US 20080005315A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2008/0005315 A1**

Lin et al. (43) **Pub. Date: Jan. 3, 2008**

(54) **APPARATUS, SYSTEM AND METHOD FOR STREAM-BASED DATA FILTERING**

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(21) Appl. No.: **11/476,577**

(22) Filed: **Jun. 29, 2006**

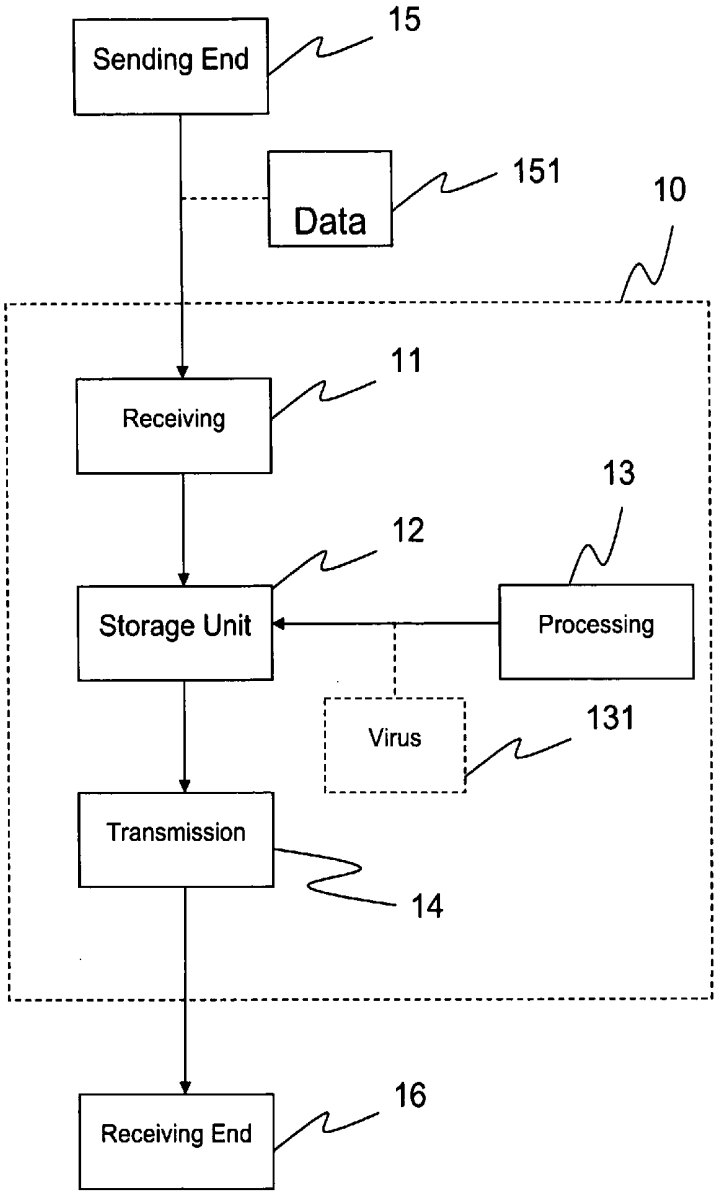
Publication Classification

(51) **Int. Cl.**
G06F 15/173 (2006.01)

(52) **U.S. Cl.** **709/224**

(57) **ABSTRACT**

An apparatus, a system and a method for stream-based data filtering are disclosed. The apparatus is for filtering data transmitted from a sending end. The data is transmitted one by one by using a plurality of data segments. The data filtering apparatus includes a receiving module, a processing module and a transmission module. The receiving module is for receiving the data segments transmitted from the sending end. The processing module implements virus scanning for the data segments one by one. The transmission module then transmits the data segments which have passed through the virus scanning to a receiving end.



