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(54) **METHOD AND APPARATUS FOR SETTING SECURE CONNECTION IN WIRELESS COMMUNICATIONS SYSTEM**

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H04L 29/06	(2006.01)
H04W 12/12	(2009.01)
H04L 29/08	(2006.01)

(52) **U.S. Cl.**

CPC ***H04L 63/1416*** (2013.01); ***H04L 63/0236*** (2013.01); ***H04L 67/14*** (2013.01); ***H04W 12/12*** (2013.01)

(58) **Field of Classification Search**

CPC H04L 29/06; H04L 63/0236; H04L 67/14; H04L 63/1416; H04W 12/12

USPC 726/23; 380/270; 709/217

See application file for complete search history.

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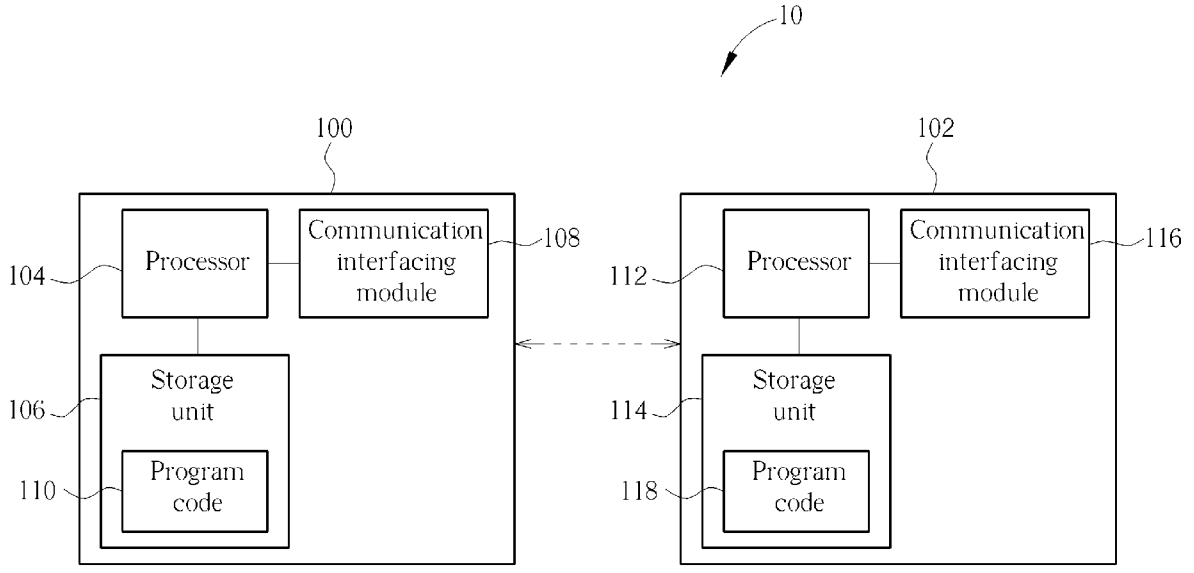
(57) **ABSTRACT**

A method of setting a secure connection in a wireless communications system is disclosed. The method comprises setting a protocol information to a terminal; and checking a packet received in the terminal according to the protocol information; wherein the packet comprises a protocol type, a source port, and a destination port.

