

Multi-Source Transmission System and Method of Instant Messaging File

Field of the Invention

The present invention relates to digital data processing technologies, and more particularly to a multi-source transmission system and method of an Instant Messaging file.

Background of the Invention

Instant Messaging (IM) system is a main application on Internet, and in the IM system users perform Peer to Peer (P2P) based file transmission through IM terminals. In order to improve the efficiency of file transmission, a conventional method for accelerating data transmission between IM terminals includes selecting multiple relay nodes according to a specific rule, so as to implement multi-path data transmission between a sender IM terminal and a receiver IM terminal, thereby furthest utilizing uplink-downlink bandwidth between the two terminals. In order to make the selected relay nodes work normally, the relay nodes should be selected according to route quality and be determined by using a shortest path algorithm.

At present, a Peer to Server and Peer (P2SP) mode is applied widely on the Internet. In the P2SP mode, through a concentrated index database, steady server resources and P2P resources which are separated originally are integrated, and a plurality of network resource indexes are collected. By using the P2SP mode, a user not only can receive files from other user terminals in a multi-source mode according to specific P2P protocols, but also can receive files from public steady servers in the multi-source mode according to general protocols, such as HTTP and FTP. Therefore, by using the P2SP mode, the resources are more abundant, the speed of file transmission is faster and the file transmission is more stable.

Summary of the Invention

The examples of the present invention provide a multi-source transmission system of an IM file, to improve the efficiency of file transmission.

The multi-source transmission system of an IM file includes a sender IM terminal

and a receiver IM terminal which are connected with each other through a network and exchanges data with each other;

the receiver IM terminal is configured to search for replicas of a file according to file information sent by the sender IM terminal, and when at least one replica is searched out,
5 receive the file from at least two file sources by using a multi-source transmission mode, wherein the at least two file sources comprise the sender IM terminal and a file source of the at least one replica;

the system further comprises an off-line file server, wherein

the off-line file server comprises an off-line control module for controlling file
10 transmission, an off-line P2SP module connected with the file sources respectively and for exchanging data with the file sources;

the off-line file server is configured to search for the replicas according to the file information sent by the sender IM terminal, and when at least one replica is searched out, receive the file from at least two file sources by using the multi-source transmission mode;
15 when no replica is searched out, receive the file from the sender IM terminal;

the off-line file server is further configured to send the file information to the receiver IM terminal, and send the file to the receiver IM terminal according to the file transmission request.

The examples of the present invention also provide a multi-source transmission
20 method of an IM file, applied between a sender IM terminal and a receiver IM terminal, and including:

generating, by the sender IM terminal, file information and sending the file information to the receiver IM terminal;

searching for, by the receiver IM terminal, replicas of the file according to the file
25 information;

when at least one replica is searched out, receiving, by the receiver IM terminal, the file from at least two file sources by using a multi-source transmission mode, wherein the at least two file sources comprises the sender IM terminal and a file source of the at least one replica;

30 wherein generating, by the sender IM terminal, file information and sending the file information to the receiver IM terminal comprises:

generating, by the sender IM terminal, the file information, and sending the file

information to an off-line file server;

searching for, by the off-line file server, the replicas of the file according to the file information;

when at least one replica is searched out, receiving, by the off-line file server, the file
5 from at least two file sources by using the multi-source transmission mode; when no replica is searched out, receiving the file from the sender IM terminal;

sending, by the off-line file server, the file information to the receiver IM terminal.

In the examples of the present invention, the replica of a file is searched for by using a conventional P2SP system, and the file with a replica is received by using a
10 multi-source transmission method, thereby improving the efficiency of file transmission, bandwidth utilization ratio and the speed of file transmission.

Brief Description of the Drawings

Figure 1 is a schematic diagram illustrating the structure of a multi-source transmission system of an IM file in accordance with a first example of the present
15 invention.

Figure 2 is a flowchart illustrating a work procedure of a multi-source transmission system of an IM file in accordance with a first and fifth example of the present invention.

Figure 3 is a flowchart illustrating a work procedure of a sender IM terminal in accordance with a second and sixth example of the present invention.

20 Figure 4 is a flowchart illustrating a work procedure of a receiver IM terminal in accordance with a second and sixth example of the present invention.

