(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
8 May 2008 (08.05.2008)

PCT

(10) International Publication Number
WO 2008/052383 A1

(51) International Patent Classification:
H04L 12/56 (2006.01)

(21) International Application Number:
PCT/CN2006/002895

(22) International Filing Date: 30 October 2006 (30.10.2006)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **HUAWEI TECHNOLOGIES CO., LTD.** [CN/CN]; Huawei Administration Building, Bantian, Longgang District, Shenzhen, Guangdong 518129 (CN).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **JOHANSSON, Johan** [SE/SE]; Atelier Telecom AB, Box 54 SE, S-16494 Stockholm (SE). **ROBERTS, Michael** [GB/FR]; Huawei Technologies France Tour Cofonca 6-8, rue Jean Jaures, F-92800 Puteaux (FR).

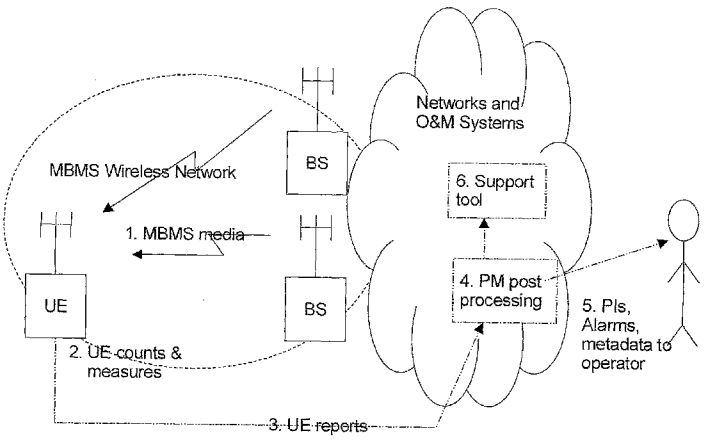
(74) Agent: **DEQI INTELLECTUAL PROPERTY LAW CORPORATION**; 7/F, Xueyuan International Tower, No. 1 Zhichun Road, Haidian District, Beijing 100083 (CN).

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

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(54) **Title:** LOAD CONTROL OF UE MBMS MEASUREMENT REPORTING



(57) **Abstract:** An improved method for load control in connection with a multimedia service transmission intended for multiple receivers over a wireless network is disclosed as well as a communication means node implementing the method. The receivers in the wireless network are able to respond to requests communicated from an ordering entity by feeding back responses to a management entity in said wireless network. The feedback of these responses uses a different communication means, separate from said wireless network. This different communication means has limited communication resources. A transmission load caused in said different communication means by said feedback of said responses is according to the invention controlled by the different communication means itself.

WO 2008/052383 A1

LOAD CONTROL OF UE MBMS MEASUREMENT REPORTING

FIELD OF THE INVENTION

The present invention relates to a method for load control as defined in the preamble of claim 1, i.e. a method for load control in connection with a multimedia service transmission intended for multiple receivers over a wireless network, said receivers in said wireless network being able to respond to requests communicated from an ordering entity by feeding back responses to a management entity in said wireless network.

The present invention also relates to a communication means node as defined in the preamble of claim 42, i.e. a communication means node arranged for performing load control in connection with a multimedia service transmission intended for multiple receivers over a wireless network, said receivers in said wireless network being arranged for responding to requests communicated from an ordering entity by feeding back responses to a management entity in said wireless network.

BACKGROUND OF THE INVENTION

Terrestrial broadcast services for small mobile devices with small antennas, e.g. for mobile TV in mobile phones, is an area that has gained a lot of attention. Multimedia service transmission intended for multiple receivers, such as e.g. Multimedia Broadcast and Multicast Services (MBMS), has been defined and developed for GSM and WCDMA mobile systems. Also for CDMA2000 there is a similar concept. In addition, standalone broadcast systems has been developed, e.g. DVB-H. All of these technologies, and related technologies, for terrestrial broadcast services for small handheld mobile devices, are subsequently referred to as MBMS or multimedia services.

It is possible to implement an MBMS system that is optimized for broadcast services, that only uses a Downlink (DL), i.e. non-duplex communication where information flows over the wireless interface only in the direction from Base Station (BS) to a receiver, such as a UE. A particular benefit of a downlink only system is that no radio spectrum resources are needed for an uplink (UL). Radio carrier and spectrum resources are needed only for the DL. Another benefit is that the radio characteristics of an UL can be ignored, and thus,

efficiency-optimized DL-only Base Stations with high output power, and good coverage can be developed for such systems. Such MBMS systems, that only uses a wireless DL, is subsequently referred to as MBMS dedicated carrier (DC) systems or shortly Dedicated Carrier (DC) systems.

