

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
19 February 2004 (19.02.2004)

PCT

(10) International Publication Number
WO 2004/016013 A2

(51) International Patent Classification⁷: **H04Q 7/22**

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(21) International Application Number:

PCT/IB2003/003165

(22) International Filing Date: 5 August 2003 (05.08.2003)

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(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

SE 0202390-1 7 August 2002 (07.08.2002) SE

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(81) **Designated States (national):** AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

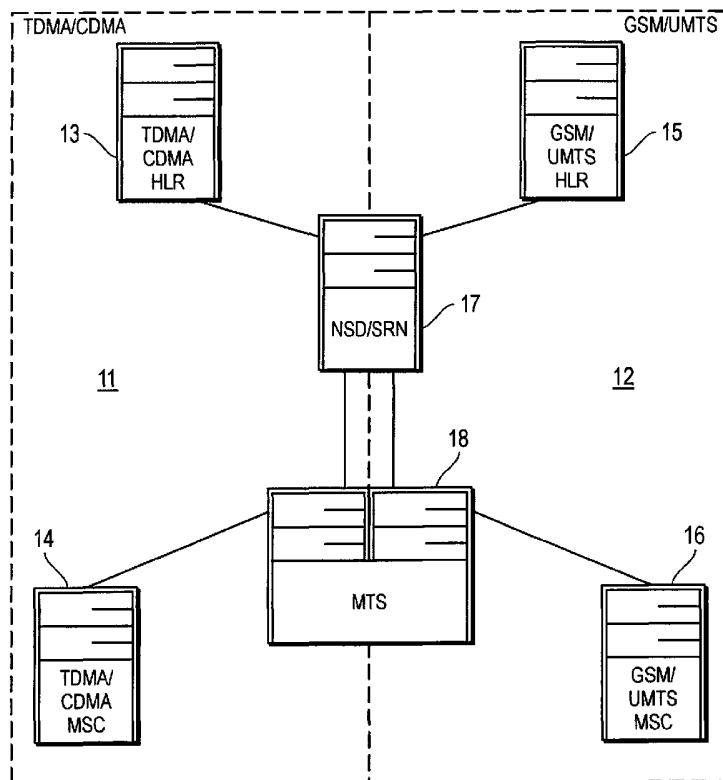
(84) **Designated States (regional):** ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,

[Continued on next page]

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(54) **Title:** ARRANGEMENT AND METHOD FOR MOBILE TELECOMMUNICATION NETWORKS



(57) **Abstract:** An arrangement and method for sending Short Message Service (SMS) messages between a TDMA/CDMA mobile network (11) and a GSM/UMTS mobile network (12). A network subscription database/signaling relay node, NSD/SRN, (17) and a multi-technology short message service center, MTS, (18) are shared between the networks. The MTS receives SMS messages from each network and forwards the messages to destination subscribers in the same or the other network. The MTS (18) first sends a request for routing information to the HLR in the network where the SMS message originated. The NSD/SRN (17) intercepts the request and determines whether the destination subscriber has a subscription in the addressed network. If so, the request is forwarded to the addressed HLR, and routing continues as normal. If not, the NSD/SRN (17) notifies the MTS (18) that the subscriber does not have a subscription in the addressed network. The MTS then requests routing information from the other HLR, and routing continues as normal.



ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— *without international search report and to be republished
upon receipt of that report*

ARRANGEMENT AND METHOD FOR MOBILE TELECOMMUNICATION NETWORKS

Field of the Invention

5 The present invention relates to mobile telecommunication networks. In particular, and not by way of limitation, the present invention is directed to an arrangement and method for supporting Short Message Service (SMS) interoperability between mobile networks based on differing technologies while also supporting mobile number migration and mobile number portability.

10

Background Art

Number migration from Time Division Multiple Access/Code Division Multiple Access (TDMA/CDMA) mobile networks to Global System for Mobile Communications/Universal Mobile Telecommunications System (GSM/UMTS) is an
15 important area for GSM and UMTS database products and also for a quick market acceptance of the GSM/UMTS system. Migration of calls from TDMA/CDMA to GSM/UMTS has been introduced, to a limited extent, but customers today are requesting full migration including SMS support.

Today there is additional customer demand to introduce the transfer of non-call
20 messages such as SMS messages between TDMA/CDMA and GSM/UMTS networks. This service would include the transfer of SMS messages for subscribers who have migrated from TDMA/CDMA to GSM/UMTS. However, TDMA/CDMA and GSM/UMTS networks utilize different Mobile Application Part (MAP) signaling protocols for the SS7 signaling. Today, therefore, SMS messages cannot be sent from an
25 TDMA/CDMA subscriber to a GSM/UMTS subscriber and vice versa. A translation between TDMA/CDMA MAP operations and GSM/UMTS MAP operations must take place.

A Short Message Service Center (SMSC) such as Logica's Telepath SMSC Release 2700 can be equipped as a Multi-Technology SMSC (MTS). When equipped as
30 an MTS, the SMSC provides support for multiple network technologies on a single SMSC to provide interworking between different technologies. The MTS has MAP interfaces to

more than one network technology, and can be equipped to interwork between TDMA/CDMA networks and GSM/UMTS networks.

Regarding the MTS, several assumptions are made. First, it is assumed that before delivery of an SMS message to a destination subscriber, the MTS decides which network
5 technology to use based on the subscriber number (SNB) of the destination subscriber. Second, delivery of the SMS message is independent of the network originating the SMS message. It is also assumed that an SMS message from a GSM/UMTS subscriber to another GSM/UMTS subscriber is transferred directly via the GSM/UMTS network, and an SMS message from a TDMA/CDMA subscriber to another TDMA/CDMA subscriber
10 is transferred directly via the TDMA/CDMA network.