Figure 5 is a schematic diagram illustrating the structure of a multi-source transmission system of an IM file in accordance with a third and seventh example of the present invention.

Figure 6 is a flowchart illustrating a work procedure of a multi-source transmission system of an IM file in accordance with a third and seventh example of the present invention.

Figure 7 is a flowchart illustrating a work procedure of a sender IM terminal in accordance with a third example of the present invention.

Figure 8 is a flowchart illustrating a work procedure of an off-line file server in accordance with a third example of the present invention.

Detailed Description of the Invention

The purpose, solutions and merits of the present invention will be illustrated in detail hereinafter with reference to the accompanying drawings and specific examples.

The first example of the present invention provides a multi-source transmission system of an IM file.

Based on distribution of files on the Internet, files transmitted between users are generally divided into files with a replica and files without a replica. A file with a replica is a file which is spread publicly on the Internet and has several replicas, such as a popular music file and a movie file; a file without a replica is a file which does not have a replica, such as a document or picture made by a user. According to the characteristics of the two kinds of files, in this example, the replicas of a file are searched for on the Internet by using a P2SP mode, if the replicas are searched out, the receiver IM terminal receives the file from file sources of the replicas by using a multi-source transmission mode, so as to improve the efficiency of file transmission.

Referring to Figure 1, the multi-source transmission system of an IM file provided by this example includes a sender IM terminal 11 and a receiver IM terminal 12. The sender IM terminal 11 and the receiver IM terminal 12 are connected with each other through a network and exchange data with each other through the network.

The receiver IM terminal 12 includes a control module 121 for controlling file

transmission, a user interaction module 122 for performing user interaction, a file receiving module 123 connected with the sender IM terminal 11 and for exchanging data with the sender IM terminal 11, and a P2SP module 124 connected with file sources respectively and for exchanging data with the file sources.

- 5 The sender IM terminal 11 includes a sending control module 111 for controlling file transmission according to a request of the receiver IM terminal 12, and a file sending module 112 for sending a file to the receiver IM terminal 12.

Referring to Figure 2, the work procedure of the multi-source transmission system of an IM file provided by this example includes the following steps.

- 10 Step S1, the sender IM terminal 11 generates file information and sends the file information to the receiver IM terminal 12.

Step S2, the receiver IM terminal 12 searches for replicas of the file according to the file information.

- 15 Step S3, if at least one replica is searched out, the receiver IM terminal 12 receives the file from file sources by using a multi-source transmission mode; if no replica is searched out, the receiver IM terminal 12 receives the file from the sender IM terminal 11.

- 20 The above network is the Internet, a local area network and/or a private network. The IM terminal includes a client program and/or a program running in a browser, and the IM terminal is installed and/or runs in a computer, a terminal device and/or a hand-hold data processing device.

- 25 The above file source refers to an entity where at least one file or replica is located, and may include the sender IM terminal 11 and the file source of the replica, such as a personal computer, a terminal device, a network hard disc or a server. The file may have multiple replicas distributed on multiple file sources, and one file source may include multiple replicas.

- 30 The receiver IM terminal 12 sends a file transmission request to at least two file sources including the sender IM terminal 11 respectively, and receives, by using a multi-source transmission mode, the file from at least two file sources responding to the file transmission request. The sending control module 111 controls file transmission according to the file transmission request of the receiver IM terminal 12, that is, the

receiver IM terminal 12 performs file transmission scheduling, adjusts the file transmission request to be sent to the file sources, the sending control module 111 sends the file to the receiver IM terminal 12 according to the file transmission request.

In view of data flow, the file transmission between the IM terminal and the file sources mainly includes a P2P direct transmission mode and a server relay mode. In the P2P direct transmission mode, a network connection is established directly between the sender IM terminal and the receiver IM terminal, and the speed of file transmission is affected by the network connection state provided by network operators of the two parties. In the server relay mode, a relay server for relaying data is configured, and takes an important additional part in the file transmission when the P2P direct transmission between the sender IM terminal and the receiver IM terminal is unavailable or the quality of the network connection between the two parties is bad, and thus the service is stable.