Terrestrial wireless systems that have MBMS functionality or techniques, and also can handle UL transmissions on radio spectrum resources that are either the same as for the DL, or paired with spectrum resources of the DL, are referred to as MBMS mixed carrier (MC) systems, or shortly mixed carrier (MC) systems. The UL in a MBMS MC system could be used for UL signalling and/or for non-MBMS services requiring an UL, e.g. unicast services, see below.

Terrestrial wireless systems that have the capability of point-to-point communication between the BS and the UE, UL or DL or both, are subsequently referred to as Unicast capable system, or shortly Unicast (UC) systems. Typical UC user services include voice-calls, video-calls, internet web-browsing, sending a message etc.

A common deployment scenario for MBMS DC systems is that such a system is overlaid on a UC network, meaning that the DC and UC systems overlap in geographical coverage. The overlaid DC and UC systems may use the same or different network equipment and network resources or a combination. For example, such scenarios have been foreseen in discussions in 3GPP, where an MBMS DC system typically would be overlaid on a UC GSM, WCDMA, LTE (Long Term Evolution) network, and a typical UE would be capable of MBMS services distributed by MC or DC, and UC services.

As will be explained below, broadcasting or multicasting in systems such as MBMS systems or the like are also denoted multimedia service transmission intended for multiple receivers. The communication resource, not being a part of the MBMS system or the like, used for transferring feedback information from the UE:s over the UC system is later also denoted a different communication means. This different communication means can be of limited resources. In this document, the term limited resources, such as limited network resources, communication resources or transmission resources, means that these resources are momentary limited. That is, these resources are at any given moment in time finite.

Network operators typically initiate network tuning based on results of statistics data collection and post-processing. This is how the network is optimized, e.g. protocol parameters are optimized to give best experienced user performance, radio and antenna parameters are optimized for good coverage etc. Network tuning for optimization is a continuous process in the operation of a network.

Also responses regarding other information than network specific measurements can be ordered by the network. Such responses can include interactive services, such as voting or any other interactive operation that requires feedback from the UE:s to an entity in the network, such as a management entity or the like.

Broadcast mechanisms have been proposed for initiating and controlling UE statistics measurements for MBMS. Also responses regarding other information than network specific measurements can be ordered by the network. Such responses can include interactive services, such as voting or any other interactive operation that requires feedback from the UE:s.

When using broadcast mechanisms for controlling measurements or ordering interactive services, the MBMS network does not know how many UE:s that are receiving this broadcast or even how many UE:s that are in an active mode in the system. It is therefore impossible for the MBMS network to know how many UE:s that will be triggered to do such measurements or other reporting and how many UE:s that will attempt to report the results of such measurements.

The primary problem and bottleneck for these report peaks is the wireless interface of the communication means carrying the responses. It is assumed that other network nodes can store and forward such measurement reports and thereby better handle such overload peak situations. If not properly designed, the reporting of such measurements could result in peaks of high overload in the wireless interface of the communication means carrying the responses. The risk of getting peaks of overload is especially high in broadcast or multicast systems, since a request to report measurements can be received by a large number of UE:s more or less simultaneously and there is a big possibility that this large number of UE:s also respond to these requests more or less simultaneously.

BRIEF SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method for load control that solves the above stated problem as well as a communication means node for implementing these methods.

The object is achieved by a load control method according to the characterizing portion of claim 1, i.e. that said feedback of responses uses a different communication means, said different communication means being separate from said wireless network and having limited communication resources, and a transmission load caused in said different communication means by said feedback of said responses is controlled by said different communication means.

The object is also achieved by a communication means node according to the characterizing portion of claim 42.

The method for load control according to the present invention and the communication means node for implementing the method make it possible for an exact and reliable load control for the communication means carrying feedback responses in the system. This is achieved by the invention since the communication means carrying the feedback responses itself controls the load control mechanism for preventing overload situations on the communication means.

In an embodiment of the invention, overload is prevented by the use of a Service Specific Access Class Barring (SSACB) mechanism, which bars receivers in certain SSACB groups from feeding back responses. This embodiment has the advantage that the statistics measurements resorts coming from the UE:s on the RAN can be stemmed and therefore protection of the RAN and the management entity from any eventual overload is possible.

In an embodiment of the invention, overload is prevented by the use of a probability factor mechanism, which controls a value corresponding to a fraction of the receivers that should feed back responses. This embodiment has the advantage that overload can be avoided and that the network can ensure that sufficient number of UE:s will report in order to get sufficient statistical accuracy for a particular measurement.

