US009271173B2

(12) **United States Patent**
Xu et al.

(10) **Patent No.: US 9,271,173 B2**
(45) **Date of Patent: *Feb. 23, 2016**

(54) **METHOD AND SYSTEM FOR COLLECTING STATISTICS ON USER EQUIPMENT INFORMATION IN MULTIMEDIA BROADCAST MULTICAST SERVICE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 141 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/816,464**

(22) PCT Filed: **Mar. 24, 2011**

(86) PCT No.: **PCT/CN2011/072095**

§ 371 (c)(1),
(2), (4) Date: **Feb. 11, 2013**

(87) PCT Pub. No.: **WO2012/019461**

PCT Pub. Date: **Feb. 16, 2012**

(65) **Prior Publication Data**

US 2013/0142072 A1 Jun. 6, 2013

(30) **Foreign Application Priority Data**

Aug. 12, 2010 (CN) 2010 1 0254987

(51) **Int. Cl.**
H04H 20/71 (2008.01)
H04W 24/08 (2009.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H04W 24/08*** (2013.01); *H04W 4/06* (2013.01); *H04W 24/04* (2013.01); *H04W 72/005* (2013.01); *H04W 72/0413* (2013.01)

(58) **Field of Classification Search**
CPC H04W 24/08; H04W 4/06; H04W 76/002; H04W 76/027; H04W 72/005
USPC 370/252–254, 328, 347, 312, 241, 370/241.1, 329, 330, 390, 331, 395, 230, 370/230.1, 310, 311, 332, 341, 401, 432, 370/445, 465, 480; 455/450, 436, 422.1, 455/452.1, 452.2, 466, 511, 522, 338, 455/412.2, 414.1, 414.2, 434, 435.2, 437, 455/438, 439, 442, 443, 447, 448, 451, 453, 455/454, 458, 464, 510, 515, 62, 69, 70
See application file for complete search history.

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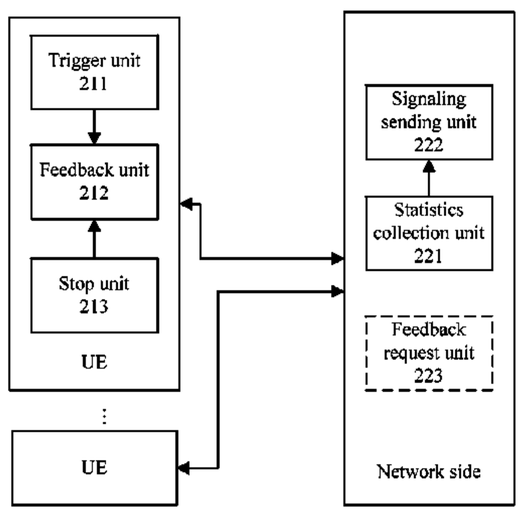
(57) **ABSTRACT**

The disclosure provides a method and system for collecting statistics of UE information in MBMS. A UE sends a dedicated RRC signaling carrying feedback information to a network side when a trigger condition is satisfied; the network side collecting statistics of UE information according to the feedback information and sends, when the collected statistics satisfy a requirement, a feedback stop indicator to the UE; and the UE stops sending the feedback information after receiving the feedback stop indicator. With the solutions, statistics of the UE information can be collected by the network side, and the requirements for activating or deactivating the MBSFN transmission mode of the MBMS service by the network side can be met; the network side instructs the UE to stop feeding back with full consideration of load of uplink resources, so that load of uplink resources can be reduced, and uplink resources can be saved.

17 Claims, 1 Drawing Sheet



(51) **Int. Cl.**

H04W 4/06	(2009.01)
H04W 72/00	(2009.01)
H04W 72/04	(2009.01)
H04W 24/04	(2009.01)

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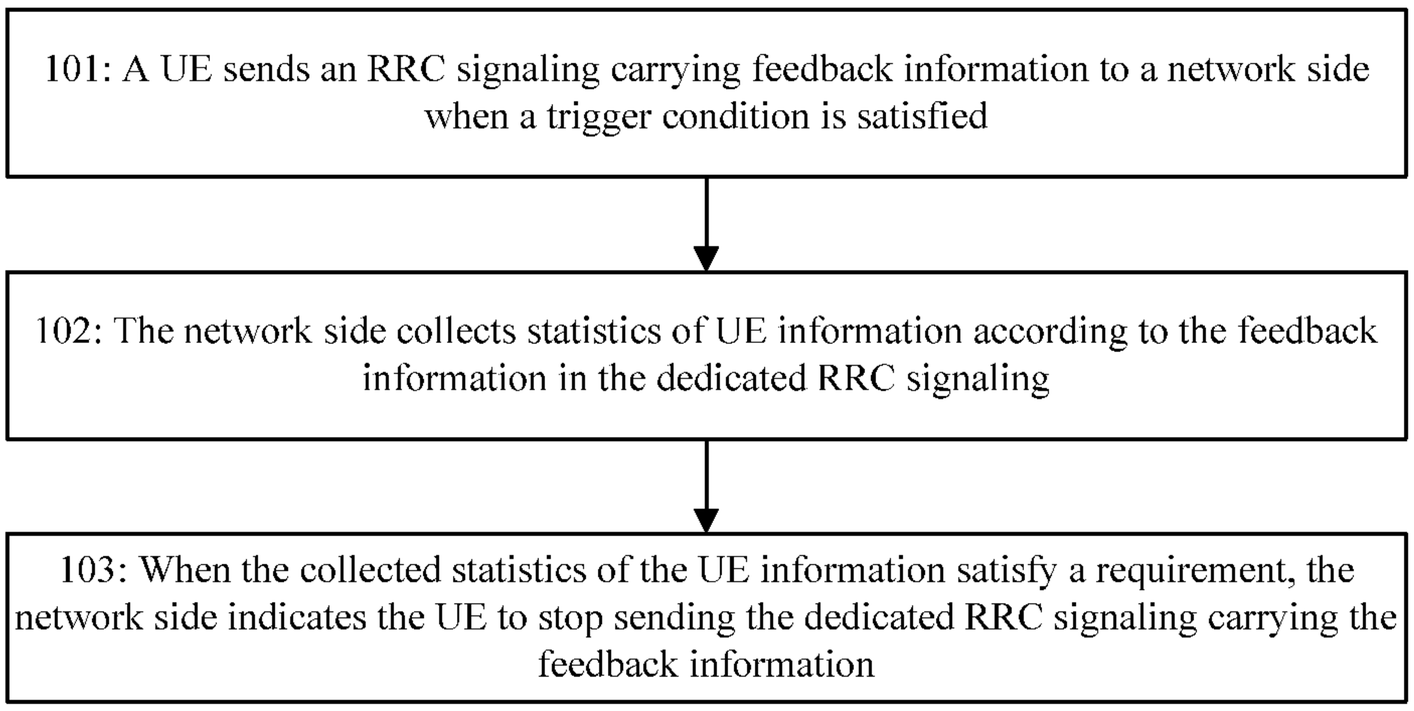
101: A UE sends an RRC signaling carrying feedback information to a network side when a trigger condition is satisfied
102: The network side collects statistics of UE information according to the feedback information in the dedicated RRC signaling
103: When the collected statistics of the UE information satisfy a requirement, the network side indicates the UE to stop sending the dedicated RRC signaling carrying the feedback information

