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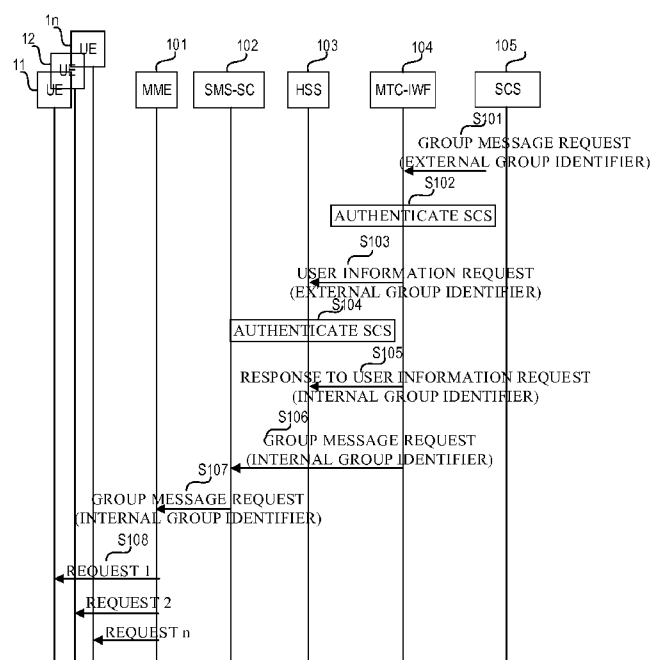


FIG. 1

(57) Abstract: Embodiments of the present disclosure provide a method and device for transmitting an MTC group message. The method reuses the existing IMSI Group Identifier in the prior art. When an MTC-IWF receives a group message request from SCS or AS, the method acquires, at HSS or HLR, an internal group identifier corresponding to the external group identifier, i.e., IMSI Group Identifier, and then transmits the group message based on the IMSI Group Identifier. Embodiments of the present invention also provide a corresponding device. The present invention is suitable for both networks deployed with MBMS and scenarios not supporting MBMS. The present invention belongs to a lightweight implementation solution.



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METHOD AND DEVICE FOR TRANSMITTING A GROUP MESSAGE

FIELD

[0001] Embodiments of the present disclosure generally relate to the field of communications, and more specifically, to a method and device for transmitting group messages.

BACKGROUND

[0002] Internet of Things (IoT), also known as MTC (Machine Type Communication), is being widely used and develops rapidly. Due to the characteristics possessed by MTC devices, almost the majority of MTC message delivery is group-based message delivery. The MTC solution of 3GPP defines a Group Message Delivery mechanism. The group message delivery means that a network providing MTC capability transmits, in response to a requirement of an SCS (Services Capability Server) or an AS (Application Server), the same contents to a group of members within a particular geographical area.

[0003] Currently, the MTC group message delivery mainly depends on MBMS (Multimedia Broadcast Multicast Service). A standard of 3GPP, TS23.682R13, also defines a flow of MBMS-based MTC group message delivery. However, the standard also points out that the flow of the MBMS-based MTC group message delivery also has limitations and cannot support all scenarios, e.g., UE lacks the MBMS ability or UE is in an area without deployment of MBMS.

SUMMARY

[0004] To tackle the limitations of MTC group message delivery in the prior art, the present invention proposes a novel solution for MTC group message delivery. The solution is suitable for scenarios supporting MBMS and scenarios not supporting MBMS.

[0005] In a first aspect of the present invention, there is provided a method of transmitting a group message in an MTC-IWF. The method comprises: receiving, from a server, a group message request including an identifier of the server and an external group identifier, the server requesting transmission of the group message to a group; transmitting, to a home subscriber server, a user information request including an identifier of the server and the external group identifier; receiving, from the home subscriber server, a response to user

information request including an internal group identifier corresponding to the external group identifier; and transmitting to a short message server, a group message request including the internal group identifier and indication information, the indication information being used to indicate the transmission of the group message to the group.

5 [0006] In some embodiments, the internal group identifier is an IMSI Group Identifier.

[0007] In some embodiments, the method further comprises: receiving a group message delivery report from the short message server, the group message delivery report including the internal group identifier and result information of transmitting the group message to the group; transmitting a group message delivery report to the server, the group message delivery report including the external group identifier and the result information of transmitting the group message to the group.

[0008] In a second aspect of the present invention, there is provided a method of transmitting a group message in a short message server. The method comprises: receiving, from an MTC-IWF, a group message request including an internal group identifier and indication information, the indication information being used to indicate transmission of the group message to a group; transmitting, to an MME, a group message request including the internal group identifier.

[0009] In some embodiments, the internal group identifier is an IMSI Group Identifier.

