

Application Server and Media Resource Allocation Method

Technical Field

The present invention relates to the field of the communication technology, and more especially, to an application server and a method for allocating media resources.

Background of the Related Art

In the Next Generation Network (NGN) or IP-based Multimedia Subsystem (IMS) network environment, the Application Server (AS) and the Media Server (MS) are more crucial network equipments. The application server is used to implement the service logic of a variety of value-added services or intelligent services, and the media server is used to provide media processing functions such as playback, receiving number, recording, faxing, and conferencing, and so on for all types of the multimedia services under the control of the application server.

Since the media resources that can be provided by the media server are limited, in some cases, there might be a case that there are not enough media resources for allocating. For example, in an application that the operator provides media resources for the enterprise users, the case always occurs that some enterprise users' applications occupy too many media resources, which causes that there are not enough media resources for other enterprise users' applications. In these circumstances, it needs to reasonably allocate the media resources, so that each enterprise users' application can be ensured, which has a significant meaning for improving the service quality by the operator.

In the related art, it can be that a plurality of media servers is connected with one master media server and the master media server uniformly allocates media resources to the connected plurality of media servers, however, this method cannot allocate the media resources according to the user requirements, and the networking mode of the master media server and the plurality of media servers is difficult to be deployed.

Summary of the Invention

In view of this, the embodiment of the present invention provides an application server and a method for allocating media resources, which are able to reasonably allocate the media resources according to the user requirements.

To solve the aforementioned problem, the embodiment of the present invention provides an application server, comprising:

- a triggering module, which is used to: trigger a service application corresponding to a call when receiving the call from a user equipment;

- an analysis module, which is used to: analyze a number of media resources that the call is required to occupy;

- an acquisition module, which is used to: acquire an upper limit of occupancy of media resources in the service application as well as a number of media resources that are currently occupied;

- a judgment module, which is used to: judge whether a media resource allocation condition is met or not according to the number of media resources that the call is required to occupy, the upper limit of occupancy of the media resources, as well as the number of media resources that are currently occupied; and

- a processing module, which is used to: control a media server to provide media resources for the call when the media resource allocation condition is met, or end the call when the media resource allocation condition is not met.

The judgment module comprises:

- a summation unit, which is used to: sum the number of media resources that the call is required to occupy and the number of media resources that are currently occupied in the service application to acquire a sum value; and

- a comparison unit, which is used to: judge whether the sum value exceeds the upper limit of occupancy of media resources in the service application or not, if the sum value exceeds the upper limit of occupancy, determine that the media resource allocation condition is met; if the sum value does not exceed the upper limit of occupancy, determine that media resource allocation condition is not met.

The application server further comprises:

a configuration module, which is connected with the acquisition module and is used to set the upper limit of occupancy of the media resources that each supportable service application is required to use.

The application server further comprises:

a release module, which is connected with the processing module and is used to release the media resources occupied by the call when the call ends.

The application server further comprises:

an update module, which is connected with the acquisition module and the release module and is used to update the number of media resources that are currently occupied in the service application corresponding to the call when releasing the media resources occupied by the call.

The embodiment of the present invention further provides a method for allocating media resources, comprising following steps:

when an application server receives a call from a user equipment, triggering a service application corresponding to the call;

the application server analyzing a number of media resources that the call is required to occupy;

the application server acquiring an upper limit of occupancy of media resources in the service application as well as a number of media resources that are currently occupied;

the application server judging whether a media resource allocation condition is met or not according to the number of media resources that the call is required to occupy, the upper limit of occupancy of the media resources, as well as the number of media resources that are currently occupied; and

when the media resource allocation condition is met, the application server controlling a media server to provide media resources for the call; when the media resource allocation condition is not met, ending the call.

Said judging whether the media resource allocation condition is met or not comprises:

the application server summing the number of media resources that the call is required to occupy and the number of media resources that are currently occupied in the service application to acquire a sum value; and

the application server judging whether the sum value exceeds the upper limit of occupancy of media resources in the service application or not, if yes, determining that the media resource allocation condition is met; otherwise, determining that media resource allocation condition is not met.