There are several problems, however, with the existing MTS solution. The MTS has information stored regarding all SNBs used in the TDMA/CDMA network. The SNB list is extremely large and difficult to administer. Based on this list, the MTS decides which technology to use when an SMS message is to be delivered to a particular
15 subscriber. When number migration from TDMA/CDMA to GSM/UMTS is introduced, the technology decision made in the MTS may not be correct because a migrated subscriber may have, for example, a TDMA/CDMA SNB together with a GSM/UMTS subscription. Thus, the MTS's attempt to route the call via the TDMA/CDMA network would fail.

20 Additionally, the number of transfers between network technologies within the MTS must be minimized because information is lost when an SMS message is transferred between TDMA/CDMA and GSM/UMTS technologies. Therefore, the MTS cannot transfer an SMS message between network technologies more than once.

25 **Summary of the Invention**

The present invention enables mobile clients to send Short Message Service (SMS) messages from a first network based on a first technology to a destination subscriber in a second network based on a second technology. The invention also tracks subscribers who have migrated from one type of network to another, and delivers to them in their new
30 network, SMS messages originating in their old network.

Thus, in one aspect, the present invention is directed to an arrangement for supporting SMS interoperability between mobile networks based on differing

technologies. The arrangement enables subscribers to continue receiving SMS messages after the subscribers have migrated from a first network based on a first technology to a second network based on a second technology. The arrangement includes first and second home location registers (HLRs) in the first and second networks, respectively; first and second mobile switching centers (MSCs) in the first and second networks, respectively; a multi-technology short message service center (MTS) shared between the networks; and a network subscription database/signaling relay node (NSD/SRN) shared between the networks that provides a subscriber number (SNB) database and forwards requests for routing information to the appropriate HLR. The arrangement is characterized in that the MTS also includes means for sending an initial request for routing information to the first HLR, and for sending a subsequent request for routing information to the second HLR when the MTS receives a notification in response to the initial request indicating that the destination subscriber has a subscription in the second network. Additionally, the NSD/SRN includes means for intercepting the initial and subsequent requests for routing information sent from the MTS before the request reaches the addressed HLR; and a subscriber database for determining whether the destination subscriber has a subscription in the first or second network. The NSD/SRN also includes means for forwarding the initial or subsequent request for routing information to the addressed HLR if the destination subscriber has a subscription in the network where the addressed HLR resides; and means for sending a notification to the MTS indicating that the destination subscriber has a subscription in the second network, if the initial request for routing information is addressed to the first HLR, and the destination subscriber has a subscription in the second network.

In another aspect, the present invention is directed to a method of supporting SMS interoperability between mobile networks based on differing technologies. The method enables subscribers to continue receiving SMS messages after the subscribers have migrated from a first network based on a first technology to a second network based on a second technology. The method is characterized by the steps of receiving in the MTS, an SMS message that originated in the first network and is addressed to a subscriber that has migrated its subscription from the first network to the second network; sending an initial request for routing information from the MTS to the first HLR; intercepting by the NSD/SRN, the initial request for routing information before the request reaches the first

HLR; and determining by the NSD/SRN, whether the destination subscriber has a subscription in the first network. Upon determining that the destination subscriber has a subscription in the first network, the NSD/SRN forwards the initial request for routing information to the first HLR; the first HLR sends routing information to the MTS; and the
5 MTS routes the SMS message to the destination subscriber in the first network. However, upon determining that the destination subscriber does not have a subscription in the first network, the NSD/SRN sends a notification to the MTS indicating that the destination subscriber does not have a subscription in the first network. The MTS then sends a subsequent request for routing information to the second HLR. The second HLR sends the
10 routing information to the MTS, and the MTS routes the SMS message to the destination subscriber in the second network.

In yet another aspect, the present invention is directed to a method in an MTS of sending an SMS message from a first network based on a first technology to a destination subscriber in a second network based on a second technology. The method includes the
15 steps of receiving the SMS message from the first network in the MTS; sending from the MTS to the NSD/SRN, a first request for routing information that identifies the destination subscriber and includes an address of the first HLR; and receiving in the MTS, a notification from the NSD/SRN indicating that the destination subscriber does not have a subscription in the first network. The MTS then sends a second request for routing
20 information to the NSD/SRN. The second request identifies the destination subscriber and includes an address of the second HLR. This is followed by receiving in the MTS, routing information from the second HLR; and routing the SMS message from the MTS to the destination subscriber utilizing the routing information acquired from the second HLR.

25 **Brief Description of the Drawings**

FIG. 1 is a simplified block diagram of a mobile network configuration in which the system of the present invention has been implemented;

FIG. 2 is a flow chart illustrating the steps of a preferred embodiment of the method of the present invention;

30 FIG. 3 is a signaling diagram illustrating exemplary signaling messages utilized in the method of FIG. 2 when the SMS message originates in a GSM/UMTS network, and the destination subscriber subscribes to a TDMA/CDMA network; and

FIG. 4 is a signaling diagram illustrating exemplary signaling messages utilized in the method of FIG. 2 when the SMS message originates in the TDMA/CDMA network, and the destination subscriber subscribes to the GSM/UMTS network.