[0010] In some embodiments, the method further comprises: receiving a delivery report from the MME, the delivery report including the internal group identifier and an identifier of a group member, the delivery report including result information of transmitting the message to the group member; merging delivery reports for all of group members into one group message delivery report, the group message delivery report including the delivery reports of all of the group members; transmitting the group message delivery report to the MTC-IWF, the group message delivery report including result information of transmitting the message to all members of the group.

[0011] In a third aspect of the present invention, there is provided a method of transmitting a group message in an MME. The method comprises: receiving a group message request from a short message server, the group message request including an internal group identifier; transmitting a message to all members of a group corresponding to the internal group identifier respectively.

[0012] In some embodiments, the internal group identifier is an IMSI Group Identifier.

[0013] In some embodiments, the method further comprises: transmitting a delivery report to the short message server, the delivery report including the internal group identifier and an identifier of a group member, the delivery report including result information of transmitting a message to the group member.

5 [0014] In a fourth aspect of the present invention, there is provided an apparatus for transmitting a group message in an MTC-IWF. The apparatus comprises: a first receiving module for receiving, from a server, a group message request including an identifier of the server and an external group identifier, the server requesting transmission of the group message to a group; a first transmitting module for transmitting, to a home subscriber server, a
10 user information request including the identifier of the server and the external group identifier; a second receiving module for receiving, from the home subscriber server, a response to the user information request including an internal group identifier corresponding to the external group identifier; a second transmitting module for transmitting to a short message server, a group message request, including the internal group identifier and indication information, the
15 indication information being used to indicate the transmission of the group message to the group.

[0015] In some embodiments, the internal group identifier is an IMSI Group Identifier.

[0016] In some embodiments, the apparatus further comprises: a third receiving module for receiving a group message delivery report from the short message server, the group message
20 delivery report including the internal group identifier and result information of transmitting the group message to the group; a third transmitting module for transmitting a group message delivery report to the server, the delivery report including the external group identifier and the result information of transmitting the group message to the group.

[0017] In a fifth aspect of the present invention, there is provided an apparatus for
25 transmitting a group message in a short message server. The apparatus comprises: a fourth receiving module for receiving, from an MTC-IWF, a group message request including an internal group identifier and indication information, the indication information being used to indicate transmission of the group message to a group; a fourth transmitting module for transmitting to an MME, a group message request including the internal group identifier.

30 [0018] In some embodiments, the internal group identifier is an IMSI Group Identifier.

[0019] In a sixth aspect of the present invention, there is provided an apparatus for transmitting a group message in an MME. The apparatus comprises: a fifth receiving

module for receiving a group message request from a short message server, the group message request including an internal group identifier; a fifth transmitting module for transmitting a message to all members of a group corresponding to the internal group identifier respectively.

5 [0020] In some embodiments, the internal group identifier is an IMSI Group Identifier.

[0021] The method or device according to embodiments of the present invention achieves the purpose of transmitting an MTC group message in an MTC system by reusing an existing IMSI group identifier. By transmitting the group message, it spares the need of separately transmitting a message to every UE from top to bottom, which can greatly reduce the message
10 amount in the network.

[0022] Compared with the existing MTC group message transmitting mechanism, the present invention has a low requirement on network deployment and is suitable for both networks deployed with MBMS and scenarios not supporting MBMS. The present invention belongs to a lightweight implementation solution. Besides, the present invention
15 makes tiny changes to the existing network by reusing the existing IMSI Group Identifier and is easy to be implemented.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] Through the following detailed description with reference to accompanying drawings, the above and other features, advantages, and aspects of each embodiment of the present
20 invention will become more apparent. In the drawings, the same or similar reference signs represent the same or similar elements, wherein:

[0024] Fig. 1 illustrates a schematic diagram of a process of transmitting an MTC group message according to one embodiment of the present invention;

[0025] Fig. 2 illustrates a schematic diagram of an apparatus for transmitting an MTC group
25 message in an MTC-IWF according to one embodiment of the present invention;

[0026] Fig. 3 illustrates a schematic diagram of an apparatus for transmitting an MTC group message in an SMS-SC according to one embodiment of the present invention;

[0027] Fig. 4 illustrates a schematic diagram of an apparatus for transmitting an MTC group messages in an MME according to one embodiment of the present invention.

30 DETAILED DESCRIPTION OF EMBODIMENTS

[0028] Embodiments of the present invention are now described in details with reference to the drawings. It should be noted that similar components or functional units in the drawings may be indicated with the same numbers. The drawings only aim to explain embodiments of the present invention. Those skilled in the art can acquire alternative implementations from the following description without deviating from the principles and protection scope of the present invention.

