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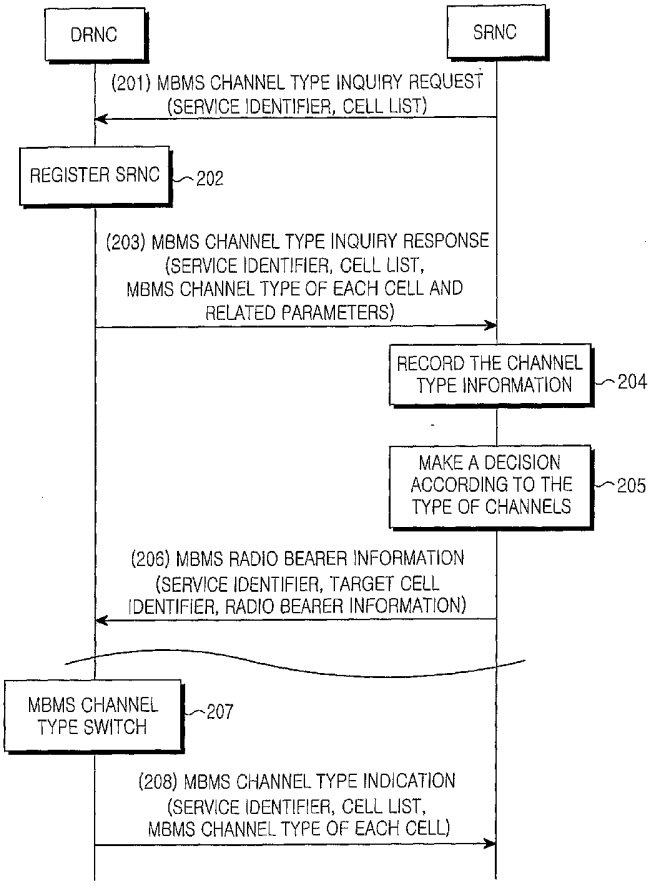
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(54) Title: METHOD FOR SRNC INQUIRING OF CHANNEL TYPE



(57) Abstract: The method for the Service Radio Network Controller (SRNC) inquiring of the DRNC about the type of specific cell's MBMS channels on the interface Iu is provided in the present invention . When the service starts or the activation set updates, the SRNC inquires of the related DRNC about the type of specific cell's MBMS channels. The DRNC registers and responses to these SRNCs. The SNRC determines the cell and channel for the UE in receiving MBMS data according to the information on the MBMS channels in the cells of the activation set. When any of the MBMS channels in the cells of the DRNC alters, the DRNC needs to send the notifications to the registered SRNC. The SRNC evaluates the information on the type of altered channels in the cells of the activation set again to make the decision.

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METHOD FOR SRNC INQUIRING OF CHANNEL TYPE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the point-to-multipoint Multimedia Broadcast and Multicast Service (hereinafter referred to as MBMS), especially to a method for Serving Radio Network Controller (hereinafter referred to as SRNC) inquiring of Drifting Radio Network Controller (hereinafter referred to as DRNC) about type of MBMS channels of specific cell on interface Iur.

2. Description of the Related Art

Multimedia Broadcast and Multicast Service (hereinafter referred to as MBMS) is a new service proposed under standardization by 3rd Generation Partnership Project (hereinafter referred to as 3GPP). MBMS is a downlink point-to-multipoint (p-t-m) service, whose most remarkable characteristic is that it can make use of radio resources and network resources efficiently.

In order to explain the present invention better, firstly, figure 1 illustrates the MBMS system structure.

Following is the description for MBMS system structure shown in Figure 1:

MBMS network structure, based on the core network of General Packet Radio Service (hereinafter referred to as GPRS), has been added with new network units. Broadcast and multicast service center 101 (hereinafter referred to as BM-SC) is the service control center of MBMS system. Both the Gateway GPRS Supporting Node 102 (hereinafter referred to as GGSN) and Service GPRS Supporting Node 103 (hereinafter referred to as SGSN) compose the transmission network of MBMS service and provide a route for MBMS data transmission. Home Location Register 107 (hereinafter referred to as HLR) is the database that saves the data of user information, and can provide services like user authentication, location registration, etc.. The Serving Radio Network Subsystem (hereinafter referred to as SRNS) 104 provides the MBMS service with radio resources in the air-interface and includes the Serving Radio Network Controller (hereinafter referred to as SRNC) and the base station (hereinafter referred to as Node B). The Drifting Radio Network Subsystem (hereinafter referred to as DRNS) 105 provides the UE with the radio resources, and similar to the SRNS,

the DRNS includes the Drifting Radio Network Controller (hereinafter referred to as DRNC) and the base station (hereinafter referred to as Node B). 106 refers to the User Equipment (hereinafter referred to as UE), and it is the terminal via which a user obtains network data and communicates with other users. When the UE simultaneously receives data from the SRNS and the DRNS, it stays in the state of macro-diversity.

108 Iu indicates the interface between Radio Access Network and Core Network. 110 Iur indicates the interface between the SRNS and the DRNS. 109 Uu indicates the air-interface, also referred to as the radio interface. When the UE stays in the state of macro-diversity, it receives data from the SRNS and the DRNS simultaneously via the air-interface. The data on the DRNS is obtained from the SRNS via the interface Iur 110, and then transmitted to the air-interface.

The most remarkable characteristic of MBMS service is that it can make use of radio resources and network resources efficiently. In order to reach this object better, the air-interface is required to be optimized. Differing from conventional services, the MBMS service is a kind of point-to-multipoint one where the network transmits only one copy of data and all different users receive the copy of data. All conventional services are transferred through the dedicated channels, while the point-to-multipoint transmission of MBMS service must be done through the common channels. Nevertheless, in the case of less UEs, the application of dedicated channels is more effective in saving radio resources than the application of common channels. Therefore, before providing users with the MBMS service, the SRNC must count the number of users in each cell, and then decides whether to adopt a point-to-point dedicated channel (hereinafter referred to as PTP mode) or a point-to-multipoint common channel (hereinafter referred to as PTM mode).

According to the feature of the current service, the UE can stay in such four states as URA_PCH, CELL_PCH, CELL_FACH and CELL_DCH. In the state of URA_PCH or CELL_PCH, the UE remains link with the network but can not perform any data transmission; in the state of CELL_FACH, it occupies the common resources and can perform little low rate data transmission; and in the state of CELL_DCH, it occupies the dedicated resources and can perform voice and data transmission with high data rate and quality.

When the UE stays in the state of URA_PCH, CELL_PCH or CELL_FACH, it only keeps in touch with the specific cell. When receiving the MBMS service, it receives data from this specific cell only, so that it is considerably easy for the SRNC in counting the number of UEs that stay in the states. When the UE stays

in the state of CELL_DCH, it presents two sub-states of mono-cell and macro-diversity. In the mono-cell state, the UE keeps in touch with only one cell, in this case, no substantial difference lies in the MBMS data receiving between the state and any other state. While in the macro-diversity state, the UE is in the edge of cells so that it can simultaneously keep in touch with many cells, the set of which is referred to as the activation set. When the SRNC provides the MBMS service for the UE that stays in the macro-diversity state, it first considers the type of channels adopted in the cells of this UE's activation set, and determines the cell and type of channel for the UE in receiving the MBMS service data. In the mode of macro-diversity, the UE has only one SRNC, but if the UE locates in cells of other Radio Network Controllers (RNCs), it has several DRNCs. When the SRNC wants to know the type of channels adopted in the cells of DRNC, it should inquire the DRNC via the interface lur.