5 Detailed Description of Embodiments

FIG. 1 is a simplified block diagram of a mobile network configuration in which the system of the present invention has been implemented. As illustrated, the network configuration includes nodes from a TDMA/CDMA network 11 and a GSM/UMTS network 12, both preferably belonging to the same operator. The TDMA/CDMA network includes a TDMA/CDMA Home Location Register (HLR) 13 and a TDMA/CDMA Mobile Switching Center (MSC) 14. Likewise, the GSM/UMTS network includes a GSM/UMTS HLR 15 and a GSM/UMTS MSC 16. A Network Subscription Database/Signaling Relay Node (NSD/SRN) 17 and a Multi-Technology SMSC (MTS) 18 are shared between the TDMA/CDMA network and the GSM/UMTS network.

All the network solutions described herein involve the NSD/SRN 17. The NSD/SRN is a database node containing subscriber number (SNB) information that is utilized to determine the network to which the subscriber belongs, i.e., the network where the subscriber has his/her subscription. The NSD/SRN is adapted to support the TDMA/CDMA protocol, and is also used for functions such as Mobile Number Portability for GSM and UMTS networks, Flexible Allocation of MSISDNs, and Number Migration from TDMA/CDMA to GSM/UMTS, or from PDC to UMTS. In the present invention, the NSD/SRN 17 is utilized as a routing element in the network, making decisions about how to further route a call/non-call related message based on the subscriber's information stored in the database. The method requires that subscribers who have migrated from one type of network to another have retained their original SNBs.

The MTS 18 does not know whether a subscriber has migrated its subscription from one type of network to another. This information is stored in the NSD/SRN 17 where it is continuously updated. Therefore, there must be a common technical solution between the NSD/SRN and the MTS to support the transfer of SMS messages to subscribers that have migrated from TDMA/CDMA to GSM/UMTS, and vice versa. Preferably, the NSD/SRN is configured to support all subscribers belonging to a single operator.

A first embodiment of the method of the present invention is applicable to SMS message transfers between TDMA/CDMA networks and GSM/UMTS networks for all subscribers belonging to one operator. Subscription network information for each subscriber is stored in the NSD/SRN 17. In this embodiment, the MTS 18 starts the
5 delivery of an SMS message by requesting routing information from one of the networks (i.e., the TDMA/CDMA network or the GSM/UMTS network) according to predefined rules. For example, the MTS may initially select the GSM/UMTS network if a majority of the subscribers have migrated into GSM/UMTS technology. Conversely, the MTS may initially select the TDMA/CDMA network if a majority of the subscribers have not
10 migrated into GSM/UMTS technology. Alternatively, the MTS may select the network in which the SMS message was originated. In this case, for an SMS message originating in the TDMA/CDMA network 11, the MTS sends the request for routing information to the TDMA/CDMA HLR 13 to receive routing data for transfer via the TDMA/CDMA network.

15 When the request for routing information is sent from the MTS 18 to the applicable HLR 13 or 15, the request message is intercepted by the NSD/SRN 17. The NSD/SRN then determines whether the subscriber has its subscription in the same type of network (i.e., TDMA/CDMA or GSM/UMTS) as the HLR to which the message is addressed. If so, the NSD/SRN relays the request for routing information to the addressed HLR.
20 However, if the NSD/SRN determines that the subscriber has its subscription in the other type of network, the NSD/SRN sends a response back to the MTS, which restarts the request for routing information using the other network technology.

In the NSD/SRN 17, the category 'GSM/UMTS subscriber' includes subscribers migrated from TDMA/CDMA to GSM/UMTS. An SMS message may only be transferred
25 between TDMA/CDMA and GSM/UMTS technologies internally within the MTS 18 when the SMS message is originated in one technology and delivered via the other technology. The MTS does not need to have information about which network a subscriber has its subscription in because the NSD/SRN has this information and ensures that the MTS sends the routing request using the correct technology.

30 FIG. 2 is a flow chart illustrating the steps of a preferred embodiment of the method of the present invention. At step 21, the MTS 18 receives an SMS message from either the TDMA/CDMA network 11 or the GSM/UMTS network 12 addressed to a

destination subscriber. At step 22, the MTS sends a request for routing information toward a selected network HLR using the appropriate signaling protocol for the selected network. At step 23, the NSD/SRN 17 intercepts the request for routing information and at step 24 determines whether the destination subscriber has a subscription in the network
5 matching the protocol of the routing request. If so, the method moves to step 25 where the NSD/SRN forwards the request for routing information to the HLR in the network matching the protocol of the request. At step 26, the HLR sends the routing information (for example, the address of the serving MSC and the International Mobile Station Identity (IMSI) of the destination mobile station) to the MTS. At step 27, the MTS sends a Short
10 Message Delivery Point-to-Point (SMDPP) message to the MSC, and at step 28, the MSC delivers the SMS message to the destination mobile station.

However, if the NSD/SRN determines at step 24 that the destination subscriber does not have a subscription in the network matching the protocol of the routing request, the method moves to step 29 where the NSD/SRN notifies the MTS of an error in the
15 signal protocol utilized for the routing request. At step 30, the MTS sends the request for routing information using the signaling protocol of the other network. The method then returns to step 23 where the NSD/SRN again intercepts the request for routing information and at step 24 determines whether the destination subscriber has a subscription in the network matching the protocol of the routing request. This time, the protocol should
20 match, and the method follows steps 25-28 to deliver the SMS message to the destination mobile station.

If it is determined at step 24 that the destination subscriber is unknown, the method moves to step 31 where the MTS 18 receives an error message.