[0029] As used herein, the term “include” and its variants are to be read as open-ended terms that mean “include, but is not limited to.” The term “based on” is to be read as “based at least in part on.” The term “one example embodiment” is to be read as “at least one embodiment.” The term “a further embodiment” is to be read as “at least one further embodiment.”

[0030] First of all, several English abbreviations used in the text are explained below:

AS: Application Server,

HSS: Home Subscriber Server,

HLR: Home Location Register,

MME: Mobility Management Entity,

MSC: Mobile Switching Center,

MTC-IWF: Machine Type Communications-InterWorking Function,

SCS: Services Capability Server,

SMS-SC: Short Message Service-Service Center,

SMS-GMSC: gateway MSC for short message service,

SMS-IW MSC: interworking MSC for short message service.

[0031] In the 3GPP network, each UE is allocated with a unique identifier number, IMSI (International Mobile Subscriber Identification Number), which is an identifier within the 3GPP network and unique in the 3GPP network. An IMSI Group Identifier is defined in the standard TS23.003 of 3GPP, which is unique within the 3GPP network for identifying a group of IMSI in the network. Each IMSI in the group corresponds to one UE. All UEs in the group are usually provided with the same service. At present, an IMSI Group Identifier is only used in an MME to facilitate congestion control at the group level.

[0032] The present invention proposes, based on the existing IMSI Group Identifier, a novel MTC group message delivery mechanism. The operator allocates a unique IMSI Group Identifier for a group of MTC devices. The IMSI Group Identifier triggers the same action

for all UEs within the group.

[0033] Fig. 1 illustrates a schematic diagram of a process of transmitting an MTC group message according to one embodiment of the present invention.

[0034] Those skilled in the art can understand that some functional entities are omitted here to facilitate description without confusing the purpose of the technical solution of the present invention. The LTE-based system herein is only taken as the example. In particular, the following description will depict embodiments of the present invention mainly with reference to 3GPP LTE/LTE-advanced (LTE-A) and adopt the specific term in LTE/LTE-A, to facilitate explaining principles and spirits of the present invention. However, as will be understood by those skilled in the art, embodiments of the present invention are certainly not limited to application environment of 3GPP LTE/LTE-A. Instead, they can be applied into any wireless communication systems, such as other communication systems that will be developed in the future.

[0035] In the embodiment, MTC group 1 comprises UE11, UE12, ..., UE1n. HSS103 stores related information of the group, such as an external group identifier and an internal group identifier corresponding to the group. The external group identifier is used in case that network elements (e.g., SCS or AC and the like) outside the 3GPP network access the group. The internal group identifier is the IMSI group identifier already existed in the 3GPP network.

[0036] The process starts from step S101.

[0037] At step S101, SCS105 determines to transmit a group message to the MTC group 1. That is, SCS105 requests to transmit a message to all members in the MTC group 1. SCS105 transmits a group message request to MTC-IWF104. The group message request includes an identifier of SCS105 and an external group identifier of the MTC group 1. The group message request here can be a device trigger message. However, those skilled in the art can understand that the present invention is also applicable to other group message requests. Besides, those skilled in the art should appreciate that other network elements, such as AS and the like, can transmit a group message request to MTC-IWF104.

[0038] Next, at step S102, MTC-IWF104 determines whether the SCS105 is group message request d to transmit a group message request.

[0039] If MTC-IWF104 determines that the SCS105 is entitled to transmit the group message, MTC-IWF104 transmits, at step S103, to HSS103 a user information request. The

user information request including the identifier of SCS105 and the above external group identifier. The user information request can be a Subscriber Information Request message. In current standards, the interface between MTC-IWF and HSS does not include the above external group identifier information. Therefore, the present invention needs to enhance the interface between MTC-IWF and HSS. Those skilled in the art should understand that the Home Subscriber Server for storing user information can also be HLR in different networks.

[0040] At step S104, HSS103 retrieves, based on the received user information request, the locally stored group data, to further determine whether the SCS105 is entitled to transmit a message to the MTC group 1.

[0041] If HSS103 determines that the SCS105 is entitled to transmit messages to the MTC group 1, HSS103 will retrieve the internal group identifier corresponding to the above group identifier, i.e., the IMSI Group Identifier. Preferably, HSS103 can also retrieve routing information corresponding to the group.

[0042] It is to be noted that the step S104 is optional, rather than necessary. HSS103 can retrieve directly after receiving the user information request.

[0043] Afterwards, at step S105, HSS103 transmits a response to user information request to MTC-IWF104. The response message includes the above internal group identifier, i.e., the IMSI Group Identifier. The response to the user information request can be the Subscriber Information Response message. In current standards, the interface between MTC-IWF and HSS does not include the above information. Therefore, the present invention needs to enhance the interface between MTC-IWF and HSS.