Before the application server judging whether the media resource allocation condition is met or not according to the number of media resources that the call is required to occupy, the upper limit of occupancy of the media resources in the application service, as well as the number of media resources that are currently occupied, the method further comprises:

the application server setting the upper limit of occupancy the media resources that each supportable service application is required to use.

The method further comprises:

the application server releasing the media resources occupied by the call when ending the call.

After the application server releasing the media resources occupied by the call when ending the call, the method further comprises:

the application server updating the number of media resources that are currently occupied in the service application corresponding to the call.

The embodiments of the present invention have the following beneficial effects:

based on the user requirements, the application server sets an upper limit of the occupancy for the media resources that each service application is required to use; when receiving a call from the user equipment, the application server judges whether to allocate media resources to the call or not according to the number of media resources that the call is required to uses, the upper limit of occupancy of the media resources in the service application corresponding to the call, as well as the number of media resources that are currently occupied, so as to make each user's service application can be ensured, which is good for improving the service quality by the

operator.

Meanwhile, the application server might charge the user according to the upper occupancy limit of the media resources configured for the service application, which improves the operator's charging method.

In addition, the application server allocates media resources to a plurality of media servers, and it does not need to change the networking mode of the media server, thus the implementation is simple.

Brief Description of Drawings

FIG. 1 is a structural diagram of a NGN/IMS network system in accordance with an embodiment of the present invention;

FIG. 2 is a structural diagram of an application server in accordance with an embodiment the present invention;

FIG. 3 is another structural diagram of an application server in accordance with an embodiment the present invention;

FIG. 4 is a flow chart of a method for allocating media resources in accordance with an embodiment of the present invention;

FIG. 5 is another flow chart of a method for allocating media resources in accordance with an embodiment of the present invention.

Preferred Embodiments of the Present Invention

The embodiment of the present invention is based on the NGN or IMS network system, and the structural diagram of the NGN/IMS network system will be introduced briefly below. FIG. 1 shows a structural diagram of the NGN/IMS network system in accordance with an embodiment of the present invention. The NGN/IMS network system mainly comprises the following network elements: the User Equipment (UE), the NGN/IMS network, the application server and the media server. When the user equipment initiates a call, the call is triggered to the application server through the NGN/IMS network, and the application server controls the media

server to allocate media resources to the call.

In the following, the specific embodiments of the present invention will be further described in detail in combination with the accompanying figures and the specific embodiments.

FIG. 2 shows a structural diagram of the application server in accordance with an embodiment of the present invention, and the application server comprises:

a triggering module 101, which is used to: trigger the service application corresponding to a call when receiving the call of the user equipment. In the embodiment of the present invention, the user equipment can access the NGN/IMS network through the wired or wireless way, and when initiating a call, the user equipment uses the Session Initiation Protocol (SIP) message to trigger the corresponding service application in the application server via the NGN/IMS network, wherein the service application might be the enterprise customer service hotline and so on.

An analysis module 102, which is used to: analyze the number of media resources that the call is required to occupy. The number of media resources might include: the number of ports, playback, receiving number, recording, faxing, and conferencing, and so on.

An acquisition module 103, which is used to: acquire the upper limit of occupancy of the media resources in the service application as well as the number of the media resources that are currently occupied.

A judgment module 104, which is used to: judge whether the media resource allocation conditions are met or not according to the number of media resources that the call is required to occupy, the upper limit of occupancy of the media resources in the service application, as well as the number of media resources that are currently occupied.

A processing module 105, which is used to: control the media server to provide media resources for the call if the media resource allocation conditions are met, or end the call when the media resource allocation conditions are not met. The specific embodying form of ending the call might be directly ending the call, or playing the prompt tone and then ending the call, and so on; specifically, it can be defined according to the service logic of each application service.

In addition, before allocating the media resources, it also needs to set an upper limit of occupancy of the media resources that each service application is required to occupy according to the user's requirement. FIG. 3 shows another structural diagram of the application server in accordance with an embodiment of the present invention, on the basis of the embodiment shown in FIG. 2, the application server also comprises: a configuration module 106, which is connected with the acquisition module 103 and is used to set an upper limit of occupancy of the media resources that each supportable service application is required to occupy. For example, in a service application of enterprise customer service hotline, it might configure the upper limits of occupancy of various media resources such as the port resources, the playback resources or the conferencing resources etc. of the service application. In addition, when the user's requirements change, the configured upper limit of media resources might be updated based on the user's requirements.

