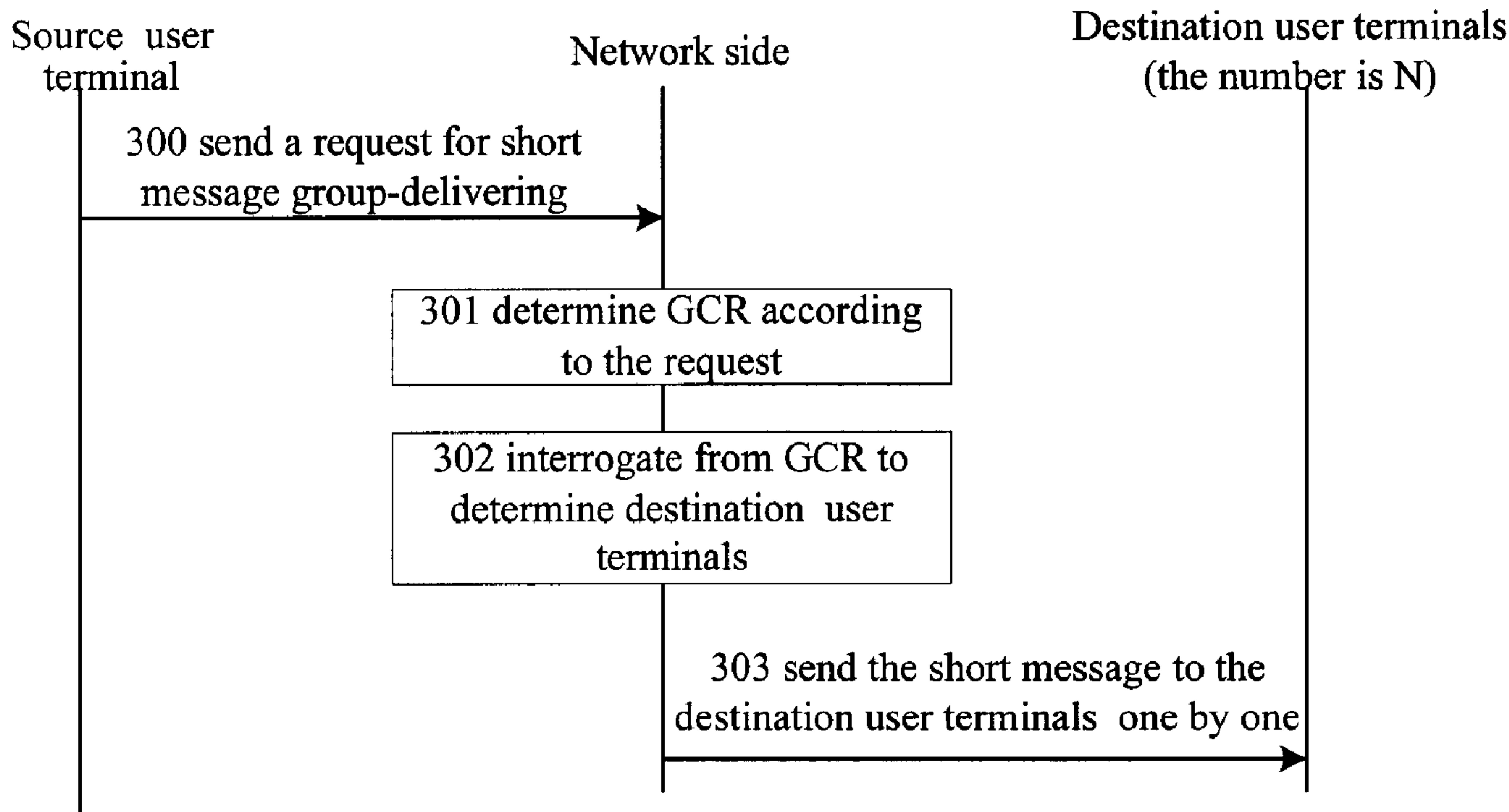




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(54) Titre : METHODE, SYSTEME ET DISPOSITIFS ASSURANT LA LIVRAISON DE GROUPES DE MESSAGES COURTS  
 COURTS  
 (54) Title: METHOD, SYSTEM AND APPARATUSES FOR SHORT MESSAGE GROUP-DELIVERING



(57) Abrégé/Abstract:

A method, a system and apparatuses for short message group-delivering, the method includes: storing in a network a group ID and IDs of user terminals which are members of the group identified by that group ID for each of a plurality of groups; receiving by the network a request for short message group-delivering which includes a group ID and the contents of a short message; determining a group according to the group ID, obtaining the IDs of the destination user terminals, and sending the contents of the short message to the destination user terminals. By the method, the system and the apparatuses, a source user terminal need not

(57) **Abrégé(suite)/Abstract(continued):**

repeatedly send short messages with same contents to each destination user terminal during short message group-delivering, thus the delivery time and radio resources are saved.