According to the existing definition of MBMS service, the MBMS service can be composed of several sessions. For each of the sessions, when it starts, the network will wake up the UEs by paging and then count the number of UEs so as to specify the type of radio bearer (either point-to-point radio bearer or point-to-multipoint radio bearer) and related parameters. What the UE is required to do is to listen to the control channel in the current cell to get information on data channel and receive data from the data channel. However, as described above, the UE simultaneously keeps in touch with several cells if it is in the macro-diversity state CELL_DCH, UE can not determine from which cell it receives MBMS service if there is no indication from the SRNC. To settle this problem, the SRNC firstly is required to know the type of channels adopted in the cells of this UE's activation set, and then makes the decision for the UE.

When the UE carries out communications in the state of macro-diversity, it simultaneously keeps in touch with several cells, which compose the activation set of this UE. In view of the MBMS service, the MBMS bearer is specified for each cell according to the number of the cell's users. So, even for the same MBMS service, different bearers (PTP mode or PTM mode) will be adopted for several cells in the activation set of one UE. In this case, the UE has no idea how to receive the MBMS service, but to wait for the decision and notification from the SRNC.

The decision made by the SRNC should be based on the type of MBMS channels in the cells of the activation set of the UE. Therefore, the SRNC should firstly know the information on the type of those channels. For the local cell controlled by the SRNC, the information on this aspect can be obtained directly.

But for the cells under the control of other RNCs, it is required to be obtained via interface Iur by the SRNC.

In the existing protocols, the MBMS connecting procedure has been regulated to support the mobility of the UE. Through this procedure, the UE can be connected to the DRNC and the DRNC responds the corresponding bearer information to the SRNC. But for the UE in macro-diversity state CELL_DCH, the SRNC is required to know the type of channels adopted in the cells of the activation set of the UE before making the decision. Before the decision is made, this UE can not be connected to any cell in the activation set. Therefore, all available connecting procedures are required to be improved.

In the prior art, system information can be well exchanged between two RNCs, but the functions required to support the MBMS service can not be achieved, so that new processes are required to devise for inquiring of the information on the MBMS channels.

SUMMARY OF THE INVENTION

To settle the problems arising in the prior art and according to the feature of MBMS service, a method for a SRNC inquiring of a DRNC about type of MBMS channels and a method for determining to provide a UE in a macro-diversity state with MBMS service channel are provided in the present invention.

A method for SRNC inquiring of a DRNC about type of MBMS channels comprising steps of:

a) sending a "MBMS Channel Type Inquiry Request" message to the DRNC by the SRNC when it wants to inquire about the type of MBMS channels of the DRNC's cells via an interface Iur, the message contains information on identifier of the service to be inquired about, and identifier of the related cell;

b) recording information on the SRNC who sends said "MBMS Channel Type Inquiry Request" message, recording the identifier of the service that SRNC wants to inquire about and the identifier of the related cell by the DRNC after receiving said "MBMS Channel Type Inquiry Request" message, and then the DRNC sending a "MBMS Channel Type Inquiry Response" message to the SRNC, which contains information on cell identifier, type of radio bearers and related parameters, where the type of radio bearers containing MBMS channel type of the related cell;

c) reporting changes to the SRNC in time by the DRNC once the inquiry about service or channel type of cell of the DRNC changes; and

d) recording the type of channel inquired by the SRNC and if necessary , ensuring that other UEs can inquiry about this channel type information expediently without inquiring of the DRNC again.

A method for determining to provide a UE in a macro-diversity state with MBMS service channel provided in the present invention comprising steps of:

(1) examining an activation set of the UE that stays in the macro-diversity state by a SRNC to determine DRNCs to which the SRNC wants to send channel type inquiry for the type information on MBMS channels of corresponding cells;

(2) sending a "MBMS Channel Type Inquiry Request" message to the DRNC via the interface Iur after the SRNC determines the DRNC to inquire about, the message contains information on the identifier of the service to be inquired about, and the identifier of the related cell;

(3) recording information on the SRNC who sends said "MBMS Channel Type Inquiry Request" message, recording the identifier of the service that SRNC wants to inquire about and the identifier of the related cell by the DRNC after receiving said "MBMS Channel Type Inquiry Request" message, and then the DRNC sending a "MBMS Channel Type Inquiry Response" message to the SRNC, which contains information on the cell identifier, the type of radio bearers and the related parameters, where the type of radio bearers containing the MBMS channel type of the related cell;

(4)determining the related cell and bearer mode for the UE in receiving the MBMS service by the SRNC according to the information on the type of channels in the cells of the UE's activation set; and

(5)configuring relevant network resources and notifying the UE of the information on MBMS radio bearer by the SRNC according to said decision, and the UE configuring the channel and receiving the MBMS data according to said information on the MBMS radio bearer, said information contains service identifier, cell identifier and radio bearer parameters.

In addition, the method further comprising steps of: once inquiring about service or channel type of DRNC's cell changes, reporting the changes to the

SRNC in time by the DRNC; when the type of MBMS channel needs to be altered for the reason that the radio resource or the number of users of the DRNC's cell changes, sending an indication of the changes to the recorded SRNC by the DRNC, the SRNC recording the information on channel type and performing said step 4 and 5 according to the changed channel type information again.

Additionally, the SRNC records the type of the inquiry about channel and if necessary, ensures that other UEs can inquire about this channel type information expediently without inquiring of the DRNC again.

Moreover, if the SRNC determines a PTM mode for the UE in receiving the MBMS data, it also examines the capability of the UE, and if the UE is not able to simultaneously receive data from both PTM channel and dedicated channel, the SRNC needs to send an indication to the UE, indicating that the UE should make a choice between the MBMS service and other services, either continuing the present service but giving up MBMS service, or giving up the present service but starting to receive MBMS service. If the SRNC determines the PTP mode for UE in receiving MBMS data, it needs to send a "Radio Bearer Reconfiguration" message to the UE and configures current radio links and starts to bear the MBMS data via the current radio links.

When the SRNC determines a cell for the UE in receiving MBMS data, it needs to send a "MBMS Connection Request" message to the DRNC where the cell in which the UE receives MBMS data locates; after the DRNC receives the "MBMS Connection Request" message, it updates the MBMS service context, and counts this UE into number of the users of said service.

Additionally, when the UE is receiving the MBMS service or any other service in the macro-diversity state CELL_DCH, it transmits a survey report to the SRNC; according to the survey report, the SRNC determines whether to update the activation set or not, that is whether to add some new cells into or remove some available cells from the activation set; if it needs to add some new cells into the activation set, it firstly check whether the information on the type of channels of the new cells has been saved in the local MBMS service context or not; if not, repeat said step 1 to 5; and if the type of channel has been altered, both the current radio links and the radio bearers be reconfigured for this UE.