Fig. 1

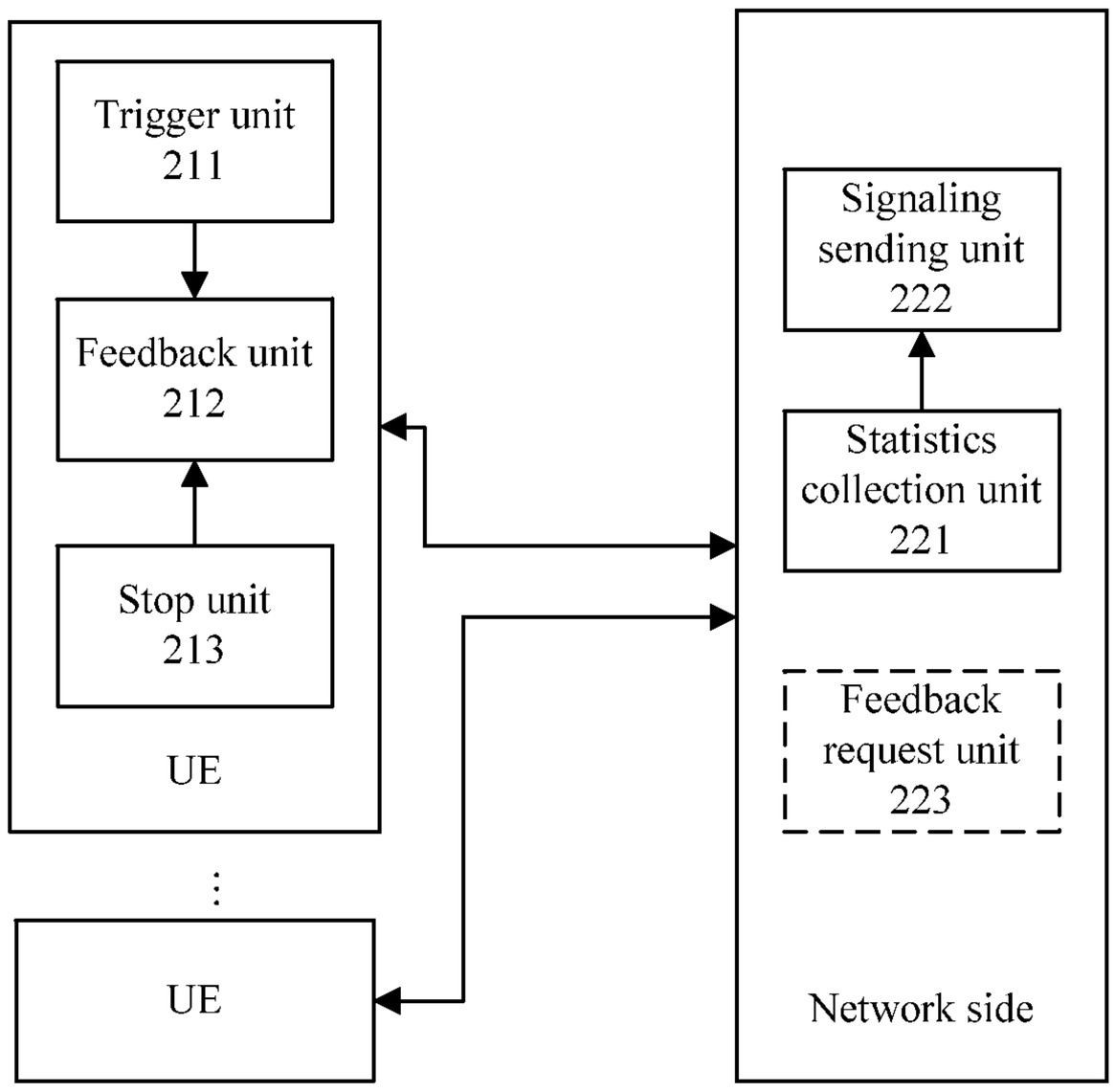
Trigger unit 211
Feedback unit 212
Stop unit 213
UE
UE
Signaling sending unit 222
Statistics collection unit 221
Feedback request unit 223
Network side

Fig. 2

METHOD AND SYSTEM FOR COLLECTING STATISTICS ON USER EQUIPMENT INFORMATION IN MULTIMEDIA BROADCAST MULTICAST SERVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is the U.S. National Phase application under 35 U.S.C. §371 of International Application PCT/CN2011/072095, filed Mar. 24, 2011, which claims priority to Chinese Application 201010254987.1, filed Aug. 12, 2010.