The service application of an enterprise customer service hotline is taken as an example to describe the application server in the aforementioned embodiment in detail.

Suppose that the enterprise user purchases 200 playback resources, 200 recording resources, and 50 conferencing resources, the upper limits of occupancy of the media resources configured by the application server for the service application of the enterprise customer service hotline are as follows: the upper limit of occupancy of the playback resources is 200, the upper limit of occupancy of the recording resources is 200, and the upper limit of occupancy of conferencing resources is 50, that is, all the types of media resources in the service application are limited.

Suppose that there is an incoming call from a user currently, the application server analyzes that the destination number of the call is the enterprise customer service hotline, the triggering module 101 triggers the service application of the enterprise customer service hotline, and the analysis module 102 analyzes that the media resources that the call of the user is required to occupy are: a playback resource and a recording resource; in addition, the acquisition module 103 acquires that the upper limit of occupancy of the playback resources in the service application is 200, the upper limit of occupancy of the recording resources is 200, the number of the playback resources that are currently occupied in the enterprise application is

60, and the number of recording resources is 55, and at this time, since there are enough playback resources and recording resources, the judgment module 104 determines that currently the media resource allocation conditions are still met and the processing module 105 controls the media server to provide playback resources and recording resources for the call. If the acquisition module 103 obtains that the number of the playback resources that are currently occupied in the enterprise application is 200 and the number of recording resources is 110, at this time, since playback resources are not enough, the judgment module 104 determines that currently the media resource allocation conditions are not met and the processing module 105 ends the call.

In the aforementioned embodiment, when judging whether the media resource allocation conditions are met currently or not, the judgment module 104 might sum the number of media resources that the call of the user is required to occupy and the number of media resources that are occupied currently in the service application corresponding to the call, and compare the sum value with the upper limit of occupancy of the media resources in the service application, and judge whether the sum value exceeds the upper limit of occupancy of the media resources in the service application or not, thereby determining whether the media resource allocation conditions are met or not.

As shown in FIG. 3, the judgment module 104 comprises:

a summation unit 1041, which is used to: sum the number of media resources that the call is required to occupy and the number of media resources that are currently occupied by the service application to acquire the sum value; and

a comparison unit 1042, which is used to: judge whether the sum value exceeds the upper limit of occupancy of media resources in the service application or not, if yes, determine that the media resource allocation conditions are met; otherwise, determine that media resource allocation conditions are not met.

In addition, when the user call ends, the application server also needs to release the media resources occupied by the call, and therefore, as shown in FIG. 3, the application server also comprises:

a release module 107, which is connected with the processing module 105 and is used to

release the media resources occupied by the call when the call of the user ends. When the call of the user ends, the application server needs to release all the media resources occupied by the call, and specifically, the application server might initiate a BYE message to the media server to indicate the media server to release the media resources occupied by the call of the user, wherein the BYE message is a kind of SIP signaling.

Since the number of media resources that are currently occupied in the service application might also change after releasing the media resources occupied by the current call, the application server also comprises: an update module 108, which is connected with the acquisition module 103 and the release module 107 and is used to update the number of media resources that are currently occupied in the service application corresponding to the call when releasing the media resources occupied by the call.

With the application server provided in the aforementioned embodiment, an upper limit of occupancy should be set for the media resources that each service application is required to use according to the user requirements; when receiving a call from the user equipment, whether to allocate media resources to the call or not is judged according to the number of media resources that this call is required to occupy, the upper limit of occupancy of the media resources in the service application corresponding to the call, and the number of media resources that are currently occupied, so that each user's service applications can be ensured, which is good for improving the service quality by the operator.

Meanwhile, the application server charges the user according to the upper limit of occupancy of the media resources configured for the service application, which improves the operator's charging way, and the charging way is different from the ways that charges according to the number of media resources that are actually occupied by the user in the related art.

In addition, the application server allocates media resources to a plurality of media servers, which does not need to make any change to the networking mode of the media server, and the implementation is simple.