In view of the real-time performance, the file transmission between conventional IM terminals includes on-line transmission and off-line transmission. In the on-line transmission, the sender IM terminal and the receiver IM terminal are both on-line, and thus both the P2P direct transmission mode and the server relay mode may be used; in the off-line transmission, the sender IM terminal and the receiver IM terminal are not on-line at the same time, that is, an off-line file server is used to implement the file transmission between the sender IM terminal and the receiver IM terminal. The off-line file server is taken as a receiver device firstly, and the sender IM terminal sends the file to the off-line file server to be stored temporarily; after the receiver IM terminal is linked to the off-line file server, the off-line file server is taken as a sender and sends the file to the receiver IM terminal, so as to implement the off-line transmission. The off-line file server may also be taken as a special terminal device which usually adopts the P2P direct transmission mode during the file transmission.

Based on the above description, a second example of the present invention is provided, in which online multi-source transmission of an IM file is implemented when a sender IM terminal and a receiver IM terminal which are both on-line.

Referring to Figure 3, the specific work procedure of the sender IM terminal 11 in this example includes the following steps.

Step S111, the sender IM terminal 11 generates file information.

Step S112, the sender IM terminal 11 sends the file information to the receiver IM terminal 12.

Step S113, if the sender IM terminal 11 receives a file transmission request from the receiver IM terminal 12, step S114 is performed, otherwise, the sender IM terminal 11
5 keeps on waiting for the file transmission request.

Step S114, the sending control module 111, according to the file transmission request, controls the file sending module 112 to send the file to the receiver IM terminal 12.

In the above work procedure, the file information includes but not limited to such information as a digital abstract, a file name, file length etc. The specific algorithm of the
10 digital abstract is identical with that in the P2SP system. For example, some P2SP system may divide the file into multiple segments according to a preset strategy and generate multiple digital abstracts for the segments respectively, while some P2SP system may generate the digital abstract for the whole file. In an example, a Message Digest algorithm
15 5 (MD5) may be used to generate the digital abstract. By using the MD5, a digital abstract or Hash value of 16 bytes is outputted for data of any size, thereby obtaining a good anti-conflict characteristic. If two files have the same digital abstract, the probability that the two files have the same contents is almost 1.

In the above work procedure, the mode for sending the file information or the file transmission mode is not limited, and the P2P direct transmission mode and the server
20 relay mode may be adopted according to practical applications.

Referring to Figure 4, the work procedure of the receiver IM terminal 12 in this example includes the following steps.

Step S121, the user interaction module 122 selects the file to be received according to user operations, and the control module 121 controls the file receiving module 123 to
25 receive the file information.

Step S122, the P2SP module 124 searches for replicas of the file according to the file information.

Step S123, if the P2SP module 124 searches out at least one replica, step S124 is performed; otherwise, step S125 is performed.

Step S124, the control module 121 controls the P2SP module 124 to send a file
30 transmission request to file sources, where the file sources include the sender IM terminal

11 and the file source of the at least one replica.

Step S125, the control module 121 controls the file receiving module 123 to send a file transmission request to the sender IM terminal 11.

Step S126, the control module 121 controls the P2SP module 124 to receive, by
5 using the multi-source mode, the file from at least two file sources responding to the file transmission request.

Step S127, the control module 121 controls the file receiving module 123 to receive the file from the sender IM terminal 11.

In order to improve the efficiency of file transmission, the control module 121 may
10 directly receive the file from the sender IM terminal 11 in step S121 when controlling the file receiving module 123 to receive the file information, and thus can control the file receiving module 123 to send the file transmission request in step S125 without needing to wait for the result of searching for the replicas by the P2SP module 124.

In step S122, the P2SP module 124 sends a request of searching for the replicas to an
15 inquiry server of the P2SP system according to an inquiry protocol interaction criterion of the P2SP system, and the request at least includes the file information, e.g. the digital abstract. In addition, the P2SP module 124 may search for the replicas in multiple P2SP systems as long as inquiry protocol interaction criteria of the P2SP systems are met.

Specifically, step S124 includes: the control module 121 divides the file into
20 multiple file blocks according to states of the file sources searched out by the P2SP module 124 and file download protocol interaction criteria of the P2SP systems to which the file sources belong respectively, and respectively requests the file sources for the file blocks according to the connection states of the file sources.

