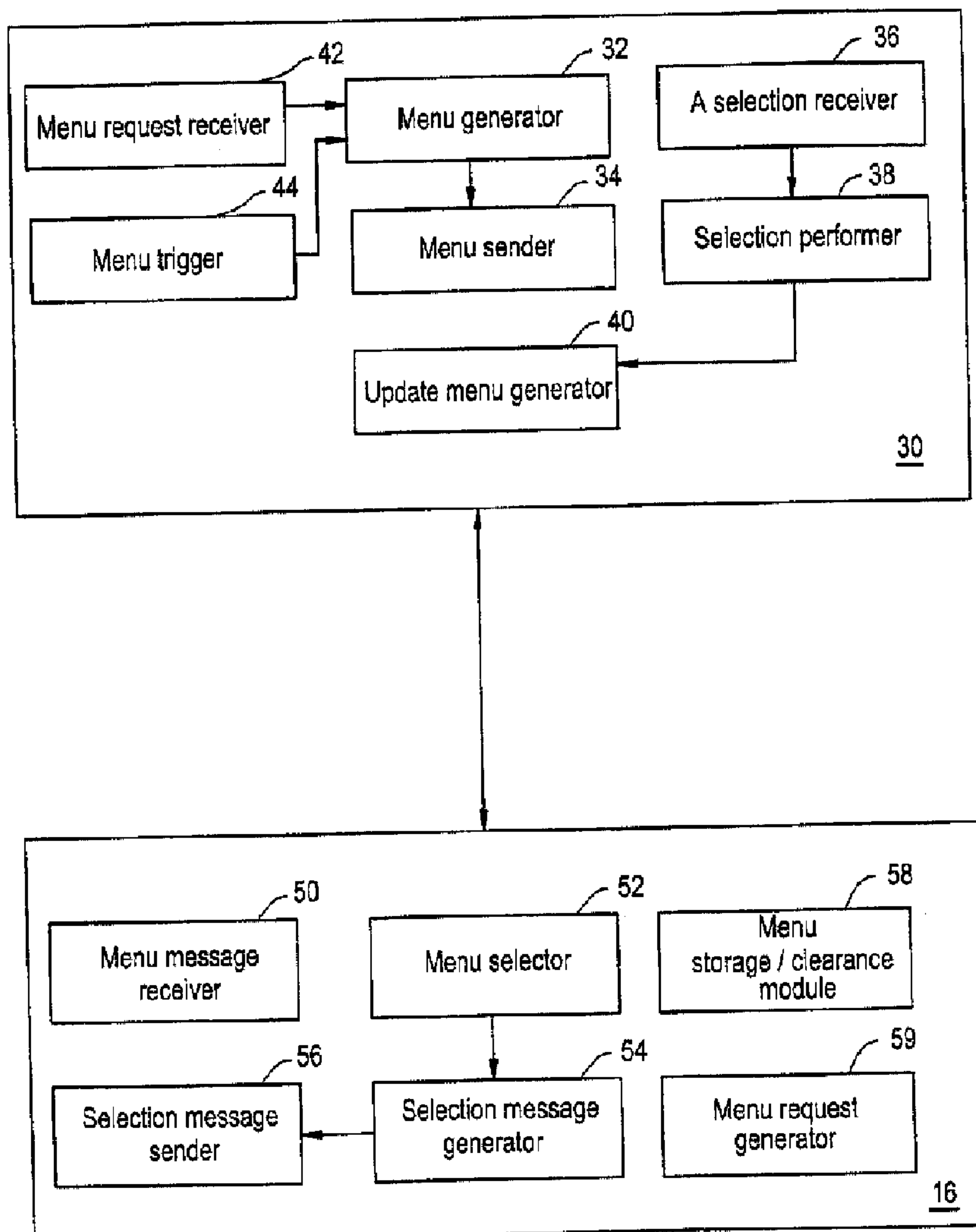


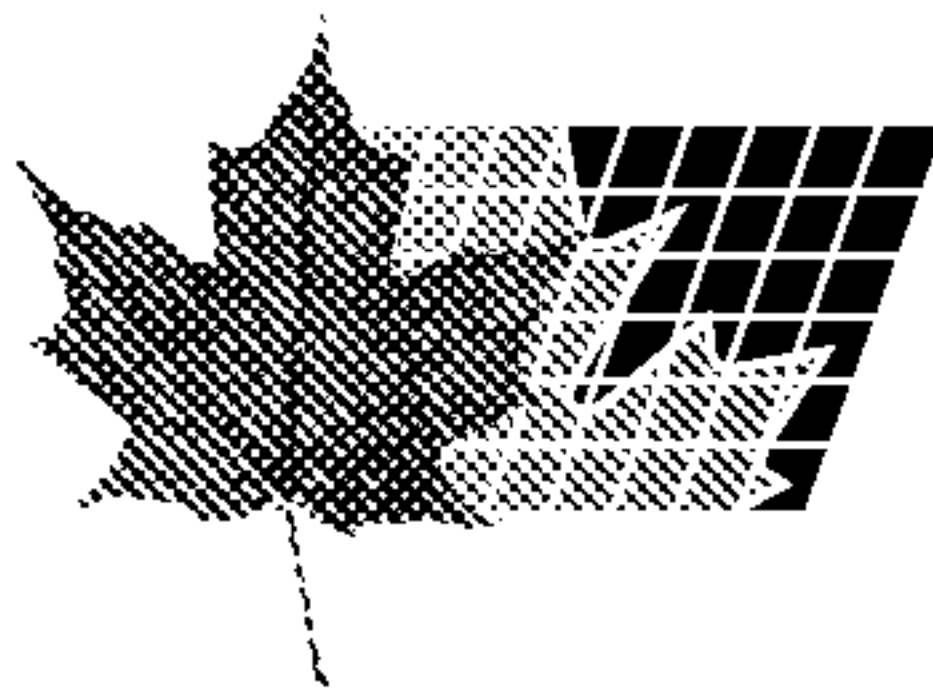


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(54) **SYSTEME ET PROCEDURE PERMETTANT DE FOURNIR UN
MENU A DES UTILISATEURS DE STATIONS MOBILES DANS
UN RESEAU DE RADIOTELECOMMUNICATION**

(54) **SYSTEM AND METHOD OF PROVIDING A MENU TO USERS
OF MOBILE STATIONS IN A RADIO
TELECOMMUNICATIONS NETWORK**





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(57) L'invention concerne un système et un procédé permettant de fournir un menu à un abonné mobile dans un réseau de radiotélécommunication (10). Un message menu (64) est généré et envoyé d'un noeud de coopération (12, 20) à une station mobile (16). Ce message menu contient des données de menu. La station mobile reçoit ce message menu et affiche les données de menu sur un écran. Dès que l'abonné a introduit une sélection de menu (72), un message de sélection de menu (74) est généré et envoyé de la station mobile au noeud de coopération. Le message menu contient la sélection opérée par l'abonné mobile. Le message menu est reçu par le noeud de coopération. La sélection de menu est opérée (76) au niveau du noeud de coopération.

(57) A system and method in a radio telecommunications network (10) of providing a menu to a mobile subscriber. A menu message (64) is generated and sent from a cooperating node (12, 20) to a mobile station (16). The menu message includes menu data. The mobile station receives the menu message and displays the menu data on a display screen. After the subscriber enters a menu selection (72), a menu selection message (74) is generated and sent from the mobile station to the cooperating node. The menu message includes the menu selection made by the mobile subscriber. The menu message is received by the cooperating node. The menu selection is performed (76) at the cooperating node.

ABSTRACT

A system and method in a radio telecommunications network (10) of providing a menu to a mobile subscriber. A menu message (64) is generated and sent from a cooperating node (12, 20) to a mobile station (16). The menu message includes menu data. The mobile station receives the menu message and displays the menu data on a display screen. After the subscriber enters a menu selection (72), a menu selection message (74) is generated and sent from the mobile station to the cooperating node. The menu message includes the menu selection made by the mobile subscriber. The menu message is received by the cooperating node. The menu selection is performed (76) at the cooperating node.

**SYSTEM AND METHOD OF PROVIDING
A MENU TO USERS OF MOBILE STATIONS
IN A RADIO TELECOMMUNICATIONS NETWORK**

5 BACKGROUND OF THE INVENTION

Technical Field of the Invention

This invention relates to radio telecommunications and, more particularly, to a system and method in a radio telecommunications network of providing a menu to users of mobile stations.

10 Description of Related Art

As the number of services increases in radio telecommunications networks, subscribers are overwhelmed by the many services offered. In certain radio telecommunications networks, to access services, subscribers dial a feature code corresponding to a service. In some cases, the feature code must be accompanied by additional information, which must be entered in a predetermined format to activate the service. Because often subscribers only use many of these services rarely, some subscribers find it difficult to remember the feature code and the correct format of the additional information required to use the services. Therefore, many, perhaps most, subscribers use only a limited number of services, and thus, do not benefit from the scope of services available to them.

20 An example of a service using feature codes is the multi-party calling service offered by the Digital Advanced Mobile Phone System (D-AMPS) and by the Global System for Mobile Communications (GSM). The multi-party calling service offers the possibility of establishing a call in which there are at least three parties: a calling party, a called party, and one or several conferencing parties. A problem with the multi-party service of both D-AMPS and GSM is the cumbersome and difficult user interface these services provide. In both cases, the subscriber must remember and enter a number of codes in order to implement and control the conferencing. When two subscribers are engaged in a telephone call, and desire to add a third subscriber to the conference, the first subscriber must first enter a code to place the second subscriber on hold. The first subscriber then dials the third subscriber's telephone

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number to establish a call with that subscriber. The first subscriber must then remember another code and enter that code to establish the three-way connection between the three subscribers. In addition, the subscribers may utilize the flash feature on their mobile phones to selectively place the other subscribers in either speech or
5 idle mode.

To overcome certain drawbacks of the access to services through feature codes, certain telecommunications networks, such as GSM, offer subscriber service management by providing mobile stations with a pull up menu on the mobile station's display for the services to which the subscriber has subscribed. Examples of such
10 services are Call Forwarding, Call Waiting, and Speed Dialing. The subscriber may scroll down to the appropriate service, and change the state of the selected service by activating, deactivating, or entering required subscriber information with the mobile station's keypad. The mobile station then transmits the updated information via Unstructured Supplementary Services Data (USSD) messages to the Public Land
15 Mobile Network (PLMN) to actually update the state of the selected feature. USSD is utilized to transport unstructured or system unrecognizable data (e.g., user specified character messages) using a non-traffic channel for communicating application-layer data between a mobile station and the PLMN.

20 The GSM subscriber service management menu, however, is hard-coded in the mobile station, and cannot be changed. Therefore, GSM lacks the flexibility to upgrade menus or add new menus at the network level without replacing the mobile stations. In addition, when a subscriber purchases a new mobile station, it may not have the same menus as the subscriber's old mobile station or the same menus as other
25 subscriber's have in a multi-party call. Such inconsistencies tend to create confusion among subscribers. Thus, further discouraging the subscribers from using new advanced services.

From the foregoing it will be apparent that there is still a need in radio telecommunications systems for a way to provide a menu to mobile stations in radio
30 telecommunications network with more flexibility.