In an embodiment of the invention, overload is prevented by the use of a random time mechanism, which spreads the responses in time by using a random time parameter for controlling when the receivers should feed back their responses. This embodiment has the advantage that overload can be avoided and that the network also can assure that a sufficient amount of UE:s report within reasonable time window.

In an embodiment of the invention, a different communication means carrying the feedback responses, such as a Radio Access Network (RAN), controls which random access and contention access radio resources to be used for the feeding back of said responses, thereby controlling the transmission load in said RAN. This embodiment makes it possible to control the transmission load of the UE reporting to match the current available resources in the wireless interface of the communication means carrying the feedback responses. This matching of resources is only possible to perform in an efficient way if it is handled by an entity that has full knowledge about the current load and other conditions of the wireless interface. The RAN itself is the only entity having this full knowledge.

Detailed exemplary embodiments and advantages of the method for load control and the communication means node according to the invention will now be described with reference to the appended drawings illustrating some preferred embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 schematically shows a system for multimedia service transmission and feedback reporting, in which the load control mechanisms according to the invention are to be implemented.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1 schematically shows a system for multimedia service transmission and feedback reporting, in which the load control mechanisms according to the invention are to be implemented. In fig. 1 it is shown that the UE performs statistics measurements, and reports to the network. It is further shown that the expected end receiver of data derived from the proposed UE statistics counters and measurements is not a radio node in the

wireless network, but instead a network management entity, which could be supervised by an human operator, and possibly support tools used by the human operator.

The reference numerals in fig. 1 refer to the following steps:

1. The UE is within expected coverage of MBMS. The UE may be receiving MBMS service, or the UE might not be receiving MBMS service.

2. The UE performs statistics measurements and maintain statistics counters with respect to MBMS reception, MBMS service and user experience of MBMS service.

3. The UE reports the results of the statistics measurements and counters to the network.

4. In the network, there may be several steps of data post processing and data conversion. The RAN (Radio Access Network) may be involved in post processing and data conversion to make it possible to optimize reporting by compression techniques that are specific to the radio access technology.

5. The result of post processing is presented to a human operator, possibly by the use of statistical indicators where results of measurements from many UE:s are combined, possibly also combined with results reported from other nodes, possibly combined over certain time periods. Results might also be converted into alarms in the case of drastic changes.

6. Other results of statistics post processing, e.g. more detailed geographical information might be input to support tools, which the operator could use for network tuning and troubleshooting.

According to the invention, the UE uses different communication means, i.e. a communication mechanism that is separate from MBMS radio bearers or separate from the MBMS system, to report the result of statistics measurements and counters. In particular, it is possible that a UC system overlaid with a MBMS system can be used for reporting of results. This is especially interesting if the MBMS system is a DC system.

In steps 1-5 above referring to fig. 1, the reporting procedure for feeding back measurement reports has been described. Corresponding steps are also taken when other information is fed back. This other information can be non-network specific information, such as interactive information responses or the like.

There is also a need for checking a basic MBMS coverage on the whole. When doing such measurements, it can be advantageous to reach also UE:s not listening to the MBMS network for the moment. This could, according to the invention, be performed by using the unicast network, such as the RAN for ordering reports. The unicast network could then be used for ordering, possibly by using its broadcast channels, measurement reporting from the UE:s as well as carrying the feedback information. In this particular case, the ordering entity is a part of the unicast network and the ordering entity orders measurements relating to the MBMS network. This is thus a measurement reporting procedure in which all information transmission is taking place in the unicast network, but the measurements are done in connection with the MBMS network,. meaning that parameters of the MBMS network are measured.

These feedback procedures are in the UE:s triggered by reception of a request broadcasted by the network. Such a broadcasted request can be received by a large number of UE:s and the network have no way of knowing how many UE:s that will respond to the request. There is thus a risk that a large number of UE:s will respond to such a broadcasted request in a short amount of time rendering overload situations in the communication means, which carries the responses.

There is therefore a need for solving the problem regarding transmission load peaks due to transmission of reports, these peaks occurring when a large number of UE:s are broadcasted a request for reporting a measurement or the like to an entity in the network.

The inventors have realised that these problems can be tackled by letting the RAN control various radio access parameters and by using other specific load control mechanisms. The RAN itself has far better knowledge about the load situation in the RAN than other parts of the system. A much more exact and reliable load control is thus achieved by letting the RAN itself control the load control in the RAN.