The features of the proposed method for a SRNC inquiring of a DRNC about type of MBMS channels are described as followings:

a) When the SRNC wants to inquire of the DRNC about the MBMS service channel information of the cells at the time when the service starts and the activation set updates, it sends the request to the DRNC and the DRNC responds to the request. According to the collected information on the type of channels in the activation set's cells, the SRNC can determine the cell and bearer for the UE in the macro-diversity state CELL_DCH in receiving MBMS service.

b) After receiving the request from the SRNC, the DRNC records this SRNC and the MBMS service identifier and cell identifier corresponding to this SRNC. In this way, the SRNC can be required to inquire of the DRNC only once, and during the entire subsequent service-lasting period, if the type of MBMS service channel of the DRNC's cell alters, the DRNC will actively notify the recorded SRNC of the changes so that the SRNC could keep track of the channel of said cell in time.

c) When the SRNC inquires of the DRNC about the type of a channel, it does not connect said UE to the concerned cell. Only when the SRNC determines some cells for the UE in receiving the MBMS service, it connect said UE to this cell through the MBMS connecting procedure, and numbers this UE into that of the users of this cell.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is the view showing the MBMS system structure.

Figure 2 is the flowchart showing the SRNC inquires of the DRNC about the type of MBMS service channels.

Figure 3 is the flowchart showing the SRNC inquires of the DRNC about the type of MBMS service channels and determines the target cell at the time when the service starts.

Figure 4 is the flowchart showing the SRNC inquires of the DRNC about the type of MBMS service channels and determines the target cell at the time when the activation set updates.

Figure 5 shows the operation flow of node SRNC.

Figure 6 shows the operation flow of node DRNC.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now the embodiments of the present invention will be described in detail with reference to the figures.

Figure 2 is the flowchart showing embodiment of the present invention, which describes the method for the SRNC inquiring of the DRNC about type of MBMS channels.

When the SRNC wants to inquire about the types of the MBMS channels in the cells of the DRNC, it sends the DRNC the "MBMS Channel Type Inquiry Request" message in phase 201. This message contains information on the identifier of the service to be inquired about, and the identifier of the related cell.

In phase 202, the DRNC records this SRNC and the MBMS service identifier and cell identifier concerned by this SRNC. Once said service or channel type of the related cell changes, the DRNC will report the changes to the SRNC in time. Detailed description will be explained in to phase 207 to 209.

In phase 203, the DRNC sends the inquiry result to the SRNC by including it into the "MBMS Channel Type Inquiry Response" message.

In phase 204, the SRNC records the type of the inquiry about channel and if necessary, ensures that other UEs can inquire about this channel type information expediently without inquiring of the DRNC again. When the type of the MBMS channel in the cell of the DRNC alters, what the SRNC needs to do is to wait for the active report of the DRNC since the DRNC has already recorded the information when the SRNC performed the inquiry for the first time, as described in phase 202.

In phase 205, the SRNC determines the cell and the channel for the UE in receiving MBMS service according to the collected information on the type of MBMS channels.

In phase 206, the SRNC notifies the UE of the MBMS radio bearer information and the UE configures the relevant channel and receives the MBMS data according to said information. The information contains items of the service identifier, the cell identifier and the radio bearer parameters.

In phase 207, When the type of MBMS channel needs to be altered for the reason that the radio resource or the number of users of the DRNC's cell changes,

In phase 208, the DRNC should send the indication of changes to the SRNC recorded in phase 202, and the SRNC records the information on channel type

and again makes the decisions just as done in phase 205 and 206 according to the changed channel type information, and notifies the UE of the results. The UE receives the data according to the changed radio bearer information. If some cell's channel type alters it will not change the decision of the SRNC, then the SRNC needs to send no notification to the UE.

Phase 208 and phase 203 can share the same message name.

In the following, the application of the embodiment will be described in particular environments.

Figure 3 illustrates the method for the SRNC inquiring of the DRNC about the type of MBMS service channels and determining the target cell at the time when the service starts.

Phase 301 indicates that the UE is staying in the macro-diversity state CELL_DCH and receiving other services before the MBMS service starts.

In phase 302, the SRNC receives a Service Start Indication from the SGSN.

In phase 303, the SRNC initiates the process of MBMS paging. As required, the SRNC can determine whether to add other UEs into the connection mode to perform the decision of channel type or not.

In phase 304, the SRNC completes the process of users counting and examination of the radio resource, and determines the types of channels and the radio bearer parameters of local cells.

In phase 305, the SRNC examines the activation set of the UE that is in the state of CELL_DCH to determine to which DRNCs it should send the Channel Type Inquiry Request message.

In phase 306, the SRNC sends the Inquiry Requests to the related DRNCs.

In phase 307, the DRNC record the SRNC that sends the Inquiry Requests and the service identifier and cell identifier concerned by this SRNC.

In phase 308, the DRNC transmits the information on MBMS channel types and related parameters inquired to the SRNC.

In phase 309, the SRNC records the received information on MBMS channel types and related parameters.

In phase 310, the SRNC determines the cell and the bearer mode for the UE in receiving MBMS service according to the types of channels in the cells of the UE's activation set.

In phase 311, the SRNC notifies the UE of the determined radio bearer mode. If the SRNC determines the PTM mode for the UE in receiving MBMS data in phase 310, it also examines the UE's capability since some UEs are not able to simultaneously receive data from both the PTM channel and the dedicated channel. If the UE is not able to simultaneously receive data from both the PTM channel and the dedicated channel, the SRNC needs to send the indication to the UE in phase 312, indicating that the UE should make a choice between the MBMS service and other services, either continuing the present service but giving up MBMS service, or giving up the present service but starting to receive the MBMS service.

In phase 313, if the SRNC determines the PTP mode for the UE in receiving the MBMS data, it needs to send the "Radio Bearer Reconfiguration" message to the UE and configures the current radio links and starts to bear MBMS data via the current radio links.

In phase 314 and 315, if the SRNC determines the cell for the UE in receiving MBMS data, it needs to send the MBMS Connection Request message to the DRNC where the specified cell locates. In phase 316, the DRNC updates the MBMS service context and numbers this UE into that of the users of this service. Detailed description on this process has been made in existing protocol, and no more detailed explanation will be given here.

Phase 317 to 319 illustrates the process that the DRNC notifies the SRNC of the changes when the type of the MBMS service channel in the cell of the concerned DRNC alters. Since this process has been described in detail in phase 207 to 208 of figure 2, explanation on it is omitted here.

Figure 4 shows the operation flow that the SRNC inquires of the DRNC about the channel type and determines the target cell if some new cells add to the activation set after the service starts.

In phase 401, the UE is receiving the MBMS service or any other service in the macro-diversity state CELL_DCH.

In phase 402, the UE sends the survey report to the SRNC.

In phase 403, the SRNC determines whether to update (i.e. add some new cells into or remove some available cells from the activation set) the activation set or not according to the survey report.

In phase 404, the SRNC firstly needs to check whether the information on the

type of channels of the new cells has been saved in the local MBMS service context or not. If so, it is not necessary to send any request to the DRNC.

In phase 405 to 408, the channel type inquiry process is performed between the SRNC and the DRNC. Since this process has been detailed in previous section, its explanation is omitted here.

In phase 409, the SRNC needs to evaluate the type of channels in the updated activation set again to make the decision once more. If the update of the activation set does not affect any previous decision, then the phase 410 to 415 are not required.

In phase 410, the SRNC needs to examine the capability of the UE to determine whether the UE is able to simultaneously receive data from both the PTP channel and the dedicated channel or not. It shares the same function with phase 311 in figure 3, and no more detail will be given here.

In phase 411, the SRNC notifies the UE of the updated radio bearer information.