SUMMARY OF THE INVENTION

In a preferred embodiment, the present invention provides a radio telecommunications system and a method for generating menus at the network level and providing those menus to mobile subscribers. These menus provide powerful user interfaces for advanced services provided by the radio telecommunications system. Because, the menus are generated at the network level and transmitted to the subscribers' mobile stations, the invention provides a flexible solution.

In one embodiment, the radio telecommunications system according to the present invention provides menus generated at the network level to mobile subscribers. A node of the system, the cooperating node, has a menu generator for generating a menu message that includes menu data, and a menu sender for sending the menu message to a mobile station in the telecommunications system. The cooperating node also has a selection receiver for receiving a selection message, which includes a menu selection made by the mobile subscriber. Furthermore, the cooperating node has a selection performer for performing the menu selection.

Another component of the invention is a mobile station, having means for determining whether it can accept the message or not, and means for notifying the coordinating node if the menu message is rejected. The mobile station further includes a menu message receiver for receiving the menu message and displaying the menu data on a display screen, and a menu selector for obtaining the menu selection from the mobile subscriber. The mobile station also has a selection message generator for generating the selection message including the menu selection, and a selection message sender for sending the selection message to the cooperating node.

In another embodiment, the present invention is a method in a radio telecommunications network of providing a menu to a mobile subscriber. The method generates in a cooperating node a menu message including menu data. Then, the menu message is sent to a mobile station, which determines whether the message is acceptable. Upon receipt of the menu message by the mobile station, if the message is determined to be acceptable, the menu data is displayed on a display screen, and a menu selection is obtained from the mobile subscriber. Then, a selection message,

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including the menu selection, is generated by the mobile station and sent to the cooperating node. The selection message is received in the cooperating node, and the menu selection is performed at the cooperating node.

5 BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and its numerous objects and

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advantages will become more apparent to those skilled in the art by reference to the following drawings, in conjunction with the accompanying specification, in which:

FIGURE 1 is a schematic diagram of a radio telecommunications network;

5 FIGURE 2 is schematic diagrams illustrating respectively components of a cooperating node and components of a mobile station in accordance with the present invention;

FIGURE 3 is a message flow diagram illustrating the flow of messages in accordance with a first preferred embodiment of the present invention;

10 FIGURE 4 is a block diagram illustrating the relationship between a MenuDeliver message of FIGURE 3, menu data displayed on a mobile station display, and a MenuSelection message of FIGURE 3 in accordance with the teachings of the present invention;

FIGURE 5 is a message flow diagram illustrating the flow of messages in accordance with a second preferred embodiment of the present invention;

15 FIGURE 6 is a message flow diagram illustrating the flow of messages in accordance with a third preferred embodiment of the present invention;

FIGURE 7 is a simplified schematic diagram of a radio telecommunications network in accordance with a fourth preferred embodiment of the present invention;

20 FIGURE 8 is an illustration of the mapping of menu data in an IS-136 R-Data MenuDeliver message in accordance with the teachings of the present invention; and

FIGURE 9 is an illustration of the mapping of menu data in an IS-136 R-DATA MenuSelection message in accordance with the teachings of the present invention.

25 DETAILED DESCRIPTION OF EMBODIMENTS

The present invention provides a radio telecommunications system and a method for generating menus at the network level and providing those menus to mobile subscribers. Hitherto advanced radio telecommunications services were difficult for subscribers to access due to cumbersome user interfaces. While static
30 menus in mobile stations have been known in prior art telecommunications system, these menus have not had the required flexibility to provide dynamic user interfaces.

The menus provided by the present invention allow for powerful user

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interfaces for advanced services provided by modern telecommunications systems. Because the menus are generated at the network level and transmitted to the subscribers' mobile stations, the invention provides a flexible solution to the problem of giving subscribers user friendly access to complex services.

Reference is now made to FIGURE 1, which is a schematic of a radio telecommunications network 10 including a plurality of interconnected Mobile Switching Centers (MSCs) 12. For illustrative purposes, only two MSCs 12 are shown. It will be understood that the network 10 likely includes many more interconnected MSCs 12.

The first and second MSCs 12 and 12' may comprise any one of a number of known telecommunications switching devices, as commonly used and known in the art for providing digital cellular telephone service to a plurality of mobile stations (MS) 16. The MSCs 12 are interconnected with each other for communication via both voice trunks 11 (illustrated with broken lines) and signaling links 15 (illustrated with solid lines) providing a known ISUP (or R1 or R2) type connection. The voice trunks 11 provide voice and data communications paths used to carry subscriber communications between the MSCs 12. The signaling links 15 carry command signals between the MSCs 12. These signals are used, for example, in setting up and tearing down voice and data communications over the voice trunks 11 and controlling the calling services provided by the MSC to the MSs 16.

The MSCs 12 are also connected to a home location register (HLR) 20 by means of signaling links 17. That connection may be a known Mobile Application Part (MAP) or IS-41 type connection or a connection according to any other now known or future protocol. The HLR 20 stores information concerning the MSs 16, such as location information and service information. The HLR 20 may further be associated with a service control point (SCP) to provide Wireless Intelligent Network (WIN) services, as known in the art. A subscriber record containing downloaded portions of the HLR 20, as well as information received from the MSs 16 themselves, is maintained in a visitor location register (VLR) associated with MSC 12.

In one implementation, the MSCs 12 are further connected to at least one associated base station controller (BSC) 13 via both a signaling link 19A and a voice trunk 21A. To simplify the illustration, only one BSC is shown in Figure 1. However,

in actual implementations it is likely that several or many BSCs are connected to an MSC 12. The voice trunk 21A provides a voice and data communications path used to carry subscriber communications between the MSC 12' and its associated BSC 13. The signaling link 19A carries command signals between the MSC 12' and its associated BSC 13. The BSC 13 is then connected to a plurality of base stations (BS) 14 which operate to effectuate radio frequency communications with proximately located MSs 16 over an air interface 18. The BSC 13 functions in a well-known manner to control this radio frequency communications operation over signaling links 19B and voice trunk 21B.

In another implementation, the MSC 12 is connected directly to the plurality of BS 14. The functionality provided by the BSC 13 in controlling the radio frequency communications operation is then instead performed by the MSC 12. The MSC 12 is connected to the BS 14 via both a signaling link 19 and a voice trunk 21. The voice trunk 21 provides a voice and data communications path used to carry subscriber communications between the MSC 12 and its associated BS 14. The signaling link 19 carries command signals between the MSC 12 and its associated BS 14.

Although direct communications links (signaling and/or trunk) are illustrated in FIGURE 1, it is understood by those skilled in the art that the links are not necessarily direct links between the illustrated nodes, and may instead pass through many other communications nodes (not shown) of the radio telecommunications network, and perhaps even utilize other communications networks (such as the public switched telephone network (PSTN) 24). For example, the MSCs 12 may further be connected to a gateway MSC (G-MSC) 22 through a voice trunk 25 and a signaling link 23. In turn, the G-MSC 22 is connected to the PSTN 24 by a signaling link 26 and a voice trunk 27. Thus, the illustration of the links in the manner of FIGURE 1 is therefore illustrative. The invention includes all alternative methods of establishing communications links.

The radio telecommunications network 10 is a Global System for Mobile (GSM) communications, a D-AMPS system, a code division multiple access (CDMA) system, or any other type of telecommunications system.

Reference is now further made to FIGURE 2, which is a schematic diagram illustrating respectively components of a cooperating node and components of a MS

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in accordance with the present invention. The present invention is a system for providing a menu to a MS used by a mobile subscriber in the radio telecommunications network 10 such as shown on FIGURE 1. The system, according to the present invention, generates menus at the network level and provides these menus to the MSs 16. Menus may be changed or upgraded at the network level and provided to operating MSs 16 without modifying or replacing the MSs 16. A cooperating node 30, which can be any node or combination of nodes in the network, forwards a menu to one of the MS 16 through the network of Figure 1. From the menu received by the MS, a subscriber selects the desired menu items. The MS 16 returns the selection to the cooperating node 30 for further processing. Thus, forwarding of menus, return of the subscriber's selection, and performing that selection in the cooperating node is accomplished. Further, updating of the MS display screen may also be performed.

The system uses the cooperating node 30, which for instance may be the MSC 12, the HLR 20, the PSTN 24 or any other node, and at least one MS 16. The cooperating node 30 has a menu generator 32 for generating a menu message including menu data, and a menu sender 34 for sending the menu message from the cooperating node to the MS 16. The cooperating node 30 also has a selection receiver 36 for receiving a selection message. The selection message includes a menu selection made by the mobile subscriber. The cooperating node 30 also includes a selection performer 38 for performing the menu selection in the cooperating node 30. The cooperating node 30 may further include an update menu generator 40 for generating and sending an update message to the MS so as to update its display screen. The cooperating node 30 also includes a menu request receiver 42 for receiving a menu request message, and a menu trigger module 44 for detecting a need for a menu. The menu trigger 44, the menu generator 32, the selection performer 38 and the update menu generator 40 may for example consist of additional logic added to the cooperating node. The menu request receiver 42, the selection receiver 36 and the menu sender 34 may consist, for example, of added logic to receivers (not shown) of the cooperating node.

The MS 16 in turn has a menu message receiver 50 for receiving the menu message and displaying the menu data on a display screen (not shown). The MS 16

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also has a menu selector 52 for obtaining the menu selection from the subscriber. The MS also has a selection message generator 54 for generating the selection message including the menu selection, and a selection message sender 56 for sending the selection message to the cooperating node 30. The MS 16 further includes a menu storage/clearance module 58 for storing incoming menu messages and clearing old menu messages. The MS also includes a menu request generator 59 for issuing a menu message thus requesting a menu. The menu selector 52, the selection message generator 54, the menu storage/clearance module 58 and the menu request generator 59 may all consist, for example, of additional logic provided in the MS. The menu message receiver 50 and the selection message sender 56 may be integrated in a transceiver (not shown) of the MS 16, by which all messages and voice communications are already performed.

Reference is now further made to FIGURE 3, which is a message flow diagram illustrating the flow of messages according to a first embodiment of the present invention. In this first embodiment, the cooperating node 30 is the MSC 12, and the menu provided is a multi-party call service menu. Figure 3 illustrates the flow of messages between the MSC 12 serving the MS 16, and that MS 16. The MSC 12 receives a MenuRequest message 60 by the menu request receiver 42. The MenuRequest message 60 is generated upon subscriber's request by depressing a menu button on the MS. Such a MenuRequest message 60 could also be a feature code or any other combination of keys, which would be recognised by the MSC 12 as meaning a request for a menu for multi-party calling.

Alternatively, if no MenuRequest message 60 is received, the MSC 12 may determine 62 the need for a menu by detection by the menu trigger 44 that a menu, and more particularly a multi-party calling menu is required, when such a function is entered by the mobile subscriber. Such a need could be for example, when one of the two parties involved in a phone conversation establishes a communication with a third party. Then, the MSC 12 generates by the menu generator 32 a menu message, hereinafter-called MenuDeliver message 64. The menu data of the MenuDeliver message 64 includes menu items. Upon receipt at the MS 16 of the MenuDeliver message 64 by the menu message receiver 50, a MenuReject message 66 or a MenuAccept message 68 is generated by the MS 16 and sent to the MSC 12. The

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MenuReject message 66 and the MenuAccept message 68 may be generated by the selection message generator 54 and sent by the selection message sender 56, or by any other existing logic of the MS 16 that generates and sends acknowledgement and refusal messages.