[0044] Upon receiving the response to the user information request, MTC-IWF104 transmits, at step S106, a group message request to SMS-SC102. The group message request includes the above internal group identifier, i.e., IMSI Group Identifier, and indication information. The indication information is used to indicate SMS-SC102 that this is a group message indicate transmitting a group message to the group corresponding to the above internal group identifier. The group message request can be a Submit Trigger message. In current standards, the Submit Trigger message does not have the above internal group identifier and indication information. Therefore, the present invention needs to enhance the parameters carried by Submit Trigger message.

[0045] Those skilled in the art should understand that the network element SMS-SC102 in this embodiment is only exemplary. In different types of networks, the network element can

also be SMS-GMSC or SMS-IW MSC.

[0046] Then, at step S107, SMS-SC102 transmits to MME101 a group message request. The group message request includes the above internal group identifier, i.e., IMSI Group Identifier. The group message request can be Forward Message message. In the current
5 standard, the Forward Message message does not have the above internal group identifier, so it is required that the present invention enhances the parameters carried by the Forward Message message.

[0047] At step S108, MME101 respectively transmits a message to all members of the groups corresponding to the above internal group identifier. MME101 transmits, based on
10 contents in the group message, the same message to all UEs in the group.

[0048] In a further embodiment, after respectively transmitting a request message to UE11, UE12, ..., UE1n, MME101 will receive corresponding delivery report 1, delivery report 2, ..., and delivery report n (not shown in figures). These reports respectively comprise result information of delivering request messages to the UEs by MME101, such as succeeding to
15 transmit, failing to transmit, reasons for failure and the like. Upon receiving a delivery report of a certain UE, MME101 will further transmit the delivery report to SMS-SC102 (not shown in figures), wherein the delivery report includes said internal group identifier (i.e., IMSI Group Identifier) and identifier of the UE. The result information of delivering a request message to the UE.

[0049] When SMS-SC102 receives delivery reports of all group members in the group, it
20 will merge the reports and generate a group message delivery report. The group message delivery report includes result information of delivering messages to all group members in the group.

[0050] Afterwards, SMS-SC102 delivers said group message delivery report to
25 MTC-IWF104 (not shown in Fig. 1). The group message delivery report includes the above internal group identifier and result information of transmitting group messages to the groups (i.e., the above result information of transmitting messages to all group members in the group).

[0051] Subsequently, MTC-IWF104 will transmit the above result information to SCS105.
30 MTC-IWF104 will transmit a group message delivery report (not shown in figures). The group message delivery report includes the above external group identifier and result information of delivering group messages to the groups (i.e., the above result information of

delivering messages to all group members in the group).

[0052] Fig. 2 illustrates a schematic diagram of an apparatus for delivering MTC group messages in MTC-IWF104 according to one embodiment of the present invention. The apparatus 200 comprises a first receiving module 201, a first transmitting module 202, a
5 second receiving module 203 and a second transmitting module 204.

[0053] The working process of the apparatus 200 will be described in details with reference to Fig. 1.

[0054] First of all, the first receiving module 201 receives a group message request from the server SCS105. The group message request includes an identifier of SCS105 and an
10 external group identifier of the MTC group 1. The server SCS105 requests to transmit a group message to the MTC group 1. That is, SCS105 requests to transmit a message to all members in the MTC group 1. The group message here can be a device trigger message. However, those skilled in the art can understand that the present invention is also applicable to other group message requests. Besides, those skilled in the art should appreciate that other
15 network elements, such as AS and the like, can also transmit a group message request to MTC-IWF104.

[0055] Then, MTC-IWF104 determines whether the SCS105 is entitled to transmit a group message request. If MTC-IWF104 determines that the SCS105 is entitled to transmit the group message, the first transmitting module 202 transmits a user information request to
20 HSS103. The user information request includes identifier of SCS105 and the above external group identifier. The user information request can be a Subscriber Information Request message. In current standards, the interface between MTC-IWF and HSS does not include the above external group identifier information. Therefore, the present invention needs to enhance the interface between MTC-IWF and HSS. Those skilled in the art should
25 understand that, in different network, the Home Subscriber Server for storing user information can also be HLR.

[0056] Next, the second receiving module 203 receives a response to the user information request from HSS103. The response message includes the internal group identifier corresponding to the above external group identifier, i.e., IMSI Group Identifier. The
30 response to the user information request can be a Subscriber Information Response message. In current standards, the interface between MTC-IWF and HSS does not include the above information. Therefore, the present invention needs to enhance the interface between

MTC-IWF and HSS.