In phase 412, the radio links is established in the new cells. If the type of channel has been altered, the current radio links and the radio bearers should also be reconfigured for this UE.

In phase 413 to 415, the connection process of the UE is performed to add the UE into the corresponding MBMS service context.

In phase 416, the process of updating the activation set on the air-interface is completed, and the UE can receive data from the new cells.

Phase 417 to 419 share the same functions with phase 317 to 319 in figure 3, no more detail will be given here.

Figure 5 and 6 below illustrate the operation flow of the channel type inquiry as shown in figure 2 implemented in the node DRNC and the node SRNC.

Figure 5 illustrates the operation flow of the node SRNC.

In phase 501, the SRNC determines to inquire of some cells about the channel type of a certain MBMS service.

In phase 502, the SRNC sends the "MBMS Channel Type Inquiry Request" message to the relevant DRNC, the message contains the service identifier and the cell identifier to inquire about.

In phase 503, the SRNC waits for the responses from the DRNC.

In phase 504, the SRNC judges whether the received message is the "MBMS Channel Type Inquiry Response" or no, and if so, the process goes to phase 506; if not, goes to phase 505.

In phase 505, the SRNC judges whether the received message is the "MBMS Channel Type Indication" or not, and if so, the process goes to phase 506; if not, goes to phase 503 to go on receiving messages.

In phase 506, the SRNC records the received information on the type of the MBMS channel in its MBMS context.

In phase 507, the SRNC determines the related cell and the bearer mode for the UE in receiving MBMS service according to the information on the type of channels in the cells of the UE's activation set.

In phase 508, the SRNC configures the network resources according to the decision made in phase 507, and transmits the related radio bearer information to the UE. The radio bearer information may contain items of the cell identifier, the channel type and the related radio bearer parameters like the configuration of the transmission channels, the configuration of the physical channels, etc.

Figure 6 illustrates the operation flow of the node DRNC.

In phase 601, the DRNC receives messages.

In phase 602, the DRNC judges whether the received message is the "MBMS Channel Type Inquiry Request" or not, and if so, the process goes to phase 603; if not, goes to phase 605.

In phase 603, the DRNC firstly registers the identifier of the SRNC that sends the request message, and records service identifier and cell identifier requested by the SRNC at the same time.

In phase 604, the DRNC sends the "MBMS Channel Type Inquiry Response" message to the SRNC, including the information on the MBMS channels of its cells.

In phase 605, the DRNC examines whether there are cells in which the MBMS channels have been altered or not. If any, the process goes to phase 606; otherwise, goes to phase 601 to go on receiving messages.

In phase 606, the DRNC transmits the information on the altered MBMS channels to the SRNCs that have been registered and are interested in said

information. The transmitted message may contain information on the identifier of the cell where channel has altered, and new type of MBMS channel.

WHAT IS CLAIMED IS:

1. A method for a SRNC inquiring of type of channels comprising steps of:

a) sending a "MBMS Channel Type Inquiry Request" message to the DRNC by the SRNC when it wants to inquire about the type of MBMS channels of the DRNC's cells via an interface Iur, the message contains information on identifier of the service to be inquired about, and identifier of the related cell;

b) recording information on the SRNC who sends said "MBMS Channel Type Inquiry Request" message, recording the identifier of the service that SRNC wants to inquire about and the identifier of the related cell by the DRNC after receiving said "MBMS Channel Type Inquiry Request" message, and then the DRNC sending a "MBMS Channel Type Inquiry Response" message to the SRNC, which contains information on cell identifier, type of radio bearers and related parameters, where the type of radio bearers containing MBMS channel type of the related cell;

c) reporting changes to the SRNC in time by the DRNC once the inquiry about service or channel type of cell of the DRNC changes; and

d) recording the type of channel inquired by the SRNC and if necessary , ensuring that other UEs can inquiry about this channel type information expediently without inquiring of the DRNC again.

2. A method for determining to provide a UE in a macro-diversity state with MBMS service channel provided in the present invention comprising steps of:

(1) examining an activation set of the UE that stays in the macro-diversity state by a SRNC to determine DRNCs to which the SRNC wants to send channel type inquiry for the type information on MBMS channels of corresponding cells;

(2) sending a "MBMS Channel Type Inquiry Request" message to the DRNC via the interface Iur after the SRNC determines the DRNC to inquire about, the message contains information on the identifier of the service to be inquired about, and the identifier of the related cell;

(3) recording information on the SRNC who sends said "MBMS Channel Type Inquiry Request" message, recording the identifier of the service that SRNC wants to inquire about and the identifier of the related cell by the

DRNC after receiving said "MBMS Channel Type Inquiry Request" message, and then the DRNC sending a "MBMS Channel Type Inquiry Response" message to the SRNC, which contains information on the cell identifier, the type of radio bearers and the related parameters, where the type of radio bearers containing the MBMS channel type of the related cell;

(4)determining the related cell and bearer mode for the UE in receiving the MBMS service by the SRNC according to the information on the type of channels in the cells of the UE's activation set; and

(5)configuring relevant network resources and notifying the UE of the information on MBMS radio bearer by the SRNC according to said decision, and the UE configuring the channel and receiving the MBMS data according to said information on the MBMS radio bearer, said information contains service identifier, cell identifier and radio bearer parameters.

3. The method according to Claim 2, wherein the method further comprising steps of: once the inquiry about service or channel type of DRNC's cell changes, reporting the changes to the SRNC in time by the DRNC; when the type of MBMS channel needs to be altered for the reason that the radio resource or the number of users of the DRNC's cell changes, sending an indication of the changes to the recorded SRNC by the DRNC, the SRNC recording the information on channel type and performing said step (4) and (5) again according to the changed channel type information.

4. The method according to Claim 3, wherein the method further comprising steps of: the SRNC recording the type of the inquiry about channel and if necessary, ensuring that other UEs can inquiry about this channel type information expediently without inquiring of the DRNC again.

5. The method according to Claim 3, wherein the method further comprising steps of:

examining the capability of the UE by the SRNC if the SRNC determines a PTM mode for the UE in receiving the MBMS data, and if the UE is not able to simultaneously receive data from both PTM channel and dedicated channel, the SRNC sending an indication to the UE, indicating that the UE should make a choice between the MBMS service and other services, either continuing the present service but giving up MBMS service, or giving up the present service but starting to receive MBMS service.

6. The method according to Claim 3, wherein the method further comprising steps of:

if determining the PTP mode for UE in receiving MBMS data, the SRNC sending a "Radio Bearer Reconfiguration" message to the UE, configuring current radio links and starting to bear the MBMS data via the current radio links.

7. The method according to Claim 5 or 6, wherein the method further comprising steps of:

when determining the cell for the UE in receiving MBMS data, the SRNC sending a "MBMS Connection Request" message to the DRNC where the cell in which the UE receives the MBMS data locates; and after receiving the "MBMS Connection Request" message, the DRNC updating a MBMS service context, and numbering this UE into that of the users of said service.

8. The method according to Claim 2, wherein the method further comprising steps of:

when receiving the MBMS service or any other service in the macro-diversity state CELL_DCH, the UE sending a survey report to the SRNC; according to the survey report, the SRNC determining whether to update the activation set or not, that is, whether to add some new cells into or remove some available cells from the activation set; if it needs to add some new cells into the activation set, checking whether the information on the type of channels of the new cells has been saved in the local MBMS service context or not firstly; if not, repeating said step (1) to (5); and if the type of channel has been altered, reconfiguring both the current radio links and the radio bearers for this UE.