5 The MenuReject message 66 is sent to indicate that the MS is currently not capable of receiving the identified menu. That condition may, for example, occur when the menu data size exceeds the data capacity of the MS, or the MS is performing some other function that does not allow the reception of the MenuDeliver message 64 at that time. If the MS 16 is able to receive the menu, the MS sends the MenuAccept
10 message 68 to the serving MSC 12. The menu items of the MenuDeliver message 64 are then displayed 70 on the display screen (as shown in Figure 4 at element 80, which is described in greater detail below) by the menu message receiver 50. When the subscriber makes a menu selection 72, which is obtained by the menu selector 52, a menu selection message, hereinafter called MenuSelection message 74 is generated
15 by the selection message generator 54. The MenuSelection message 74 is sent by the selection message sender 56 of the MS 16, and is received by the selection receiver 36. The serving MSC 12 performs 76 the subscriber's selection indicated in the received MenuSelection message 74, using the selection performer 38. Furthermore, the serving MSC 12 may generate and send another MenuDeliver message 78, by the
20 update menu generator 40 so as to update the menu on the display screen of the MS 16.

Referring now to FIGURE 4, there is shown a block diagram illustrating the relationship between the MenuDeliver message 64 of FIGURE 3, menu data displayed on the MS display 80, and the MenuSelection message 74 of FIGURE 3 in accordance
25 with the teachings of the present invention.

The MS 16 has the display screen 80, an upward button 82, a downward button 84, a send button 86, a toggle menu button 88 and a menu button 89. The upward button 82 and the downward button 84 are used to browse through the different items displayed on the display screen 80. The send button 86 is used as is well known in the
30 art to initiate a call, and is further used to send the MenuSelection message 74 upon completion of menu selection by the subscriber. The menu button 89 is used to generate from the MS 16 the MenuRequest message 60. Furthermore, it is possible

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for the menu to be saved in a memory, such as the menu storage/clearance module 58 of the MS 16 shown on Figure 2, and be pulled up again by the subscriber. By allowing the storing of menus, it is possible for the MS 16 to interact with several menus at once. Entries made utilizing the old menu are still recognized by the MSC 12, or the pertaining cooperating node, when the menu is still applicable, i.e. recognized by the cooperating node. For pulling back old menus, or toggling between menus, the toggle menu button 88 on the MS 16 is used.

By way of example, the menu items of the MenuDeliver message 64 are shown in Figure 4. In the MenuDeliver message of the example, five menu items 90, 92, 94, 96 and 98 are presented. Each menu item is composed of four fields: a menu item length field, a menu item display attribute field, a menu item selection attribute field, and a menu item string field. The menu item length field indicates the length of that particular menu item. The menu item display attribute indicates the type of displaying that is used for the corresponding menu item string field. Examples of menu item display attribute are normal, blinking, reverse, hidden, etc. The menu item selection attribute indicates whether the corresponding menu item string field offers a selection to the subscriber, and what type of selection may be accepted. For example, the menu item selection attribute field may specify that no, or normal selection, or default selection, or any input which is to be hidden (not displayed on the display screen 80) may be accepted. Finally, the menu item string field is the information that is to be displayed on the display screen 80.

Turning now to the example of FIGURE 4, the first menu item 90 indicates that the length of the menu item is 22 (which may correspond to a full line for example), that the menu item display attribute is normal, that the menu item selection attribute is no select, and that the menu item string is "0 to end/1 to toggle". The second menu item 92 indicates that the menu item length is 22, that the menu item display attribute is normal, that the menu item selection attribute is select, and that the menu item string to be displayed is "Sandra [Speech]". The third menu item 94 indicates that the menu item length is 22, that the menu item display attribute is normal, that the menu item selection attribute is select, and that the menu item string to be displayed on the display screen is "Louis [Hold]". The fourth menu item 96 indicates that the menu item length is 22, that the menu item display attribute is

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normal, that the menu item selection attribute is select, and that the menu item string to be displayed on the display screen 80 according to the mentioned display attribute is "Nam [Speech]". The fifth menu item 98 indicates that the menu item length is 22, that the menu item display attribute is normal, that the menu item selection attribute is select & default, and that the menu item string to be displayed on the display screen 80 according to the display attribute is "other". It is possible for the subscriber to perform a selection on the second menu item 92, the third menu item 94, the fourth menu item 96 and the fifth menu item 98. As shown on the display screen 80, for clarifying which menu items may be selected by the subscriber, a "greater than" sign, or other indicator, may be added in front of each menu item string which may be the object of a selection. Furthermore, the menu item may be highlighted, blinking, or in some other way made to indicate which menu item the subscriber is considering. To move upward in the menu, the subscriber uses the upward button 82, and to move downward, the downward button 84. The interface displayed also includes an "input" line, for example, placed at the bottom of the screen, for indicating to the subscriber the selection made for the specified menu item string. When such a selection is performed and the send button 86 is pressed, the selection message generator 34 of the MS 16 generates the MenuSelection message 74.

The MenuSelection message 74 includes the following fields: a menu type field, a menu selection identifier field, a menu input string length field, and a menu input string field. The menu type field is described in greater detail below in conjunction with Figures 8 and 9. The menu selection identifier field (MenuSelectionid) indicates that the selection relates to the fourth menu item 96, the menu input string length field indicates that the length is 1, and the menu input string field comprises the selection performed by the subscriber, which in this example is 1.

Because in the first embodiment the menu according to the invention relates to multi-party calling, the MenuDeliver message 64 carries information on the speech state of currently placed calls. Possible speech states include, for example, hold, in speech, and in conference. The MS display screen 80 shows the calling subscriber/called subscriber number or name, and the speech state. Also, an indicator for each called subscriber may be displayed for the mobile subscriber to toggle between the hold, speech, and conference positions. This mechanism enables mobile

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subscribers to receive or place many calls simultaneously and to put some of these calls on hold while maintaining an active communication in other calls. Sub-conferences— having only a subset of calls concurrently handled by a MS 16 active - are also possible.

5 Referring now to FIGURE 5, there is shown a message flow diagram illustrating the flow of messages according to a second embodiment of the invention. In the second embodiment, the cooperating node 30 is the HLR 20, and the menu provided to the subscriber is a transfer class menu to allow the subscriber to perform modifications to the services subscribed. In that second embodiment, the subscriber
10 obtains a menu upon making a request for such a menu, by depressing the menu button 89. The MenuRequest message 60 is generated by the menu request generator 59 and sent to the HLR through the MSC 12. The MSC 12 receives the MenuRequest message 60, determines that it is for the HLR 20 and sends the MenuRequest message 60 to the HLR 20. In a preferred way, the MenuRequest message 60 and all other
15 messages exchanged between the MSC 12 and the HLR 20 are in an ANSI-41 protocol. It can be appreciated that any other protocol well known in the art for exchanging messages between cellular telecommunications nodes could also be used. The MSC 12 may also perform, if necessary, a translation between the various menu messages received from the MS 16 and directed to the HLR 20, or received from the
20 HLR 20 and directed to the MS 16.

Alternatively, the MenuRequest message 60 can be generated by depressing the menu button 88 shown on FIGURE 3, or by dialing a feature code, or by any appropriate means known in the art. Upon receipt of the MenuRequest message 60 in the HLR, the latter generates a menu message through its menu generator 32 and the
25 menu sender 34 sends the MenuDeliver message 64 to the MS 16 through the MSC 12. Again, upon receipt of the MenuDeliver message 64 in the MSC 12, the latter determines that it is addressed to the MS 16 and sends the MenuDeliver message 64 to the MS 16. Although not entirely shown, the MS generates and sends either the MenuReject message 66 or the MenuAccept message 68 to the HLR 20 through the
30 MSC 12, as previously described above in conjunction with Figure 3.

The menu message receiver of the MS 16 takes the menu items from the MenuDeliver message 64, and displays the menu strings, as shown on FIGURE 4, on

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the display screen 80. Then, the subscriber makes a selection 72 and enters it by using the keyboard of the MS and the send button 86. The selection is detected by the menu selector 52, and the selection message generator generates the MenuSelection message 74 in the same manner as shown in FIGURE 4. Upon depression of the send button 86, the MenuSelection message 74 is sent by the selection message sender 56 to the HLR 20 through the MSC 12. The MenuSelection message 74 is received by the selection receiver 36, and the selection performer 38 performs the subscriber's selection in the HLR 20 so as to update the services of the subscriber.

Then, the update menu generator 40 of the HLR 20 generates and sends another MenuDeliver message 78 to the MS 16 through the MSC 12. This MenuDeliver message 78 is received by the menu message receiver 50 to update the information displayed on the display screen 80. If the subscriber wishes to perform more selections, it is possible to do so by allowing the collection and exchange of messages 72 to 78 be performed several times, until the subscriber selects a menu item called "end" (not shown), or presses a button (not shown) which is predefined as an "end" selection.

Reference is now made to FIGURE 6, wherein there is shown a message flow diagram illustrating the flow of messages according to a third embodiment of the present invention. In that third embodiment, the cooperating node is the PSTN node 24, and the menu provided to the subscriber is for third party services. Third party services are services provided by either cellular service providers or operators other than the cellular service provider or operator with which the subscriber has a subscription, or services which do not relate to the cellular subscription. In this third embodiment, the mobile subscriber requests to obtain a menu by either pressing the menu button 88 shown on FIGURE 4, by dialing a special number and pressing the send button 86 of FIGURE 4, or by using a feature code or a SMS message (not shown) as known to those skilled in the art.

As previously explained with respect to FIGURE 5, the different messages (60, 64, 68, 74, 78) are exchanged between the MS 16 and the cooperating node 30, which in this particular case is the PSTN node 24, by passing through the serving MSC 12. Furthermore, the different messages, (60, 64, 68, 74, 78) also pass through the G-MSC 22 before reaching the PSTN node 24. For the messages exchanged between the MSC

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12 and the G-MSC 22, the ANSI-41 protocol is preferred. Of course, any other well-known protocol for exchanging messages between cellular telecommunications nodes could also be used. So, MSC 12 performs any required modifications to the menu messages received from the MS 16 and directs them to the PSTN 24, and vice-versa. For its part, the gateway MSC 22 receives the various menu messages (60, 64, 68, 74 and 78) and upon determination that these are menu messages addressed to the PSTN 24, translates the menu messages (60, 64, 68, 74 and 78) into the ISDN format or any other known protocol, as well known in the art, and vice-versa.

Reference is now made to FIGURE 7 which is a simplified schematic diagram of a radio telecommunications network in accordance with a fourth embodiment of the present invention. That fourth embodiment combines the first, second and third embodiments. In that fourth embodiment, different types of menus may be obtained by different MSs 16 at once. Each menu may be obtained, and menu selection treated according to previously described FIGURES 3, 5 and 6. Thus, it is possible for MS 16(1) to obtain a menu for a multi-party call and to perform selections as indicated for the first embodiment, while MS 16(2) obtains a menu for transfer class and performs selection for such as for the second embodiment, while MS 16(3) obtains a menu for a PSTN service and performs selection as described in the third embodiment.