[0057] Subsequently, the second delivering module 204 transmits a group message request to SMS-SC102. The group message request includes the above internal group identifier (i.e., IMSI Group Identifier) and indication information. The indication information is for
5 indicating SMS-SC102 that it is a group message and indicates delivering a group message to the group corresponding to the above internal group identifier. The group message request can be a Submit Trigger message. In current standards, the Submit Trigger message does not have the above internal group identifier and indication information. Therefore, the present invention needs to enhance the parameters carried by the Submit Trigger message.

10 [0058] Those skilled in the art should understand that the network element SMS-SC102 in this embodiment is only exemplary. In different types of networks, the network element can also be SMS-GMSC or SMS-IW MSC.

[0059] In a further embodiment, the apparatus also comprises a third receiving module (not shown in the figures) and a third transmitting module (not shown in the figures).

15 [0060] The third receiving module receives a group message delivery report from SMS-SC102. The group message delivery report includes the above internal group identifier and result information of transmitting group messages to the groups (i.e., the above result information of delivering messages to all group members in the group).

[0061] Subsequently, the third transmitting module transmits the above result information to
20 SCS105. SCS105 transmits a group message delivery report to SCS105. The group message delivery report includes the above external group identifier and result information of delivering group messages to the groups (i.e., the above result information of delivering messages to all group members in the group).

[0062] Fig. 3 illustrates a schematic diagram of an apparatus for transmitting an MTC group
25 message in SMS-SC102 according to one embodiment of the present invention. The apparatus 300 comprises a fourth receiving module 301 and a fourth transmitting module 302.

[0063] The working process of the apparatus 300 will be described in details with reference to Fig. 1.

[0064] First of all, the fourth receiving module 301 receives a group message request from
30 MTC-IWF104. The group message request includes one internal group identifier (i.e., IMSI Group Identifier) and indication information. The indication information is for indicating

SMS-SC102 that this is a group message and indicates delivering a group message to the group corresponding to the above internal group identifier. The group message request can be a Submit Trigger message. In current standards, the Submit Trigger message does not have the above internal group identifier and indication information. Therefore, the present invention needs to enhance the parameters carried by Submit Trigger message.

[0065] Then, the fourth transmitting module 302 transmits a group message request to MME101. The group message request includes the above internal group identifier, i.e., IMSI Group Identifier. The group message request can be a Forward Message message. In current standards, the Forward Message message does not have the above internal group identifier. Therefore, the present invention needs to enhance the parameters carried by the Forward Message message.

[0066] In a further embodiment, the apparatus 300 also comprises a sixth receiving module (not shown in the figures), a merging module (not shown in the figures), and a sixth transmitting module (not shown in the figures).

[0067] The sixth receiving module receives a delivery report from MME101. The delivery report includes the above internal group identifier (i.e., IMSI Group Identifier) and an identifier of one UE. The delivery report includes result information of transmitting a request message to the UE.

[0068] Upon SMS-SC102 receives delivery reports of all group members in the group, the merging module will merge the reports and generate a group message delivery report. The group message delivery report includes result information of transmitting messages to all group members in the group.

[0069] Afterwards, the sixth transmitting module transmits the above group message delivery report to MTC-IWF104. The above group message delivery report includes the above internal group identifier and result information of delivering group messages to the groups (i.e., the above result information of delivering messages to all group members in the group).

[0070] Fig. 4 illustrates a schematic diagram of an apparatus for delivering an MTC group message in MME101 according to one embodiment of the present invention. The apparatus comprises a fifth receiving module 401 and a fifth delivering module 402.

[0071] The working process of the apparatus 400 will be described in details with reference to Fig. 1.

[0072] First of all, the fifth receiving module 401 receives a group message request from SMS-SC102. The group message request includes one internal group identifier, i.e., IMSI Group Identifier. The group message request can be a Forward Message message. In current standards, the Forward Message message does not include the above internal group identifier. Therefore, the present invention needs to enhance the parameters carried by the Forward Message message.

[0073] Then, the fifth transmitting module 402 respectively transmits a message to all members of the group (i.e., MTC group 1) corresponding to the above internal group identifier. MME101 transmits, based on contents in the group message, the same message to all UEs in the group.

[0074] In a further embodiment, the apparatus 400 also comprises a seventh transmitting module (not shown in the figures).

[0075] After respectively delivering request messages to UE11, UE12, ..., UE1n, MME101 will receive corresponding delivery report 1, delivery report 2, ..., and delivery report n. These reports respectively comprise result information of delivering request messages to the UEs by MME101, such as succeeding to transmit, failing to transmit, reasons for failure and the like. When MME101 receives a delivery report of a certain UE, the seventh transmitting module will further transmit the delivery report to SMS-SC102, wherein the delivery report includes the above internal group identifier, (i.e., IMSI Group Identifier) and an identifier of the UE. The delivery report includes the result information of delivering a request message to the UE.