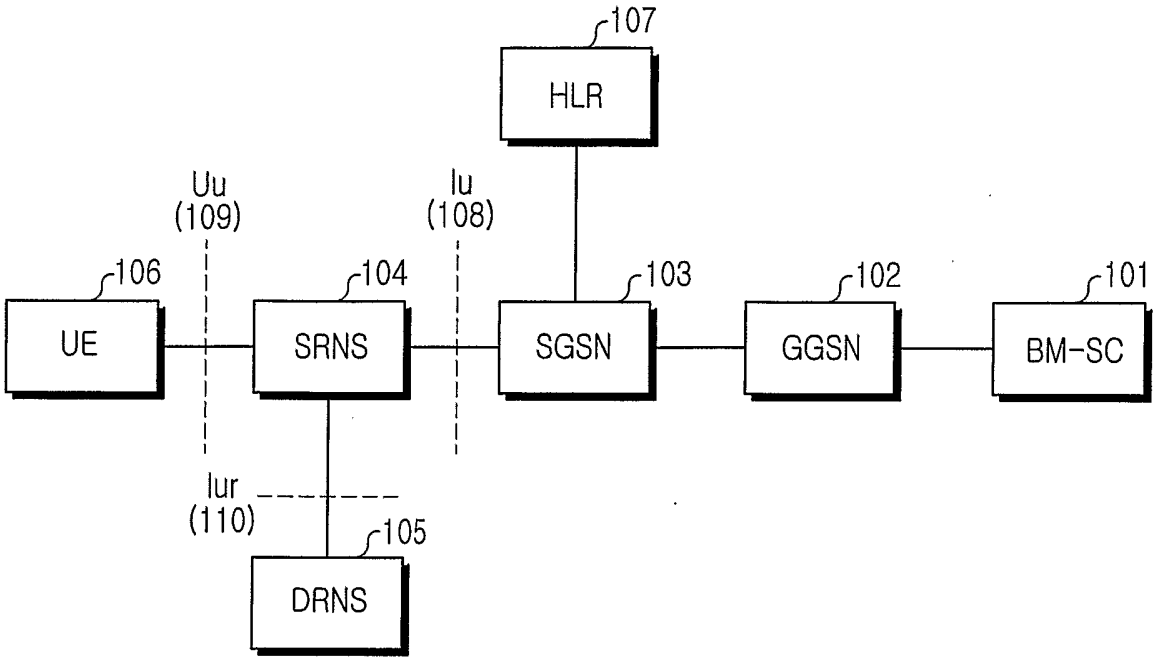

107
HLR
Uu
(109)
Iu
(108)
106
104
103
102
101
UE
SRNS
SGSN
GGSN
BM-SC
Iur
(110)
105
DRNS

FIG.1

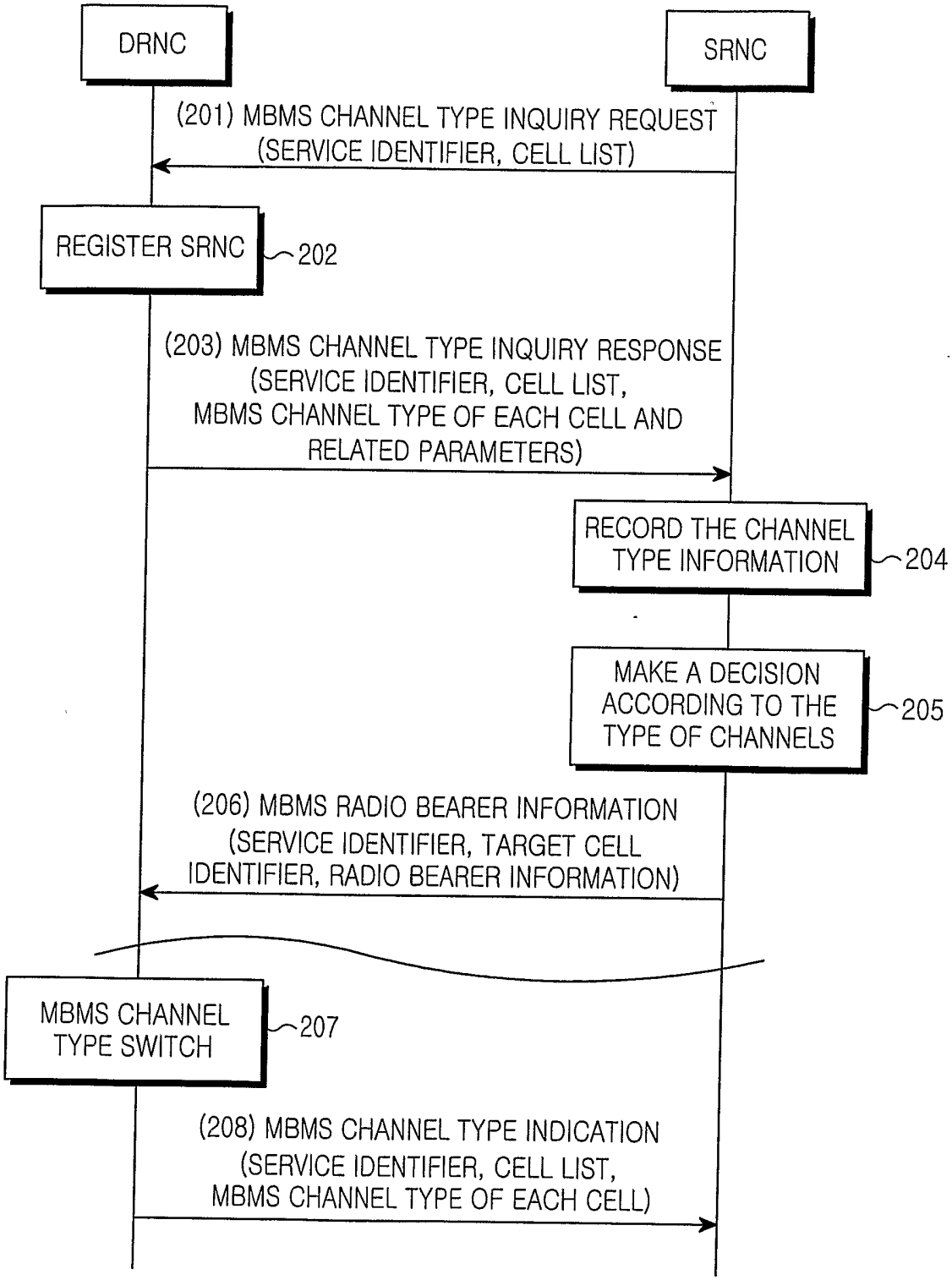

DRNC
SRNC
(201) MBMS CHANNEL TYPE INQUIRY REQUEST
(SERVICE IDENTIFIER, CELL LIST)
REGISTER SRNC
202
(203) MBMS CHANNEL TYPE INQUIRY RESPONSE
(SERVICE IDENTIFIER, CELL LIST,
MBMS CHANNEL TYPE OF EACH CELL AND
RELATED PARAMETERS)
RECORD THE CHANNEL TYPE INFORMATION
204
MAKE A DECISION ACCORDING TO THE TYPE OF CHANNELS
205
(206) MBMS RADIO BEARER INFORMATION
(SERVICE IDENTIFIER, TARGET CELL
IDENTIFIER, RADIO BEARER INFORMATION)
MBMS CHANNEL TYPE SWITCH
207
(208) MBMS CHANNEL TYPE INDICATION
(SERVICE IDENTIFIER, CELL LIST,
MBMS CHANNEL TYPE OF EACH CELL)