TECHNICAL FIELD

The disclosure relates to a feedback technology of a User Equipment (UE) in a Multimedia Broadcast Multicast Service (MBMS) system, in particular to a method and a system for collecting statistics of UE information in an MBMS.

BACKGROUND

In order to effectively utilize mobile network resources, a 3rd Generation Partnership Project (3GPP) proposes an MBMS service. As a technology of transmitting data to a plurality of target mobile terminals from one data source, the MBMS service realizes share of network (comprising a core network and an access network) resources, and improves a utilization ratio of the network resources, particularly, air interface resources.

In a Long Term Evolution (LTE) system, when a UE is notified that a certain MBMS service is going to change (these changes can be a session start, a service bearer update or a session stop or the like), Downlink Control Information (DCI) and an MBMS-Radio Network Temporary Identifier (M-RNTI) can be sent on a Physical Downlink Control Channel (PDCCH) first, and then, the UE further reads a specific MBMS point-to-multipoint Control Channel (MCCH) message according to related information in the DCI, this is called MCCH notification mechanism. Specific service configuration parameters, such as a service ID, a Radio Link Control (RLC) parameter of a service, a Media Access Control (MAC) parameter and a physical layer configuration parameter and the like, will be sent on the MCCH.

In the LTE system, there are two bearing modes for the MBMS: a broadcast mode and an enhanced broadcast mode. As a multicast mode is not provided, a network side is unable to know which MBMS services the UE receives or is interested in receiving. As a mode between the broadcast mode and the multicast mode, the enhanced broadcast mode absorbs advantages of the simple flow in broadcast and advantages of optimized resources in multicast. In a case that the enhanced broadcast mode of the MBMS is used for bearing, it only needs to implement a join/leave process in an application layer to realize a registration/cancellation from the UE to a Broadcast Multicast-Service Center (BM-SC), no signaling interaction and information storage are needed in a bearing network layer. The enhanced broadcast is an optimization and extension of the broadcast, for example, in the access network, in a case of the enhanced broadcast, data will not be sent to a cell under which there is no UE accessed. For the MBMS service under the enhanced broadcast mode, during the configuration of a System Frame Number (SFN) and the allocation of resources, the status and number of UEs receiving the MBMS service are required to be considered, and this needs the UEs that receive or are interested in receiving the MBMS service to feed back information, it is called an uplink feedback of the MBMS. For a 3GPP Rel-10 MBMS, in order to activate/deactivate a Multicast Broadcast Single Frequency Network (MBSFN) transmission mode, the network side needs to obtain reception status information of the UEs, for example, information about the number of the UEs that are receiving a specific MBMS service.

In order to enable the network side to obtain the number of users with requirements on the MBMS service in each cell, a counting process is introduced in the MBMS system. The counting process is a process in which the network side initiates to count the number of users that receive or are interested in receiving a certain MBMS service when one MBMS session starts or during the session (also called recounting), so as to confirm whether to employ the MBSFN transmission mode. When the network side prepares to initiate a counting/recounting process, an ID and an access probability of the MBMS service are added in access information (access info) of the MCCH. The access probability is used because not all users are needed to establish a connection for feedback, as long as the number of feedbacks reaches a threshold; otherwise uplink congestion may be caused in a case that there are many users in an idle status.

In a conventional technology, the 3GPP Rel-10 MBMS needs a method for controlling the activation or deactivation of the MBSFN transmission mode. The method is to be based on statistics of UE information performed by the network side; however, there is no specific solution at present about how to collect statistics of the UE information by the network side.

SUMMARY

In view of the above, the disclosure provides a method and a system for collecting statistics of UE information in an MBMS, so as to realize the statistics of the UE information performed by the network side, reduce a load of uplink resources, and save the uplink resources.

The technical solution of the disclosure is implemented as follows.

The disclosure provides a method for collecting statistics of UE information in an MBMS, and the method comprises:

a UE sending a dedicated Radio Resource Control (RRC) signaling carrying feedback information to a network side when a trigger condition is satisfied;

the network side collecting statistics of UE information according to the feedback information in the dedicated RRC signaling, and sending, when the collected statistics of the UE information satisfy a requirement, a feedback stop indicator to the UE; and

the UE stopping sending the feedback information after receiving the feedback stop indicator.

In the above solution, the trigger condition comprises: a trigger by the network side and/or an active trigger by the UE, wherein

the trigger by the network side is that: the network side sends a feedback request to trigger a feedback;

the active trigger by the UE is that: a feedback cycle is set and the feedback is triggered when the feedback time arrives; or, a trigger event is set and the feedback is triggered when the trigger event occurs.

In the above solution, the dedicated RRC signaling carrying the feedback information comprises a new RRC signaling which is created according to an RRC rule and is used to carry the feedback information dedicatedly.