FIG. 4 is a flow chart of a method for allocating media resources in accordance with an embodiment of the present invention, and the method for allocating media resources comprises the following steps.

Step 401, when receiving a call from the user equipment, the application server triggers the service application corresponding to the call. When initiating a call, the user equipment uses the SIP message to trigger the corresponding service application in the application server via the NGN/IMS network.

Step 402, the application server analyzes the number of media resources that the call is required to occupy. The number of media resources might include: the number of ports, playback, receiving number, recording, faxing, and conferencing, and so on.

Step 403, the application server acquires the upper occupancy limit of the media resources in the service application as well as the number of media resources currently occupied.

Step 404, the application server judges whether the media resource allocation conditions are met or not according to the number of media resources that this call is required to occupy, the upper limit of occupancy of the media resources in the service application, as well as the number of media resources that are currently occupied, and if yes, step 405 is performed; otherwise, step 406 is performed.

Step 405, the application server controls the media server to provide media resources for the call.

Step 406, the application server ends the call.

In the aforementioned embodiment, when judging whether the media resource allocation conditions are met currently or not, the judgment module 104 might sum the number of media resources that the call of the user is required to occupy and the number of media resources that are occupied currently in the service application corresponding to the call, and compare the sum value with the upper limit of occupancy of the media resources in the service application to judge whether the sum value exceeds the upper limit of occupancy of the media resources in the service application or not, thereby judging whether the media resource allocation conditions are met or not.

Therefore, the aforementioned step 404 might also comprise the following steps:

step 1, the application server sums the number of media resources that the call is required to occupy and the number of media resources that are currently occupied in the service

application to acquire the sum value;

step 2, the application server judges whether the sum value exceeds the upper limit of occupancy of media resources in the service application or not, and if yes, determines that the media resource allocation conditions are met; otherwise, determines that media resource allocation conditions are not met.

In addition, before allocating the media resources, an upper limit of occupancy should also be set for the media resources that each service application is required to use according to the user requirements, and before the aforementioned step 404, it might also comprise: the step of the application server setting an upper limit of occupancy of the media resources that each supportable service application is required to use.

In addition, when the call of the user ends, the application server also needs to release the media resources occupied by the call, and therefore, the method for allocating media resources also comprises: the step of the application server releasing the media resources occupied by the call when ending the call.

Since the number of the media resources that are currently occupied in the service application also change after releasing the media resources that are currently occupied by the call, after the step of the application server releasing the media resources occupied by the call when ending the call, it also comprises: the step of the application server updating the number of media resources that are currently occupied in the service application corresponding to the call.

In the following, allocating the playback resource is taken as an example, the process procedure of the method for the application server allocating the media resources will be described in detail, and as shown in FIG. 5, it might specifically comprise the following steps.

Step 501, the user equipment calls through the NGN/IMS network call, and uses an INVITE message to trigger a service application in the application server, wherein the INVITE message includes the Session Description Protocol (SDP) of the user equipment, and the SDP is used to describe information such as the streaming media initialization parameter and so on.

Step 502, the application server analyzes the number of media resources that are currently occupied by the call of the user, and acquires the upper limit of occupancy of the media

resources in the service application as well as the number of media resources that are currently occupied, and according to which, judge whether to allocate the media resources or not.

Suppose that the number of the playback media resources that the call of the user is currently required to occupy is M , the upper limit of the playback media resources configured for this service application in the application server is R , the number of playback media resources that are currently used in the service application is N ; M and N are summed, and if the sum value is greater than R , step 503 is performed, otherwise step 504 is performed.

Step 503, it indicates that the current playback media resources are not enough, the application server replies an error message to the NGN/IMS network, and forwards the message to the user equipment, this error message can be specified by the service application itself, such as the 480 message, and then the application server ends the whole call procedure.

Step 504, it indicates that the current playback media resources are sufficient, and the application server sends an INVITE message including the SDP of the user equipment to the media server.

Step 505, the media server replies a 200 OK message including the SDP of the media server to the application server, and the application server forwards this 200 OK message to the NGN/IMS network and responds the 200 OK to the user equipment.

Step 506, the NGN/IMS network sends an acknowledgment (ACK) message to the application server after acquiring the acknowledgement from the user equipment, and the application server forwards the ACK message to the media server.