For allowing various menu types and various nodes to be involved, a structure for the messages exchanged between the MS 16 and the MSC 12 is described. Reference is now made to FIGURES 8 and 9 which are, respectively, an illustration of the mapping of menu data in an IS-136 R-Data MenuDeliver and MenuSelection message according to the present invention. In the preferred embodiments of the present invention, the cellular network 10 is a Time Division Multiple Access (TDMA) network operating with the IS-136 air interface standard, which is hereby incorporated by reference herein. The invention is also applicable to other standards such as the Global System for Mobile Communication (GSM), the Code Division Multiple Access (CDMA), the Digital Advanced Mobile Phone System (D-AMPS), or the Pacific Digital Cellular Standard (PDC) or any other air interface which has Short Message Service (SMS) capability, or similar capabilities.

As shown on FIGURES 3, 5 and 6, four new menu messages are added to IS-136: MenuDeliver, MenuAccept, MenuReject and MenuSelection. The present

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invention sends menu messages utilizing an IS-136 R-DATA message 200 between the cooperating node 30 (MSC 12, HLR 20 or PSTN 24 or a combination thereof) and the MS 16. Of course, any equivalent of the IS-136 R-DATA message may be used, and the IS-136 R-DATA message is being used here for exemplary purposes only.

5 The IS-136 R-DATA message includes the following fields: a protocol discriminator (PT) 202, a message type (MT) 204, an R-Transaction Identifier (RTI) 206, an R-Data Unit (RDU) 208, a user destination address (UDA) 209 and a user origination address (UOA) 211. As known in the art, the RDU 208 is used to send Short Message Service (SMS) messages (shown in broken lines). For doing so, the
10 RDU 208 is divided into a Higher Layer Protocol Identifier (HLPI) 210' and a High Layer Protocol Data Unit (HLPDU) 212'. For SMS messages, HLPI 210' is set equal to 1. In the IS-136 standard, an HLPI 210' value of 0 indicates that the message is network specific, a value of 2 relates to Cellular Paging Teleservice (CPT), a value of 3 relates to Over-The-Air Activation Teleservice (OATS), while values of 4-255 have
15 been set aside for future use.

One embodiment of the present invention makes use one of these reserved values, for example, 4, to indicate that the message is a menu message according to the invention. The HLPI 210' is appended to the HLPDU 212' in which the SMS data 214 is encapsulated. Thus, in that embodiment, menu messages for the HLPI 210 is
20 assigned the value 4 which, in turn, identifies the appended HLPDU 212 to the MS 16 as menu data 214. The menu data 214 may be composed of several fields, which are used as necessary.

For example, for the MenuDeliver message 64, the fields of the menu data are: MenuType 216, MenuId 218, MenuAddbit 220, MenuNbitem 222 and the various
25 Menuitems 224-228. Each of the Menuitems 224-228 are composed of four fields, as previously described with respect to Figure 4. The MenuType 216 may take different values, and depending of those values, the components of the menu data 214 may vary. Some possible values of the MenuType field 216 are: Deliver, DeliverAck and Clear. A MenuType field 216 having value Deliver indicates that the menu data
30 214 is to be delivered, while a MenuType field 216 having a value DeliverAck indicates that the menu data 214 relates to an acknowledgement message (MenuAccept message 68). A MenuType field 216 of value Clear indicates that the

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display screen 80 and the menu storage/clearance module 58 of the MS 16 should be cleared of the indicated menu data. It is also possible to replace the previously mentioned MenuSelection message 74 by a MenuDeliver message 64 having a MenuType field 216 of value equal to Selection 72.

5 Thus, when the MenuType field 216 is set to Deliver, the following fields in the menu data 214 are mandatory: MenuId 218, MenuAddbit 220, MenuNbitem 222 and Menuitems 224-228. When the MenuType field 216 is set to DeliverAck, the mandatory fields of the menu data 214 are: MenuId 218 and MenuNbitem 222. For a MenuType field 216 of value equal to Selection, the following fields in the menu
10 data 214 are mandatory: MenuId 218, MenuSelectionIdentifier 230, Menuinputstringlength 232 and Menuinputstring 234, which have previously been discussed for Figure 4. As for the MenuType field 216 of value clear, the menu data 214 has the MenuId field 218 as mandatory.

The MenuId 218 may be a number or an alphanumeric string identifying the
15 considered menu to both the serving MSC 12 and the MS 16. When several menus are used simultaneously by the MS 16, the responsibility of the MS 16 is to ensure that the value of the MenuId field 218 corresponds to the appropriate menu when sending a MenuSelection message 74 to the cooperating node 30. In turn, the serving MSC 12 must keep track of which menus are being used by which MS 16, even when the MSC
20 12 is not the cooperating node 30 so as to avoid confusion between menus and selection. Such a tracking is performed using the MenuId field 218.

The MenuAddbit field 220 indicates whether this menu data 214 is to be appended to a previous menu already sent, thus allowing large menus to be sent in smaller chunks. The MenuNbitems field 222 informs the MS 16 as to how many
25 Menuitems fields 224-228 are included in the menu data 214.

As previously discussed for Figure 4, the fields of the MenuSelection message 74 are: MenuType 216, MenuId 218, MenuSelectionIdentifier 230, Menuinputstringlength 232 and Menuinputstring 234. The MenuSelectionIdentifier field 230 indicates which menu item has been selected. The Menuinputstringlength
30 field 232 indicates the length of the input string, and finally the Menuinputstring field 234 contains the string that has been entered for the selection.

The MenuReject message 66 and the MenuAccept message 68 may be

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composed of subsets of the previous mentioned fields of the menu data 214. For example, the MenuReject message 66 and the MenuAccept message 68 may use the MenuType field 216, MenuId 218 field and MenuNbitem field 222.

As known in the art, the R-DATA messages 200 are sent over the digital traffic channel, so the menu messages may be sent simultaneously with speech. Thus, the MS 16 can be in the speech mode while the subscriber is receiving a menu and toggles through the various options in the menu and makes selections. The selections are sent back via the base station 14 to the MSC 12 over the digital control channel, and if the cooperating node 30 is not the MSC 12, the translation into the appropriate protocol is performed by the MSC 12. Also to allow adequate service to the mobile subscriber, the menu messages are sent and received in real-time, thus allowing dynamic menu selections and adequate service to mobile subscribers with as short delay as possible.

While the method and system shown and described and illustrated by several specific embodiments, the invention is not to be limited to the methods, specific forms, or arrangements of parts so described and illustrated. Various changes and modifications could be made therein without departing from the spirit and scope of the invention as defined in the following claims. The invention is limited only by the claims.

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WHAT IS CLAIMED IS:

1. A system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network, the system comprising:

a cooperating node including:

5 a menu generator for generating a menu message comprising menu data;

a menu sender for sending the menu message;

a selection receiver for receiving a selection message, the selection message including a menu selection made by the mobile subscriber; and

10 a selection performer for performing within the cooperating node the menu selection; and

the mobile station including:

means for determining whether to accept or reject the menu message;

15 means for generating and transmitting a message to the coordinating node in the event that the menu message is rejected;

a menu message receiver for receiving the menu message and displaying the menu data on a display screen in the event that the menu message is determined to be acceptable;

20 a menu selector for obtaining the menu selection from the mobile subscriber;

a selection message generator for generating the selection message including the menu selection; and

25 a selection message sender for sending the selection message to the cooperating node.

2. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 1, wherein the menu data includes an origination address, a destination address, a menu type and menu items.

30

3. The system for providing a menu to a mobile station used by a mobile

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subscriber in a radio telecommunications network of claim 2, wherein the origination address of the menu message is an address of the cooperating node, the destination address of the menu message is an address of the mobile station, and the menu items of the menu message are displayed on the display screen of the mobile station.

5

4. The system for providing a menu to a mobile station used by mobile station used by a mobile subscriber in a radio telecommunications network of claim 3, wherein the selection message includes an origination address, a destination address, a menu type, a menu selection identifier, and a menu input string.

10

5. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 4, wherein the origination address of the selection message is the address of the mobile station, and the destination address of the selection message is the address of the cooperating node.

15

6. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 1, wherein the menu message is sent by the cooperating node and is received by the mobile station in real-time, and wherein the selection message is sent by the mobile station and received by the cooperating node in real-time.

20

7. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 1, wherein the cooperating node is a Mobile Switching Center (MSC) when the menu data relates to multi-party call control menu or a Home Location Register (HLR) when the menu data relates to subscriber features control menu.

25

8. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 1 wherein the radio telecommunications network is a Time Division Multiple Access (TDMA) network, and

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the menu sender and the selection message sender include logic for sending IS-136 R-DATA messages.

5 9. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 8, wherein the menu message and the selection message are sent over a Digital Control Channel (DCCH).

10 10. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 9 wherein the menu data is included in a Higher Layer Protocol Data Unit (HLPDU) within an R-Data Unit (RDU) of the IS-136 R-DATA message.

15 11. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 10 wherein the menu data further comprises an indicator that the menu data is menu data in a Higher Layer Protocol Identifier (HLPI) within an R-Data Unit (RDU) of the IS-136 R-DATA messages.

20 12. A system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network, the system comprising:

a Mobile Switching Center (MSC) including:

15 a menu generator for generating a menu message comprising multi-party call control menu items;
a menu sender for sending the menu message;
a selection receiver for receiving a selection message, the selection message including a menu selection made by the mobile subscriber; and
a selection performer for performing within the MSC the menu selection; and

20 the mobile station including:

means for determining whether to accept or reject the menu message;

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means for generating and transmitting a message to the MSC in the event that the menu message is rejected;

5 a menu message receiver for receiving the menu message and displaying the multi-party call control menu items on a display screen in the event that the menu message is determined to be acceptable;

a menu selector for obtaining the menu selection from the mobile subscriber;

10 a selection message generator for generating the selection message including the menu selection; and

a selection message sender for sending the selection message to the MSC.

15 13. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 12, wherein the menu selector includes logic for obtaining changes of multi-party call state, and wherein the selection message sender sends the changes of multi-party call state.

20 14. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 13, wherein the selection receiver receives the changes of multi-party call state, and the selection performer performs the changes to the multi-party call state.

25 15. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 14, wherein the MSC further comprises a menu trigger detecting initiation of a multi-party call by the mobile subscriber, and the menu sender sends the menu message upon detection of initiation of a multi-party call by the menu trigger.

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16. A system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network, the system comprising:

a Home Location Register (HLR) including:

5 a menu generator for generating a menu message comprising subscriber features control menu items, the means generator generates the menu message from stored subscriber information in the HLR;

a menu sender for sending the menu message;

10 a selection receiver for receiving a selection message, the selection message including a menu selection made by the mobile subscriber; and

a selection performer for performing within the HLR the menu selection; and

the mobile station including:

15 means for determining whether to accept or reject the menu message;

means for generating and transmitting a message to the HLR in the event that the menu message is rejected;

20 a menu message receiver for receiving the menu message and displaying the multi-party call control menu items on a display screen in the event that the menu message is determined to be acceptable;

a menu message receiver for receiving the menu message and displaying the subscriber features control menu items on a display screen;

a menu selector for obtaining the menu selection from the mobile subscriber;

25 a selection message generator for generating the selection message including the menu selection; and

a selection message sender for sending the selection message to the HLR.