In the above solution, the feedback information comprises a service identification (ID), and at least one of the following: a UE status and an area ID; wherein

the UE status comprises at least one of the following: interested in receiving, not interested in receiving, start to receive, stop receiving, receiving bearer change, cell update and cell handover;

the area ID comprises: a Multicast Broadcast Single Frequency Network (MBSFN) area ID, or a notification indicator;

the service ID comprises: a Temporary Mobile Group Identity (TMGI), and/or an MBMS service ID, and/or a Physical Multicast Channel (PMCH) ID, and/or a Logic Channel Identification (LCID), and/or a session ID, and/or a service list index, and/or a service guidance ID.

In the above solution, the feedback stop indicator is implemented by creating a new RRC signaling, or using an existing RRC signaling, to carry an identifier indicating the UE to stop sending the dedicated RRC signaling carrying the feedback information.

In the above solution, the existing RRC signaling comprises at least one of the following: an RRC connection setup message, an RRC connection reconfiguration message, an RRC connection re-establishment message, an RRC connection re-establishment rejection message, an RRC connection release message, an RRC connection rejection message, an MBMS point-to-multipoint Control CHannel (MCCH) message, and a System Information Block 13 (SIB13) message.

In the above solution, the step of the UE sending the dedicated RRC signaling carrying the feedback information to the network side comprises:

if a UE status does not change within one feedback cycle and a feedback request is received only once, the UE sending the dedicated RRC signaling carrying the feedback information once;

if the UE status changes within one feedback cycle or the feedback request is received more than once, the UE sending the dedicated RRC signaling carrying the feedback information each time the UE status changes or each time the UE receives the feedback request.

In the above solution, a change of a UE reception status comprises at least one of the following: a change from not interested in receiving to interested in receiving, a change from interested in receiving to not interested in receiving, a change from not receive to start to receive, a change from receiving to stop receiving, and a change in a receiving bearer.

The disclosure provides a system for collecting statistics of User Equipment (UE) information in a Multimedia Broadcast Multicast Service (MBMS), comprising: a UE and a network side; wherein

the UE is configured to send a dedicated Radio Resource Control (RRC) signaling carrying feedback information to the network side according to a trigger condition, and stop sending the dedicated RRC signaling carrying the feedback information after receiving a feedback stop indicator sent by the network side;

the network side is configured to receive the dedicated RRC signaling sent by the UE, collect statistics of UE information according to the feedback information in the dedicated RRC signaling, and send, when the collected statistics of the UE information satisfy a requirement, the feedback stop indicator to the UE.

In the above solution, the UE comprises a trigger unit, a feedback unit and a stop unit, wherein

the trigger unit is configured to trigger the feedback unit according to the trigger condition;

the feedback unit is configured to send the dedicated RRC signaling carrying the feedback information to the network side;

the stop unit is configured to notify, after receiving the feedback stop indicator from the network side, the feedback unit to stop sending the dedicated RRC signaling carrying the feedback information;

the network side comprises: a statistics collection unit and a signaling sending unit, wherein

the statistics collection unit is configured to receive the dedicated RRC signaling sent by the UE, collect the statistics according to the feedback information in the dedicated RRC signaling, and notify the signaling sending unit when the collected statistics of the UE information satisfy the requirement;

the signaling sending unit is configured to send the feedback stop indicator to the UE.

In the above solution, when the trigger condition is that the network side sends a feedback request to trigger a feedback, the network side further comprises a feedback request unit configured to send the feedback request to the UE;

correspondingly, the trigger unit is further configured to receive the feedback request sent by the network side.

In the above solution, the statistics collection unit is specifically configured to count the number of UEs in different statuses currently in each service according to a UE status, an area identification (ID) and a service ID included in the feedback information in the dedicated RRC signaling.

In the above solution, the trigger unit is further configured to trigger the feedback unit when detecting that a UE status of the UE, in which the trigger unit is located, changes.

The disclosure provides a receiving unit for use in a Multimedia Broadcast Multicast Service (MBMS) system, wherein the receiving unit comprises:

means for receiving a feedback request and/or a feedback stop indicator; and

means for sending a dedicated Radio Resource Control (RRC) signaling carrying feedback information to a transmitting unit.

In the above solution, the receiving unit is a User Equipment (UE).

According to the method and system for collecting statistics of UE information in an MBMS in the disclosure, a UE sends a dedicated RRC signaling carrying feedback information to a network side when a trigger condition is satisfied; the network side collects statistics of UE information according to the feedback information in the dedicated RRC signaling, and sends, when the collected statistics of the UE information satisfy a requirement, a feedback stop indicator to the UE; the UE stops sending the feedback information after receiving the feedback stop indicator. In this way, the statistics of the UE information can be collected by the network side, and the requirements for activating or deactivating the MBSFN transmission mode of the MBMS service by the network side can be met. In accordance with the method, the network side can instruct the UE to stop feeding back with full consideration of a load of uplink resources, so that the load of the uplink resources can be reduced, and the uplink resources can be saved.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a flow diagram of a method for collecting statistics of UE information in an MBMS in an embodiment of the disclosure;

FIG. **2** is a structure diagram of a system for collecting statistics of UE information in an MBMS in an embodiment of the disclosure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

A basic principle of the embodiments of the disclosure comprises that: a UE sends a dedicated RRC signaling carrying feedback information to a network side when a trigger condition is satisfied; the network side collects statistics of UE information according to the feedback information in the dedicated RRC signaling, and sends, when the collected statistics of the UE information satisfy a requirement, a feedback stop indicator to the UE; the UE stops sending the feedback information after receiving the feedback stop indicator; and the network side adjusts a service transmission mode according to a result of the statistics.