FIG. 3 is a signaling diagram illustrating exemplary signaling messages utilized in
25 the method of FIG. 2 when the SMS message originates in the GSM/UMTS network 12, and the destination subscriber subscribes to the TDMA/CDMA network 11. It should be noted that although specific exemplary signaling messages are utilized in the description herein, the invention is not limited to these specific messages, and any functionally equivalent messages may also be utilized. The MTS 18 first sends, for example, a Send
30 Routing Information for Short Message (SRIforSM) message 33 toward the GSM/UMTS HLR 15 (not shown), specifying the SNB of the destination subscriber. The NSD/SRN 17 intercepts the SRIforSM message and determines whether the destination subscriber is a

GSM/UMTS subscriber. If the NSD/SRN's check determines that the destination subscriber is a GSM/UMTS subscriber, the NSD/SRN forwards the SRIforSM message to the GSM/UMTS HLR 15, and the procedure continues as normal in GSM/UMTS networks. In the exemplary case of FIG. 3, however, the destination subscriber is a TDMA/CDMA subscriber. Therefore, the NSD/SRN responds to the MTS with an acknowledgment message (SRIforSM-ACK) 34 indicating to the MTS that the destination subscriber is a TDMA/CDMA subscriber.

The MTS 18 then sends a TDMA/CDMA SMS Request (SMSREQ) message 35 toward the TDMA/CDMA HLR 13, specifying the subscriber directory number of the destination subscriber. The NSD/SRN 17 intercepts the SMSREQ message and determines whether the destination subscriber is a TDMA/CDMA subscriber. Since the destination subscriber is a TDMA/CDMA subscriber, the NSD/SRN forwards the SMSREQ message at 36 to the TDMA/CDMA HLR 13. The TDMA/CDMA HLR retrieves the routing information and sends an SMSREQ-RES return result message 37 to the MTS 18. The return result message may include, for example, the address of the serving TDMA/CDMA MSC 14, and the destination subscriber's IMSI. The MTS then sends an SMDPP message 38 to the TDMA/CDMA MSC, and the MSC delivers the SMS message to the destination mobile station. The TDMA/CDMA MSC then sends an SMDPP-RES response message 39 to the MTS.

FIG. 4 is a signaling diagram illustrating exemplary signaling messages utilized in the method of FIG. 2 when the SMS message originates in the TDMA/CDMA network 11, and the destination subscriber subscribes to the GSM/UMTS network 12. The MTS 18 first sends an SMSREQ message 41 toward the TDMA/CDMA HLR 13 (not shown), specifying the SNB of the destination subscriber. The NSD/SRN 17 intercepts the SMSREQ message and determines whether the destination subscriber is a TDMA/CDMA subscriber. If the NSD/SRN's check determines that the destination subscriber is an TDMA/CDMA subscriber, the NSD/SRN forwards the SMSREQ message to the TDMA/CDMA HLR 13, and the procedure continues as normal in TDMA/CDMA networks. In the exemplary case of FIG. 4, however, the destination subscriber is a GSM/UMTS subscriber. Therefore, the NSD/SRN responds to the MTS with an SMSREQ-RES return result message 42 or a return error indicating to the MTS that the destination subscriber is a GSM/UMTS subscriber.

The MTS 18 then sends an SRIforSM message 43 toward the GSM/UMTS HLR 15, specifying the SNB of the destination subscriber. The NSD/SRN 17 intercepts the SRIforSM message and determines whether the destination subscriber is a GSM/UMTS subscriber. Since the destination subscriber is a GSM/UMTS subscriber, the NSD/SRN
5 forwards the SRIforSM message at 44 to the GSM/UMTS HLR 15. The GSM/UMTS HLR retrieves the routing information and sends an SRIforSM-ACK message 45 to the MTS 18. The acknowledgment message may include, for example, the address of the serving GSM/UMTS MSC 16, and the destination subscriber's IMSI. The MTS then sends a ForwardSM message 46 to the GSM/UMTS MSC, and the MSC delivers the SMS
10 message to the destination mobile station. The GSM/UMTS MSC then sends a ForwardSM Response message 47 to the MTS.

A second embodiment of the method of the present invention is applicable to short message transfers to subscribers who have migrated from TDMA/CDMA to GSM/UMTS. Subscription network information for each subscriber is stored in the MTS 18, but for
15 migrated subscribers, correct subscription network information is stored only in the NSD/SRN 17. In this embodiment, the subscriber number analysis is performed in the MTS. The result of the analysis is 'TDMA/CDMA subscriber' or 'GSM/UMTS subscriber'. In most cases, the routing request is then addressed to the proper HLR. For subscribers that have migrated from TDMA/CDMA to GSM/UMTS, however, the MTS
20 still indicates 'TDMA/CDMA subscriber'. Therefore, all requests to transfer an SMS message to a subscriber migrated from TDMA/CDMA to GSM/UMTS start by sending a request for routing information from the MTS to the TDMA/CDMA HLR 13. The message is then intercepted by the NSD/SRN. If the NSD/SRN determines that the subscriber has migrated to GSM/UMTS, the NSD/SRN responds to the MTS that the
25 subscriber is denied/migrated. The MTS then requests routing information from the GSM/UMTS network. In both embodiments, the MTS can have additional logic for handling of SMS messages.

It should be noted that an SMS message that is originated in a GSM/UMTS network is sent via/stored in an SMSC in the originator's GSM/UMTS network, while an
30 SMS message originated in a TDMA/CDMA network is transported to, and sent via/stored in, the SMSC in the receiver's TDMA/CDMA network. It should also be noted that in the GSM/UMTS network, the address of the SMSC to use for a particular SMS message is set

on the SIM card in the originating subscriber's mobile station. Under standards being developed by the Third Generation Partnership Project (3GPP), it is possible for the originating subscriber to change the SMSC address. Therefore, it is possible that subscribers not belonging to an operator's network may send SMS messages via the operator's SMSC. There are also non-standardized functions in the GSM/UMTS network that enable the subscriber to use only certain SMSCs.