[0076] Those skilled in the art can easily recognize that modules or steps in the above various methods can be executed by programmed computers. In the present invention, some embodiments also intend to encompass program storage devices, such as digital data storage media, which are instruction programs that are readable by the machine or the computer and executable by the encoding machine or the computer, where the instructions execute some or all of the steps in the above method. The program storage device can be, e.g., digital memory, such as magnetic storage medium of disk and tape, hard disk drive or optically-readable digital data storage media. Embodiments also intend to comprise the computer programmed to execute steps of the above method.

[0077] Functions of various elements of the apparatus shown in the drawings can be provided with software, dedicated hardware, and hardware associated with suitable software

and being capable of executing the software, or firmware, or the combinations thereof. When the functions are provided by the processor, the functions can be provided by a single dedicated processor, a single shared processor or multiple separate processors. Besides, the term “processor” can comprise, but not limited to , digital signal processor (DSP) hardware,
5 network processor, application-specific integrated circuit (ASIC), field programmable gate array (FPGA), read-only memory (ROM) for storing software, random-access memory (RAM) and non-volatile storage apparatus. It can also include other conventional and/or customized hardware.

[0078] Through the teaching offered in the above description and the related drawings,
10 many modifications of the present invention and their implementations provided here can be realized by those skilled in the art. Therefore, it should be understood that implementations of the present invention are not restricted to the specific implementations of the present disclosure, and it is intended to include modifications and other implementations within the scope of the present invention. Furthermore, although the above description and the related
15 drawings describe the example implementations in the context of some example combinations of components and/or functions, it should be realized that alternative implementations can provide different combinations of components and/or functions without deviating from the scope of the present invention. At this point, other combinations of components and/or functions different from the above clearly described ones can also be expected within the
20 scope of the present invention. Although specific terms are employed here, they are only used in general and descriptive meanings without restrictive intentions.

I/We Claim:

1. A method of transmitting a group message in an MTC-IWF, comprising:
receiving, from a server, a group message request including an identifier of the server
and an external group identifier, the server requesting transmission of the group message to a
5 group;

transmitting, to a home subscriber server, a user information request including the
identifier of the server and the external group identifier;

receiving, from the home subscriber server, a response to the user information request
including an internal group identifier corresponding to the external group identifier;

10 transmitting, to a short message server, a group message request including the internal
group identifier and indication information, the indication information being used to indicate
the transmission of the group message to the group.

2. The method of claim 1, wherein the internal group identifier is an IMSI Group
15 Identifier.

3. The method of claim 1 or 2, further comprising:

receiving a group message delivery report from the short message server, the group
message delivery report including the internal group identifier and result information of
20 transmitting the group message to the group;

transmitting a group message delivery report to the server, the group message delivery
report including the external group identifier and the result information of transmitting the
group message to the group.

25 4. A method of transmitting a group message in a short message server, comprising:

receiving, from an MTC-IWF, a group message request including an internal group
identifier and indication information, the indication information being used to indicate
transmission of the group message to a group;

transmitting, to an MME, a group message request including the internal group
30 identifier.

5. The method of claim 4, wherein the internal group identifier is an IMSI Group
Identifier.

6. The method of claim 4 or 5, further comprising:

receiving a delivery report from the MME, the delivery report including the internal group identifier and an identifier of a group member, the delivery report including result information of transmitting the message to the group member;

merging delivery reports for all of group members into one group message delivery report, the group message delivery report including the delivery reports of all of the group members;

transmitting the group message delivery report to the MTC-IWF, the group message delivery report including result information of transmitting the message to all members of the group.

7. A method of transmitting a group message in an MME, comprising:

receiving a group message request from a short message server, the group message request including an internal group identifier;

transmitting a message to all members of a group corresponding to the internal group identifier, respectively.

8. The method of claim 7, wherein the internal group identifier is an IMSI Group Identifier.

9. The method of claim 7 or 8, further comprising:

transmitting a delivery report to the short message server, the delivery report including the internal group identifier and an identifier of a group member, the delivery report including result information of transmitting the message to the group member.

10. An apparatus for transmitting a group message in an MTC-IWF, comprising:

a first receiving module for receiving, from a server, a group message request including an identifier of the server and an external group identifier, the server requesting transmission of the group message to a group;

a first transmitting module for transmitting, to a home subscriber server, a user information request including the identifier of the server and the external group identifier;

a second receiving module for receiving, from the home subscriber server, a response to the user information request including an internal group identifier corresponding to the

external group identifier;

a second transmitting module for transmitting, to a short message server, a group message request including the internal group identifier and indication information, the indication information being used to indicate the transmission of the group message to the group.