FIG.2

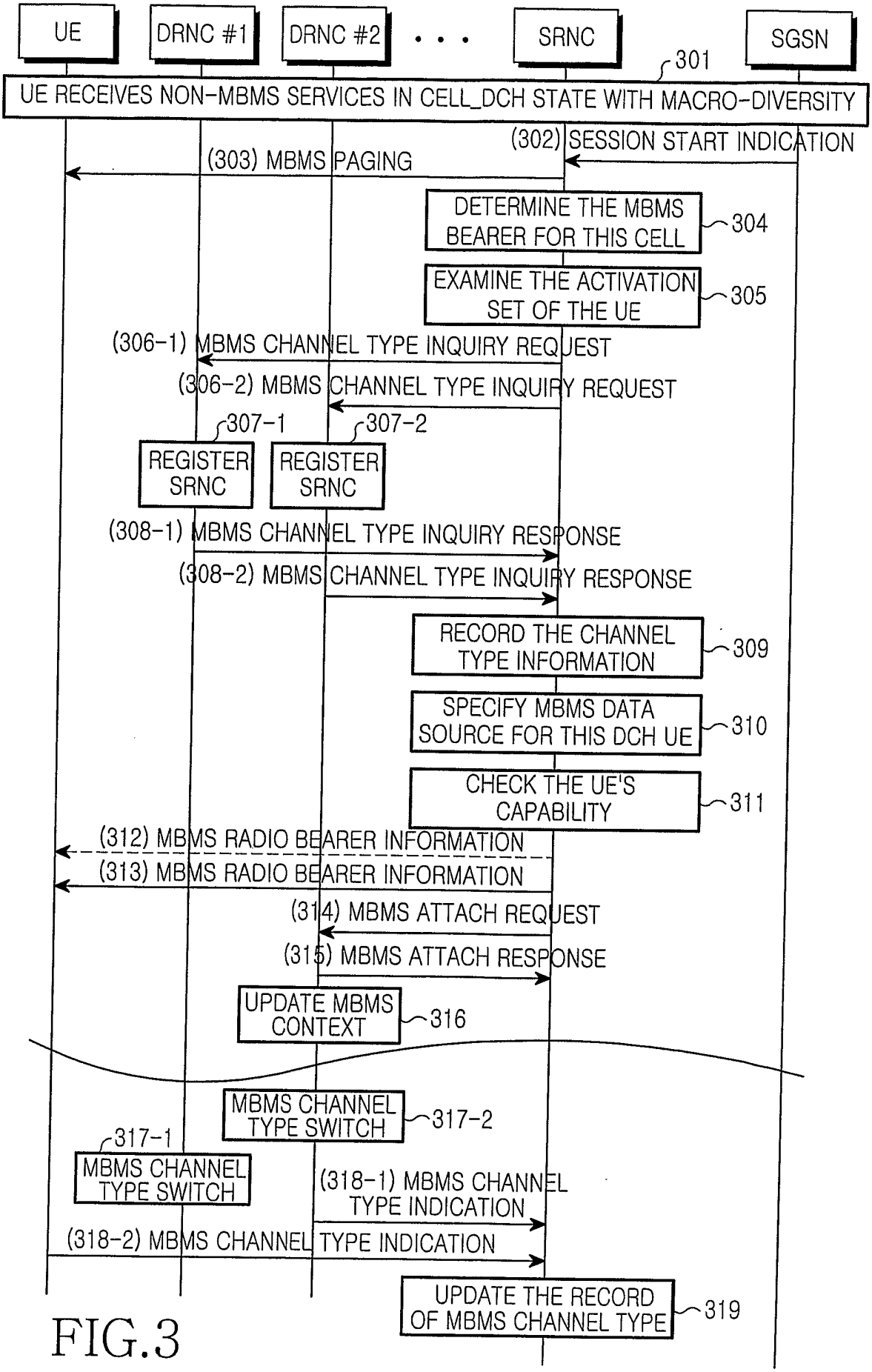

UE
DRNC #1
DRNC #2
SRNC
SGSN
301
UE RECEIVES NON-MBMS SERVICES IN CELL_DCH STATE WITH MACRO-DIVERSITY
(302) SESSION START INDICATION
(303) MBMS PAGING
DETERMINE THE MBMS BEARER FOR THIS CELL
304
EXAMINE THE ACTIVATION SET OF THE UE
305
(306-1) MBMS CHANNEL TYPE INQUIRY REQUEST
(306-2) MBMS CHANNEL TYPE INQUIRY REQUEST
307-1
307-2
REGISTER SRNC
REGISTER SRNC
(308-1) MBMS CHANNEL TYPE INQUIRY RESPONSE
(308-2) MBMS CHANNEL TYPE INQUIRY RESPONSE
RECORD THE CHANNEL TYPE INFORMATION
309
SPECIFY MBMS DATA SOURCE FOR THIS DCH UE
310
CHECK THE UE'S CAPABILITY
311
(312) MBMS RADIO BEARER INFORMATION
(313) MBMS RADIO BEARER INFORMATION
(314) MBMS ATTACH REQUEST
(315) MBMS ATTACH RESPONSE
UPDATE MBMS CONTEXT
316
MBMS CHANNEL TYPE SWITCH
317-2
317-1
MBMS CHANNEL TYPE SWITCH
(318-1) MBMS CHANNEL TYPE INDICATION
(318-2) MBMS CHANNEL TYPE INDICATION
UPDATE THE RECORD OF MBMS CHANNEL TYPE
319