In the above, the trigger condition can be: a trigger by the network side or an active trigger by the UE. The trigger by the network side is that: the network side sends a feedback request to trigger a feedback. The active trigger by the UE is that: a feedback cycle is set and the feedback is triggered when the feedback time arrives; or, a trigger event is set and the feedback is triggered when the trigger event occurs.

The feedback information comprises a service ID, and at least one of the following: a UE status and an area ID.

The UE status comprises at least one of the following: interested in receiving, not interested in receiving, start to receive, stop receiving, receiving bearer change, cell update and cell handover and the like. The area ID comprises: an MBSFN area ID, or a notification indicator. The service ID comprises: a TMGI, and/or an MBMS service ID, and/or a PMCH ID, and/or an LCID, and/or a session ID, and/or a service list index, and/or a service guidance ID or the like. In the above, interested in receiving means that: the UE intends to receive an MBMS service via an MBSFN mode and is monitoring a change notification message on the MCCH; not interested in receiving means that: the UE does not intend to receive the MBMS service via the MBSFN mode and is not monitoring the change notification message on the MCCH.

The feedback information further comprises at least one of the following: a reception capability indicator of the UE and a UE ID.

The reception capability indicator of the UE is used to indicate a capability of the UE in receiving the MBSFN transmission and can be expressed by one bit, and the reception capability indicator information is used to realize a service continuity during the movement of the UE. The UE ID is used to distinguish that same UE sends a same feedback for many times within one feedback cycle. The service guidance ID indicates an MBMS service not started and is used to count the number of UEs that are interested in receiving the service.

The disclosure will be further described in details below with reference to drawings and specific embodiments.

The method for collecting statistics of UE information in an MBMS in an embodiment of the disclosure, as shown in FIG. **1**, comprises the following steps.

Step **101**: A UE sends a dedicated RRC signaling carrying feedback information to a network side when a trigger condition is satisfied.

In this step, the trigger condition can be: a trigger by the network side and/or an active trigger by the UE. The trigger by the network side is that: the network side sends a feedback request to trigger a feedback; the active trigger by the UE is that: a feedback cycle is set and the feedback is triggered when the feedback time arrives; or, a trigger event is set and the feedback is triggered when the trigger event occurs.

The feedback cycle can be selected by the UE itself, or specified by the network side via an RRC message or an MAC message. Preferably, the feedback cycle selected by the UE itself can be one or more MCCH modification cycle or one or more MBMS Service Channel (MCH) scheduling cycle. Preferably, the cycle is generally shorter than a duration of a service session.

The trigger event can be a session start of an MBMS service, a session stop of an MBMS service, a bearer change indication, a cell update, a cell handover or the like.

The step that the network side sends a feedback request can be that: the network side indicates the UE to send the feedback information via an RRC message or an MAC message. Preferably, the RRC message can be an MCCH message or a system message.

The feedback request comprises an MBMS service ID and a probability factor. The MBMS service ID is used to indicate services needing statistics of the UE information, wherein the services are those within the range of one MBSFN area, that is, the statistics of the UE information are collected in a unit of the MBSFN area, and there can be one or more MBMS service IDs. The probability factor is used to indicate the number of UEs that send the feedback information simultaneously, for example, if the probability factor is 0.5, the UEs that receive the service request are valued randomly from 0 to 1 and the UE with a value less than 0.5 sends the feedback information; if the probability factor is 0, it is indicated that the network side requires the UE to stop feeding back; if the probability factor is 1, it is indicated that the number of UEs participating in feedback is not limited.

In the above, within one feedback cycle, after the UE is triggered to feed back once, the UE can send the feedback information continuously according to a trigger event or a feedback request from the network side; that is, within one feedback cycle, the UE can send the feedback information once or multiple times. Preferably, if a UE status does not change within one feedback cycle and the UE only receives the feedback request once, the UE sends the dedicated RRC signaling carrying the feedback information once, and it can send the dedicated RRC signaling carrying feedback information when receiving the feedback request; if the UE status changes within one feedback cycle or the UE receives the feedback request more than once, the UE sends the dedicated RRC signaling carrying the feedback information each time the UE status changes or each time the UE receives the feedback request. The change of a UE reception status comprises at least one of the following: a change from not interested in receiving to interested in receiving, a change from interested in receiving to not interested in receiving, a change from not receive to start to receive, a change from receiving to stop receiving, and a change in a receiving bearer.

In this step, the UE is a UE having an MBMS reception capability. The UE can be in an RRC connected status or an RRC idle status, and it also may be or not be receiving a service. The network side comprises an eNodeB (eNB) and an MBMS Coordination Entity (MCE); wherein the MCE, as a logic entity, can exist independently or exist as a part of other network elements, for example, a part of the eNB. Preferably, the network side also can be a relay or a Home eNodeB (HeNB) or the like.

The dedicated RRC signaling carrying the feedback information is specifically: a new RRC signaling which is created according to an RRC rule to carry the feedback information dedicatedly and is named as MBMSReceptionStatusReport. If the MBMSReceptionStatusReport signaling is sent unsuccessfully, the UE can resend the MBMSReceptionStatusReport signaling or stop sending the MBMSReceptionStatusReport signaling according to an indicator from the network side. The MBMSReceptionStatusReport signaling can be sent via a logical channel, e.g., a Common Control CHannel

(CCCH) or a Dedicated Control Channel (DCCH), a default configuration of a physical layer and an MAC layer can be employed, and a transmission mode of Un-acknowledgement Mode (UM) is employed in an RLC layer. The UE should be in the RRC connected status when sending the MBMSReceptionStatusReport signaling, that is, if the UE is in the RRC idle status, the UE needs to enter the RRC connected status before sending the MBMSReceptionStatusReport signaling. The UE first initiates a random access process and sends an RRC connection establishment request, wherein the reason for the RRC connection establishment is set as an MBMS reception, if the RRC connection is established successfully, the UE sends the MBMSReceptionStatusReport signaling via corresponding uplink resources, otherwise, the UE requests for random access again. When the UE is triggered to send the MBMSReceptionStatusReport signaling to the network side according to the trigger condition, if the UE is scheduled, the UE sends the feedback information via existing uplink resources; otherwise, the UE requests for uplink resources via a Scheduling Request (SR) or a Buffer Status Report (BSR) to send the feedback information.