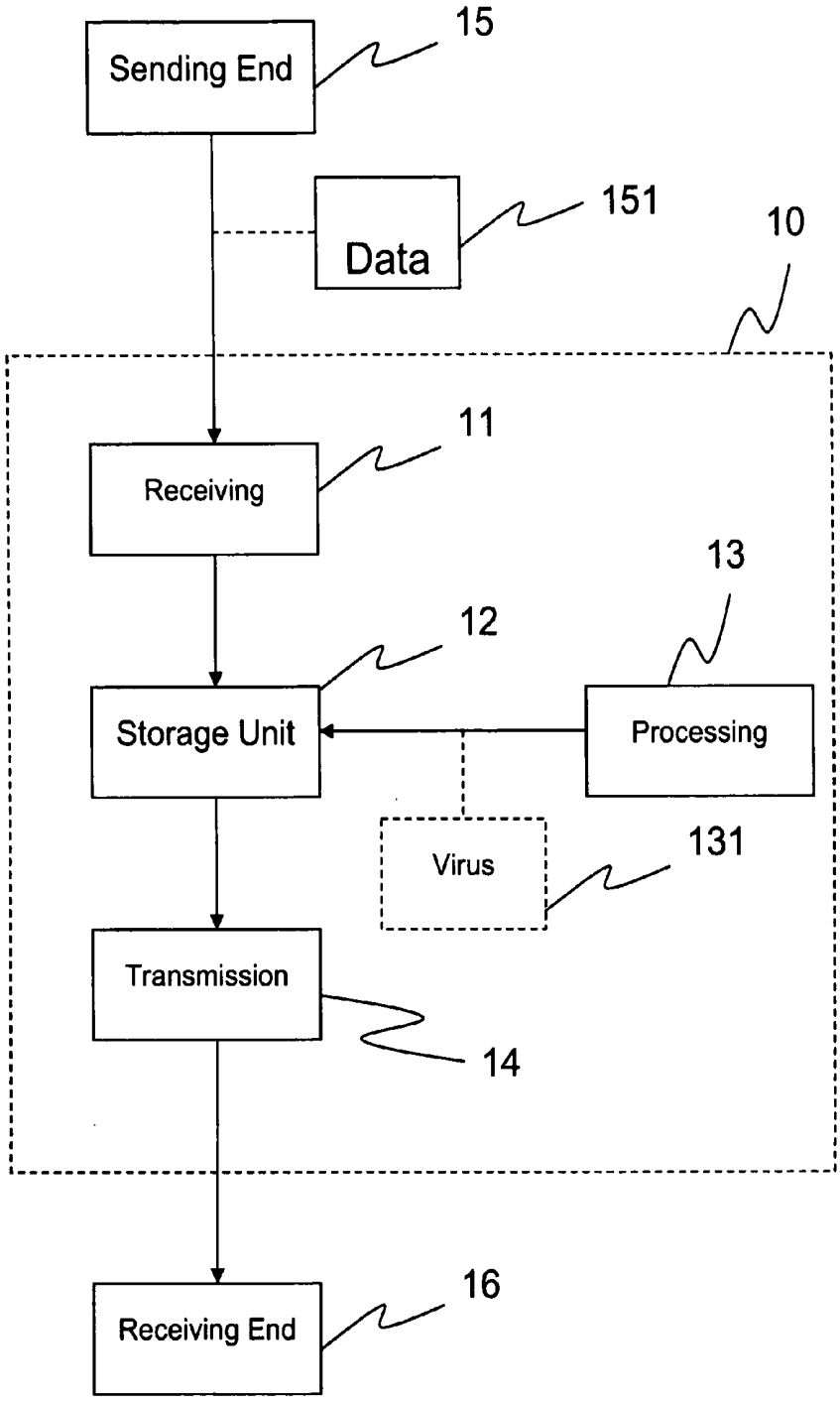

Sending End
15
Data
151
10
Receiving
11
13
12
Storage Unit
Processing
Virus
131
Transmission
14
Receiving End
16