Radio access control

According to the present invention, the RAN shall control the UE reporting behaviour. The reporting can include measurement reporting of information relating to statistics data, counters and other measurements. The reporting can also include information relating to interactive applications, such as voting or the like. Reporting can further also include UE counting used for bearer reconfigurations or other parameters used for configurations in the network. There are a number of advantages in letting the radio access network control the radio resources. This makes it possible to control the transmission load of the UE reporting to match the current available resources in the wireless interface, e.g. depending on current load, depending on overall capacity, carrier bandwidth etc. Furthermore, if the UE reporting is expected to cause a temporary increase in load of certain resources, e.g. increase in random access load or contention access load, the radio access network can temporarily re-assign radio resources to match this expected increase in load, e.g. allocate more frequencies, timeslots, codes or the like for e.g. the random access or the contention access. This matching of resources can only be performed in an efficient way if it is handled by an entity that has full knowledge about the current load and other conditions of the wireless interface. The RAN itself is the only entity having this full knowledge.

In particular, in accordance with one embodiment of the invention, it is possible for the network to control which random access or contention access radio resources that are to be used for the UE:s. This control is done either by indicating to the UE:s which resources to use when the measurement is requested, together with the measurement control information, or alternatively by indicating separately in an other signalling information, e.g. by system information broadcast. This makes it possible to isolate the application of UE measurement reporting from other applications, so that overload induced by UE measurement reporting will not cause damage to other applications, and vice versa.

It is in a further embodiment of the invention possible for the RAN to explicitly control the contention behaviour of the random access or contention access for the application of UE statistics measurement reporting. This control includes control of parameters controlling random backoff, number of re-attempts, barring etc. These control parameters are indicated to the UE:s when the measurement is requested, together with the measurement control information, or separately in an other signalling information, e.g. by system information broadcast. To control the contention behaviour makes it possible to

optimize the random access for UE measurement reporting. The UE measurement reporting is particular in that it tolerates longer delays than other procedures. Measurement reporting is further particular since it often tolerates that not all UE:s need to report. These specific tolerances for measurement reporting are by the present invention utilised for avoiding overload in the system. For instance, random backoff parameters can be set to high backoff delays, which give very high load tolerance but also give extra delays. The re-attempt parameter can further be set low, so that it is likely that some UE:s will not succeed to do a random access at high load.

For the purpose to be used for certain services or certain use-cases, a radio resource partition and its associated control parameters for random access or contention access behaviour is subsequently referred to as an Access Service Class (ASC). Different ASC:s may use the same or different actual radio resources. This definition of ASC:s is similar to the definition of ASC used in 3GPP TS:s 25.331 and 25.321.

Even though the radio resource separation and contention handling mechanisms of random access or contention access, ASC etc. can take care of many of the load problems, they might not be able to handle all overload situations. If the amount of UE:s that respond to a request is very high, more mechanisms may be needed to avoid contention.

Response time requirements

For statistics data, counters, or measurements according to the present invention, the RAN (Radio Access Network) is not the main recipient of the measurement results. Instead, the main recipient is an management entity in the MBMS system, such as an O&M post-processing system or the like. Note also that normally the need for reported results is not immediate. Usually, results from large parts of the network are first collected to be post-processed regularly. A common time interval for post-processing of network statistics data is 15 minutes. Thus, time requirements for reporting can be expected to be in this time scale. Considering that UE:s do the reporting, and not the network, requirements can probably be further relaxed, maybe up to the hours timescale, if found beneficial from other points of view.

The inventors have realised that these relatively long response time intervals make it possible to develop mechanisms for handling overload peaks that can occur in the system

due to broadcasted measurement requests. The inventors have realised that mechanisms for transmission of this particular type of information therefore can be developed that prevent that all UE:s report statistic measurement reports at the same time.

Three such mechanisms, a probability factor mechanism, a random time mechanism and a Service Specific Access Class Barring (SSACB) mechanism, for load control according to the present invention are described below.

Probability factor

The concept of probability factor for load control of UE counting for MBMS multicast was defined for 3GPP MBMS Rel-6. In the present invention, however, the probability factor concept is used for load control of measurement reporting and not for counting. There is an important network load difference between counting and measurement reporting. A UE that has done a measurement report, does not need to re-report this measurement, even if it would receive more requests for this report and the randomness function would trigger to report again. Thus, a UE that has reported a measurement result must store this result for further reporting. This will keep the load of the wireless interface at a low level. For counting, on the contrary, re-reporting is made if necessary, which can result in a higher load of the wireless interface.

The basic idea of the probability factor mechanism is that it will determine how many of all UE:s that should send a report. The decision whether a UE should send or should not send a measurement report is thus here based on randomness, which is based on a network controlled probability factor. According to this mechanism, a fraction of UE:s expected to report can be controlled (0-100%). There is thus a clear relation between this fraction and the number of responses that will be reported. This solution has the clear advantage that overload due to UE reporting could be avoided, since the number of transmitted reports can be controlled.