The feedback information comprises a service ID, and at least one of the following: a UE status and an area ID.

The UE status comprises at least one of the following: interested in receiving, not interested in receiving, start to receive, stop receiving, receiving bearer change, cell update and cell handover and the like. The area ID comprises: an MBSFN area ID, or a notification indicator. The service ID comprises: a TMGI, and/or an MBMS service ID, and/or a PMCH ID, and/or an LCID, and/or a session ID, and/or a service list index, and/or a service guidance ID or the like.

The feedback information further comprises at least one of the following: a reception capability indicator of the UE and a UE ID.

Step **102**: The network side collects statistics of UE information according to the feedback information in the dedicated RRC signaling.

In this step, the reception of the feedback information is generally completed within a period of time. Preferably, one or more corresponding timers are set, wherein the duration of each timer is generally shorter than the duration of the MBMS session on which the statistics are to be collected. When the UE starts to feed back the feedback information, the timer is started, when the timer turns to 0, the network side stop receiving the feedback information.

The network side collects the statistics of the UE information according to the feedback information in the dedicated RRC signaling, and this step generally comprises: the network side counts the number of UEs in different statuses currently in each service according to the UE status, the area ID and the service ID included in the feedback information in the dedicated RRC signaling.

Preferably, when the trigger condition is that the network side sends a feedback request to trigger feedback, the network side counts the number of UEs in different statuses currently in each service in the MBSFN area according to the probability factor in the sent feedback request.

Within the period of time, if not receiving any feedback information from the UE, the network side will regard that the UE stop receiving or is not interested in receiving the MBMS service. Within the period of time, if receiving a plurality of pieces of same feedback information from the same UE, the network side can collect the statistics once.

Preferably, if the system for the MBMS service also comprises UEs of systems prior to Rel-10, for example, UEs of Rel-9 system, as the UEs of the Rel-9 system have no feedback capability, the number of UEs of all MBMS services in the system can be estimated approximately by determining a scale factor according to the scale of the UEs of Rel-9 system to the UEs of Rel-10 system in the system for the MBMS service.

Step **103**: When the collected statistics of the UE information satisfy a requirement, the network side indicates the UE to stop sending the dedicated RRC signaling carrying the feedback information.

Specifically, the network side sends a feedback stop indicator to the UE when the collected statistics of the UE information satisfy a requirement; the UE stops sending the dedicated RRC signaling carrying the feedback information after receiving the feedback stop indicator. Generally, when the counted number of UEs that send the dedicated RRC signaling has reached a preset threshold, or when a reception time of the feedback information ends, the collected statistics of the UE information is considered to satisfy the requirement. The feedback stop indicator can be implemented by creating a new RRC signaling, or using an existing RRC signaling, to carry an identifier indicating the UE to stop sending the dedicated RRC signaling carrying the feedback information.

The existing RRC signaling comprises at least one of the following: an RRC connection setup message, an RRC connection reconfiguration message, an RRC connection re-establishment message, an RRC connection re-establishment rejection message, an RRC connection release message, an RRC connection rejection message, an MCCH message, and an SIB13 message.

In the embodiment, the requirements for activating or deactivating the MBSFN transmission mode of the MBMS service by the network side are met, simultaneously, the network side can instruct the UE to stop feeding back according to the method, so that the load of the uplink resources can be reduced, and the uplink resources can be saved.

To implement the above method, an embodiment of the disclosure provides a system for collecting statistics of UE information in an MBMS, as shown in FIG. **2**, comprising: at least one UE and a network side.

The UE is configured to send a dedicated RRC signaling carrying feedback information to the network side according to a trigger condition, and stop sending the dedicated RRC signaling carrying the feedback information after receiving a feedback stop indicator sent by the network side.

In the above, the trigger condition can be: a trigger by the network side and/or an active trigger by the UE. The trigger by the network side is that: the network side sends a feedback request to trigger feedback; and the active trigger by the UE is that: a feedback cycle is set and a feedback is triggered when the feedback time arrives, or a trigger event is set and the feedback is triggered when the trigger event occurs.

The network side is configured to receive the dedicated RRC signaling sent by the UE, collect statistics of UE information according to the feedback information in the dedicated RRC signaling, and send, when the collected statistics of the UE information satisfy a requirement, the feedback stop indicator to the UE.

The UE comprises a trigger unit **211**, a feedback unit **212** and a stop unit **213**.

The trigger unit **211** is configured to trigger the feedback unit **212** according to the trigger condition.

For example, a feedback cycle is preset, the trigger unit **211** triggers the feedback unit **212** when the feedback time arrives; or, a feedback event is preset, the trigger unit **211** triggers the feedback unit **212** when the feedback event occurs; or, the trigger unit **211** triggers the feedback unit **212** when receiving a feedback request from the network side.

The feedback unit **212** is configured to send the dedicated RRC signaling carrying the feedback information to the network side.

The dedicated RRC signaling carrying the feedback information is specifically: a new RRC signaling which created according to an RRC rule and is used to carry the feedback information dedicatedly.