Although the present invention has been described in detail with reference to only a few exemplary embodiments, those skilled in the art will appreciate that various modifications can be made without departing from the invention. Accordingly, the invention is defined only by the following claims, which are intended to embrace all equivalents thereof.

WHAT IS CLAIMED IS:

1. An arrangement for supporting Short Message Service, SMS, interoperability between mobile networks based on differing technologies, said
5 arrangement enabling subscribers to continue receiving SMS messages after the subscribers have migrated from a first network based on a first technology to a second network based on a second technology, said arrangement including first and second home location registers, HLRs, (13, 15) in the first and second networks, respectively; first and second mobile switching centers, MSCs, (14, 16) in the first and second networks,
10 respectively; a multi-technology short message service center, MTS, (18) shared between the networks that receives SMS messages from each network and forwards the messages to destination subscribers in the same network; and a network subscription database/signaling relay node, NSD/SRN, (17) shared between the networks that provides a subscriber number database, said arrangement characterized in that:
15 the MTS (18) also includes means for sending an initial request for routing information to the first HLR (13), and for sending a subsequent request for routing information to the second HLR (15) when the MTS receives a notification in response to the initial request indicating that the destination subscriber has a subscription in the second network (12); and
20 the NSD/SRN (17) includes:
means for intercepting the initial and subsequent requests for routing information sent from the MTS before the request reaches the addressed HLR;
a subscriber database for determining whether the destination subscriber has a subscription in the first or second network;
25 means for forwarding the initial or subsequent request for routing information to the addressed HLR if the destination subscriber has a subscription in the network where the addressed HLR resides; and
means for sending a notification to the MTS (18) indicating that the destination subscriber has a subscription in the second network (12), if the initial request
30 for routing information is addressed to the first HLR (13), and the destination subscriber has a subscription in the second network.

2. The arrangement of claim 1, wherein the first network is a Time Division Multiple Access/Code Division Multiple Access, TDMA/CDMA, network, and the second network is a Global System for Mobile Communications/Universal Mobile Telecommunication System, GSM/UMTS, network.

5

3. The arrangement of claim 1, wherein the first network is a Global System for Mobile Communications/Universal Mobile Telecommunication System, GSM/UMTS, network, and the second network is a Time Division Multiple Access/Code Division Multiple Access, TDMA/CDMA, network.

10

4. The arrangement of claim 1, wherein the subscriber database in the NSD/SRN indicates which subscribers have migrated from the first network technology to the second network technology, and from the second network technology to the first network technology, and includes an indication of which technology each subscriber currently subscribes to.

15

5. The arrangement of claim 4, wherein the MTS also includes a database of subscription information that is utilized to address the initial request for location information to the first or second HLR, wherein the database of subscription information in the MTS is not updated to indicate which subscribers have migrated.

20

6. The arrangement of claim 1, wherein the means in the MTS for sending an initial request for routing information to the first HLR (13) includes means for sending the initial request for routing information to the first HLR if the majority of subscribers have their subscriptions in the first network.

25

7. The arrangement of claim 1, wherein the means in the MTS for sending an initial request for routing information to the first HLR (13) includes means for sending the initial request for routing information to the first HLR if the MTS receives an SMS message that originated in the first network.

30

8. A method of supporting Short Message Service, SMS, interoperability between mobile networks based on differing technologies, said method enabling subscribers to continue receiving SMS messages after the subscribers have migrated from a first network based on a first technology to a second network based on a second
5 technology, wherein a network arrangement includes first and second home location registers, HLRs, (13, 15) in the first and second networks, respectively; first and second mobile switching centers, MSCs, (14, 16) in the first and second networks, respectively; a multi-technology short message service center, MTS, (18) shared between the networks; and a network subscription database/signaling relay node, NSD/SRN, (17) shared between
10 the networks that provides a subscriber number database, said method characterized by the steps of:

receiving in the MTS (18), an SMS message that originated in the first network (11) and is addressed to a subscriber that has migrated its subscription from the first network to the second network (12);

15 sending an initial request for routing information from the MTS (18) to the first HLR (13);

intercepting by the NSD/SRN (17), the initial request for routing information before the request reaches the first HLR;

determining by the NSD/SRN, whether the destination subscriber has a
20 subscription in the first network (11);

upon determining that the destination subscriber has a subscription in the first network:

forwarding the initial request for routing information to the first HLR (13);

sending routing information from the first HLR to the MTS (18); and

25 routing the SMS message from the MTS to the destination subscriber in the first network; and

upon determining that the destination subscriber does not have a subscription in the first network (11):

sending a notification from the NSD/SRN (17) to the MTS (18) indicating
30 that the destination subscriber does not have a subscription in the first network;

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sending a subsequent request for routing information from the MTS (18) to the second HLR (15) in response to the notification that the destination subscriber does not have a subscription in the first network;

sending routing information from the second HLR (15) to the MTS (18);

5 and

routing the SMS message from the MTS (18) to the destination subscriber in the second network (12).

9. The method of claim 8, wherein the first network is a Time Division
10 Multiple Access/Code Division Multiple Access, TDMA/CDMA, network, and the second network is a Global System for Mobile Communications/Universal Mobile Telecommunication System, GSM/UMTS, network.