**Abstract**

A method, a system and apparatuses for short message group-delivering, the method includes: storing in a network a group ID and IDs of user terminals which are members of the group identified by that group ID for each of a plurality of groups;  
5 receiving by the network a request for short message group-delivering which includes a group ID and the contents of a short message; determining a group according to the group ID, obtaining the IDs of the destination user terminals, and sending the contents of the short message to the destination user terminals. By the method, the system and the apparatuses, a source user terminal need not repeatedly send short messages with  
10 same contents to each destination user terminal during short message group-delivering, thus the delivery time and radio resources are saved.

# METHOD, SYSTEM AND APPARATUSES FOR SHORT MESSAGE GROUP-DELIVERING

## Field of the Invention

The present invention is related to the technique for short message delivery in a wireless communication system, and more particularly to a method, a system and apparatuses for short message group-delivering in a wireless communication system.

## Background of the Invention

Along with the development of wireless communication technology, short message service has been applied gradually into the wireless communication system. Short message service transfers text information of short messages with No.7 signaling network as its bearing system. The contents of a short message are limited within 70 words, i.e. 140 bytes or so. A short message is mainly sent and received by mobile terminals peer to peer, or between a mobile terminal and a communication network.

A mobile network generally includes voice channels and control channels. Although it is a value added service provided by the wireless communication system like voice transmission and fax, short message service does not occupy the voice channel which ensures the speediness of delivery and greatly reduces the cost for communication.

A short message is delivered via a wireless control channel, stored and forwarded by a Short Message Service Center (SMSC) in the network of the communication system, and the contents of each message are limited within 140 bytes. The plain text information from the sender is stored in the SMSC, and then forwarded to the destination user terminals, which means that even if the receiver can not receive information instantly due to mobile offline and many other reasons, the system may save and resend the information later at an appropriate time.

When a service subscriber wants to make short message group-delivering, it actually means that this service subscriber send a point to point short message to each destination user terminal one by one. The process is described as below: the source service subscriber edits a text short message first, and then picks up phone numbers of

destination user terminals or by Men Machine Interface (MMI) such as from a telephone directory or directly inputting on a keyboard, and afterwards presses the “YES” or “ENTER” button to start delivering this short message. The short message is sent to the first destination user terminal according to the point-to-point short message sending process, if this first delivery is successful, the short message is sent to the next destination user terminal until the last destination user terminal has successfully received the message; if the short message delivery to a destination user terminal fails, a failure report is returned and the process of short message delivery terminates.

10 Figure 1 shows a specific process of short message group-delivering in the prior art. The short message sender is set to be a source user terminal and all short message receivers are set to be destination user terminals, and the number of destination user terminals is at least one, the detailed steps are as blow:

15 Step 100: the source user terminal sends an access request to the network using random access procedures.

Step 101: upon receiving the access request, the network initiates a Radio Resource (RR) connection establishment with the source user terminal, including an immediate assignment procedure and a service request procedure etc. The RR connection establishment may also include an authentication procedure and a cipherring procedure as well, and the service request indicates that the type of service is short message.

Steps 102-103: the source user terminal sends a short message to a first destination user terminal through the network;

25 the process of the source user terminal sending the short message to the first destination user terminal through the network is that the source user terminal sends the short message to the SMSC in the network and the SMSC forwards the short message to the first destination user terminal later.

Step 104: upon receiving the short message, the first destination user terminal makes an acknowledgement to the SMSC that it has received the short message.

Step 105: after sending a short message to the first destination user terminal, the source user terminal sends a service request to the network indicating that the delivery of the short message needs to be continued, which means that the RR connection need not be released by the network.

5 Step 106: the network makes an acknowledgement to the source user terminal that the first destination user terminal has received the short message.

Step 107-108: the source user terminal then sends the short message to a second destination user terminal through the network.

10 Step 109: upon receiving the short message, the second destination user terminal makes an acknowledgement to the SMSC that it has received the short message.

Step 110: after sending the short message to the second destination user terminal, the source user terminal sends a service request to the network indicating that the delivery of the short message needs to be continued, which means that the RR connection need not be released by the network.

15 Step 111: the network makes an acknowledgement to the source user terminal that the second destination user terminal has received the short message.

Step 112-113: the source user terminal then sends the short message to a third destination user terminal through the network and then steps 107-111 are repeatedly performed until the sending of the short message to the last destination user terminal is completed.

20 As aforesaid, the technical solution for short message group-delivering is equivalent to a source user terminal sending the same short message to different destination user terminals one by one. Each time for sending the short message to different destination user terminals, it is necessary to send a service request to the network, and then send for N times the short message with the same contents. Therefore, the time for short message group-delivering is very long, and radio resources are wasted for sending a short message with the same contents each time.