The feedback information comprises a service ID, and at least one of the following: a UE status and an area ID.

The UE status comprises at least one of the following: interested in receiving, not interested in receiving, start to receive, stop receiving, receiving bearer change, cell update and cell handover and the like. The area ID comprises: an MBSFN area ID, or a notification indicator. The service ID comprises: a TMGI, and/or an MBMS service ID, and/or a PMCH ID, and/or an LCID, and/or a session ID, and/or a service list index, and/or a service guidance ID or the like.

The feedback information further comprises at least one of the following: a reception capability indicator of the UE and a UE ID.

The stop unit **213** is configured to notify, after receiving the feedback stop indicator from the network side, the feedback unit to stop sending the dedicated RRC signaling carrying the feedback information.

Preferably, when the trigger condition is that the network side sends a feedback request to trigger feedback, the trigger unit **211** is further configured to receive the feedback request sent by the network side.

Preferably, the trigger unit **211** is further configured to trigger the feedback unit **212** when detecting that the UE status of the UE, in which the trigger unit **211** is located, changes.

The change of the UE status comprises at least one of the following: a change from not interested in receiving to interested in receiving, a change from interested in receiving to not interested in receiving, a change from not receive to start to receive, a change from receiving to stop receiving, and a change in a receiving bearer.

The network side comprises: a statistics collection unit **221** and a signaling sending unit **222**.

The statistics collection unit **221** is configured to receive the dedicated RRC signaling sent by the UE, collect statistics according to the feedback information in the dedicated RRC signaling, and notify the signaling sending unit **222** when the collected statistics of the UE information satisfy a requirement.

The statistics collection unit **221** is specifically configured to count the number of UEs in different statuses currently in each service according to the UE status, the area ID and the service ID included in the feedback information in the dedicated RRC signaling.

The signaling sending unit **222** is configured to send the feedback stop indicator to the UE.

Specifically, the process that the signaling sending unit **222** sends a feedback stop indicator to the UE can be: the signaling sending unit **222** creates a new RRC signaling or utilizes an existing RRC signaling to carry an identifier indicating the UE to stop sending the dedicated RRC signaling, wherein the existing RRC signaling is at least one of the following: an RRC connection setup message, an RRC connection reconfiguration message, an RRC connection re-establishment message, an RRC connection re-establishment rejection message, an RRC connection release message, an RRC connection rejection message, an MCCH message, and an SIB13 message.

Preferably, when the trigger condition is that the network side sends a feedback request to trigger feedback and the UE sends the feedback information according to the feedback request after receiving the feedback request, the network side further comprises a feedback request unit **223** configured to send the feedback request to the UE.

In the solution, the UE sends the dedicated RRC signaling carrying the feedback information to the network side, so that the statistics of the UE information can be collected by the network side. The reception status of each service can be known more accurately according to the result of the statistics, thereby facilitating the adjustment on the transmission mode of services, optimizing the network resource configuration, and improving the service experience of users. Furthermore, when the collected statistics of the UE information satisfy a requirement, the network side can instruct the UE to stop sending the dedicated RRC signaling carrying the feedback information, so that the load of the uplink resources can be reduced, and the uplink resources can be saved.

Above contents are only preferable embodiments of the disclosure and are not used for limiting the disclosure. Any modifications, equivalent replacements and improvements within the principle of the disclosure should be contained within the protection scope of the disclosure.

What is claimed is:

1. A method for collecting statistics of User Equipment (UE) information in a Multimedia Broadcast Multicast Service (MBMS), comprising:

a UE sending a dedicated Radio Resource Control (RRC) signaling carrying feedback information to a network side when a trigger condition is satisfied, wherein the feedback information comprises a service identification (ID), and at least one of the following: a UE status and an area ID, wherein the service ID comprises: a Temporary Mobile Group Identity (TMGI), and/or a Physical Multicast Channel (PMCH) ID, and/or a Logic Channel Identification (LCID), and/or a session ID, and/or a service list index, and/or a service guidance ID;

the network side collecting statistics of UE information according to the feedback information in the dedicated RRC signaling to meet requirements for activating or deactivating a Multicast Broadcast Single Frequency Network (MBSFN) transmission mode of the MBMS, and sending, when the collected statistics of the UE information satisfy the requirements, a feedback stop indicator to the UE; and

the UE stopping sending the feedback information after receiving the feedback stop indicator.

2. The method according to claim **1**, wherein the trigger condition comprises: a trigger by the network side and/or an active trigger by the UE, wherein

the trigger by the network side is that: the network side sends a feedback request to trigger a feedback;

the active trigger by the UE is that: a feedback cycle is set and the feedback is triggered when the feedback time arrives; or, a trigger event is set and the feedback is triggered when the trigger event occurs.

3. The method according to claim **2**, wherein

the UE status comprises at least one of the following: interested in receiving, not interested in receiving, start to receive, stop receiving, receiving bearer change, cell update and cell handover;

the area ID comprises: a Multicast Broadcast Single Frequency Network (MBSFN) area ID, or a notification indicator.

4. The method according to claim **1**, wherein the dedicated RRC signaling carrying the feedback information comprises

a new RRC signaling which is created according to an RRC rule and is used to carry the feedback information dedicatedly.

5. The method according to claim **4**, wherein

the UE status comprises at least one of the following: interested in receiving, not interested in receiving, start to receive, stop receiving, receiving bearer change, cell update and cell handover;

the area ID comprises: a Multicast Broadcast Single Frequency Network (MBSFN) area ID, or a notification indicator.