When using the probability factor solution, the control of the actual measurement and the reporting of the measurement can be separated by the network. Separated controls can make it possible for the network to first request measurement reporting and then try different probability factors. It is, for instance, possible to then start with a low probability factor, resulting in a few UE reports, and then (possibly in several steps) increase the

probability factor until a sufficient number of UE reports are transmitted. This solution has the advantage that overload can be avoided and that the network can ensure that a sufficient number of UE:s will report in order to get sufficient statistical accuracy for a particular measurement.

The same entity that configures the measurements in the RAN, e.g. the O&M data post processing system, also sets a parameter corresponding to the minimum number of UE:s that shall report, in order to achieve sufficient statistical accuracy. This has the advantage of being a simple and uniform control of the measurement and its reporting requirements, when probability factor load control is used.

Random Time

A random time for the time to do the report can be used to spread out the UE reporting in time. This has the clear advantage that overload peaks could be avoided since the load is spread out.

The randomness, that is the random spreading times, is controlled by the RAN and a randomness mechanism is applied that assures that all UE:s have reported within a certain time, when this is requested. This has the advantage that overload can be avoided and that the network also can assure that a sufficient amount of UE:s report within reasonable time window.

In a particular embodiment, the randomness algorithm is an algorithm where the time window for reporting, or an equivalent parameter, is explicitly signalled by the network. The UE then pseudo-randomly selects any time within this window for generating a report. If the network finds that the reporting rate is low for a certain setting of the time window, the network then reconfigures the time window to a smaller one. The UE:s that have not yet reported can then pseudo-randomly reselect the time to report. By this the network can start with a parameter setting suitable for a high number of UE:s and then, if few UE:s actually respond, speed up the process, thereby increasing the reporting rate. This has the advantage that the network dynamically can adapt to the number of UE:s in the network.

The RAN can further set a latest-report-time parameter, this parameter corresponding to the requirement set by the principles of the operation of the O&M post-processing

system. The latest-report-time parameter can be within the random time window, if such a time window is used. It is also possible that UE:s can have randomly selected a reporting time after the latest-report time, these UE:s do then not have to report at all.

Alternatively, it is in another embodiment of the present invention suggested that a random time mechanism (as described above) for reporting can be used together with a probability factor mechanism. The probability factor mechanism is then used to limit the number of UE:s that actually report, and the random time mechanism is used to spread out the reporting in time. The network can by these mechanisms thus limit the number of UE:s that actually report.

Service Specific Access Class Barring (SSACB)

In GERAN (GSM Edge Radio Access Network) and UTRAN (UMTS Terrestrial Radio Access Network) of today, there is known a concept for Access Class barring and Service Specific Access Class Barring (SSACB) for overload control, see reference document [2]. There is a list of reference documents at the end of this description

The Access Class Barring and also especially the SSACB known from background art is, however, not directed to load control for measurement reports in MBMS systems. The SSACB known from the background art is instead directed to restricting UE:s to access to circuit switched calls, packet switched sessions and SMS during emergency situations. The conditions and purposes of the SSACB of the background art systems are thus totally different from the once in the present invention.

According to the present invention, the SSACB mechanism is instead used for controlling the load of measurement reporting. It is, according to the invention, possible for the RAN to bar mobiles from making measurement reports using a service specific access class barring mechanism. This has the advantage that the O&M data processing system can stem the statistics measurements resorts coming from the UE:s on the RAN and therefore protect the RAN and itself from any eventual overload. This mechanism would probably act as a last resort solution in the worse case scenario, where neither the random time nor probability factor mechanisms are enough to protect the RAN and the O&M data processing system from overload. SSACB is thus a reactive mechanism that tries to solve a problematic situation when it has happened, whereas random time and probability factor

mechanisms are pre-active mechanisms that try to prevent a problematic situation from occurring.

The SSACB mechanism can also include a possibility to divide UE:s according to access classes according to existing mechanisms (e.g. in 3GPP), and to further divide these UE:s in another dimension, into groups based on service. One such service could be UE statistics data measurement reporting. The grouping, based on services could be the same as, or similar to the service grouping for Access Service Classes (ASC:s), which corresponds to parameters for random access or contention access in the RAN. This has the advantage that the O&M system hereby can stem a percentage of the mobiles from sending measurements, thereby allowing the O&M system to recover from resets and further allowing a smooth recovery in case of catastrophic failures.

It is, according to the invention, also possible to perform SSACB grouping based on the measurement control, more specifically based on whether UE:s perform measurements for particular O&M data processing nodes. By performing grouping this way, the O&M data processing system can protect the RAN and itself against overload in the way described above, without impacting measurement reporting towards other O&M data processing systems.