In Step S126, after receiving a response to the file transmission request from at least
25 two file sources, the P2SP module 124 receives the file blocks from the at least two file sources; the control module 121 performs file transmission scheduling according to the receiving state of the file, adjusts the file transmission request sent to the file sources including the sender IM terminal 11, so as to implement multi-source transmission of the file. The above processing is performed until the sender IM terminal 12 receives all file
30 blocks to form the whole file.

In the above work procedure, if the P2SP module 124 does not search out any replica,

the control module 121 may divide the file into multiple file blocks or not divide the file. If the control module 121 divides the file, the file receiving module 123 requests the sender IM terminal 11 for all the file blocks, and receives all the file blocks to form the whole file.

5 In addition, in the procedure of file transmission, the control module 121 calculates the progress of receiving the file from the sender IM terminal 11 and other file sources, performs file transmission scheduling and adjusts the file transmission request sent to the sender IM terminal 11 and/or other file sources according to the progress of receiving the file and the connection state of each file source. The control module 121 sends the
10 progress to the sending control module 111 of the sender IM terminal 11, so that the sender IM terminal 11 can learn the progress of receiving the file by the receiver IM terminal 12 and control the sending of the file according to the file transmission request. The file transmission request usually includes a file identity and file information / file block information, the file information may be file length, and the file block information
15 may be an identity, e.g. a file block number, or may be an original address and offset of the file block. When needing to adjust the file or file block to be sent from the sender IM terminal 11, the control module 121 only needs to adjust the file identity and file information / file block information in the file transmission request and send out the adjusted file transmission request in the step S125.

20 The progress of receiving the file may be presented as the progress of receiving the file from each file source, or may be presented as a total progress obtained by counting the progress of receiving the file from each file source, and may be presented through a percentage, a progress bar or a progress value.

 Based on the above description, a third example of the present invention is provided
25 to implement multi-source transmission of an IM file in an off-line case.

 Referring to Figure 5, an off-line file server 20 is further included in this example, which is connected with the sender IM terminal 11 and/or the receiver IM terminal 12 through a network and exchanges data with the sender IM terminal 11 and/or the receiver IM terminal 12. The off-line file server 20 includes an off-line control module 201 for
30 controlling file transmission, an off-line file receiving module 203 connected with the sender IM terminal 11 and for exchanging data with the sender IM terminal 11, an off-line P2SP module 204 connected with file sources respectively and for exchanging data with

the file sources, an off-line sending control module 202 for controlling the file transmission according to the request of the receiver IM terminal 12, and an off-line file sending module 205 for sending the file to the receiver IM terminal 12.

The work procedure of this example is similar to that of the first example. The
5 off-line file server 20 is taken as a receiver device at first, and receives the file from the sender IM terminal 11 according to the work procedure shown in Figure 2; and then the off-line file server 20 is taken as a sender device, and sends the file to the receiver IM terminal 12 according to the work procedure shown in Figure 2. Specifically, referring to Figure 6, the work procedure of this example includes the following steps.

10 Step S31, the sender IM terminal 11 generates file information and sends the file information to the off-line file server 20.

Step S32, the off-line file server 20 searches for replicas of the file according to the file information.

Step S33, if at least one replica is searched out, the off-line file server 20 receives the
15 file from file sources by using a multi-source transmission mode, where the file sources include the sender IM terminal 11 and the file source of the at least one replica; if no replica is searched out, the off-line file server 20 receives the file from the sender IM terminal 11.

Step S34, the off-line file server 20 sends the file information to the receiver IM
20 terminal 12.

Step S35, the receiver IM terminal 12 searches for the replicas of the file according to the file information.

Step S36, if at least one replica is searched out, the receiver IM terminal 12 receives the file from file sources by using the multi-source transmission mode, where the file
25 sources include the off-line file server and the file source of the at least one replica; if no replica is searched out, the receiver IM terminal 12 receives the file from the off-line file server 20.

In the above work procedure, the mode for sending the file information and the file transmission mode are not limited, and the P2P direct transmission mode and the server
30 relay mode may be adopted according to practical applications.

The file source described above may include the off-line file server 20.