6. The method according to claim **1**, wherein

the UE status comprises at least one of the following: interested in receiving, not interested in receiving, start to receive, stop receiving, receiving bearer change, cell update and cell handover;

the area ID comprises: a Multicast Broadcast Single Frequency Network (MBSFN) area ID, or a notification indicator.

7. The method according to claim **1**, wherein the feedback stop indicator is implemented by creating a new RRC signaling, or using an existing RRC signaling, to carry an identifier indicating the UE to stop sending the dedicated RRC signaling carrying the feedback information.

8. The method according to claim **7**, wherein the existing RRC signaling comprises at least one of the following: an RRC connection setup message, an RRC connection reconfiguration message, an RRC connection re-establishment message, an RRC connection re-establishment rejection message, an RRC connection release message, an RRC connection rejection message, an MBMS point-to-multipoint Control CHannel (MCCH) message, and a System Information Block 13 (SIB13) message.

9. The method according to claim **1**, wherein the step of the UE sending the dedicated RRC signaling carrying the feedback information to the network side comprises:

if a UE status does not change within one feedback cycle and a feedback request is received only once, the UE sending the dedicated RRC signaling carrying the feedback information once;

if the UE status changes within one feedback cycle or the feedback request is received more than once, the UE sending the dedicated RRC signaling carrying the feedback information each time the UE status changes or each time the UE receives the feedback request.

10. The method according to claim **9**, wherein a change of a UE reception status comprises at least one of the following: a change from not interested in receiving to interested in receiving, a change from interested in receiving to not interested in receiving, a change from not receive to start to receive, a change from receiving to stop receiving, and a change in a receiving bearer.

11. A system for collecting statistics of User Equipment (UE) information in a Multimedia Broadcast Multicast Service (MBMS), comprising: a UE and a network side; wherein

the UE is configured to send a dedicated Radio Resource Control (RRC) signaling carrying feedback information to the network side according to a trigger condition, and stop sending the dedicated RRC signaling carrying the feedback information after receiving a feedback stop indicator sent by the network side, wherein the feedback information comprises a service identification (ID), and at least one of the following: a UE status and an area ID, wherein the service ID comprises: a Temporary Mobile Group Identity (TMGI), and/or a Physical Multicast Channel (PMCH) ID, and/or a Logic Channel Identification (LCID), and/or a session ID, and/or a service list index, and/or a service guidance ID;

the network side is configured to receive the dedicated RRC signaling sent by the UE, collect statistics of UE information according to the feedback information in the dedicated RRC signaling to meet requirements for activating or deactivating a Multicast Broadcast Single Frequency Network (MBSFN) transmission mode of the MBMS, and send, when the collected statistics of the UE information satisfy the requirements, the feedback stop indicator to the UE.

12. The system according to claim **11**, wherein

the UE comprises a trigger unit, a feedback unit and a stop unit, wherein

the trigger unit is configured to trigger the feedback unit according to the trigger condition;

the feedback unit is configured to send the dedicated RRC signaling carrying the feedback information to the network side;

the stop unit is configured to notify, after receiving the feedback stop indicator from the network side, the feedback unit to stop sending the dedicated RRC signaling carrying the feedback information;

the network side comprises: a statistics collection unit and a signaling sending unit, wherein

the statistics collection unit is configured to receive the dedicated RRC signaling sent by the UE, collect the statistics according to the feedback information in the dedicated RRC signaling, and notify the signaling sending unit when the collected statistics of the UE information satisfy the requirement;

the signaling sending unit is configured to send the feedback stop indicator to the UE.

13. The system according to claim **12**, wherein when the trigger condition is that the network side sends a feedback request to trigger a feedback, the network side further comprises a feedback request unit configured to send the feedback request to the UE;

correspondingly, the trigger unit is further configured to receive the feedback request sent by the network side.

14. The system according to claim **13**, wherein the statistics collection unit is specifically configured to count the number of UEs in different statuses currently in each service according to a UE status, an area identification (ID) and a service ID included in the feedback information in the dedicated RRC signaling, wherein

the UE status comprises at least one of the following: interested in receiving, not interested in receiving, start to receive, stop receiving, receiving bearer change, cell update and cell handover;

the area ID comprises: a Multicast Broadcast Single Frequency Network (MBSFN) area ID, or a notification indicator.

15. The system according to claim **12**, wherein the trigger unit is further configured to trigger the feedback unit when detecting that a UE status of the UE, in which the trigger unit is located, changes; wherein

a change of the UE status comprises at least one of the following: a change from not interested in receiving to interested in receiving, a change from interested in receiving to not interested in receiving, a change from not receive to start to receive, a change from receiving to stop receiving, and a change in a receiving bearer.

16. The system according to claim **12**, wherein the statistics collection unit is specifically configured to count the number of UEs in different statuses currently in each service accord-

ing to a UE status, an area identification (ID) and a service ID included in the feedback information in the dedicated RRC signaling, wherein

the UE status comprises at least one of the following: interested in receiving, not interested in receiving, start to receive, stop receiving, receiving bearer change, cell update and cell handover;

the area ID comprises: a Multicast Broadcast Single Frequency Network (MBSFN) area ID, or a notification indicator.

17. The system according to claim **11**, wherein the statistics collection unit is specifically configured to count the number of UEs in different statuses currently in each service according to a UE status, an area identification (ID) and a service ID included in the feedback information in the dedicated RRC signaling, wherein

the UE status comprises at least one of the following: interested in receiving, not interested in receiving, start to receive, stop receiving, receiving bearer change, cell update and cell handover;

the area ID comprises: a Multicast Broadcast Single Frequency Network (MBSFN) area ID, or a notification indicator.

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