FIG.3

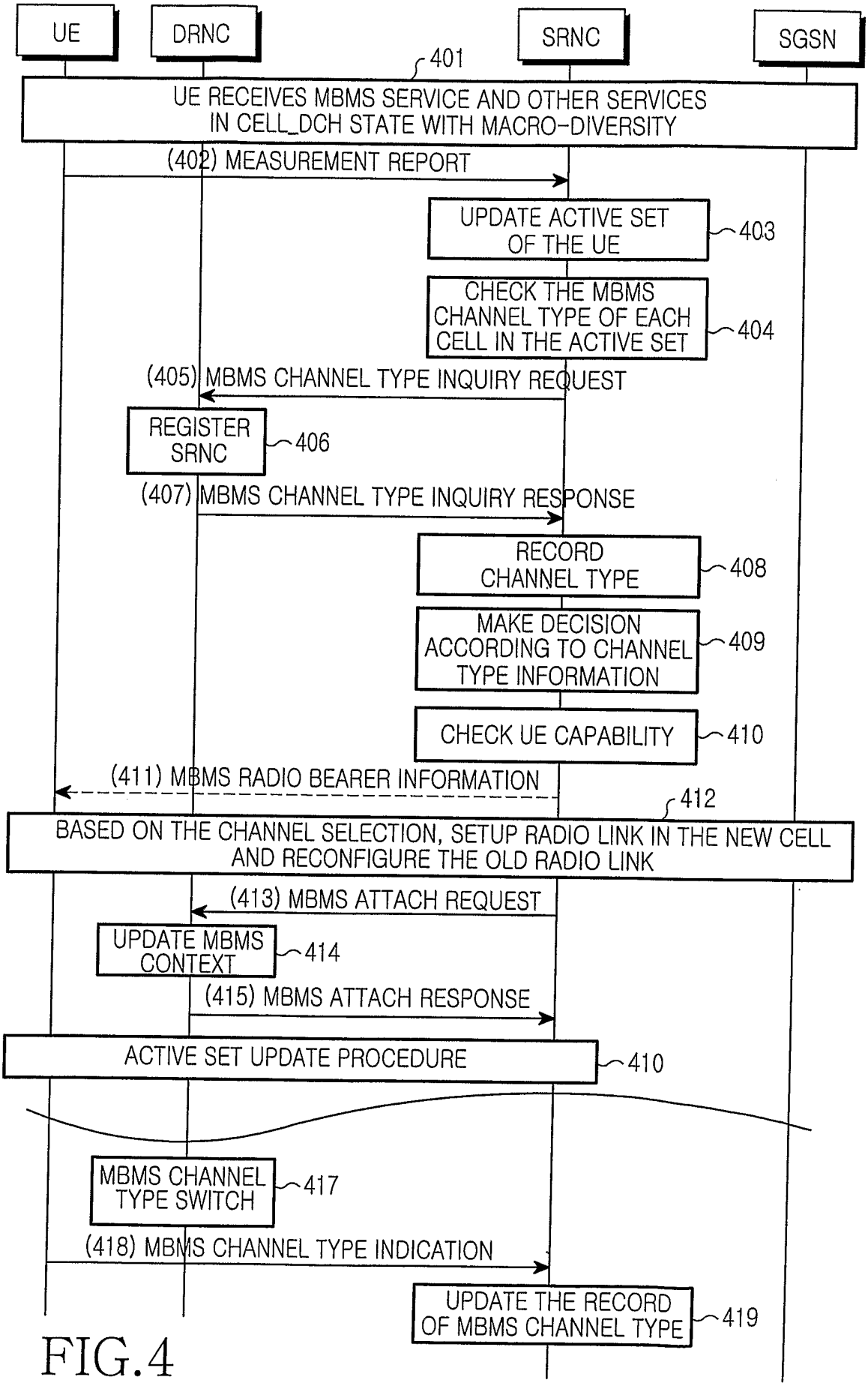

UE
DRNC
SRNC
SGSN
401
UE RECEIVES MBMS SERVICE AND OTHER SERVICES IN CELL_DCH STATE WITH MACRO-DIVERSITY
(402) MEASUREMENT REPORT
UPDATE ACTIVE SET OF THE UE
403
CHECK THE MBMS CHANNEL TYPE OF EACH CELL IN THE ACTIVE SET
404
(405) MBMS CHANNEL TYPE INQUIRY REQUEST
REGISTER SRNC
406
(407) MBMS CHANNEL TYPE INQUIRY RESPONSE
RECORD CHANNEL TYPE
408
MAKE DECISION ACCORDING TO CHANNEL TYPE INFORMATION
409
CHECK UE CAPABILITY
410
(411) MBMS RADIO BEARER INFORMATION
412
BASED ON THE CHANNEL SELECTION, SETUP RADIO LINK IN THE NEW CELL AND RECONFIGURE THE OLD RADIO LINK
(413) MBMS ATTACH REQUEST
UPDATE MBMS CONTEXT
414
(415) MBMS ATTACH RESPONSE
ACTIVE SET UPDATE PROCEDURE
410
MBMS CHANNEL TYPE SWITCH
417
(418) MBMS CHANNEL TYPE INDICATION
UPDATE THE RECORD OF MBMS CHANNEL TYPE
419