10. The method of claim 8, wherein the first network is a Global System for
15 Mobile Communications/Universal Mobile Telecommunication System, GSM/UMTS, network, and the second network is a Time Division Multiple Access/Code Division Multiple Access, TDMA/CDMA, network.

11. The method of claim 8, wherein the step of determining by the NSD/SRN,
20 whether the destination subscriber has a subscription in the first network, includes accessing a subscriber database in the NSD/SRN, said database indicating which subscribers have migrated from the first network technology to the second network technology, and from the second network technology to the first network technology, and the database including an indication of which technology each subscriber currently
25 subscribes to.

12. The method of claim 11, wherein the MTS includes a database of
subscription information that is not updated to indicate which subscribers have migrated,
and the step of sending the initial request for routing information from the MTS includes
30 the steps of:

sending the initial request to the first HLR if the database of subscription information indicates that the destination subscriber has a subscription in the first network; and

otherwise, sending the initial request to the second HLR.

5

13. The method of claim 8, wherein the step of sending an initial request for routing information from the MTS (18) to the first HLR (13) includes sending the initial request for routing information to the HLR that resides in the type of network in which a majority of subscribers have their subscriptions.

10

14. The method of claim 8, wherein the step of sending an initial request for routing information from the MTS (18) to the first HLR (13) includes sending the initial request for routing information to the HLR that resides in the network where the SMS message originated.

15

15. In a multi-technology short message service center, MTS, (18) a method of sending a Short Message Service, SMS, message from a first network (11) based on a first technology to a destination subscriber in a second network (12) based on a second technology, wherein the first network includes a first home location register, HLR, (13) and the second network includes a second HLR (15), and the first and second networks share the MTS and a network subscription database/signaling relay node, NSD/SRN, (17) said method comprising the steps of:

20

receiving the SMS message from the first network in the MTS (18);

25

sending a first request for routing information from the MTS to the NSD/SRN (17), said first request identifying the destination subscriber and including an address of the first HLR (13);

receiving in the MTS, a notification from the NSD/SRN indicating that the destination subscriber does not have a subscription in the first network (11);

30

sending a second request for routing information from the MTS (18) to the NSD/SRN (17), said second request identifying the destination subscriber and including an address of the second HLR (15);

receiving in the MTS, routing information from the second HLR; and

routing the SMS message from the MTS (18) to the destination subscriber utilizing the routing information acquired from the second HLR.

16. The method of claim 15, wherein the first network is a Time Division
5 Multiple Access/Code Division Multiple Access, TDMA/CDMA, network, and the second network is a Global System for Mobile Communications/Universal Mobile Telecommunication System, GSM/UMTS, network.

17. The method of claim 15, wherein the first network is a Global System for
10 Mobile Communications/Universal Mobile Telecommunication System, GSM/UMTS, network, and the second network is a Time Division Multiple Access/Code Division Multiple Access, TDMA/CDMA, network.

18. The method of claim 15, wherein the step of sending a first request for
15 routing information from the MTS (18) includes sending the first request for routing information to the HLR that resides in the type of network in which a majority of subscribers have their subscriptions.

19. The method of claim 15, wherein the step of sending a first request for
20 routing information from the MTS (18) includes sending the first request for routing information to the HLR that resides in the network where the SMS message originated.

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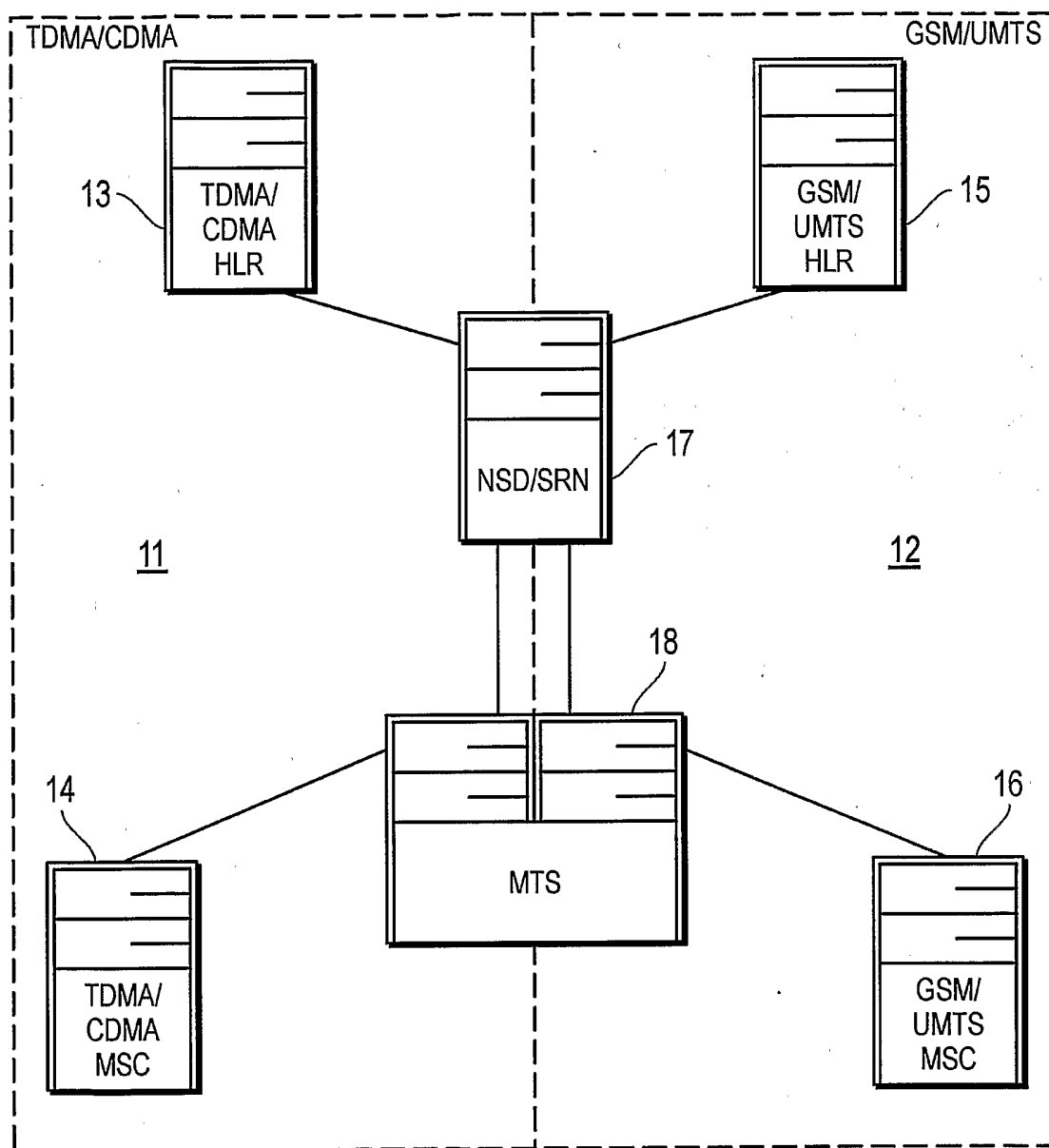