30 17. The system for providing a menu to a mobile station used by a mobile

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subscriber in a radio telecommunications network of claim 16, wherein the menu selector includes logic for obtaining changes of subscriber features, and wherein the selection message sender sends the changes of subscriber features.

5 18. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 17, wherein the selection receiver further receives the changes of subscriber features, and the selection performer further includes logic for performing the changes of subscriber features.

10 19. The system for providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 18, wherein the mobile station further includes a menu button, which upon depression, activates generating of a menu request message sent by the mobile station to the HLR, and the HLR further comprises a menu request receiver for receiving the menu request message, and upon receipt of the
15 menu request message, the menu generator generates the menu message wherein the menu data comprises menu items, and the menu sender sends the menu message comprising the menu items.

20 20. A method of providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network, the method comprising steps of:
generating in a cooperating node a menu message comprising menu data;
sending the menu message from the cooperating node;
determining within the mobile station if the menu message is acceptable;
receiving the menu message within the mobile station and displaying the menu
25 data on a display screen if the menu message is determined to be acceptable;
generating in the mobile station a rejection message if the menu message is determined not to be acceptable and sending the rejection message to the cooperating node;
obtaining within the mobile station a menu selection from the mobile subscriber;
30 generating in the mobile station a selection message including the menu selection;

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sending from the mobile station the selection message to the cooperating node;
receiving at the cooperating node the selection message; and
performing at the cooperating node the menu selection.

5 21. The method of providing a menu to a mobile station used by a mobile
subscriber in a radio telecommunications network of claim 20, wherein the menu data
includes an origination address, a destination address, a menu type, a number of items and
menu items.

10 22. The method of providing a menu to a mobile station used by a mobile
subscriber in a radio telecommunications network of claim 21, wherein the origination
address of the menu data is an address of the cooperating node, the destination address of
the menu data is an address of the mobile station, and the menu items of the menu data are
displayed on the display screen of the mobile station.

15 23. The method of providing a menu to a mobile station used by a mobile
subscriber in a radio telecommunications network of claim 22, wherein the selection
message includes an origination address, a destination address, a menu type, and a menu
input string.

20 24. The method of providing a menu to a mobile station used by a mobile
subscriber in a radio telecommunications network of claim 23, wherein the origination
address of the selection message is the address of the mobile station, and the destination
address of the selection message is the address of the cooperating node.

25 25. The method of providing a menu to a mobile station used by a mobile
subscriber in a radio telecommunications network of claim 20, wherein the menu message
is sent by the cooperating node and is received by the mobile station in real-time, and
wherein the selection message is sent by the mobile station and received by the
30 cooperating node in real-time.

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26. The method of providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 20 wherein the radio telecommunications network is a Time Division Multiple Access (TDMA) network, and the step of sending the menu message and the step of sending the selection message are performed using IS-136 R-DATA messages.

27. The method of providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 26, wherein the menu message and the selection message are sent over a Digital Control Channel (DCCH).

28. The method of providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 27 wherein the menu data is included in a Higher Layer Protocol Data Unit (HLPDU) within an R-Data Unit (RDU) of the IS-136 R-DATA message.

29. The method of providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 28 wherein the menu data further comprises an indicator that the menu data is menu data in a Higher Layer Protocol Identifier (HLPI) within an R-Data Unit (RDU) of the IS-136 R-DATA message.

30. A method of providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network, the method comprising steps of:

- generating in a Mobile Switching Center (MSC) a menu message comprising multi-party call control menu items;
- sending the menu message from the MSC;
- determining within the mobile station whether the menu message can be accepted;
- receiving within a mobile station the menu message, upon determining it can be accepted, and displaying the multi-party call control menu items on a display

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screen;
obtaining within the mobile station a menu selection from the mobile
subscriber;
generating in the mobile station a selection message including the menu
5 selection;
sending from the mobile station the selection message to the MSC;
receiving at the MSC the selection message; and
performing at the MSC the menu selection.

10 31. The method of providing a menu to a mobile station used by a mobile
subscriber in a radio telecommunications network of claim 30, wherein the step of
obtaining the menu selection from the mobile subscriber includes obtaining changes
of multi-party call control, and wherein the step of sending the selection message
sends the changes of multi-party call control.

15 32. The method of providing a menu to a mobile station used by a mobile
subscriber in a radio telecommunications network of claim 31, wherein the step of
receiving a selection message further comprises a step of receiving the changes of
multi-party call control, and the step of performing the menu selection performs the
20 changes of the multi-party call within the MSC.

25 33. The method of providing a menu to a mobile station used by a mobile
subscriber in a radio telecommunications network of claim 32, wherein the method further
comprises a step of detecting within the MSC initiation of a multi-party call by the mobile
subscriber and sending the menu message upon detection of initiation of a multi-party call.

30 34. A method of providing a menu to a mobile station used by a mobile
subscriber in a radio telecommunications network, the method comprising steps of:
generating in a Home Location Register (HLR) a menu message
comprising subscriber features control menu items, the subscriber features control menu

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items providing stored subscriber information in the HLR;
sending the menu message from the HLR;
determining within a mobile station whether the menu message can be
accepted;
5 receiving within a mobile station the menu message, if the mobile station
determines that the menu message can be accepted, and displaying the subscriber features
control menu items on a display screen;
obtaining within the mobile station a menu selection from the mobile
subscriber;
10 generating in the mobile station a selection message including the menu
selection;
sending from the mobile station the selection message to the HLR;
receiving at the HLR the selection message; and
performing at the HLR the menu selection.

15
35. The method of providing a menu to a mobile station used by a
mobile subscriber in a radio telecommunications network of claim 34, wherein the step
of obtaining the menu selection from the mobile subscriber further includes obtaining
changes of subscriber features, and wherein the step of sending the selection message
20 further sends the changes of subscriber features.

36. The method of providing a menu to a mobile station used by a
mobile subscriber in a radio telecommunications network of claim 35, wherein the step of
receiving a selection message further includes receiving the changes of subscriber features,
25 and wherein the step of performing at the HLR the menu selection performs the changes
of subscriber features.

37. The method of providing a menu to a mobile station used by a
mobile subscriber in a radio telecommunications network of claim 34, further comprising
30 steps of:

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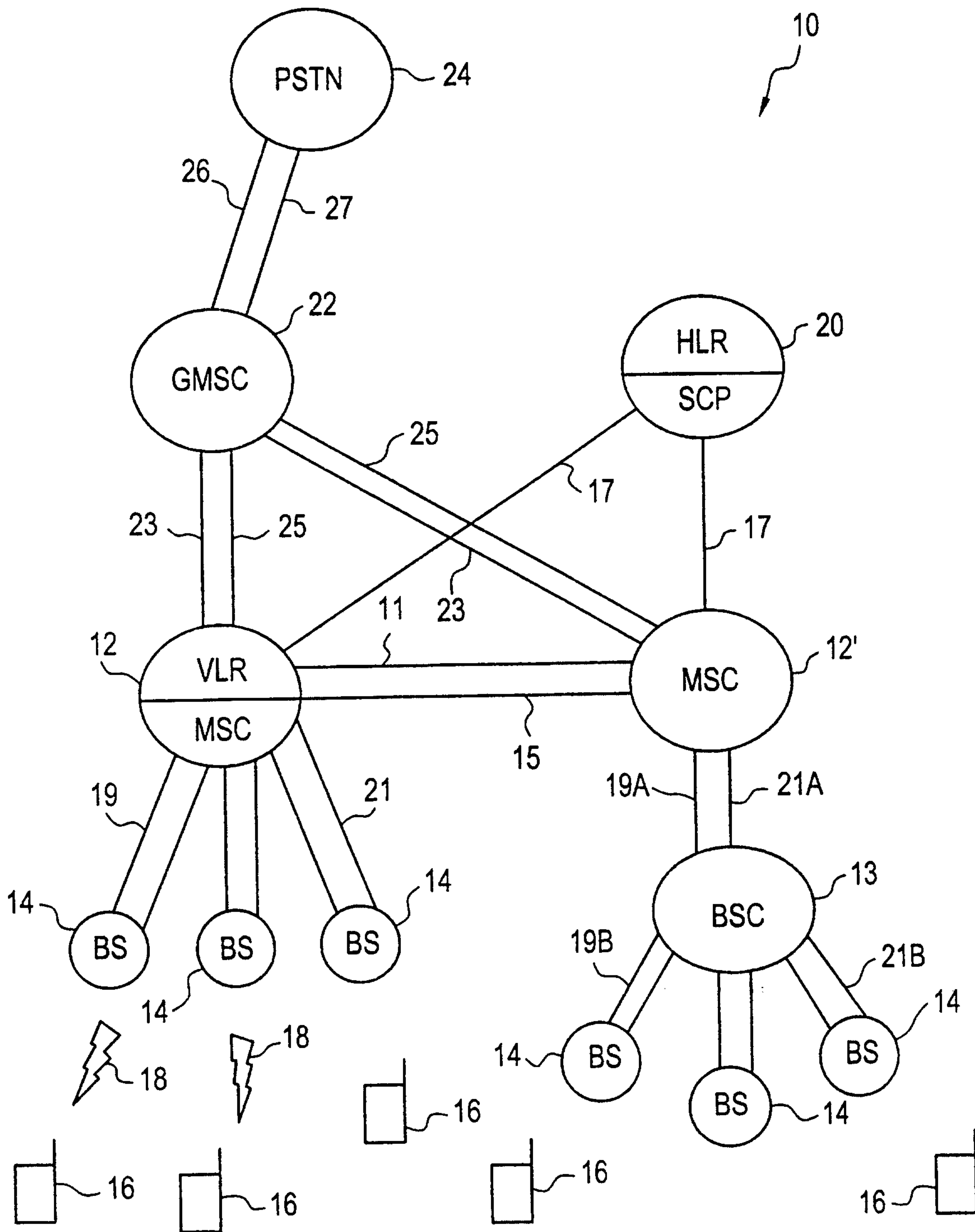
obtaining from the mobile subscriber depression of a menu button of the mobile station;

generating and sending of a menu request message by the mobile station to the HLR; and

5 receiving the menu request message in the HLR and generating and sending of the menu message wherein the menu data comprises menu items.