At present, along with the development of wireless communication technology, a trunk radio communication system or, for short, a trunk system appears. As a rather

economical and flexible commanding/dispatching communication system recently developed, the trunk system is widely used in government agencies, energy source and transportation units, airports and docks, industrial and mining enterprises, fire and police stations, water authority and military units to meet the demand of various units  
5 for intercommunication.

In the existing trunk system, each group includes information of group identification (group ID) and group call area defined as a cluster of cells. The information, however, is some fixed information stored in a Home Location Register (HLR) and a Subscriber Identity Module (SIM) card when a service subscriber opens  
10 an account, which do not enable mobile management of group call service subscribers.

Figure 2 illustrates the core network structure of a trunk system. In Figure 2, an HLR stores information of a service subscriber, including International Mobile Subscriber Identify (IMSI) of the service subscriber and a list of group IDs the service subscriber is entitled to use; a Gateway Mobile Switching Center (GMSC) connected  
15 with the external network and also connected with an anchor Mobile Switching Center (MSC); the anchor MSC is responsible for managing and maintaining a Voice Group Call Service (VGCS); a relay MSC is the MSC controlling cells of a group call area which are not under control of the group call anchor MSC when the group call area exceeds one MSC area, the relation between the anchor MSC and the relay MSCs  
20 is one-to-multiple in tree shape; a Visitor Location Register (VLR) stores the IMSI of a service subscriber and a list of group IDs the service subscriber is entitled to use, which are copied from the HLR when the service subscriber roams; a Group Call Register (GCR) includes group ID and group call area which are combined as a group call reference, the GCR connected with the anchor MSC contains a list of identities of  
25 dispatchers, a list of relay MSC, and a list of cells controlled directly by the Anchor MSC related to the group call reference, and the GCR connected with relay MSC contains an anchor MSC address related to the group call reference, and a list of cells controlled by the relay MSC.

Upon receiving a group call initiating request, the anchor MSC interrogates the  
30 group attributes from the connected GCR to get the list of identities of dispatchers, the list of relay MSCs, and the list of cells under the control of the anchor MSC; then the anchor MSC calls the dispatcher, calls the relay MSCs and establishes group call

channels in the cells under the control of all relay MSCs, notifies the service subscribers in the group about the initiated group call on the NCH of each cell and indicates the group channel for group members to listen on.

Upon receiving the group call request from the anchor MSC, the relay MSC  
 5 interrogates the list of cells from the connected GCR, establishes group call channels in these cells, and notifies service subscribers in the group about the initiated group call on the NCH of each cell and indicates the group channels for group members to listen on.

It may be realized by the trunk system that a call may be initiated by a service subscriber and listened simultaneously by other service subscribers in a group; however, a  
 10 service subscriber of the group in the trunk system can only have the group ID but can not have list of service subscribers in the group. Therefore it is impossible to realize the one-to-multiple short message delivery service, thus can not solve the problem of repeatedly sending a short message with the same contents to each destination user terminal.

### **Summary of the Invention**

15 The embodiments of the present invention provides a method, a system and apparatuses for short message group-delivering, by which there is no need to send short messages with same contents to different destination user terminals one by one, therefore the delivery time and radio resources may be saved.

A method for short message group-delivering includes:

20 storing, in a Group Call Register in a network, a group ID and IDs of user terminals which are members of the trunking group identified by that group ID for each of a plurality of trunking groups;

receiving, by the network, a request for short message group-delivering which request includes the group ID and the contents of a short message;

25 determining, by the network, a group according to the group ID, obtaining the IDs of destination user terminals from the Group Call Register, and sending the contents of the short message to the destination user terminals.

Optionally, the request is sent from a source user terminal to the network;

the trunking group is determined according to the area where the source user terminal is located and the group ID.

Optionally, the request is sent from a source user terminal to the network and  
5 includes the group call area; and

the group is determined according to the group call area and the group ID.

Optionally, the source user terminal is in the form of one of a mobile User Equipment (UE), Internet, Email and a communication system control center.

The process of sending the contents of the short message to the destination user  
10 terminals includes:

sending, by the network, the IDs of the destination user terminals and the contents of the short message to a Short Message Service Center or Short Message Service Gateway Mobile Switching Center (SMSC/SMS-GMSC) in the network;

sending, by the SMSC/SMS-GMSC, the contents of the short message to the  
15 destination user terminals with the IDs one by one.

Optionally, the IDs of the destination user terminals may be International Mobile Subscriber Identities (IMSI).

Optionally, the method further includes:

after sending the contents of the short message to the destination user terminals,  
20 monitoring, by the network, whether the destination user terminals have received the short message,

producing, according to the result of monitoring, a state report about whether the destination user terminals have received the short message, and

returning the state report to a user terminal initiating the request for short message  
25 group-delivering.