It is further possible for the RAN to protect itself by allocating a Service Class for the service grouping dimension of SSACB. There would thus be a hierarchy of such service classes. This could be seen as a further division of service classes into sub service classes according to data receiver. Depending on which data receiver being overloaded, different service specific access classes would be barred. The RAN here has the highest level in the hierarchy followed thereafter by each individual data processing node. This means that if a service specific access class is barred, which maps to a particular service, certain UE:s and the RAN data receiver, the corresponding service specific access classes for other data receivers are also barred. According to this embodiment of the invention, the RAN can, dynamically, in a reactive way, switch off UE statistics data measurement reporting, if the RAN experiences heavy transmission load due to UE statistics measurement reporting or by other services or use cases.

Combinations

The probability factor, random time and SSACB mechanisms described above for avoiding that many UE:s attempt to report at the same time can be separate from the random access or contention access parameters of the RAN, or can be integrated with the random access or contention access parameters and their handling.

The methods and communication means node according to the invention may be modified by those skilled in the art, as compared to the exemplary embodiments described above.

In this description, the invention has been explained and exemplified by implementation in a system having a MBMS network and a RAN, such as a GERAN or UTRAN, overlapping each other in geographical coverage. This is, however only one exemplary embodiment out of a number possible implementations of the present invention. A person skilled in the art realises that any wireless multicast or broadcast network, overlapping any limited network, communication or transmission resources, can be used for implementing the invention.

Reference documents

[1] 3GPP TS 26.346, Multimedia Multicast/Broadcast Service (MBMS), protocols and codecs.

[2] 3GPP TS 23.898, Access Class Barring and Overload Protection (ACBOP).

[3] 3GPP TS 25.346, Introduction of the Multimedia Broadcast Multicast Service into the Radio Access Network (RAN), stage 2.

[4] 3GPP TS 25.331, Radio Resource Control (RRC); Protocol specification

Claims

1. Method for load control in connection with a multimedia service transmission intended for multiple receivers over a wireless network, said receivers in said wireless network being able to respond to requests communicated from an ordering entity by feeding back responses to a management entity in said wireless network,

characterized in that

said feedback of responses uses a different communication means, said different communication means being separate from said wireless network and having limited communication resources, and

a transmission load in said different communication means, caused by said feedback of said responses, is controlled by said different communication means.

2. Method as claimed in claim 1, wherein overload is prevented by the use of a Service Specific Access Class Barring (SSACB) mechanism, which bars receivers in certain SSACB groups from feeding back responses.

3. Method as claimed in claim 2, wherein said SSACB groups are defined in correspondence with parameters for random access or contention access behavior.

4. Method as claimed in claim 2, wherein said groups are defined based on receiver participation in performing measurements for a particular management entity.

5. Method as claimed in claim 2, wherein a hierarchical order of service classes is defined, thereby allowing a hierarchical barring procedure.

6. Method as claimed in claim 1, wherein overload is prevented by the use of a probability factor mechanism, which controls a value corresponding to a fraction of the receivers that should feed back responses.

7. Method as claimed in claim 6, wherein a value corresponding to a minimum number of responses is set by said management entity, said number of responses relating to said fraction.

8. Method as claimed in claim 6, wherein said fraction initially is set to a low value and is then stepwise increased until a sufficient number of responses are received.

9. Method as claimed in claim 1, wherein overload is prevented by the use of a random time mechanism, which spreads the responses in time by using a random time parameter for controlling when the receivers should feed back their responses.

10. Method as claimed in claim 9, wherein the random time mechanism is configured such that all receivers have responded within a time limit.

11. Method as claimed in claim 9, wherein a time window is sent to the receivers and the receivers can then randomly select a response time within this time window.

12. Method as claimed in claim 9, wherein a length of said time window is dynamically adjustable, said length initially being set to a high value and then, possibly stepwise, being decreased if a response frequency is low.

13. Method as claimed in claim 9, wherein a latest response time parameter is set by said management entity.

14. Method as claimed in claim 9, wherein said random time mechanism is combined with a probability factor mechanism such that a probability factor regulated number of responses are spread in time by the random time mechanism.

15. Method as claimed in claim 1, wherein said different communication means is a Radio Access Network (RAN).

16. Method as claimed in claim 15, wherein said RAN controls which random access and contention access radio resources to be used for the feeding back of said responses, thereby controlling the transmission load in said RAN.

17. Method as claimed in claim 16, wherein said RAN controls contention behaviour by controlling any parameter from the group consisting of: random-backoff time, number of re-attempts, barring.

18. Method as claimed in claim 16, wherein it is indicated to said receivers which resources to use, said indication being included in any message from the group consisting of: a measuring request message, a measurement control information message, a system information broadcast message, another signalling information message.