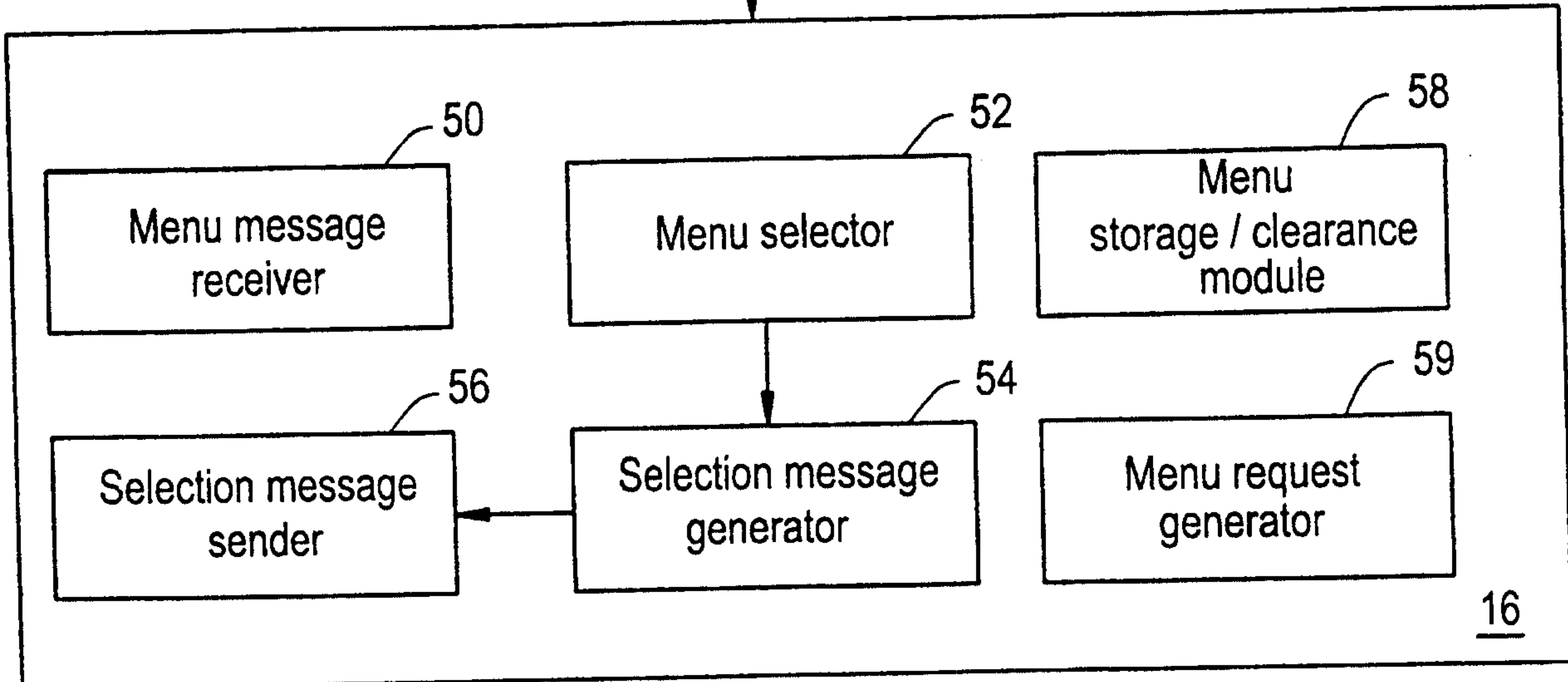
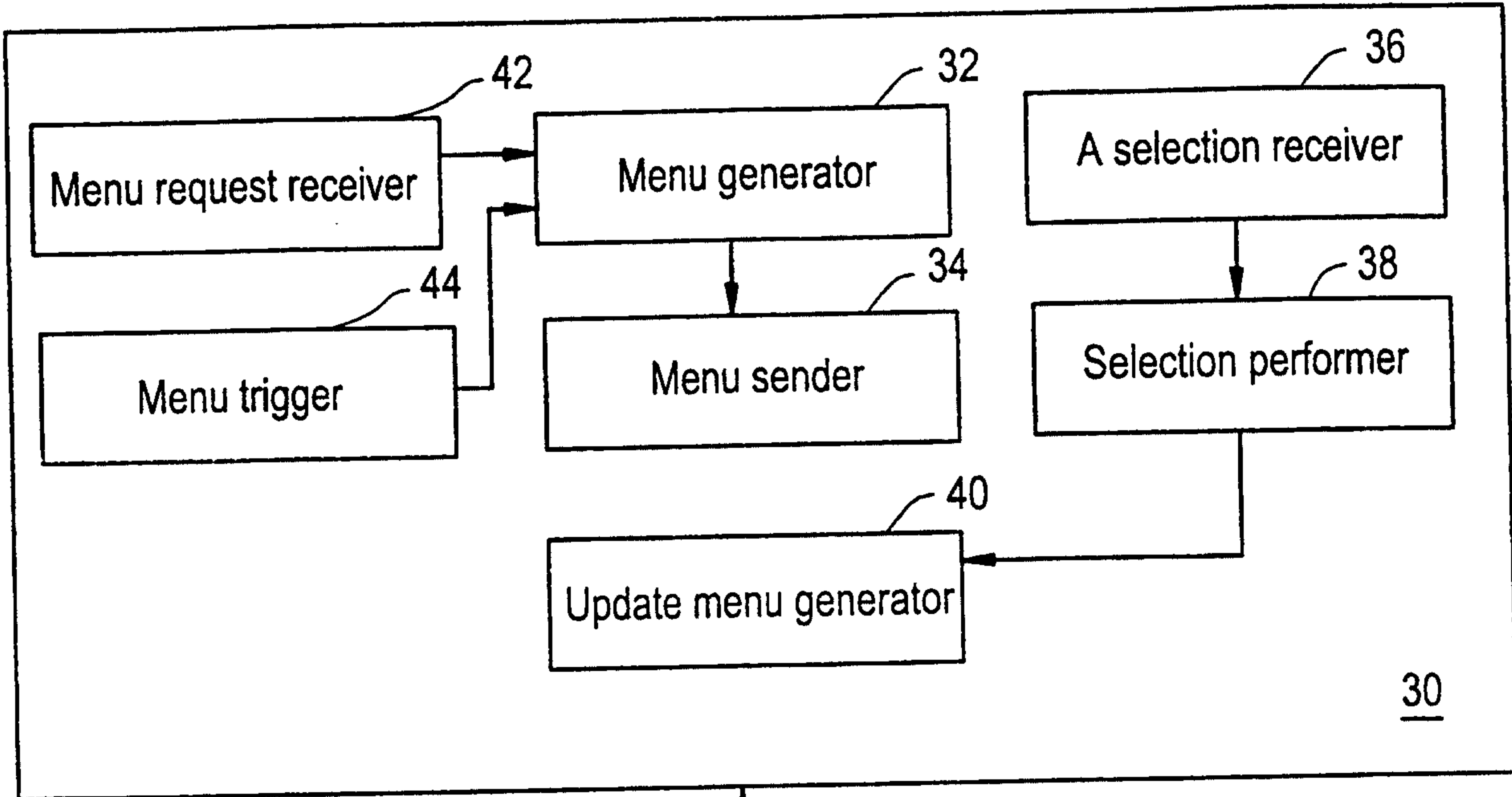
10 38. The method of providing a menu to a mobile station used by a mobile subscriber in a radio telecommunications network of claim 34, wherein the cooperating node is a Mobile Switching Center (MSC) when the menu data relates to multi-party call control menu and the cooperating node is a Home Location Register (HLR) when the menu data relates to subscriber features control menu.