FIG. 1

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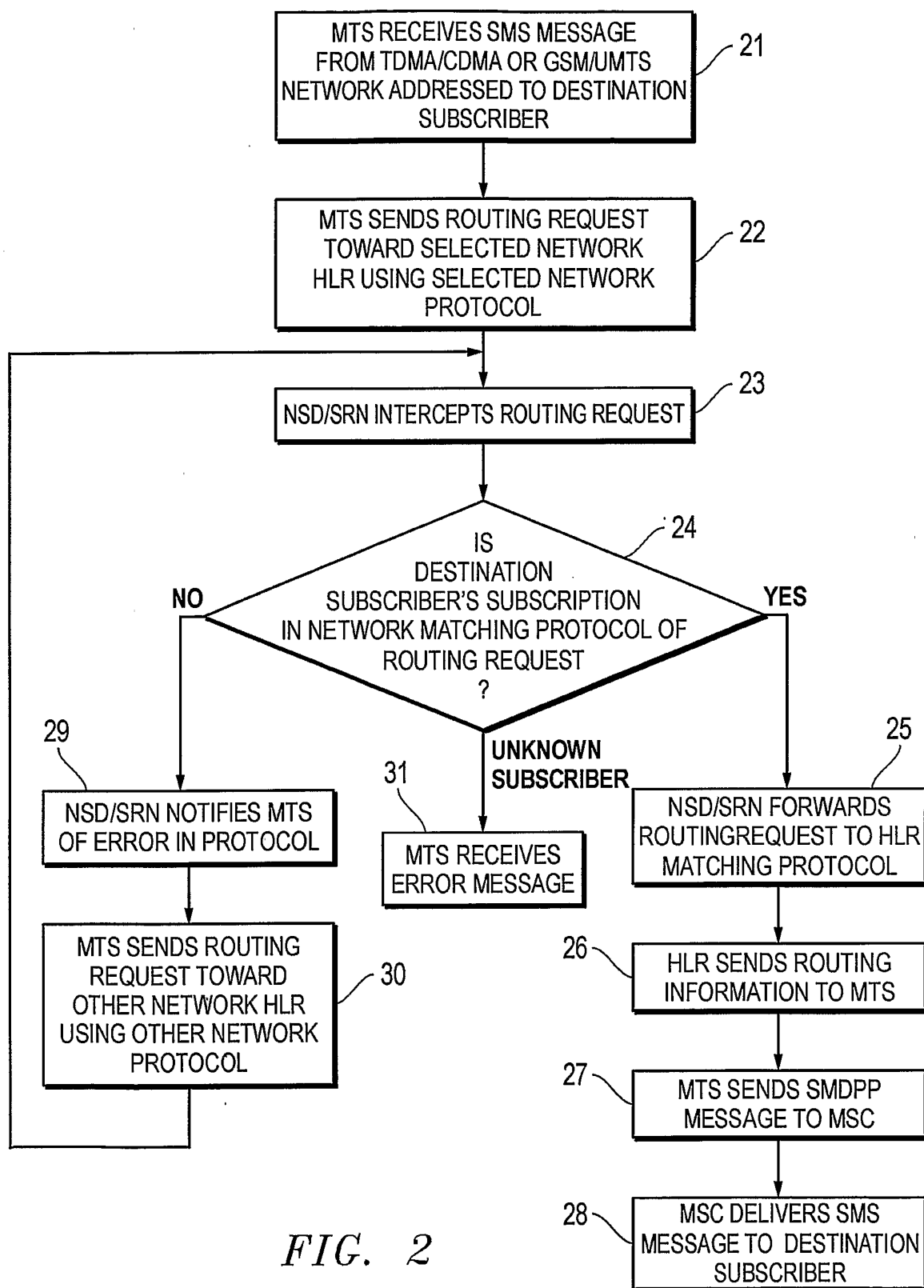