Referring to Figure 7, the work procedure of the sender IM terminal 11 in this example includes the following steps.

Step S211, the sender IM terminal 11 generates file information.

Step S212, the sender IM terminal 11 sends the file information to the off-line file server 20.

Step S213, if the sender IM terminal 11 receives a file transmission request from the off-line file server 20, step S214 is performed; otherwise, the sender IM terminal 11 keeps on waiting for the file transmission request.

Step S214, the sending control module 111, according to the file transmission request, controls the file sending module 112 to send the file to the off-line file server 20.

The above steps are similar to the work procedure of the sender IM terminal 11 shown in Figure 3. The sender IM terminal 11 takes the off-line file server 20 as a receiver IM terminal 12 and sends the file to the off-line file server 20.

Referring to Figure 8, the specific work procedure of the off-line file sever 20 in this example includes the following steps.

Step S201, the off-line control module 201 selects the file to be received, and controls the off-line file receiving module 203 to receive the file information.

Step S202, the off-line P2SP module 204 searches for replicas of the file according to the file information.

Step S203, if the off-line P2SP module 204 searches out at least one replica, step S204 is performed; otherwise, step S205 is performed.

Step S204, the off-line control module 201 controls the off-line P2SP module 204 to send a file transmission request to file sources, where the file sources include the sender IM terminal 11 and the file source of at least one replica.

Step S205, the off-line control module 201 controls the off-line file receiving module 203 to send a file transmission request to the sender IM terminal 11.

Step S206, the off-line control module 201 controls the off-line P2SP module 204 to receive the file from at least two file sources responding to the file transmission request by using the multi-source transmission mode.

Step S207, the off-line control module 201 controls the off-line file receiving module

203 to receive the file from the sender IM terminal 11.

Step S208, the off-line file sever 20 sends the file information to the receiver IM terminal 12.

Step S209, if the off-line file sever 20 receives a file transmission request from the receiver IM terminal 12, step S210 is performed; otherwise, the off-line file sever 20 keeps on waiting for the file transmission request.

Step S210, the off-line sending control module 202, according to the file transmission request, controls the off-line file sending module 205 to send the file to the receiver IM terminal 12.

The above work procedure of the off-line file server 20 includes two sub-procedures: a receiving sub-procedure including steps S201-S207 and a sending sub-procedure including steps S208-S210. In the receiving sub-procedure, the off-line file server 20 is taken as a receiver device, and the work procedure is similar to that of the receiver IM terminal 12 in the second example. In the receiving sub-procedure, the off-line file server 20 may search multiple P2SP systems respectively for the replicas to improve the hit rate of file searching, may also divide the file into multiple file blocks and receives the file blocks respectively, and may further calculate the progress of receiving the file and perform the file transmission scheduling. In the sending sub-procedure, the off-line file server 20 is taken as a sender device, and the work procedure is similar to that of the sender IM terminal 11 in the second example. The difference lies in that the off-line server does not generate the file information, but forwards the received file information to the receiver IM terminal 12, and sends the file to the receiver IM terminal 12 according to the file transmission request.

In step S208, specifically, after the receiver IM terminal 12 logs on the IM system, the IM system activates the sending sub-procedure of the off-line file server 20.

The work procedure of the receiver IM terminal 12 in this example is similar to that in the second example. The difference lies in that the off-line file server 20 is taken as the sender IM terminal 11, if at least one replica is searched out, the receiver IM terminal 12 receives the file from the off-line file server 20 and at least one file source of the replica by using the multi-source transmission mode, and if no replica is searched out, the receiver IM terminal 12 receives the file from the off-line file server 20.

The control module 121 of the receiver IM terminal 12 and/or the off-line control module 201 of the off-line file server 20 may perform file transmission scheduling at any moment according to the speed of receiving the file from at least two file sources or according to the connection state between the receiver IM terminal 12 and the at least two
5 file sources and/or between the off-line file server 20 and the at least two file sources, and adjusts the proportion of receiving the file from the sender IM terminal 11, the off-line file server 20 and/or at least one other file source by adjusting the file transmission request to improve the efficiency of file transmission. When needing to adjust the file or file block to be sent from the sender IM terminal 11 or the off-line file server 20, the
10 control module 121 and/or the off-line control module 201 only need to adjust the file identity and the file information / file block information in the file transmission request and sent out the adjusted file transmission request.