19. Method as claimed in claim 16, wherein overload is prevented by the use of a Service Specific Access Class Barring (SSACB) mechanism, which bars receivers utilizing specific service access classes from feeding back responses.

20. Method as claimed in claim 16, wherein overload is prevented by the use of a probability factor mechanism, which controls a value corresponding to a fraction of the receivers that should feed back responses.

21. Method as claimed in claim 16, wherein overload is prevented by the use of a random time mechanism, which spreads the responses in time by using a random time parameter for controlling when the receivers should feed back their responses.

22. Method as claimed in claim 15, wherein said RAN is a GERAN (GSM EDGE Radio Access Network) of a GSM system.

23. Method as claimed in claim 15, wherein said RAN is an UTRAN (UMTS Terrestrial Radio Access Network) of a CDMA system or a LTE (Long Term Evolution) network.

24. Method as claimed in claim 1, wherein said ordering entity is a part of said wireless network.

25. Method as claimed in claim 24, wherein said responses include information relevant to said multimedia service transmission in the network.

26. Method as claimed in claim 25, wherein said information includes at least one quality measure for said multimedia service transmission in the network.

27. Method as claimed in claim 25, wherein said information is transmitted to said management entity in the network, said management entity utilising said information for tuning the network.

28. Method as claimed in claim 25, wherein said information includes counting of receivers.

29. Method as claimed in claim 24, wherein said responses include non-network specific information.

30. Method as claimed in claim 29, wherein said non-network specific information includes voting information.

31. Method as claimed in claim 29, wherein said non-network specific information includes interactive TV application data.

32. Method as claimed in claim 1, wherein said ordering entity is a part of said different communication means.

33. Method as claimed in claim 32, wherein said responses include information relevant to said multimedia service transmission in the network.

34. Method as claimed in claim 33, wherein said information includes at least one quality measure for said multimedia service transmission in the network.

35. Method as claimed in claim 33, wherein said information is transmitted to said management entity in the network, said management entity utilising said information for tuning the network.

36. Method as claimed in claim 33, wherein said information includes counting of receivers.

37. Method as claimed in claim 1, wherein said wireless network is a terrestrial wireless network.

38. Method as claimed in claim 1, wherein said wireless network is a Multimedia Broadcast Multicast Services (MBMS) network.

39. Method as claimed in claim 1, wherein said multimedia service transmission is of a broadcast type.

40. Method as claimed in claim 1, wherein said multimedia service transmission is of a multicast type.

41. Method as claimed in claim 1, wherein said wireless network operates in a downlink only mode.

42. Communication means node arranged for performing load control in connection with a multimedia service transmission intended for multiple receivers over a wireless network, said receivers in said wireless network being arranged for responding to requests communicated from an ordering entity by feeding back responses to a management entity in said wireless network,

characterized in that

said feedback of responses is arranged for using a different communication means, said different communication means being separate from said wireless network and having limited communication resources, and

said different communication means node is arranged for controlling a transmission load in said different communication means caused by said feedback of said responses.

43. Communication means node as claimed in claim 42, wherein said wireless network is a Multimedia Broadcast Multicast Services (MBMS) network.

44. Communication means node as claimed in claim 42, wherein said different communication means is a Radio Access Network (RAN).

45. Communication means node as claimed in claim 42, wherein said wireless network is arranged for operating in a downlink only mode.