FIG. 1



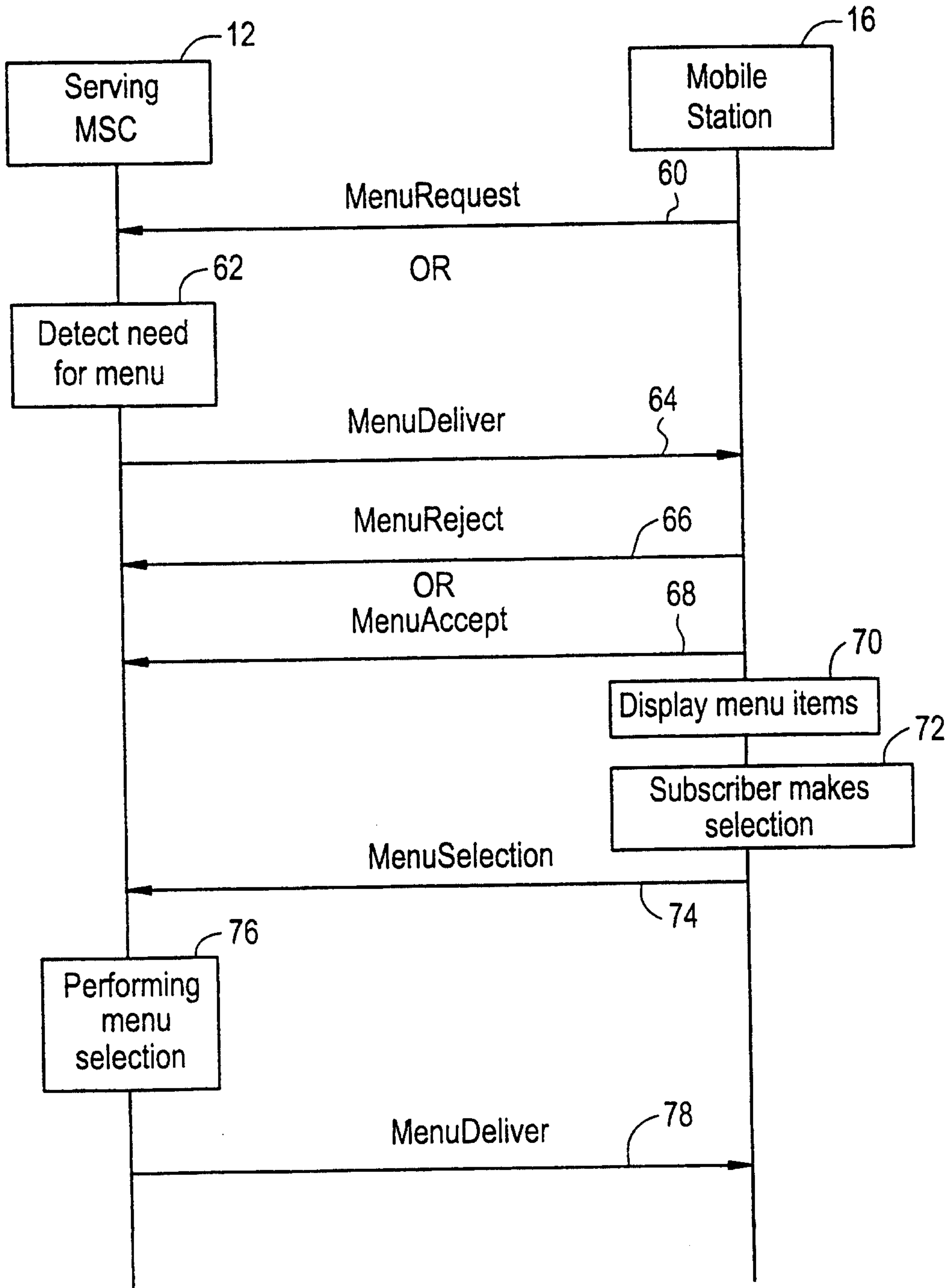
Marks & Clerk

FIG.2



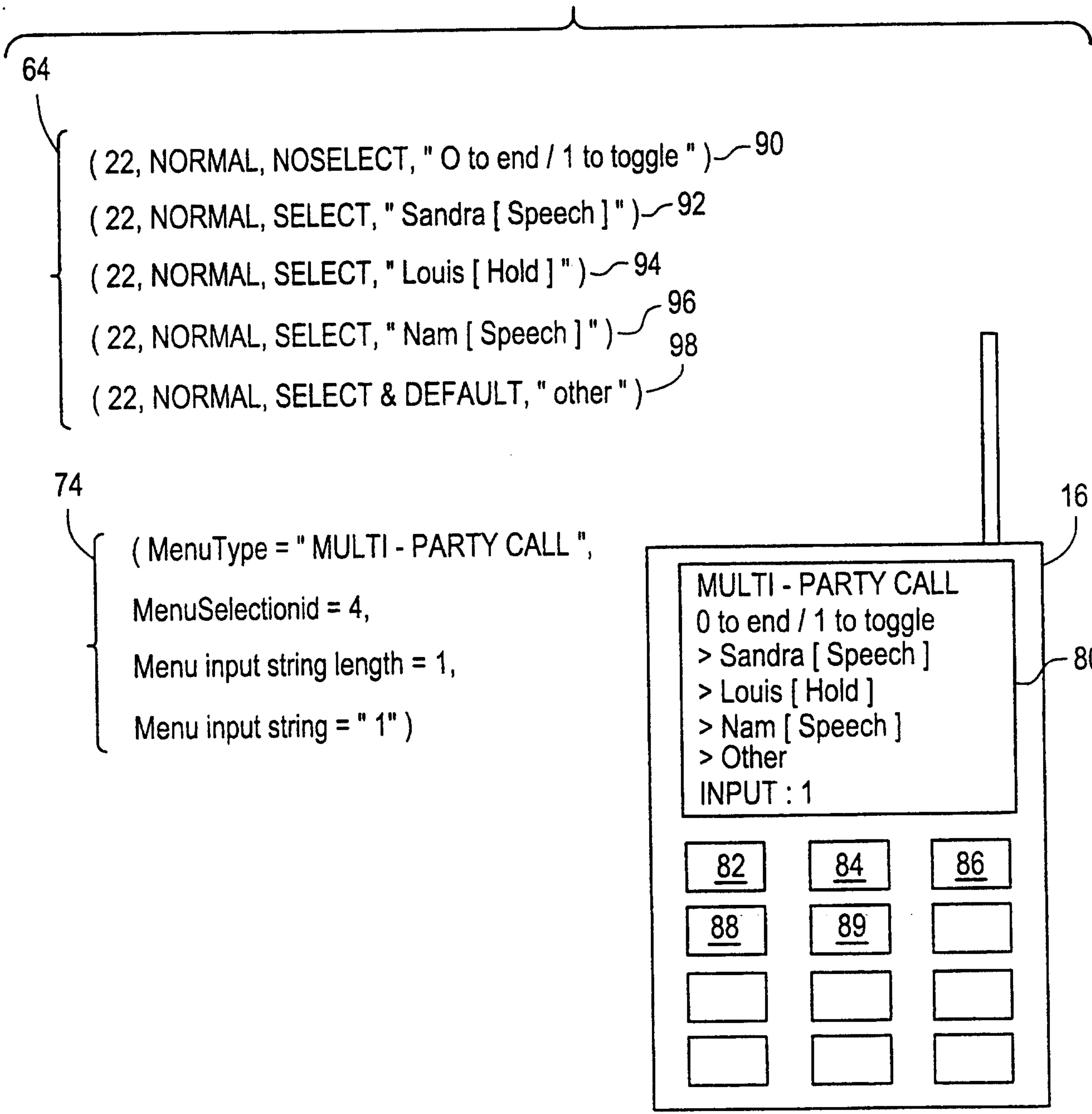
Mark & Clerk

FIG.3



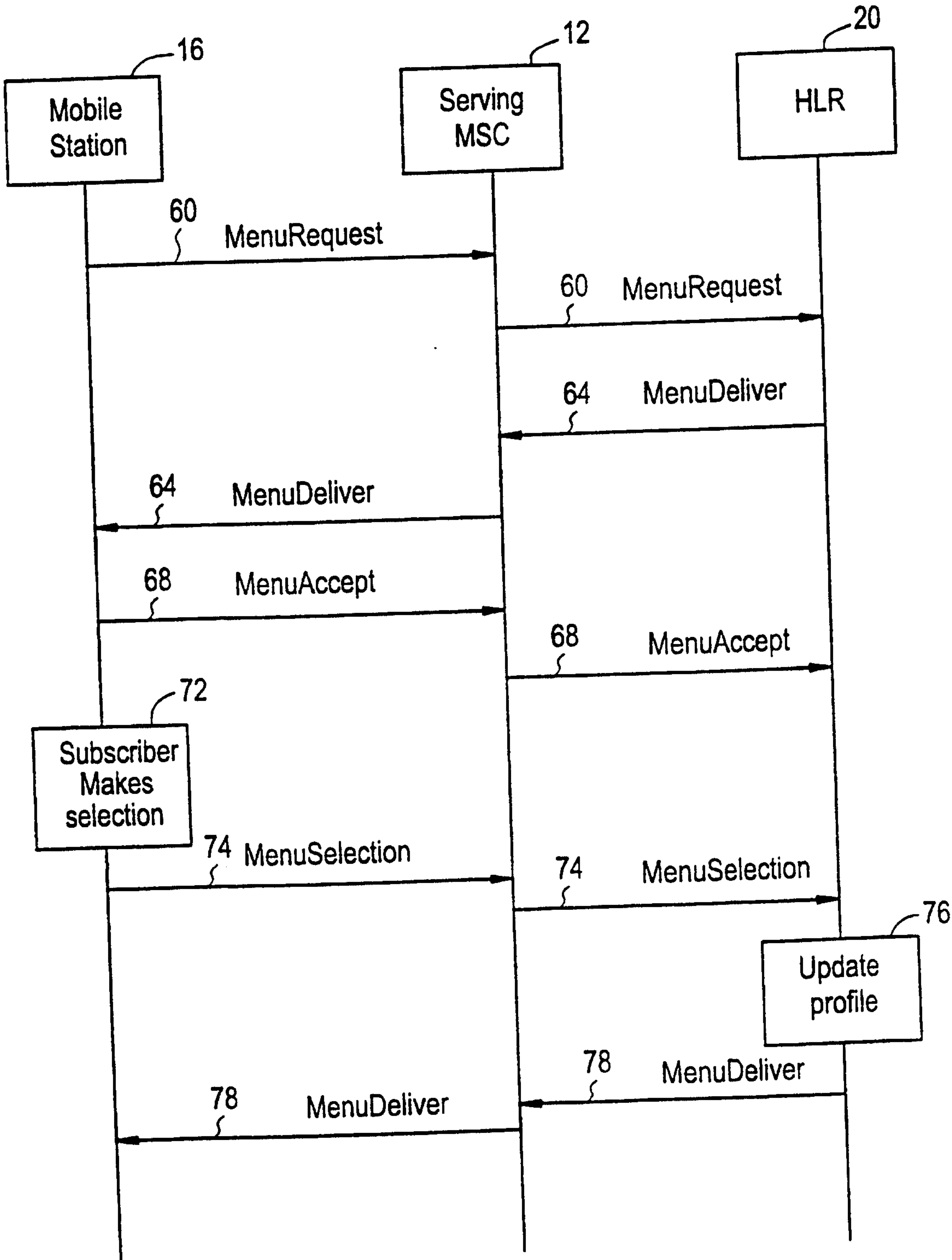
Markus & Clerk

FIG.4



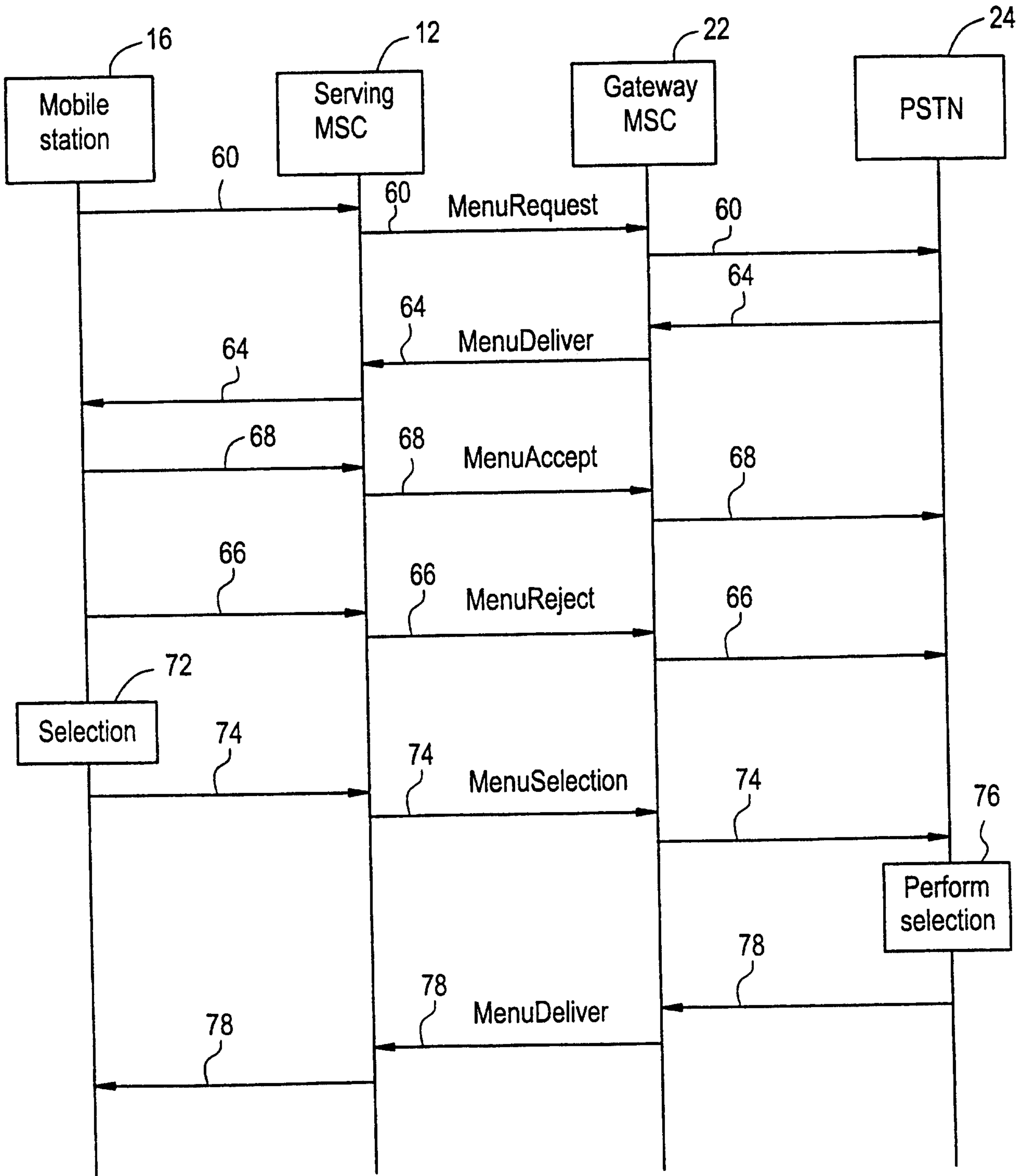
Mark & Clerk

FIG.5



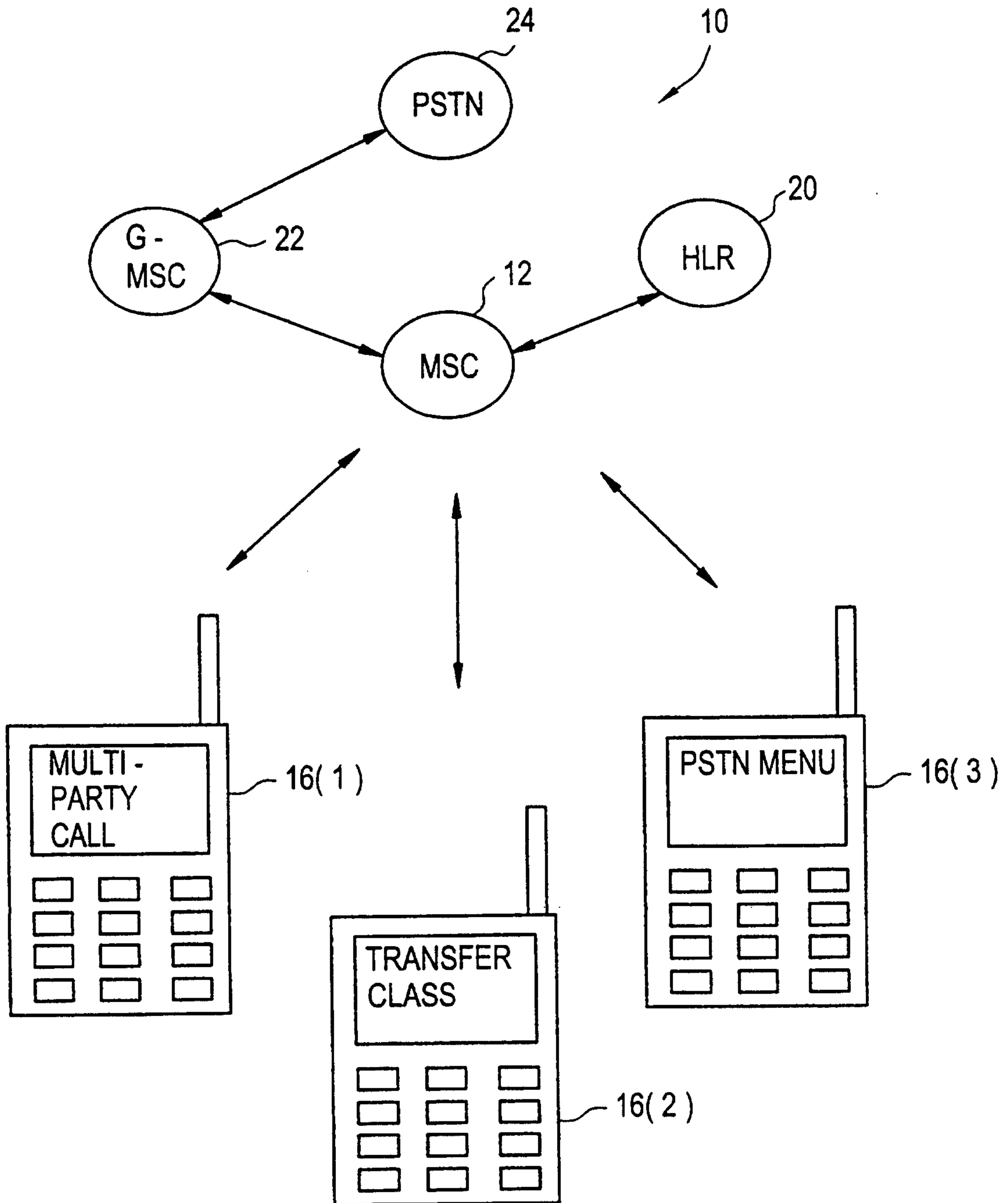