In this example, the coupling degree between the file transmission of the IM terminal and the P2SP system is low, so this example is easy to be implemented based on the prior
15 art, development cost is low, and it is unnecessary to improve the P2SP system.

In order to further improve the efficiency of file transmission, a fourth example of the present invention is provided.

In this example, the receiver IM terminal 12 may perform a flexible share strategy after receiving the file. For example, the receiver IM terminal 12 inherits a report function
20 of the P2SP mode, sends a file data report message to an index server of the P2SP system after receiving the file, registers the file sources and reports the replicas of the file. Through the report procedure, the file has more replicas in the network, and if there is a transmission requirement for the file, the efficiency of file transmission will be improved by using the replicas.

25 A fifth example of the present invention provides a multi-source transmission method of an IM file based on the sender IM terminal 11 and the receiver IM terminal 12 to implement the multi-source transmission of the IM file.

Referring to Figure 2, the method includes the following steps.

Step S1, the sender IM terminal 11 generates file information and sends the file
30 information to the receiver IM terminal 12.

Step S2, the receiver IM terminal 12 searches for replicas of the file according to the

file information.

Step S3, if at least one replica is searched out, the receiver IM terminal 12 receives the file from file sources including the sender IM terminal 11 by using a multi-source transmission mode; if no replica is searched out, the receiver IM terminal 12 receives the
5 file from the sender IM terminal 11.

A sixth example of the present invention is also provided, in which online multi-source transmission of an IM file is implemented between a sender IM terminal and a receiver IM terminal which are both on-line.

Referring to Figure 3, the work procedure of the sender IM terminal 11 in this
10 example includes the following steps.

Step S111, the sender IM terminal 11 generates file information.

Step S112, the sender IM terminal 11 sends the file information to the receiver IM terminal 12.

Step S113, if the sender IM terminal 11 receives a file transmission request from the
15 receiver IM terminal 12, step S114 is performed; otherwise, the sender IM terminal 11 keeps on waiting for the file transmission request.

Step S114, the sender IM terminal 11 send the file to the receiver IM terminal 12 according to the file transmission request.

Referring to Figure 4, the work procedure of the receiver IM terminal 12 in the
20 example includes the following steps.

Step S121, the receiver IM terminal 12 selects the file to be received according to user operations and receives the file information.

Step S122, the receiver IM terminal 12 searches for replicas of the file according to the file information.

Step S123, if the receiver IM terminal 12 searches out at least one replica, step S124
25 is performed; otherwise, step S125 is performed.

Step S124, the receiver IM terminal 12 sends a file transmission request to the file sources including the sender IM terminal 11.

Step S125, the receiver IM terminal 12 sends a file transmission request to the sender
30 IM terminal 11.

Step S126, the receiver IM terminal 12 receives the file from at least two file sources responding to the file transmission request by using the multi-source transmission mode.

Step S127, the receiver IM terminal 12 receives the file from the sender IM terminal 11.

5 In order to improve the efficiency of file transmission, the receiver IM terminal 12 may directly receive the file from the sender IM terminal 11 in step S121 when receiving the file information, and can send the file transmission request to the sender IM terminal 11 in step S125 without needing to wait for the result of searching for the replicas.

10 In step S122, the receiver IM terminal 12 sends a request of searching for the replicas to an index server of the P2SP system according to an inquiry protocol interaction criterion of the P2SP system, and the request at least includes the file information, e.g. a digital abstract. In addition, the receiver IM terminal 12 may search multiple P2SP systems as long as the inquiry protocol interaction criteria of the P2SP systems are met.

15 Specifically, step S124 includes that: the receiver IM terminal 12 divides the file into multiple file blocks according to the states of the file sources searched out by the P2SP module 124 and the file download protocol interaction criteria of the P2SP systems to which the file sources belong, and the receiver IM terminal 12 respectively requests the file sources for the file blocks according to the connection states of the file sources.