FIG.4

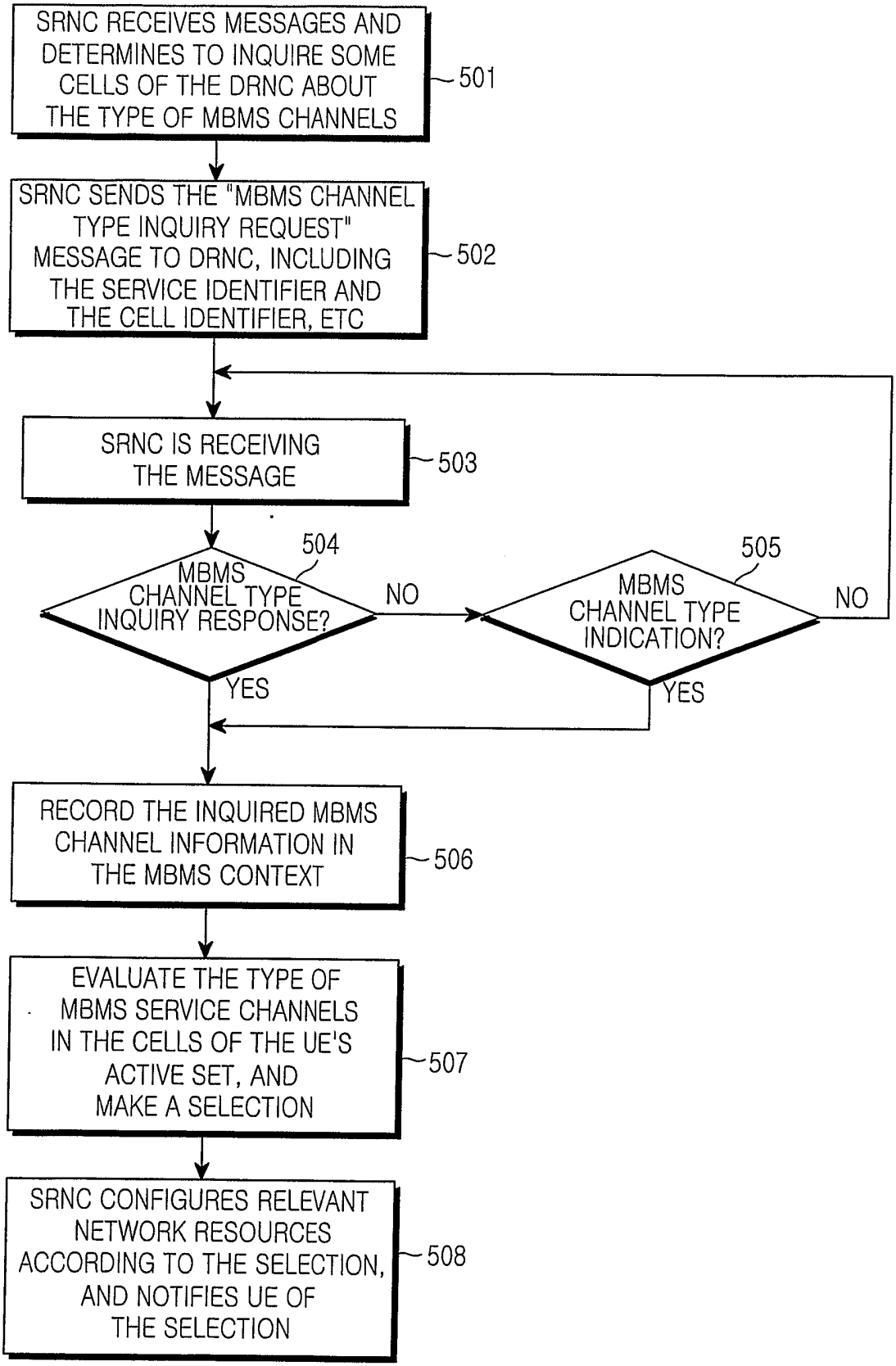

SRNC RECEIVES MESSAGES AND DETERMINES TO INQUIRE SOME CELLS OF THE DRNC ABOUT THE TYPE OF MBMS CHANNELS
501
SRNC SENDS THE "MBMS CHANNEL TYPE INQUIRY REQUEST" MESSAGE TO DRNC, INCLUDING THE SERVICE IDENTIFIER AND THE CELL IDENTIFIER, ETC
502
SRNC IS RECEIVING THE MESSAGE
503
504
MBMS CHANNEL TYPE INQUIRY RESPONSE?
NO
505
MBMS CHANNEL TYPE INDICATION?
NO
YES
YES
RECORD THE INQUIRED MBMS CHANNEL INFORMATION IN THE MBMS CONTEXT
506
EVALUATE THE TYPE OF MBMS SERVICE CHANNELS IN THE CELLS OF THE UE'S ACTIVE SET, AND MAKE A SELECTION
507
SRNC CONFIGURES RELEVANT NETWORK RESOURCES ACCORDING TO THE SELECTION, AND NOTIFIES UE OF THE SELECTION
508

FIG.5

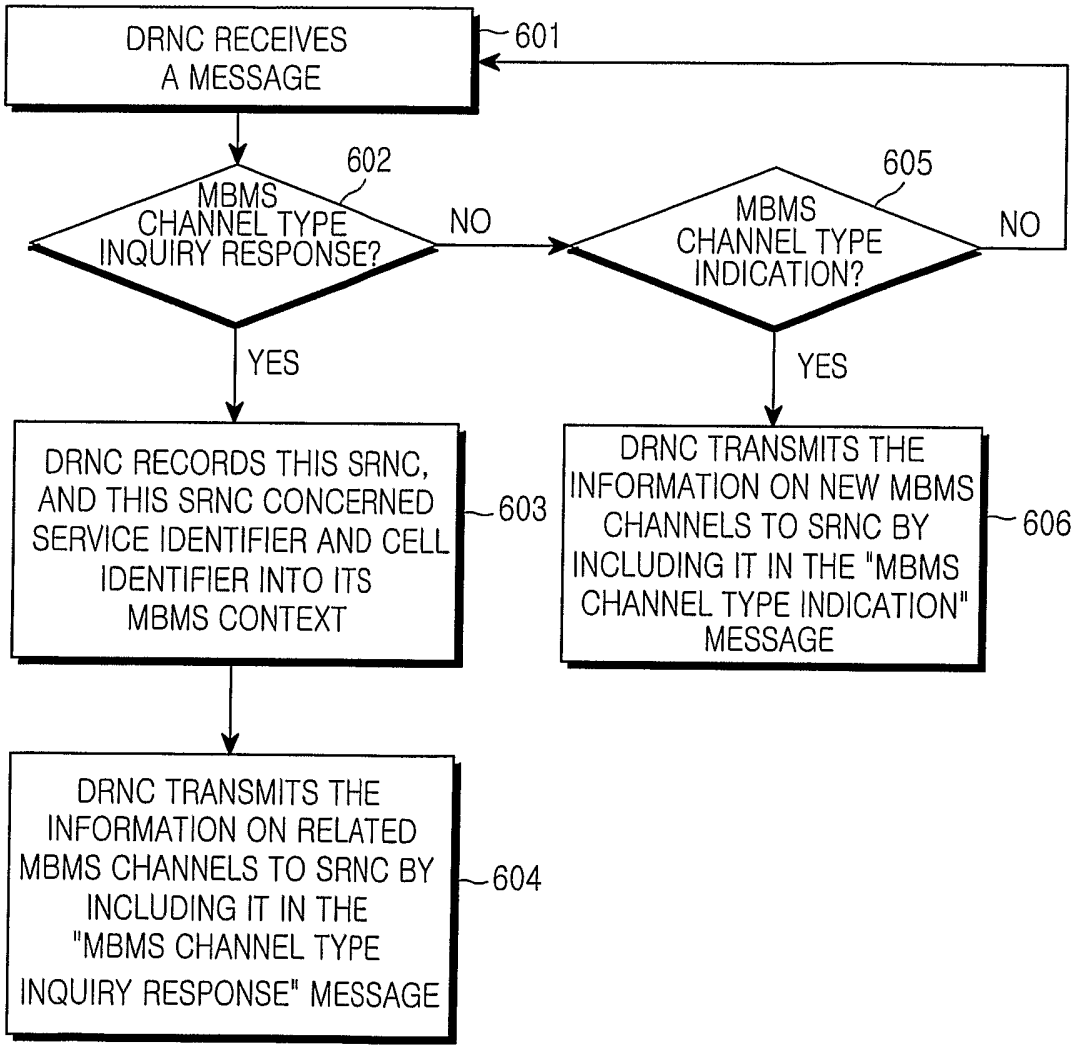

DRNC RECEIVES A MESSAGE
601
MBMS CHANNEL TYPE INQUIRY RESPONSE?
602
NO
YES
MBMS CHANNEL TYPE INDICATION?
605
NO
YES
DRNC RECORDS THIS SRNC, AND THIS SRNC CONCERNED SERVICE IDENTIFIER AND CELL IDENTIFIER INTO ITS MBMS CONTEXT
603
DRNC TRANSMITS THE INFORMATION ON NEW MBMS CHANNELS TO SRNC BY INCLUDING IT IN THE "MBMS CHANNEL TYPE INDICATION" MESSAGE
606
DRNC TRANSMITS THE INFORMATION ON RELATED MBMS CHANNELS TO SRNC BY INCLUDING IT IN THE "MBMS CHANNEL TYPE INQUIRY RESPONSE" MESSAGE
604

FIG.6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2004/002121

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 H04B 7/26

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)
IPC7 H04B 7/26, H04Q 7/24, H04L 12/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
KOREAN PATENTS AND APPLICATIONS FOR INVENTIONS SINCE 1975
KOREAN UTILITY MODELS AND APPLICATIONS FOR UTILITY MODELS SINCE 1975

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search terms used)
KIPASS, DELPHION & Keywords : MBMS, radio, network, controller, serving, drift, channel, type and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 02/43282 A1 (SAMSUNG ELECTRONICS CO., LTD) 30 May 2002 * the whole document *	1 - 8
A	WO 03/030568 A1 (TELEFONATIEBOLAGET LM ERICSSON) 10 April 2003 * the whole document *	1 - 8
A	US 2002/ 0151304 A1 (WILLIAM D. HOGAN) 17 OCTOBER 2002 * the whole document *	1 - 8
P, A	WO 2004/017580 A1 (SAMSUNG ELECTRONICS CO., LTD) 26 February 2004 * the whole document *	1 - 8

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"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	Date of mailing of the international search report
30 NOVEMBER 2004 (30.11.2004)	**30 NOVEMBER 2004 (30.11.2004)**

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Republic of Korea
Facsimile No. 82-42-472-7140

Authorized officer
SHIN, Jun Ho
Telephone No. 82-42-481-8129

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR2004/002121

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