22 Claims, 3 Drawing Sheets



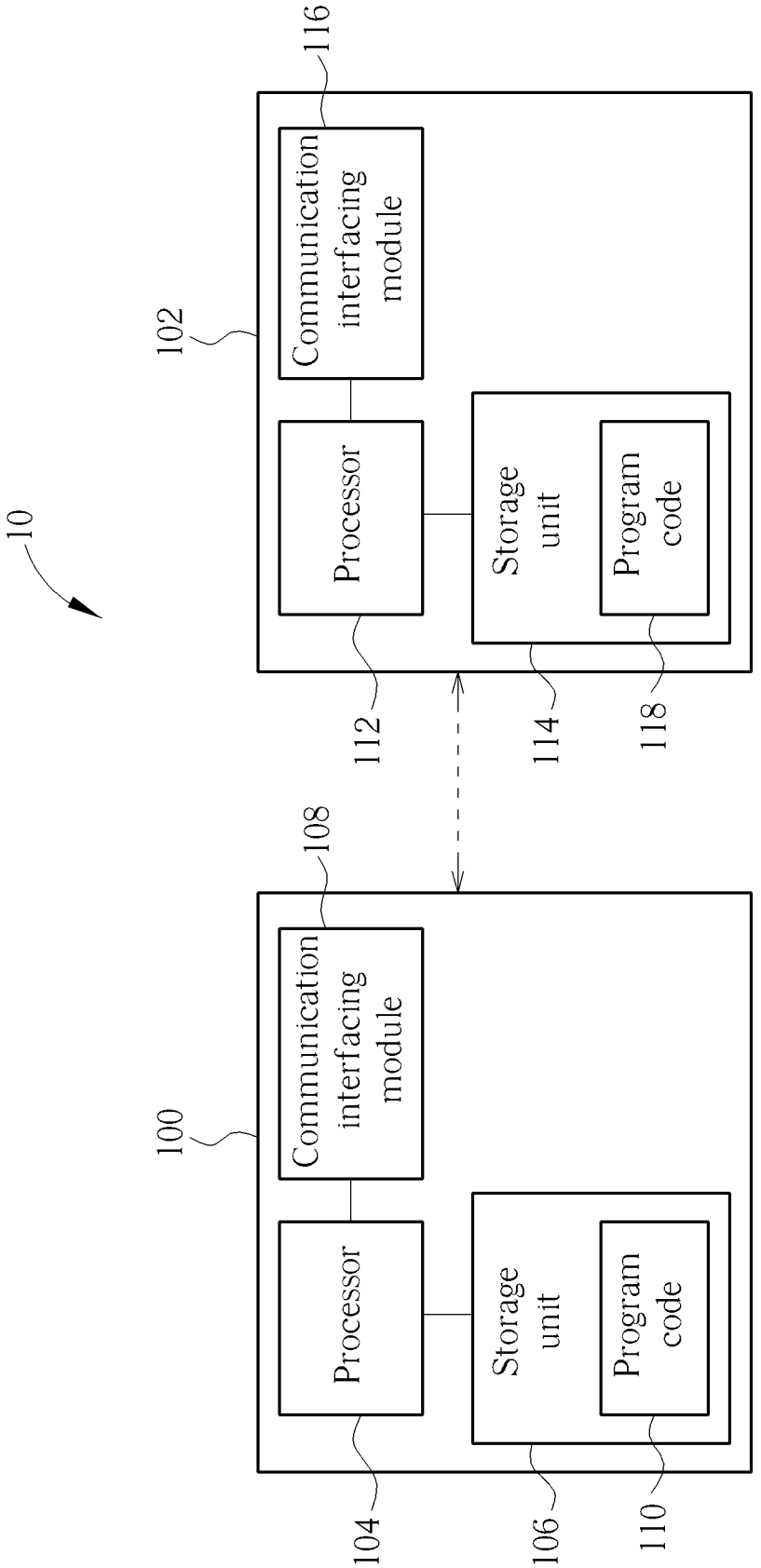

10
100
102
104
106
108
110
112
114
116
118
Communication interfacing module
Processor
Storage unit
Program code
Communication interfacing module
Processor
Storage unit
Program code