20 In Step S126, after receiving a response to the file transmission request from at least two file sources, the receiver IM terminal 12 receives the file blocks from the at least two file sources, performs file transmission scheduling according to the state of receiving the file, and adjusts the file transmission request sent to the sender IM terminal 11 and/or other file sources, so as to implement the multi-source transmission of the file. The above processing is performed until the sender IM terminal 12 receives all file blocks to form
25 the whole file.

In the above work procedure, if the receiver IM terminal 12 does not search out any replica, the receiver IM terminal 12 may divide the file into multiple file blocks or not divide the file. If the receiver IM terminal 12 divides the file, the receiver IM terminal 12 requests the sender IM terminal 11 for all the file blocks, and receives all the file blocks to
30 form the whole file.

In addition, in the procedure of file transmission, the receiver IM terminal 12

calculates the progress of receiving the file from the sender IM terminal 11 and other file sources, performs file transmission scheduling and adjusts the file transmission request sent to the sender IM terminal 11 and/or other file sources according to the progress of receiving the file and the connection state between the receiver IM terminal 12 and each
5 file source. The receiver IM terminal 12 sends the progress to the sender IM terminal 11, so that the sender IM terminal 11 can learn the progress of receiving the file by the receiver IM terminal 12 and control the sending of the file according to the file transmission request.

The progress of receiving the file may be presented as the progress of receiving the
10 file from each file source, or may be presented as a total progress obtained by counting the progress of receiving the file from each file source, and may be presented through a percentage, a progress bar or a progress value.

Referring to Figure 5, a seventh example of the present invention is provided to implement multi-source transmission of an IM file in the off-line case, based on the
15 off-line file server 20, the sender IM terminal 11 and the receiver IM terminal 12.

The work procedure of this example is similar to that of the fifth example. The off-line file server 20 is taken as a receiver device at first, and receives the file from the sender IM terminal 11 according to the work procedure shown in Figure 2; and then the off-line file server 20 is taken as a sender device, and sends the file to the receiver IM
20 terminal 12 according to the work procedure shown in Figure 2. Specifically, referring to Figure 6, the work procedure of this example includes the following steps.

Step S31, the sender IM terminal 11 generates file information and sends the file information to the off-line file server 20.

Step S32, the off-line file server 20 searches for replicas of the file according to the
25 file information.

Step S33, if at least one replica is searched out, the off-line file server 20 receives the file from file sources including the sender IM terminal 11 by using a multi-source transmission mode; if no replica is searched out, the off-line file server 20 receives the file from the sender IM terminal 11.

Step S34, the off-line file server 20 sends the file information to the receiver IM
30 terminal 12.

Step S35, the receiver IM terminal 12 searches for the replicas of the file according to the file information.

Step S36, if at least one replica is searched out, the receiver IM terminal 12 receives the file from file sources including the off-line file server 20 by using the multi-source
5 transmission mode; if no replica is searched out, the receiver IM terminal 12 receives the file from the off-line file server 20.

In the above example, the file source may include the off-line file server 20. The solutions of generating the file information, dividing the file, requesting the file blocks from multiple file sources, calculating the progress of receiving the file, performing the
10 file transmission scheduling, and reporting the replicas are similar to those in the examples described above, and are not described herein.

The foregoing are only preferred examples of the present invention and are not for use in limiting the protection scope of the present invention. Any modification, equivalent replacement and improvement made within the scope of the present invention should be
15 covered under the protection scope of the present invention.

Claims

1. A multi-source transmission system of an Instant Messaging (IM) file, comprising a sender IM terminal and a receiver IM terminal which are connected with each other through a network and exchanges data with each other;

5 the receiver IM terminal is configured to search for replicas of a file according to file information sent by the sender IM terminal, and when at least one replica is searched out, receive the file from at least two file sources by using a multi-source transmission mode, wherein the at least two file sources comprise the sender IM terminal and a file source of the at least one replica;

10 the system further comprises an off-line file server, wherein

the off-line file server comprises an off-line control module for controlling file transmission, an off-line P2SP module connected with the file sources respectively and for exchanging data with the file sources;

15 the off-line file server is configured to search for the replicas according to the file information sent by the sender IM terminal, and when at least one replica is searched out, receive the file from at least two file sources by using the multi-source transmission mode; when no replica is searched out, receive the file from the sender IM terminal;

20 the off-line file server is further configured to send the file information to the receiver IM terminal, and send the file to the receiver IM terminal according to the file transmission request.