Fig. 1

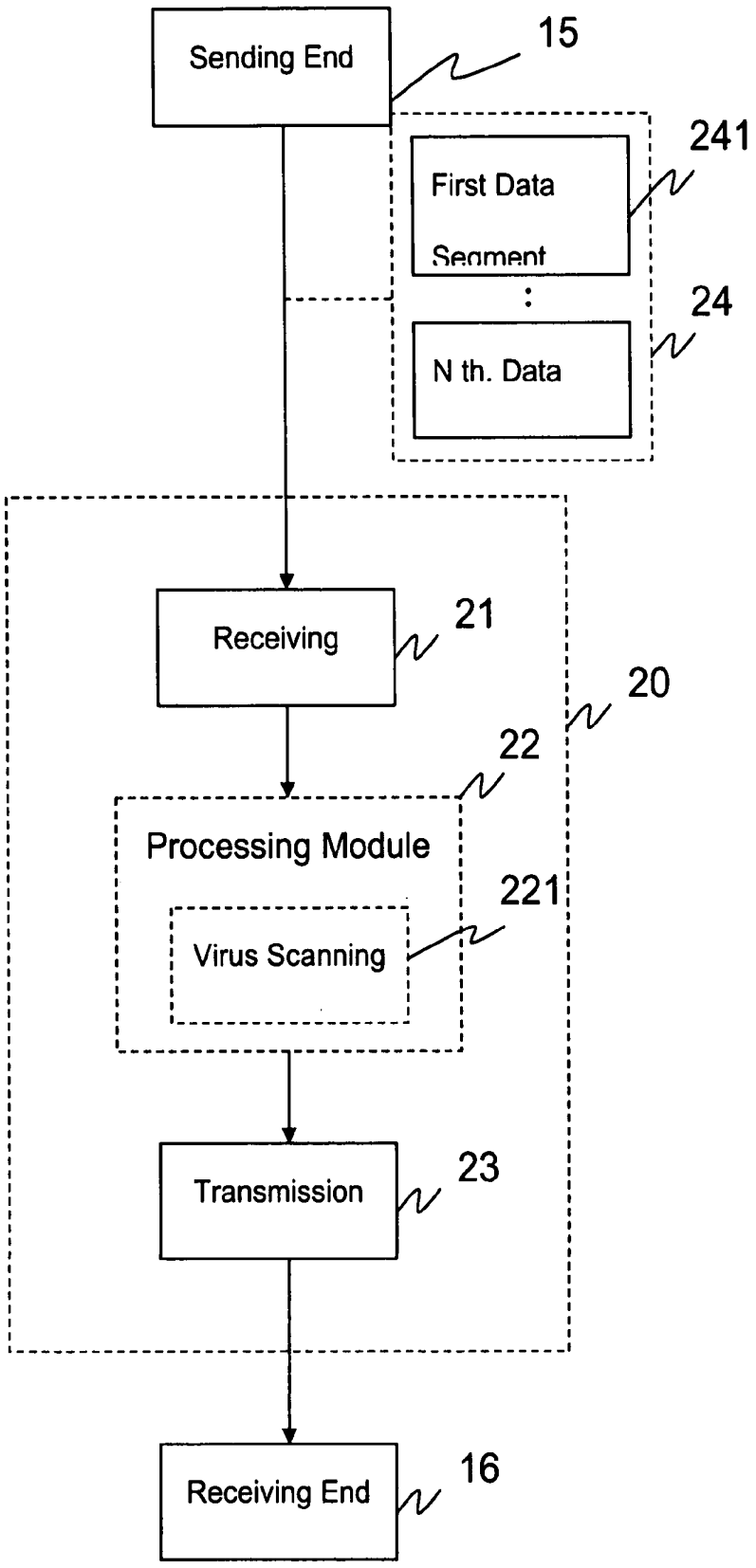

Sending End
15
241
First Data
Segment
24
N th. Data
Receiving
21
20
22
Processing Module
221
Virus Scanning
Transmission
23
Receiving End
16

Fig. 2

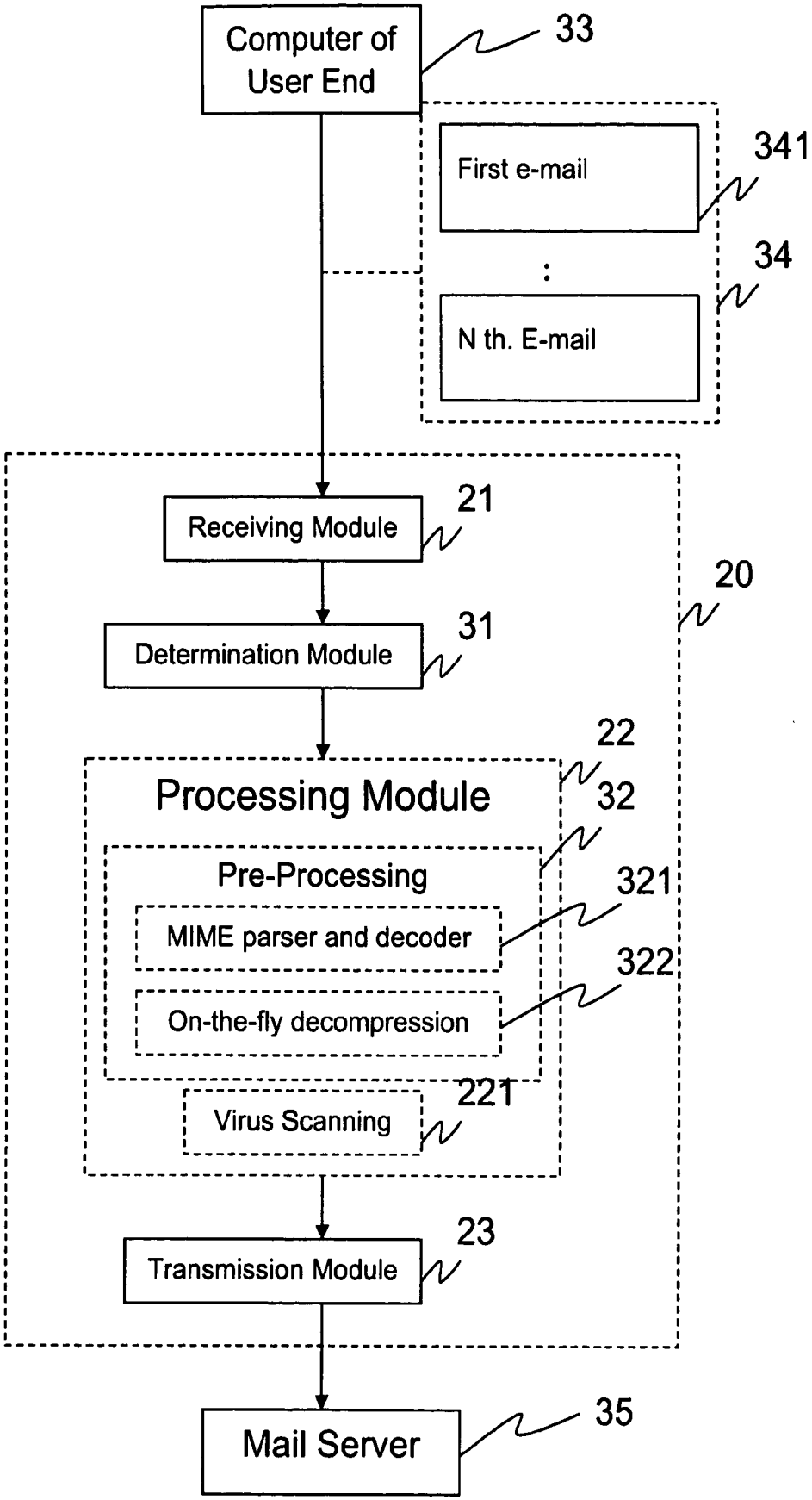

Computer of User End
33
First e-mail
341
34
N th. E-mail
Receiving Module
21
20
Determination Module
31
22
Processing Module
32
Pre-Processing
321
MIME parser and decoder
322
On-the-fly decompression
221
Virus Scanning
23
Transmission Module
Mail Server
35