A system for short message group-delivering, includes:

a source user terminal adapted to produce and send a request for short message group-delivering which request includes the contents of a short message and a group ID to identify a trunking group to which the message is to be sent;

5 a Group Call Register adapted to store the group ID and IDs of user terminals which are members of the trunking group identified by that group ID for each of a plurality of trunking groups;

at least one destination user terminal; and

10 a network apparatus adapted to receive, from the source user terminal, the request for short message group-delivering which request includes the group ID and the contents of the short message; to determine the trunking group according to the group ID; to acquire IDs of the at least one destination user terminal from the Group Call Register; and to send the contents of the short message to the at least one destination user terminal.

A Mobile User Equipment (UE) includes:

15 means adapted to modify and save group IDs together with IDs of destination user terminals identified by each group ID in a corresponding Group Call Register (GCR);

means adapted to select a group ID from said group IDs; and

means adapted to send a request for short message group-delivering which includes a group ID and contents of a short message.

A network apparatus, includes:

20 a Group Call Register adapted to store a group ID and IDs of user terminals which are members of a group identified by that group ID for each of a plurality of groups; and

25 second means adapted to receive the group ID and the contents of a short message; to determine the group according to the group ID; to acquire the IDs of the destination user terminals and to forward the contents of the short message to the destination user terminals.

A Group Call Register (GCR) includes:

means operable to save a list of IDs of user terminals in a group attribute of the GCR which is responsible for recording the IDs of user terminals in each group; and

means operable to add IDs of user terminals to the said list when user terminals open accounts;

means operable to modify the IDs of user terminals in the said list when user terminals modify their opening information; and

5 means operable to delete IDs of user terminals from the said list when user terminals exit from the group.

A Short Message Service Centre includes:

means adapted to receive a group ID and the contents of a short message;

means adapted to determine a trunking group according to the group ID;

10 means adapted to acquire the IDs of destination user terminals from a Group Call Register; and

means adapted to forward the contents of the short message to the destination user terminals with the IDs.

A Short Message Service-Gateway Mobile Switching Centre, includes:

15 means adapted to receive a group ID and the contents of a short message;

means adapted to determine a trunking group according to the group ID;

means adapted to acquire the IDs of destination user terminals from a Group Call Register; and

20 means adapted to forward the contents of the short message to the destination user terminals with the IDs.

It can be seen from the above solution that the embodiments of the invention establishes a group that will receive short messages, identifies the group with a group ID and stores the IDs of service subscribers to which the short message is delivered. When initiating short message group-delivering, the source user terminal sends a request to the network for short message group-delivering including the group ID and the contents of the short message; upon receiving the request, the network determines the group according to the group ID and determine the destination user terminals to which the short message is to

25

be sent one by one by the IDs of service subscribers in the group ID. By the method, the system and the apparatuses, a source user terminal need not send point-to-point short messages with same contents to different destination user terminal one by one. It only needs the network to confirm different destination user terminals to which short message  
5 is to be sent one by one. Therefore, message delivery time and radio resources could be saved. Furthermore, this invention may establish a group that will receive and send short messages based on a trunking system, store the group as a trunking group in the GCR to which the group belongs so as not to increase the space of the network.

### **Brief Description of the Drawings**

10 Figure 1 is a flowchart illustrating a specific process for delivering short message to a group in the prior art.

Figure 2 is a block diagram illustrating the core network structure of a trunk system.

Figure 3 is a flowchart illustrating the process for delivering short message to a group in a trunk system according to an embodiment of the present invention.

### **Detailed description of the invention**

The present invention is hereinafter described in detail with reference to the embodiments and the accompanying drawings.

Group call area and group ID are combined as a group call reference. In the prior art, a GCR only records the basic group attributes, i.e. the group call reference, but does not  
20 record the number of the service subscribers and the IDs of all service subscribers in the group.

In order to realize the method for short message group-delivering in a trunk system, an embodiment of the invention adds a list of service subscribers to each group attribute of the GCR responsible for maintaining the list of service subscribers. When a service  
25 subscriber opens an account or modifies account opening information, the ID of the service subscriber is updated into the list of service subscribers related with the GCR.

When a service subscriber opens an account, it is necessary to indicate the group and group call area to which the service subscriber belongs i.e., the group call reference; the network of the communication system will find the corresponding GCR according to the group call reference, add the ID of the service subscriber into the list of service subscribers  
5 of the corresponding trunk group in the GCR. When a service subscriber exits from a group for such reasons as changing position, demission, retiring, or the terminal being stolen, the GCR will delete the ID of the service subscriber from the list of service subscribers of the corresponding trunk group.

With the adding and deleting operations, the GCR can maintain the list of service  
10 subscribers of the trunk group.

In order to perform short message group-delivering, a service subscriber may in advance establish a trunk group including a source user terminal and destination user terminals, and take the IMSIs of the source user terminal and destination user terminals as a list of service subscribers, then save the IMSIs correspondingly with the source user  
15 terminal and destination user terminals to the GCR to which the trunk group belongs.