FIG. 1

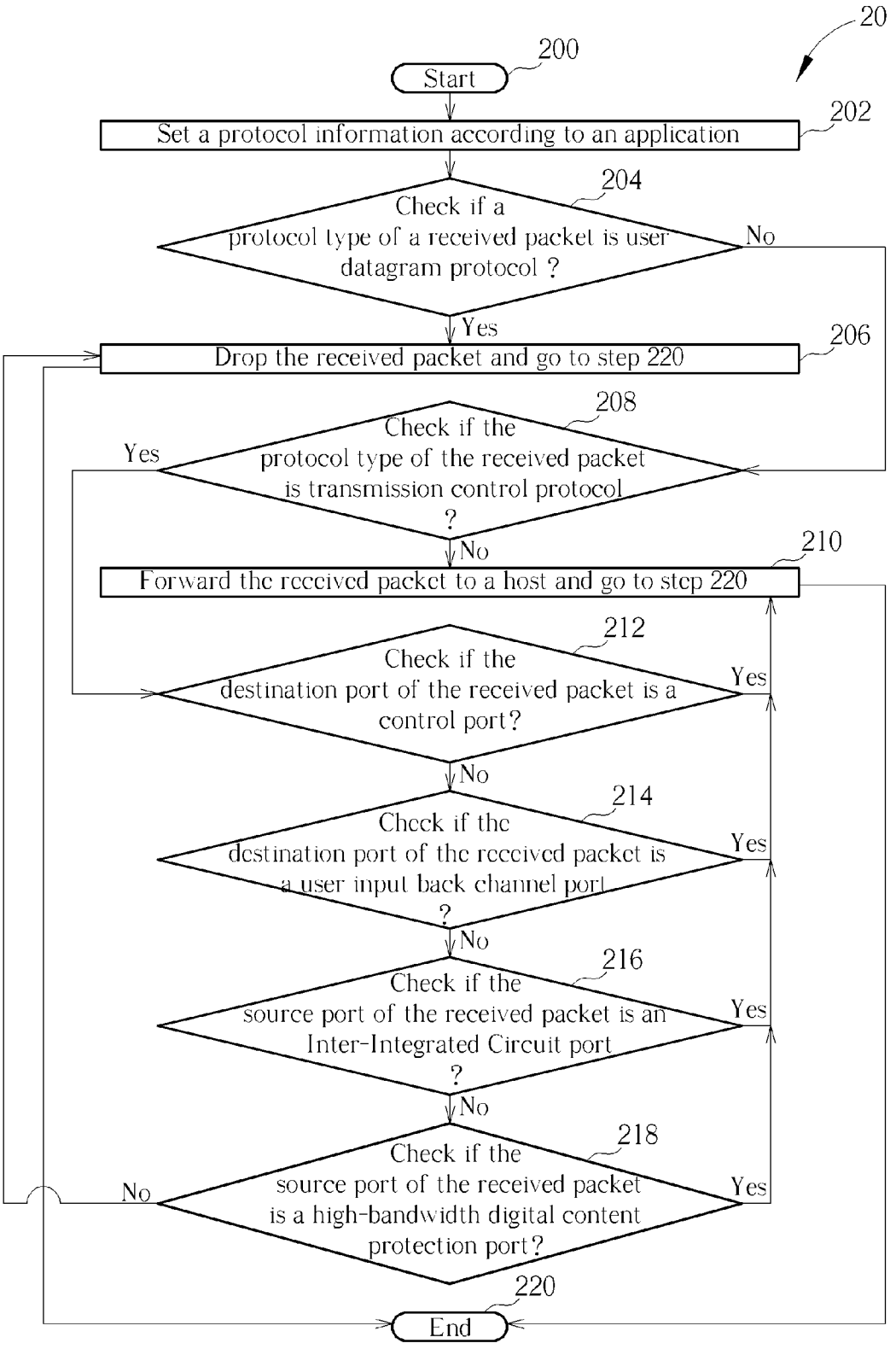

20
200
Start
202
Set a protocol information according to an application
204
Check if a protocol type of a received packet is user datagram protocol ?
No
Yes
206
Drop the received packet and go to step 220
208
Check if the protocol type of the received packet is transmission control protocol ?
Yes
No
210
Forward the received packet to a host and go to step 220
212
Check if the destination port of the received packet is a control port?
Yes
No
214
Check if the destination port of the received packet is a user input back channel port ?
Yes
No
216
Check if the source port of the received packet is an Inter-Integrated Circuit port ?
Yes
No
218
Check if the source port of the received packet is a high-bandwidth digital content protection port?
No
Yes
220
End