Step 507, the application server sends the INFO (Information) message including the playback instruction to the media server.

Step 508, the media server returns a 200 OK message to the application server according to the INFO message.

Step 509, the media server performs the normal playback procedure.

Step 510, when the call ends, the user equipment sends a BYE message to the application server through the NGN/IMS network, and the application server releases the media resources and re-calculates the number of playback media resources that are currently occupied in the

service application, and sends a BYE message to the media server.

In the aforementioned embodiment, the INVITE, 480, 200 OK, ACK, and INFO messages are all SIP signaling.

Although the above description is only the preferred embodiments of the present invention, it should be noted that, those skilled in the field can make various improvements and retouches according to the present invention without departure from the spirit and essence of the present invention, and these improvements and retouches should fall into the protection scope of the present invention.

What is claimed is:

1. An application server, comprising:

a triggering module, which is used to: trigger a service application corresponding to a call when receiving the call from a user equipment;

an analysis module, which is used to: analyze a number of media resources that the call is required to occupy;

an acquisition module, which is used to: acquire an upper limit of occupancy of media resources in the service application as well as a number of media resources that are currently occupied;

a judgment module, which is used to: judge whether a media resource allocation condition is met or not according to the number of media resources that the call is required to occupy, the upper limit of occupancy of the media resources, as well as the number of media resources that are currently occupied; and

a processing module, which is used to: control a media server to provide media resources for the call when the media resource allocation condition is met, or end the call when the media resource allocation condition is not met.

2. The application server of claim 1, wherein the judgment module comprises:

a summation unit, which is used to: sum the number of media resources that the call is required to occupy and the number of media resources that are currently occupied in the service application to acquire a sum value; and

a comparison unit, which is used to: judge whether the sum value exceeds the upper limit of occupancy of media resources in the service application or not, if the sum value exceeds the upper limit of occupancy, determine that the media resource allocation condition is met; if the sum value does not exceed the upper limit of occupancy, determine that media resource allocation condition is not met.

3. The application service of claim 1 or 2, wherein the application server further comprises:

a configuration module, which is connected with the acquisition module and is used to set

the upper limit of occupancy of the media resources that each supportable service application is required to use.

4. The application server of claim 3, wherein the application server further comprises:

a release module, which is connected with the processing module and is used to release the media resources occupied by the call when the call ends.

5. The application server of claim 4, wherein the application server further comprises:

an update module, which is connected with the acquisition module and the release module and is used to update the number of media resources that are currently occupied in the service application corresponding to the call when releasing the media resources occupied by the call.

6. A method for allocating media resources, comprising following steps:

when an application server receives a call from a user equipment, triggering a service application corresponding to the call;

the application server analyzing a number of media resources that the call is required to occupy;

the application server acquiring an upper limit of occupancy of media resources in the service application as well as a number of media resources that are currently occupied;

the application server judging whether a media resource allocation condition is met or not according to the number of media resources that the call is required to occupy, the upper limit of occupancy of the media resources, as well as the number of media resources that are currently occupied; and

when the media resource allocation condition is met, the application server controlling a media server to provide media resources for the call; when the media resource allocation condition is not met, ending the call.

7. The method of claim 6, wherein said judging whether the media resource allocation condition is met or not comprises:

the application server summing the number of media resources that the call is required to occupy and the number of media resources that are currently occupied in the service application to acquire a sum value; and

the application server judging whether the sum value exceeds the upper limit of occupancy of media resources in the service application or not, if yes, determining that the media resource allocation condition is met; otherwise, determining that media resource allocation condition is not met.

8. The method of claim 6 or 7, before the application server judging whether the media resource allocation condition is met or not according to the number of media resources that the call is required to occupy, the upper limit of occupancy of the media resources in the application service, as well as the number of media resources that are currently occupied, the method further comprising:

the application server setting the upper limit of occupancy the media resources that each supportable service application is required to use.

9. The method of claim 8, further comprising:

the application server releasing the media resources occupied by the call when ending the call.

10. The method of claim 9, after the application server releasing the media resources occupied by the call when ending the call, the method further comprising:

the application server updating the number of media resources that are currently occupied in the service application corresponding to the call.