2. The system of claim 1, wherein the receiver IM terminal is configured to, when no replica is searched out, receive the file from the sender IM terminal.

25 3. The system of claim 1, wherein the sender IM terminal is configured to control file transmission according to a file transmission request from the receiver IM terminal.

4. The system of claims 1, 2 or 3, wherein file sources of the replicas belong to at least one Peer to Server and Peer (P2SP) system, and

30 the receiver IM terminal is configured to search the at least one P2SP system for the replicas.

5. The system of claims 1, 2 or 3, wherein

the receiver IM terminal is further configured to divide the file into at least two file blocks according to the file source of the at least one replica, request the at least two file sources respectively for the file blocks, and receive all the file blocks from the at least two file sources to form the whole file.

6. The system of claims 1, 2 or 3, wherein

the receiver IM terminal is further configured to perform file transmission scheduling according to the state of receiving the file, and adjust a file transmission request sent to the sender IM terminal and/or the file source of the at least one replica;

the sender IM terminal is further configured to send the file to the receiver IM terminal according to the file transmission request.

7. The system of claim 1, wherein the off-line file server is further configured to control the file transmission according to the file transmission request of the receiver IM terminal.

8. The system of claim 1, wherein file sources of the replicas belong to at least one P2SP system;

the off-line file server is configured to search the at least one P2SP system for the replicas.

9. The system of claim 1, wherein

the off-line file server is further configured to divide the file into at least two file blocks according to the file source of the at least one replica, request the at least two file sources respectively for the file blocks, and receive all the file blocks from the at least two file sources to form the whole file.

10. The system of claim 1, wherein

the off-line file server is further configured to perform file transmission scheduling according to the state of receiving the file, and adjust the file transmission request sent to the sender IM terminal and/or the file source of the at least one replica;

the sender IM terminal is further configured to send the file to the off-line file server according to the file transmission request; and/or

the receiver IM terminal is further configured to perform file transmission scheduling according to the state of receiving the file, and adjust the file transmission request sent to the off-line file server and the file source of the at least one replica;

the off-line file server is further configured to send the file to the receiver IM terminal according to the file transmission request.

11. A multi-source transmission method of an Instant Messaging (IM) file, applied between a sender IM terminal and a receiver IM terminal, and comprising:

generating, by the sender IM terminal, file information and sending the file information to the receiver IM terminal;

searching for, by the receiver IM terminal, replicas of the file according to the file information;

when at least one replica is searched out, receiving, by the receiver IM terminal, the file from at least two file sources by using a multi-source transmission mode, wherein the at least two file sources comprises the sender IM terminal and a file source of the at least one replica;

wherein generating, by the sender IM terminal, file information and sending the file information to the receiver IM terminal comprises:

generating, by the sender IM terminal, the file information, and sending the file information to an off-line file server;

searching for, by the off-line file server, the replicas of the file according to the file information;

when at least one replica is searched out, receiving, by the off-line file server, the file from at least two file sources by using the multi-source transmission mode; when no replica is searched out, receiving the file from the sender IM terminal;

sending, by the off-line file server, the file information to the receiver IM terminal.

12. The method of claim 11, further comprising:

when no replica is searched out, receiving, by the receiver IM terminal, the file from the sender IM terminal.

13. The method of claim 12, further comprising:

performing, by the receiver IM terminal, file transmission scheduling according to the state of receiving the file, and adjusting a file transmission request sent to the sender IM terminal and/or the file source of the at least one replica;

5 sending, by the sender IM terminal, the file to the receiver IM terminal according to the file transmission request.

14. The method of claim 11, further comprising:

performing, by the off-line file server, file transmission scheduling according to the
10 state of receiving the file, and adjusting a file transmission request sent to the sender IM terminal and/or the file source of the at least one replica;

sending, by the sender IM terminal, the file to the off-line file server according to the file transmission request; performing, by the receiver IM terminal, file transmission scheduling according to the state of receiving the file, and adjusting the file transmission
15 request sent to the off-line file server and/or the file source of the at least one replica;

sending, by the off-line file server, the file to the receiver IM terminal according to the file transmission request.