FIG. 2

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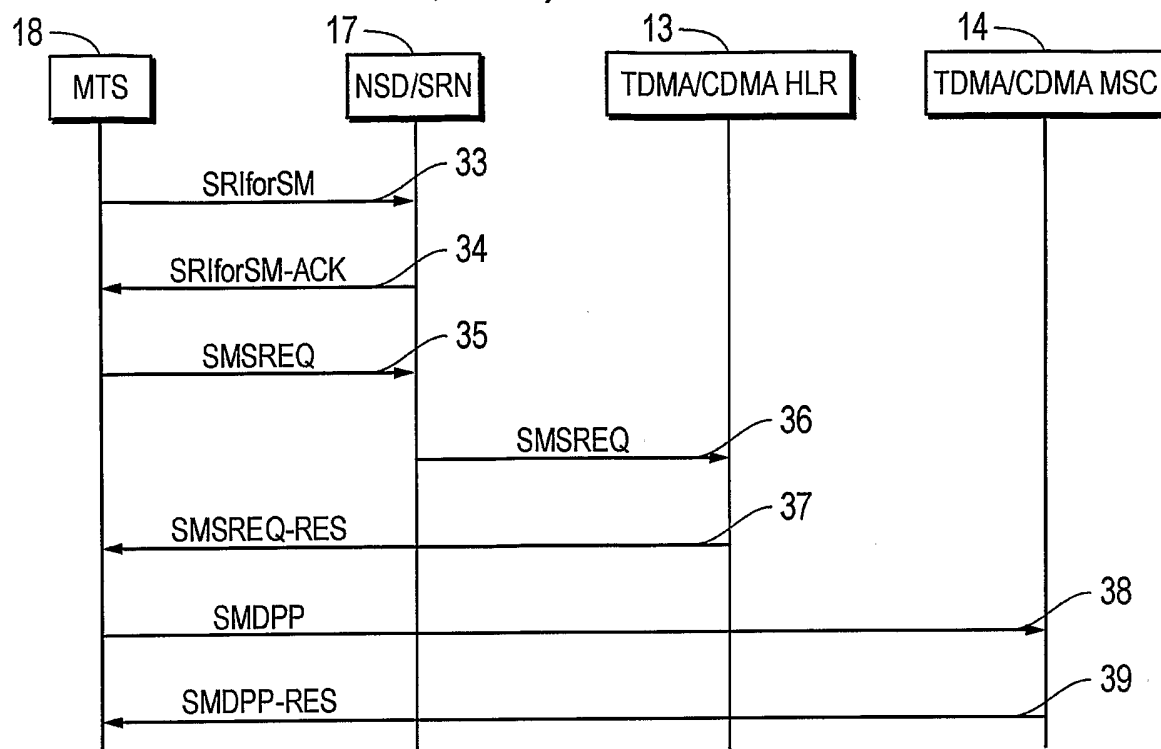


FIG. 3

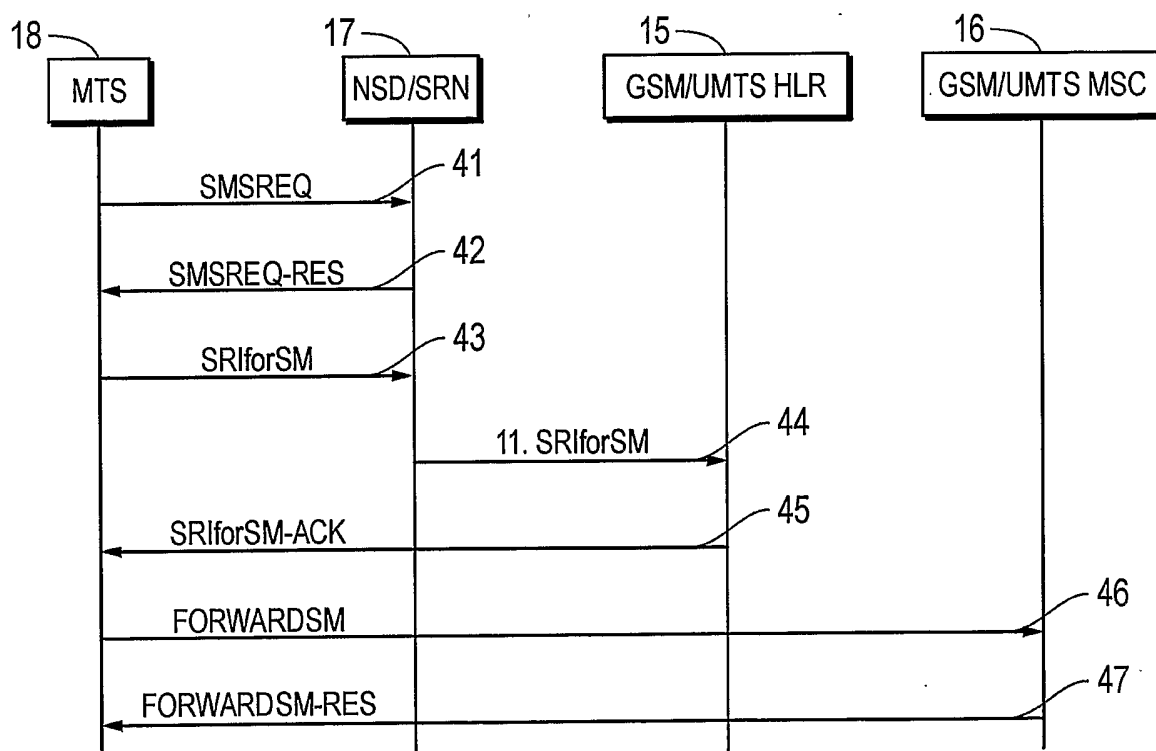


FIG. 4