Figure 3 is a flowchart illustrating the method for short message group-delivering in a trunk system according to an embodiment of this invention; in this embodiment, the list of service subscribers is included in a GCR, and identified by a group ID, the method includes specific steps as below.

5 Step 300: a source user terminal sends to the network a request for short message group-delivering including a trunk group ID and the contents of the short message.

Step 301: upon receiving the request, the network determines the group call reference of the trunk group according to the cell the source user terminal is located and the trunk group ID included in the request, and determines the GCR to which the  
10 trunk group belongs according to the group call reference of the trunk group.

Step 302: the network interrogates the determined GCR, obtains the list of service subscribers corresponding to the trunk group, and obtains IDs of a plurality of destination user terminals to which the short message is to be sent.

Step 303: the network sends the short message to the obtained destination user  
15 terminals.

The network sends the IDs of the destination user terminals to the SMSC in the network, and the SMSC sends the contents of the short message from the source user terminal one by one to the destination user terminals associated with the IDs.

When, according to the prior art, detecting that the service subscriber in the trunk  
20 group fails to receive the short message, the network may return, by the SMSC in it, a state report to the source user terminal to indicate which user terminals fail in reception and which user terminals succeed in reception.

In the embodiment above, when the function of an SMSC is realized by an SMS Gateway MSC (SMS-GMSC), the SMSC may be replaced by the SMS-GMSC. The  
25 group reference and the list of service subscribers corresponding to the trunk group are saved in a GCR, and, alternatively, may be saved in other storage units such as an HLR or an SMS-GMSC in implementation, which is easy to understand.

In the embodiment above, the source user terminal is a mobile User Equipment. Optionally, short message group-delivering may be directly initiated by the network,

and the network may initiate short message group-delivering from Internet web pages, Emails or communication system control centers which is similar to the process above. The difference is that when an initiation is made by the network, the group call reference instead of the group ID must be given clearly. Otherwise, the network can  
5 not determine which group call area the user terminal belongs to.

Alternatively, the embodiment may not be based on a trunk system, but in advance establish a group of short message group-delivering in the network, and identify the group by its group ID and stores the IMSIs of the service subscribers for receiving and sending short messages. When initiating a short message group-  
10 delivering to the network, the source user terminal sends a request for short message group-delivering including a group ID and the contents of the short message. Upon receiving the request, the network determines the group according to the group ID and determines destination user terminals to which the short message is to be sent one by one.

15 With the aforesaid technique, the service subscriber can conveniently realize short message delivery within a group to ensure that the short message is sent to all user terminals in the group and the source user terminal may get an acknowledgement of short message group-delivering. In addition, when initiating a short message group-delivering, it is unnecessary for a source user terminal to send a short message with  
20 the same contents to a network repeatedly.

The foregoing is only preferred embodiments of this invention and is not for use in limiting the protection scope thereof; any modification, equivalent replacement and improvement are covered in the protection scope thereof.

**We claim:**

1. A method for short message group-delivering, comprising:
  - storing in a Group Call Register in a network, a group ID and IDs of user terminals which are members of the trunking group identified by that group ID for each of a plurality of trunking groups;
  - receiving, by the network, a request for short message group-delivering which request includes the group ID and the contents of a short message;
  - determining, by the network, a group according to the group ID, obtaining the IDs of destination user terminals from the Group Call Register, and sending the contents of the short message to the destination user terminals.
2. The method of Claim 1, wherein the request is sent from a source user terminal to the network;
  - the trunking group is determined according to the area where the source user terminal is located and the group ID.
3. The method of Claim 1, wherein the request is sent from a source user terminal to the network and includes the group call area; and
  - the group is determined according to the group call area and the group ID.
4. The method of either Claim 2 or Claim 3, wherein the source user terminal is in the form of any one of a mobile User Equipment (UE), Internet, Email and a communication system control center.
5. The method of Claim 1, wherein the process of sending the contents of the short message to the destination user terminals comprises:
  - sending, by the network, the IDs of the destination user terminals and the contents of the short message to a Short Message Service Center or Short Message Service-Gateway Mobile Switching Center (SMSC/SMS-GMSC) in the network;
  - sending, by the SMSC/SMS-GMSC, the contents of the short message to the destination user terminals with the IDs one by one.

6. The method of either Claim 1 or Claim 5, wherein the IDs of the destination user terminals are International Mobile Subscriber Identities (IMSI).

7. The method of Claim 1, further comprising:

5 after sending the contents of the short message to the destination user terminals, monitoring, by the network, whether the destination user terminals have received the short message,

producing, according to the result of monitoring, a state report about whether the destination user terminals have received the short message, and

10 returning the state report to a user terminal initiating the request for short message group-delivering.