11. The apparatus of claim 10, wherein the internal group identifier is an IMSI Group Identifier.

12. The apparatus of claim 10 or 11, further comprising:

a third receiving module for receiving a group message delivery report from the short message server, the group message delivery report including the internal group identifier and result information of transmitting the group message to the group;

a third transmitting module for transmitting a group message delivery report to the server, the group message delivery report including the external group identifier and the result information of transmitting the group message to the group.

13. An apparatus for transmitting a group message in a short message server, comprising:

a fourth receiving module for receiving, from an MTC-IWF, a group message request including an internal group identifier and indication information, the indication information being used to indicate transmission of the group message to a group;

a fourth transmitting module for transmitting, to an MME, a group message request including the internal group identifier.

14. The apparatus of claim 13, wherein the internal group identifier is an IMSI Group Identifier.

15. An apparatus for transmitting a group message in an MME, comprising:

a fifth receiving module for receiving a group message request from a short message server, the group message request including an internal group identifier;

a fifth transmitting module for transmitting a message to all members of a group corresponding to the internal group identifier respectively.

16. The apparatus of claim 15, wherein the internal group identifier is an IMSI Group Identifier.

DRAWINGS

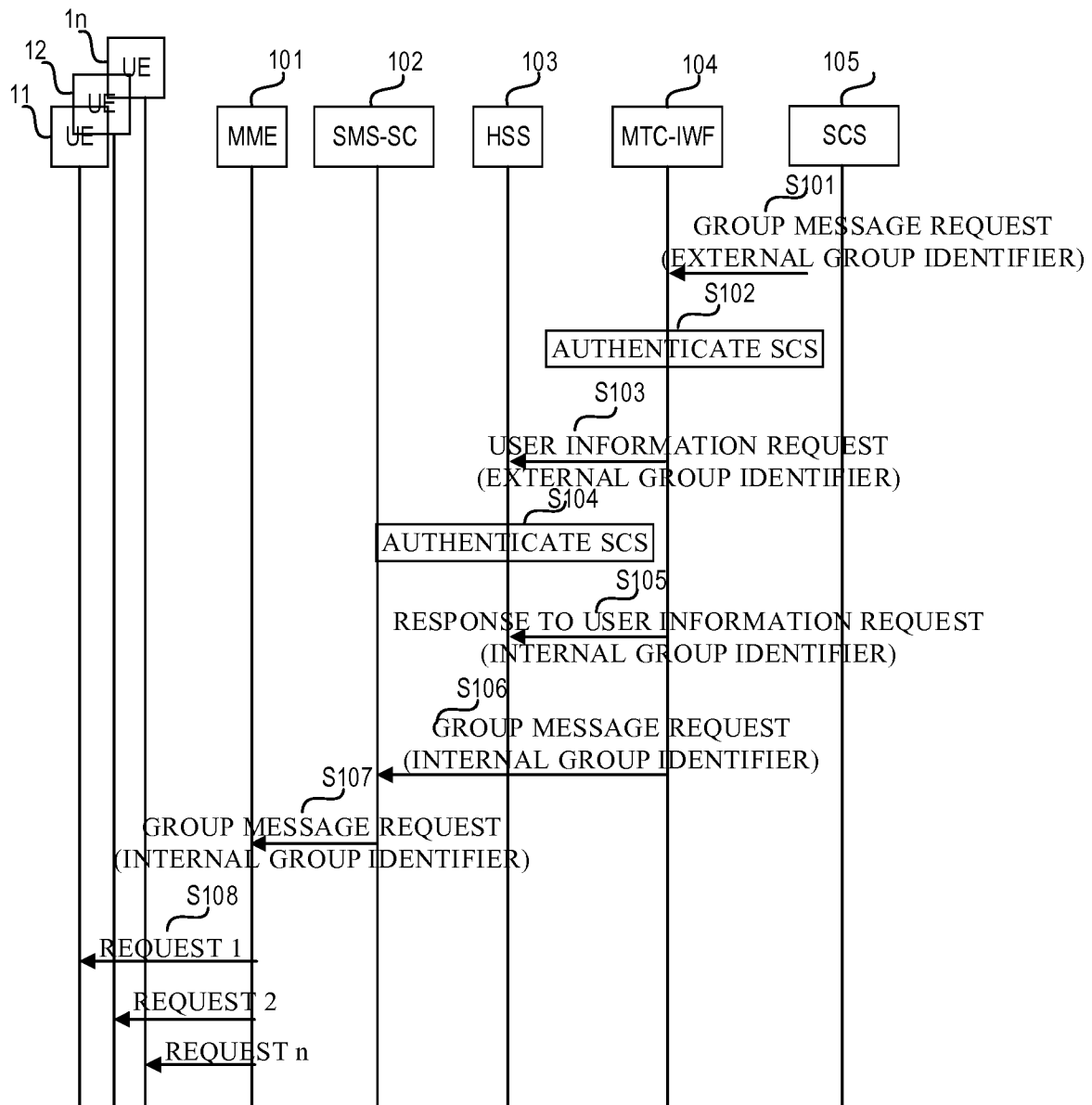


FIG. 1

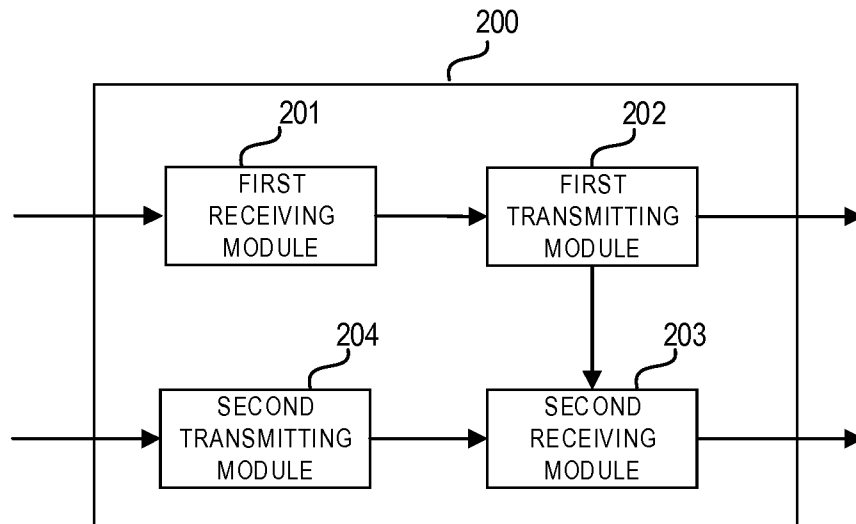


FIG. 2

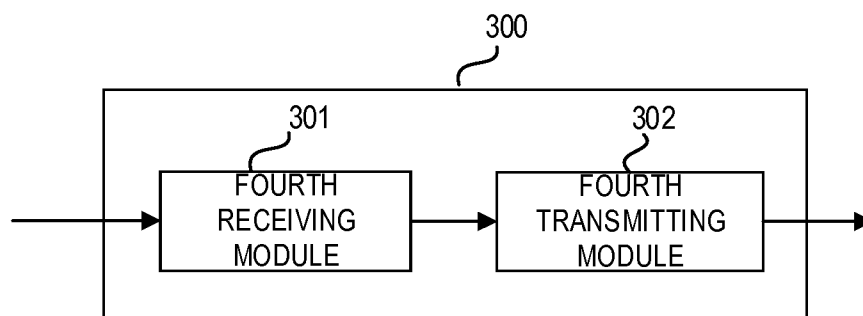


FIG. 3

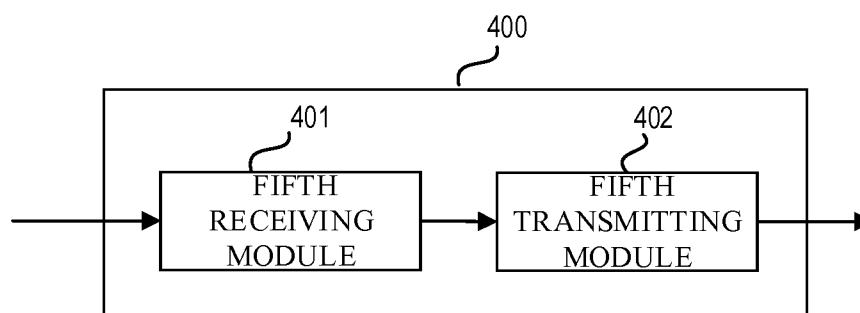


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/081432

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04W4/00
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04W

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, IBM-TDB, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2014/027740 A1 (KT CORP [KR]) 20 February 2014 (2014-02-20) paragraphs [0075], [0111] - [0117], [0124], [0136] - [0142], [0148] - [0157], [0175] - [0189]; figure 5 -----	1-16
X	US 2015/245162 A1 (CHAO HUA [CN]) 27 August 2015 (2015-08-27) paragraphs [0013] - [0027], [0049] - [0077], [0091] - [0143] -----	1,4,7, 10,13,15
A	US 2014/135044 A1 (BERGQVIST JENS [SE] ET AL) 15 May 2014 (2014-05-15) the whole document -----	1-16



Further documents are listed in the continuation of Box C.



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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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