Fig. 3

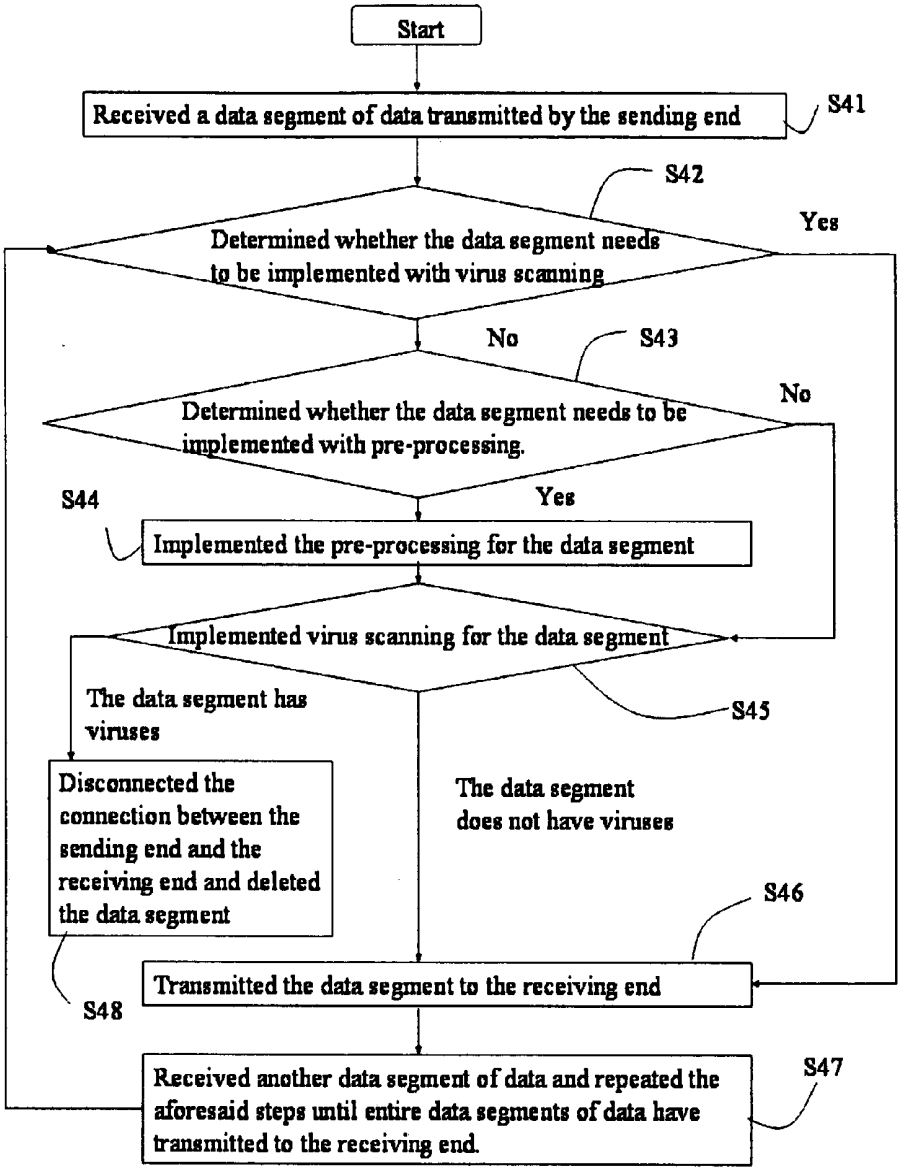

Start
Received a data segment of data transmitted by the sending end
S41
S42
Determined whether the data segment needs to be implemented with virus scanning
Yes
No
S43
Determined whether the data segment needs to be implemented with pre-processing.
No
Yes
S44
Implemented the pre-processing for the data segment
Implemented virus scanning for the data segment
S45
The data segment has viruses
Disconnected the connection between the sending end and the receiving end and deleted the data segment
S48
The data segment does not have viruses
S46
Transmitted the data segment to the receiving end
Received another data segment of data and repeated the aforesaid steps until entire data segments of data have transmitted to the receiving end.
S47