8. A system for short message group-delivering, comprising:

a source user terminal adapted to produce and send a request for short message group-delivering which request includes the contents of a short message and a group ID to identify a trunking group to which the message is to be sent;

15 a Group Call Register adapted to store the group ID and IDs of user terminals which are members of the trunking group identified by that group ID for each of a plurality of trunking groups;

at least one destination user terminal; and

20 a network apparatus adapted to receive, from the source user terminal, the request for short message group-delivering which request includes the group ID and the contents of the short message; to determine the trunking group according to the group ID; to acquire IDs of the at least one destination user terminal from the Group Call Register; and to send the contents of the short message to the at least one destination user terminal.

9. A Mobile User Equipment (UE), comprising:

25 means adapted to modify and save group IDs together with IDs of destination user terminals identified by each group ID in a corresponding Group Call Register (GCR);

means adapted to select a group ID from the group IDs; and

means adapted to send a request for short message group-delivering which includes a group ID and the contents of a short message.

10. A network apparatus, comprising:

a Group Call Register adapted to store a group ID and IDs of user terminals which are members of a group identified by that group ID for each of a plurality of groups; and  
 means adapted to receive the group ID and the contents of a short message; to  
 5 determine the group according to the group ID; to acquire the IDs of destination user terminals and to forward the contents of the short message to the destination user terminals.

11. A Group Call Register (GCR), comprising:

means operable to save a list of IDs of user terminals in a group attribute of the GCR  
 10 which is responsible for recording the IDs of user terminals in each group; and

means operable to add IDs of user terminals to the said list when user terminals open accounts;

means operable to modify the IDs of user terminals in the said list when user terminals modify their opening information; and

15 means operable to delete IDs of user terminals from the said list when user terminals exit from the group.

12. A Short Message Service Centre, comprising:

means adapted to receive a group ID and the contents of a short message;

means adapted to determine a trunking group according to the group ID;

20 means adapted to acquire the IDs of destination user terminals from a Group Call Register; and

means adapted to forward the contents of the short message to the destination user terminals with the IDs.

13. A Short Message Service-Gateway Mobile Switching Centre, comprising:

25 means adapted to receive a group ID and the contents of a short message;

means adapted to determine a trunking group according to the group ID;

means adapted to acquire the IDs of destination user terminals from a Group Call Register; and

30 means adapted to forward the contents of the short message to the destination user terminals with the IDs.

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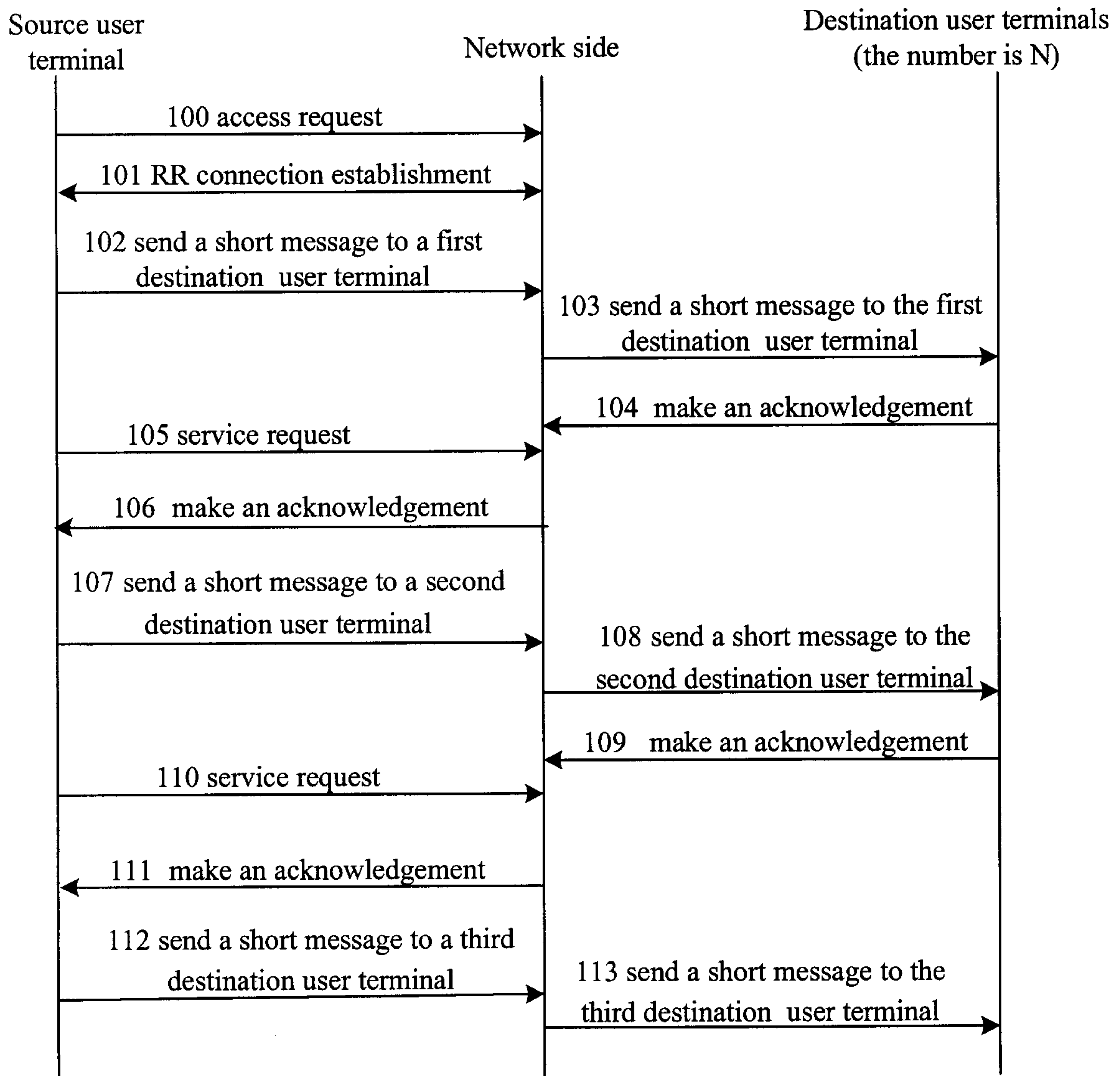