Mark & Clerk

FIG.6



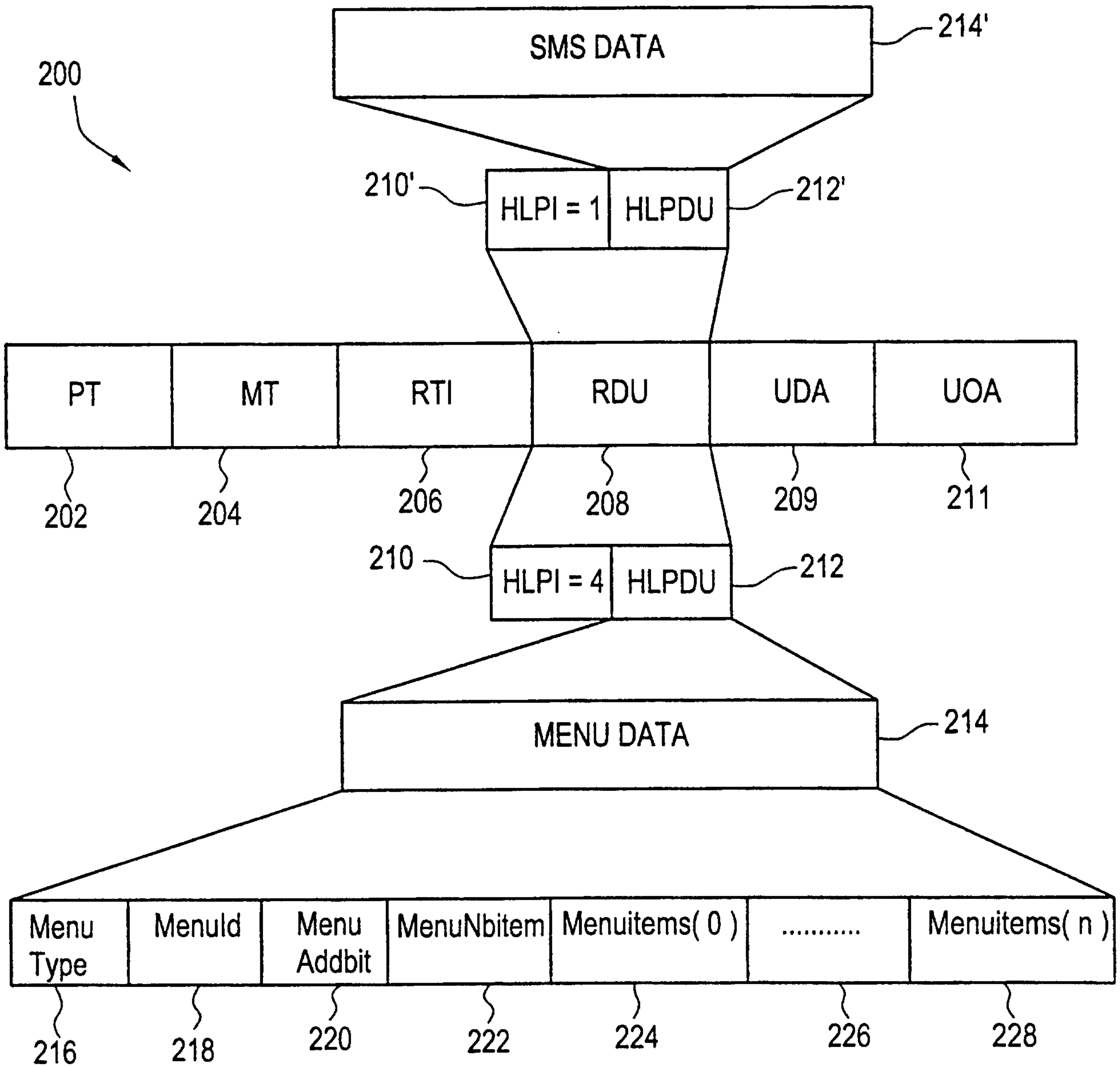
Markus & Clerk

FIG.7



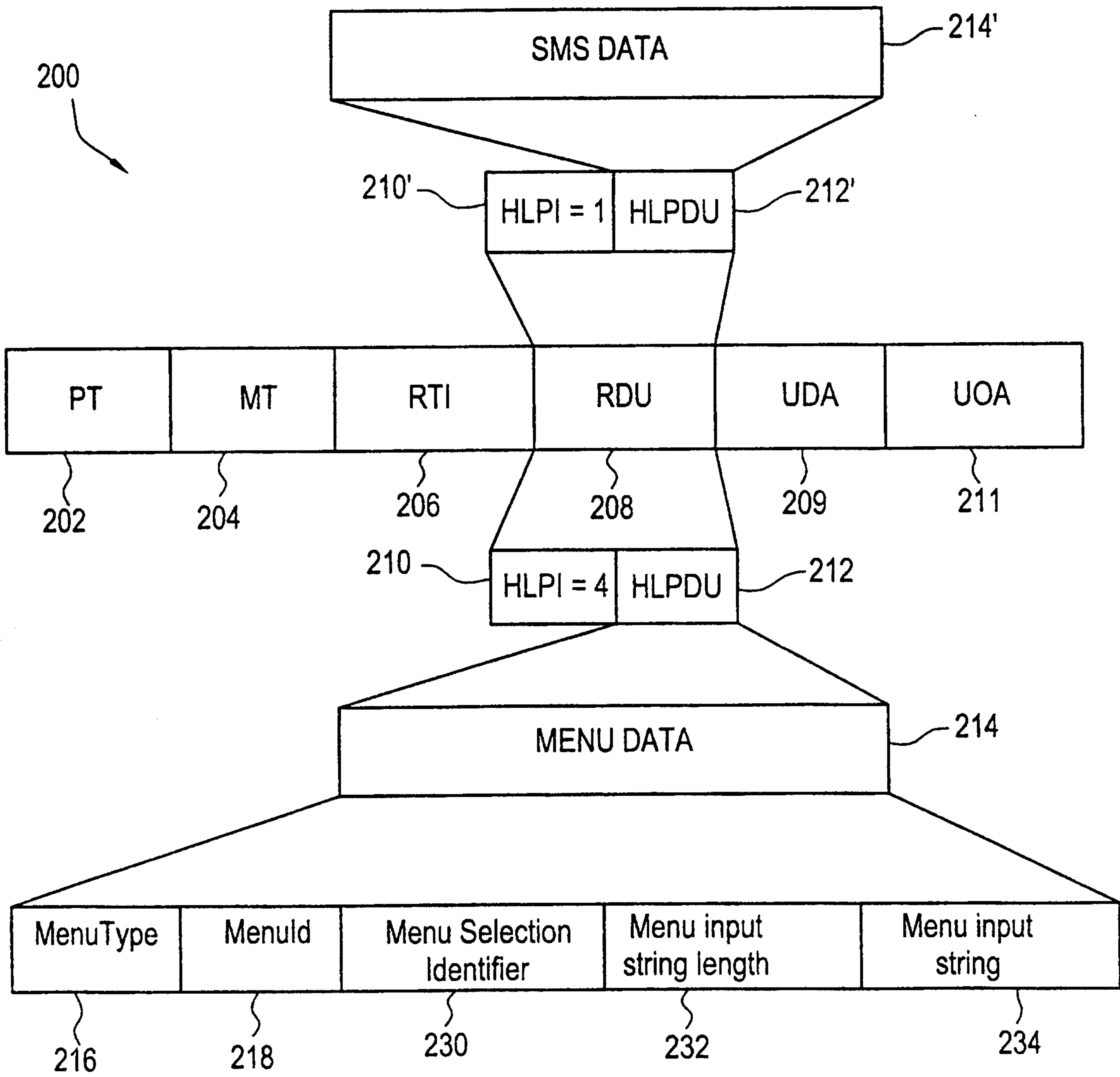
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FIG.8



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FIG.9



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