Fig. 4

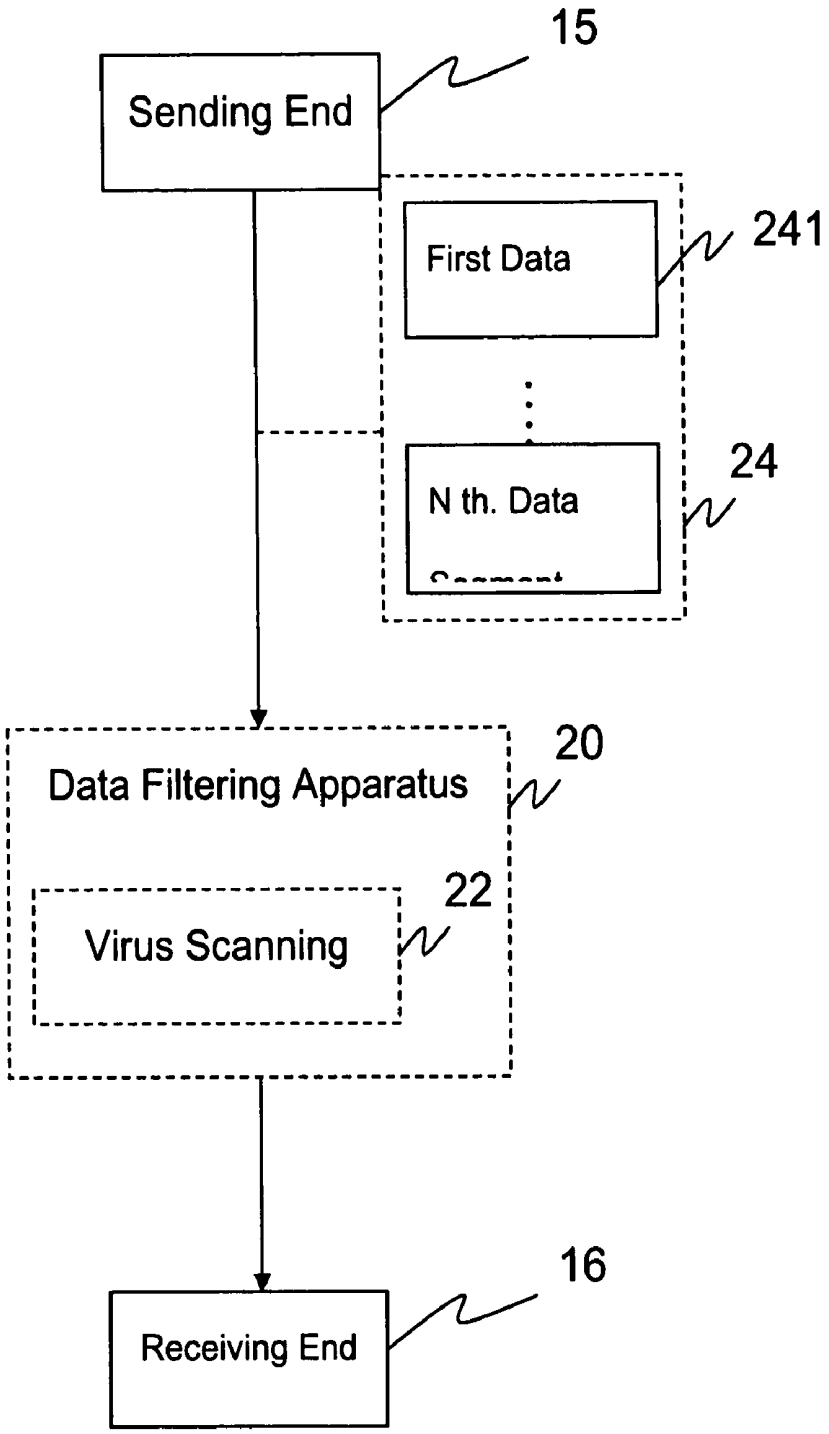

15
Sending End
241
First Data
24
N th. Data
20
Data Filtering Apparatus
22
Virus Scanning
16
Receiving End

Fig. 5

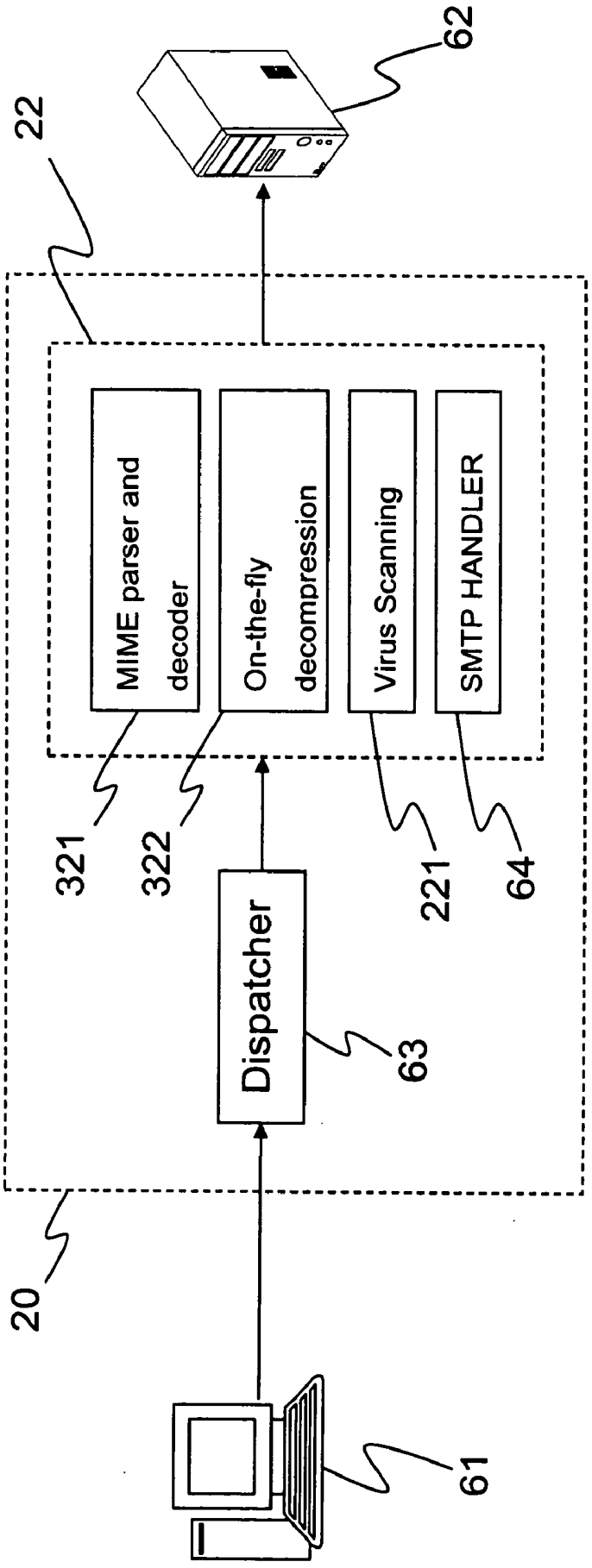

62
22
MIME parser and decoder
On-the-fly decompression
Virus Scanning
SMTP HANDLER
321
322
221
64
Dispatcher
63
20
61

Fig. 6

APPARATUS, SYSTEM AND METHOD FOR STREAM-BASED DATA FILTERING

FIELD OF THE INVENTION

[0001] The present invention relates to an apparatus, a system and a method for stream-based data filtering, and more particularly to the data filtering apparatus interleaves receiving, virus scanning, transmitting for every data segment.

BACKGROUND OF THE INVENTION

[0002] Computer viruses may be easily spread and transmitted through the Internet. General speaking, implementing virus scanning on gateways or firewall systems has advantages with central management and early blocking malicious programs. Referring to FIG. **1**, a block diagram illustrates a conventional antivirus apparatus. The antivirus apparatus **10** includes a receiving module **11**, a storage unit **12**, a processing module **13** and a transmission module **14**. When a sending end **15** sends data **151** to a receiving end **16**, the antivirus apparatus **10** would intercept data **151** through the receiving module **11**. The data **151** are then store in the storage unit **12**. After receiving and storing entire data **151**, a virus scanning **131** is implemented through the processing module **13**. If the data pass the virus scanning, the data are transmitted to the receiving end through the transmission module.

[0003] This way belongs to the storage-based antivirus system. Entire data are stored in advance and the virus scanning is then implemented. The system has disadvantages as follows:

[0004] 1. The storage-based antivirus system needs larger memories and hard drive spaces. The scalability is worse.

[0005] 2. The storage-based antivirus system must be installed in an apparatus with hard drives.

[0006] 3. Storing data is time-consuming.

[0007] 4. The conventional way may waste resources too fast and has loads for file system accesses while managing many computers.

[0008] To satisfy the demands for improving the storage antivirus system, the inventor of the present invention based on years of experience on related research and development invents an apparatus, a system and a method for stream-based data filtering to overcome the foregoing shortcomings.

SUMMARY OF THE INVENTION

[0009] Accordingly, the object of the present invention is to provide an apparatus, a system and a method for stream-based data filtering. The data filtering apparatus implements receiving, virus scanning, sending for every data segment.