Figure 1

2/2

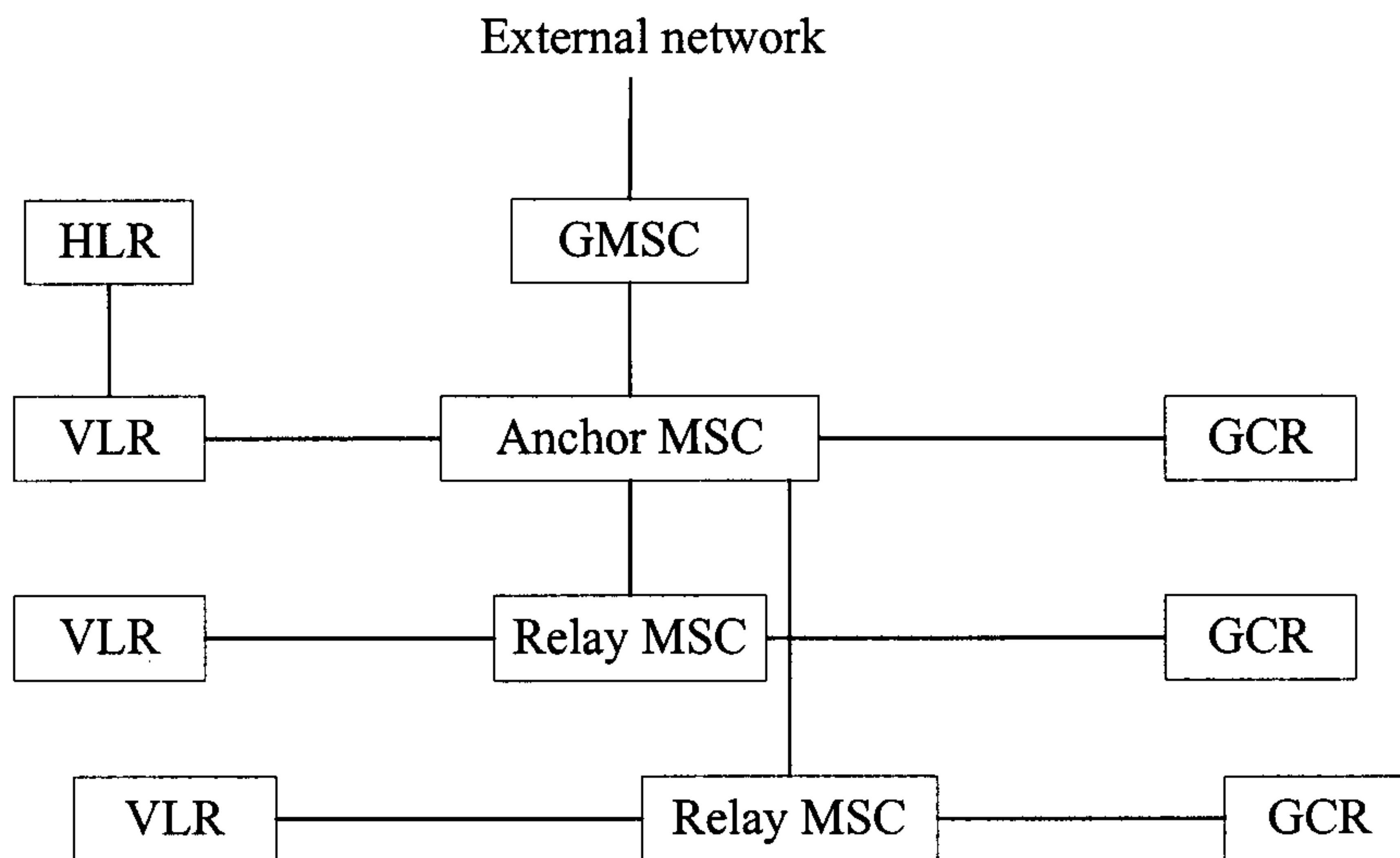


Figure 2

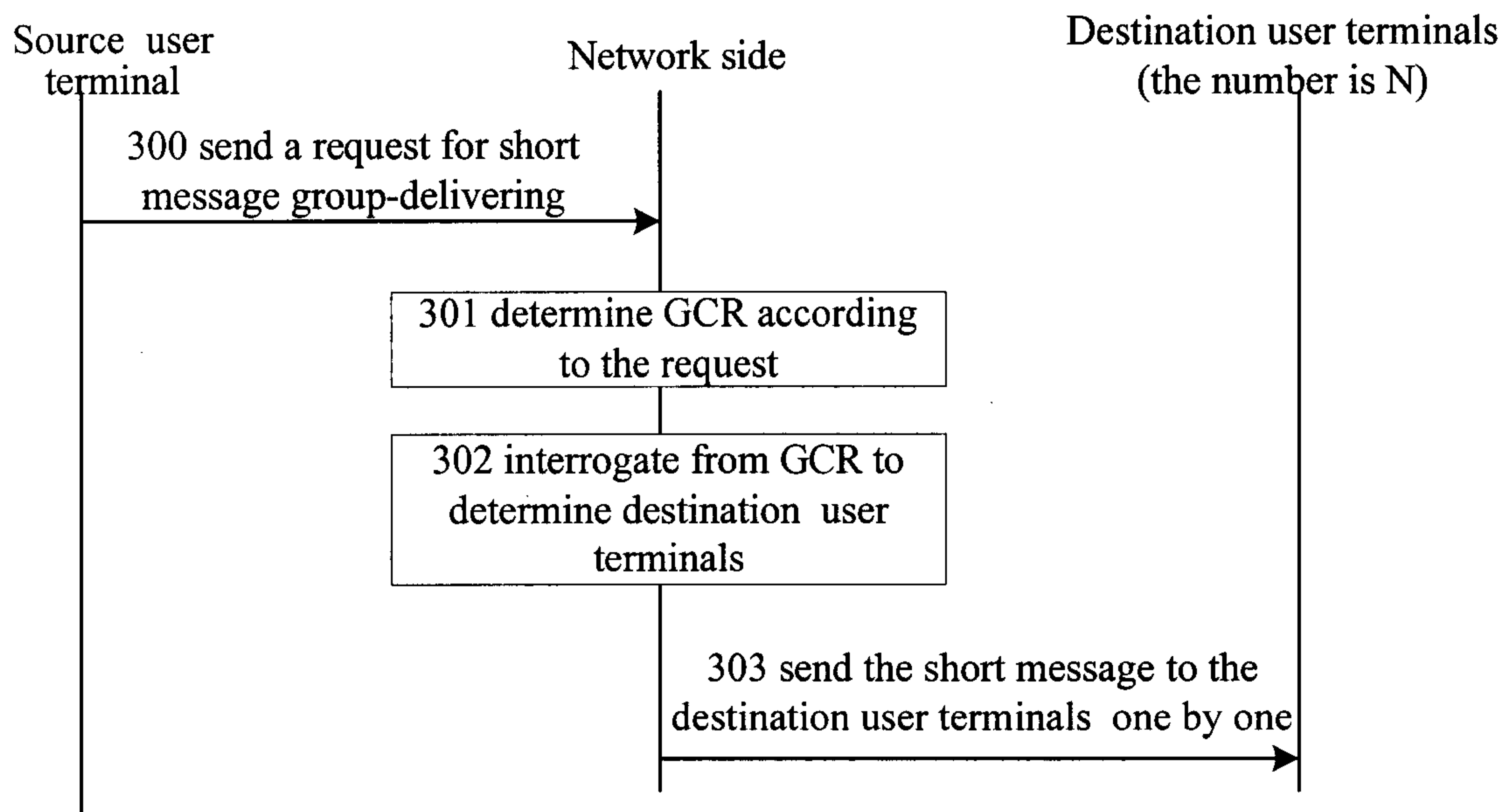


Figure 3

Source user terminal

Network side

Destination user terminals  
(the number is N)

300 send a request for short message group-delivering

301 determine GCR according to the request

302 interrogate from GCR to determine destination user terminals

303 send the short message to the destination user terminals one by one