1/1

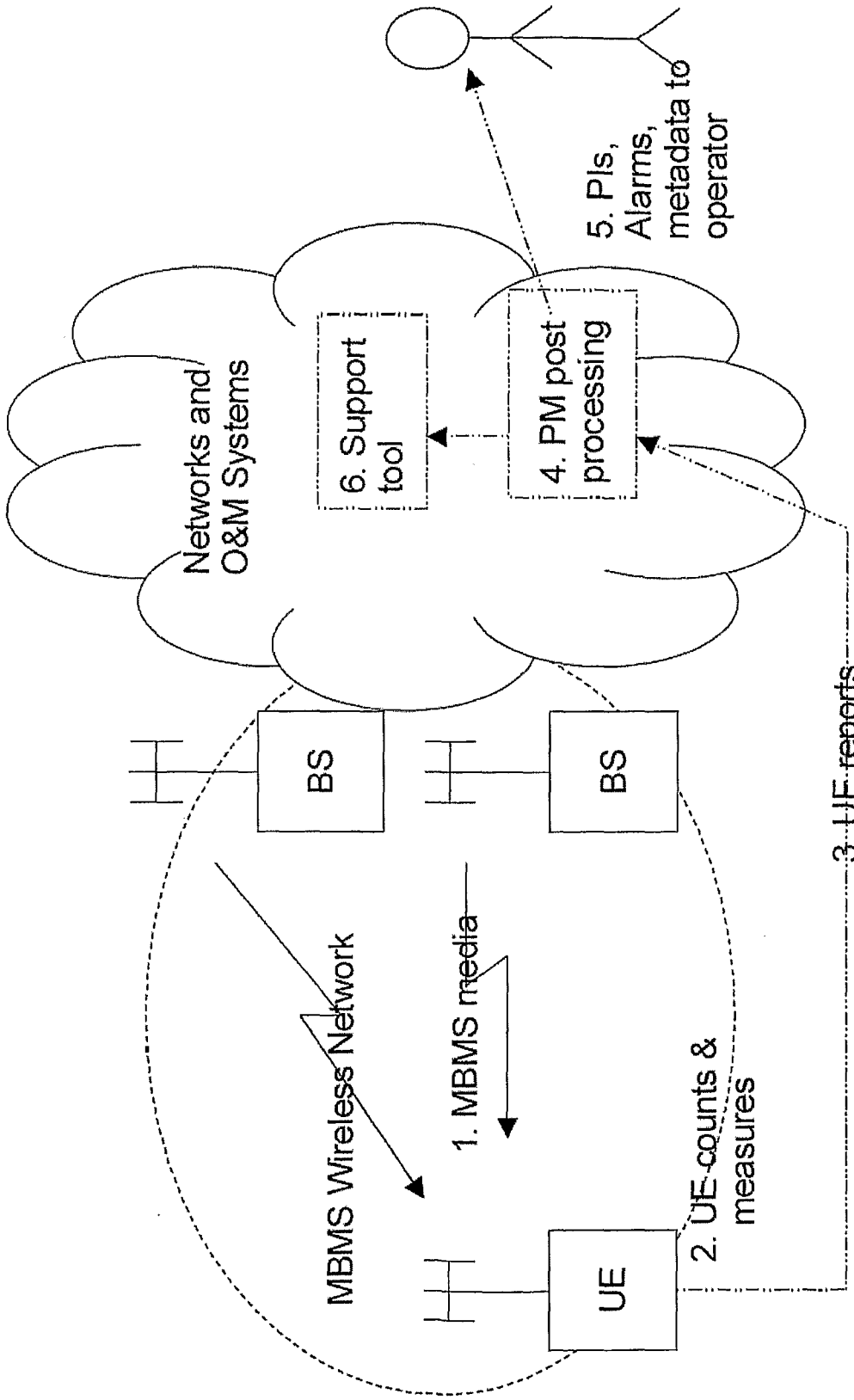

5. PIs, Alarms, metadata to operator
Networks and O&M Systems
6. Support tool
4. PM post processing
BS
BS
3. UE reports
MBMS Wireless Network
1. MBMS media
2. UE counts & measures
UE

Fig. 1

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference DF0644415P	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/CN2006/002895	International filing date *(day/month/year)* 30 Oct. 2006(30.10.2006)	(Earliest)Priority date *(day/month/year)*
Applicant HUAWEI TECHNOLOGIES CO.,LTD. ET-AL		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the language, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ With regard to any **nucleotide and /or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (see Box No. II)
3. ☐ **Unity of invention is lacking** (see Box No. III)
4. With regard to the **title**,
   ☒ the text is approved as submitted by the applicant
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,
   ☒ the text is approved as submitted by the applicant
   ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,
   a. The figure of the **drawings** to be published with the abstract is Figure No. 1
      ☒ as suggested by the applicant
      ☐ as selected by this Authority, because the applicant failed to suggest a figure
      ☐ as selected by this Authority, because this figure better characterizes the invention
   b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2006/002895

A. CLASSIFICATION OF SUBJECT MATTER

H04L12/56(2007.01)i

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)

IPC: H04L12

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)

WPI,EPODOC,PAJ, CNPAT,CNKI

feedback response control load mbms multicast groupcast

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN1692578A(LG ELECTRONICS INC) 2 Nov. 2005（02.11.2005） see the whole document	1-45
A	US20040209623A1(Nortel Networks Limited) 21 Oct. 2004(21.10.2004) see the whole document	1-45

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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
20 JAN. 2007(20.01.2007)	08 MAR 2007 (08.03.2007)
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer ZHU Shaohua Telephone No. 86-10-62086079

Form PCT/ISA /210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2006/002895

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN1692578A	02.11.2005	WO2004042963A1	21.05.2004
		US2004151133A1	05.08.2004
		KR20040040724A	13.05.2004
		AU2003276745A1	07.06. 2004
		EP1556974A1	27.07.2005
US20040209623A1	21.10.2004	EP1469698A2	20.10.2004