[0010] In accordance with the data filtering apparatus is for filtering data sent by a sending end. The data is transmitted one by one by using a plurality of data segments. The data filtering apparatus includes a receiving module, a processing module and a transmission module. The receiving module receives data segments transmitted from the sending end. The processing module implements a filtering action one by one for the data segments. The transmission module transmits the data segments which have passed through the filtering action to the receiving end. The filtering action is virus scanning.

[0011] The apparatus, the system and the method for stream-based data filtering have the following advantages:

[0012] 1. The storage space required for entire system can be reduced to be a minimum. There is almost no need to use temporary files.

[0013] 2. The file system access time can be reduced.

[0014] 3. When there are compressed files, real-time decompression is implemented to interleave pre-processing, decompression and content filtering. The compression files do not need to be stored in advance and are real-time processed.

[0015] 4. In the conventional way, the storage space is proportional to the file size and the number of connections. However, the storage space used in the present invention is proportional to the number of connections.

[0016] Other features and advantages of the present invention and variations thereof will become apparent from the following description, drawings, and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. **1** is a block diagram illustrating a conventional antivirus apparatus;

[0018] FIG. **2** is a block diagram illustrating a data filtering apparatus according to an embodiment of the present invention;

[0019] FIG. **3** is a block diagram illustrating a data filtering apparatus according to a preferred embodiment of the present invention;

[0020] FIG. **4** is a flowchart illustrating a method for data filtering according to an embodiment of the present invention;

[0021] FIG. **5** is a block diagram illustrating a data filtering system according to an embodiment of the present invention; and

[0022] FIG. **6** is a schematic diagram illustrating a data filtering system according to a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0023] Referring to FIG. **2**, a block diagram illustrates a data filtering apparatus according to an embodiment of the present invention. The data filtering apparatus **20** is for filtering data **24** transmitted by the sending end **15**. The data **24** is transmitted one by one by using a plurality of data segments **241**. The data filtering apparatus **20** includes a receiving module **21**, a processing module **22** and a transmission module **23**. The receiving module **21** is for receiving the data segments **241** transmitted from the sending end **15**. The processing module **22** implements virus scanning **221** for the data segments **241**. The transmission module **23** transmits the data segments **241** which have passed through the virus scanning **221** to the receiving end **16**.

[0024] The data can be a file or an electronic mail. The processing module **22** implements a pre-processing before implementing the virus scanning **221**. The pre-processing includes a Multipurpose Internet Mail Extension (MIME) parser, a MIME decoder or a real-time decompression. A buffer is disposed in the data filtering apparatus **20**. The buffer is used in implementation process of the pre-processing. The space of the buffer is a constant. The constant does not follow the size of the data to be changed. The data filtering apparatus **20** further includes a determination mod-

ule or a compression detection module. The determination module is for determining whether the data segments **241** cannot have viruses first. For instance, the data segments **241** can be merely pure text formats. If no virus is possible, the data segments **241** are directly transmitted to the receiving end **16** without implementing the virus scanning **221**. The compression detection module is for determining whether the data segments **241** need to be implemented with the real-time decompression. The sending end **15** and the receiving end **16** are a computer.

[0025] Referring to FIG. **3**, a block diagram illustrates a data filtering apparatus according to a preferred embodiment of the present invention. The data filtering apparatus **20** includes the receiving module **21**, a determination module **31**, the processing module **22** and the transmission module **23**. When a computer **33** of a user end transmits an electronic mail **34** to a mail server **35**, the electronic mail **34** is transmitted by using a plurality of electronic mail segments **341**. The data filtering apparatus **20** then intercepts the electronic mail segments **341** through the receiving module **21**. The determination module **31** determines whether the electronic mail segments **341** cannot have viruses first. For example, the mail includes only pure English text. If no virus is possible, the electronic mail segments **341** are directly transmitted to the mail server **35** without implementing the virus scanning **221**. If viruses are possible, the processing module **22** implements pre-processing **32** and the virus scanning **221**. The pre-processing **32** includes the MIME parser and decoder **321**, and on-the-fly decompression **322**. Lastly, the transmission module **23** transmits the electronic mail segments **341** which have passed through the virus scanning **221** to the mail server **35**.

[0026] Referring to FIG. **4**, a flowchart illustrates a method for filtering data according to an embodiment of the present invention. The method is applied to a data filtering apparatus. The data filtering apparatus is for filtering data transmitted by a sending end. The data is transmitted one by one by using a plurality of data segments. The steps of the method for filtering data are as follows:

[0027] Step S**41**: Received a data segment of data transmitted by the sending end

[0028] Step S**42**: Determined whether the data segment needs to be implemented with virus scanning. If it is impossible for the data segment to have viruses, step S**46** is implemented. If it is possible for the data segment to have viruses, step S**43** is implemented.

[0029] Step S**43**: Determined whether the data segment needs to be implemented with pre-processing. If the data segment needs to be implemented with the pre-processing, step S**44** is implemented. If the data segment does need to be implemented with the pre-processing, step S**45** is implemented.

[0030] Step S**44**: Implemented the pre-processing for the data segment.

[0031] Step S**45**: Implemented virus scanning for the data segment. If the data segment does not have viruses, step S**46** is implemented.

[0032] Step S**46**: Transmitted the data segment to the receiving end.

[0033] Step S**47**: Received another data segment of data and repeated the aforesaid steps until entire data segments of data have transmitted to the receiving end.

[0034] The virus scanning described in step S**45** is that if the data segment has viruses, step S**48** is implemented.

[0035] Step S**48**: Disconnected the connection between the sending end and the receiving end and deleted the data segment.

[0036] The data is a file or an electronic mail. The pre-processing includes a MIME parser, a MIME decoder and a real-time decompression module. The sending end and the receiving end are a computer.

[0037] Referring to FIG. **5**, a block diagram illustrates a data filtering system according to an embodiment of the present invention. The data filtering system includes the sending end **15**, the receiving end **16** and the data filtering apparatus **20**. The sending end **15** sends data **24**. The data **24** is transmitted one by one by using the plurality of data segments **241**. The data filtering apparatus **20** is disposed between the sending end **15** and the receiving end **16** and is for receiving the data segments **241** in order to implement the virus scanning **221** for the data segments **241** one by one. The data segments **241** which have passed through the virus scanning **221** are then transmitted to the receiving end **16**.

[0038] The data **24** is a filter or an electronic mail. The data filtering apparatus **20** implements a pre-processing before implementing the virus scanning **221**. The pre-processing includes a MIME parser, a MIME decoder and a real-time decompression module. The data filtering apparatus **20** further includes a determination module. The determination module is for determining whether the data segments **241** need to be implemented with the virus scanning in advance. For example, the data segments **241** are pure text formats. If it is impossible for the data segments to have viruses, the data segments **241** are directly transmitted to the receiving end **16** without implementing the virus scanning **221**. The sending end **15** and the receiving end **16** are a computer.

[0039] Referring to FIG. **6**, a schematic diagram illustrates a data filtering system according to a preferred embodiment of the present invention. The data filtering system includes a computer **61**, the data filtering apparatus **20** and a Simple Mail Transfer Protocol (SMTP) server **62**. A dispatcher **63** intercepts packets from the computer of the user. The packets are guided to a SMTP hander **64**. The SMTP handler **64** would make connection for the computer **61** of the user and the SMTP server **62** simultaneously and starts to transmit mails. The data segments of the mails may use streams to interleave the MIME parser and decoder **321**, on-the-fly decompression **322** and the virus scanning **321**. If no virus is possible, the mails are then transmitted to the SMTP server **62** otherwise the mails with viruses are blocked.

[0040] Although the features and advantages of the embodiments according to the preferred invention are disclosed, it is not limited to the embodiments described above, but encompasses any and all modifications and changes within the spirit and scope of the following claims.

What is claimed is:

1. A data filtering apparatus filtered data transmitted from a sending end, said data being transmitted one by one by using a plurality of data segments, comprising:

a receiving module received said data segments transmitted from said sending end;

a processing module implemented a filtering action for said data segments one by one; and

a transmission module transmitted said data segments to a receiving end, said data segments being passed through said filtering action.

2. The data filtering apparatus of claim 1, wherein said data is a file or an electronic mail.

3. The data filtering apparatus of claim 1, wherein said processing module performs pre-processing prior to said filter action.

4. The data filtering apparatus of claim 3, wherein said pre-processing includes a multipurpose internet mail extensions (MIME) parser, a MIME decoder and a real-time decompression module.

5. The data filtering apparatus of claim 3, wherein said data filtering apparatus further includes a buffer, and said buffer is utilized in implementation process of said pre-processing, and the space of said buffer is a constant, and said constant does not follow the size of said data to be changed.

6. The data filtering apparatus of claim 1, wherein said filtering action is virus scanning.

7. The data filtering apparatus of claim 6, wherein said data filtering apparatus further includes a determination module for determining whether said data segments need to be implemented with said virus scanning in advance, and if it is possible for said data segments to have viruses so that said data segments need to be implemented with said virus scanning, and if it is impossible for said data segments to have viruses so that said data segments are directly transmitted to said receiving end without implementing said virus scanning.

8. The data filtering apparatus of claim 4, wherein said data filtering apparatus further includes a compression detection module for determining whether said data segments need to be implemented with said real-time decompression.

9. The data filtering apparatus of claim 1, wherein said sending end and said receiving end are a computer.

10. A method for filtering data for use in a data filtering apparatus, said data filtering apparatus filtered data transmitted from a sending end, said data being transmitted one by one by using a plurality of data segments, comprising:

(a) receiving said data segment of said data transmitted by said sending end;

(b) determining whether said data segment cannot have viruses, wherein if no virus is possible for said data segment, implementing step (f) is implemented; otherwise, implementing step (c);

(c) determining whether said data segment needs to be implemented with pre-processing, if said data segment needs to be implemented with said pre-processing, implementing step (d), otherwise, implementing step (e);

(d) implementing said pre-processing for said data segment;

(e) implementing virus scanning for said data segment, if there is no virus in said data segment, implementing step (f);

(f) transmitting said data segments to a receiving end; and

(g) receiving another data segment of said data, and repeating step (b) to step (g) until all said data segments of said data being transmitted to said receiving end;

wherein in step (e) as said virus scanning, if there are viruses in said data segment, connections for said sending end and said receiving end are disconnected and said data segment is deleted.

11. The method for filtering data of claim 10, further comprising providing a file or an electronic mail to be said data.

12. The method for filtering data of claim 10, further comprising providing a multipurpose internet mail extensions (MIME) parser, a MIME decoder and a real-time decompression module to be said pre-processing.

13. The method for filtering data of claim 10, further comprising providing a buffer, wherein said buffer is utilized in implementation process of said pre-processing, and a space of said buffer is a constant, and said constant does not follow the size of said data to be changed.

14. The method for filtering data of claim 10, further comprising providing a computer to be said sending end and said receiving end.

15. A data filtering system, comprising:

a sending end sent data, said data being transmitted one by one by using a plurality of data segments;

a receiving end; and

a data filtering apparatus disposed between said sending end and said receiving end for receiving said data segments, a filtering action being implemented one by one for said data segments, said data segments being transmitted to said receiving end, said data segments being passed through said filtering action.

16. The data filtering system of claim 15, wherein said data is a file or an electronic mail.

17. The data filtering system of claim 15, wherein said data filtering apparatus implements pre-processing prior to said filter action.

18. The data filtering system of claim 17, wherein said pre-processing includes a multipurpose internet mail extensions (MIME) parser, a MIME decoder and a real-time decompression module.

19. The data filtering system of claim 17, wherein said data filtering system further includes a buffer, and said buffer is utilized in implementation process of said pre-processing, and a space of said buffer is a constant, and said constant does not follow the size of said data to be changed.

20. The data filtering system of claim 15, wherein said filter action is virus scanning.

21. The data filtering system of claim 20, wherein said data filtering system further includes a determination module for determining whether said data segments need to be implemented with said virus scanning in advance, and if it is possible for said data segments to have viruses so that said data segments need to be implemented with said virus scanning, and if no viruses is possible for said data segments so that said data segments are directly transmitted to said receiving end without implementing said virus scanning.

22. The data filtering system of claim 18, wherein said data filtering system further includes a compression detection module for determining whether said data segments need to be implemented with real-time decompression.

23. The data filtering system of claim 15, wherein said sending end and said receiving end are a computer.

* * * * *