FIG. 2

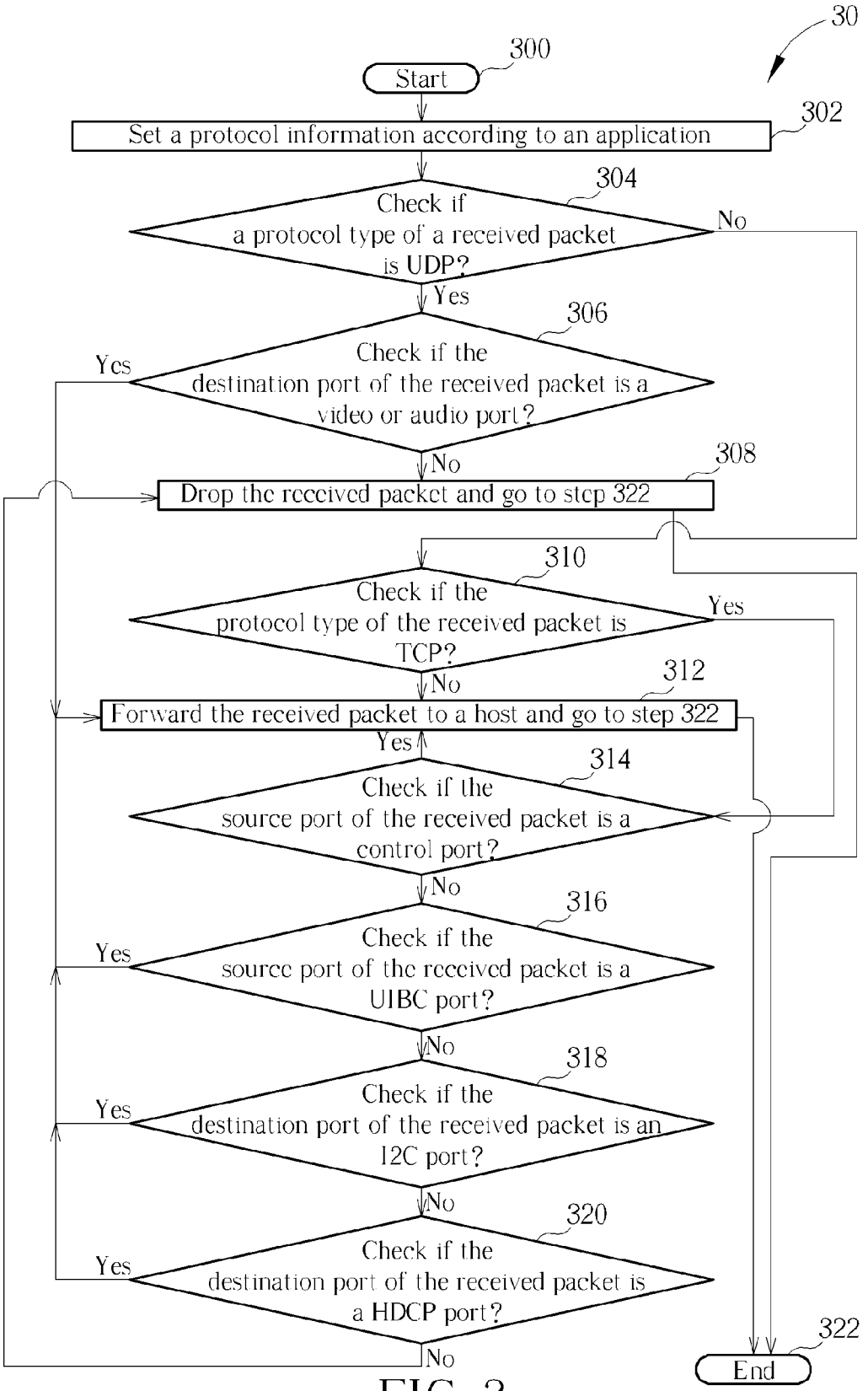

30
300
Start
302
Set a protocol information according to an application
304
Check if a protocol type of a received packet is UDP?
No
Yes
306
Check if the destination port of the received packet is a video or audio port?
Yes
No
308
Drop the received packet and go to step 322
310
Check if the protocol type of the received packet is TCP?
Yes
No
312
Forward the received packet to a host and go to step 322
Yes
314
Check if the source port of the received packet is a control port?
No
316
Check if the source port of the received packet is a UIBC port?
Yes
No
318
Check if the destination port of the received packet is an I2C port?
Yes
No
320
Check if the destination port of the received packet is a HDCP port?
Yes
No
322
End

FIG. 3

METHOD AND APPARATUS FOR SETTING SECURE CONNECTION IN WIRELESS COMMUNICATIONS SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 61/722,787, filed on Nov. 6, 2012, entitled "Method for protecting a communications device from receiving unsolicited data", the contents of which are incorporated herein in their entirety.

BACKGROUND

The present invention relates to a method and apparatus utilized in a wireless communications system, and more particularly, to a method and apparatus of setting a secure connection in a wireless communication system.

Wireless Fidelity (Wi-Fi) Display specification is a standard for a Wi-Fi technology and used in a latency-aware application for streaming in a short distance, such as a wireless local area network (WLAN). In the Wi-Fi Display application, a connection is established between a source device and a sink device. The source device encodes video contents into encoded video bit streams and sends the encoded video bit streams to the sink device. The sink device further decodes the received video bit streams and recovers to the video contents. Therefore, a user can watch the video contents on a suitable display of the sink device for the user's purpose than a display of the source device. For example, a user shares a video from a notebook computer to a large screen television so that more people can comfortably watch the video on the television together. In this example, the notebook computer is the source device and the television is the sink device (assuming the television supports Wi-Fi Display specifications), and the source device transmits video contents to the sink device for playback on a display of the sink device.

Since malwares may attack through the connection, security of the connection is important. However, a standard firewall is not useful for an embedded system with restricted computing resources including memory and processor, so that the standard firewall cannot avoid the attack. Therefore, how to set up a secure connection becomes a goal.

SUMMARY

The present invention therefore provides a method and an apparatus for setting a secure connection in a wireless communications system, to resist the attack from the malwares and keep secure.

A method of setting a secure connection in a wireless communications system is disclosed. The method comprises setting a protocol information to a terminal in the wireless communication system; and checking a packet received in the terminal according to the protocol information; wherein the packet comprises a protocol type, a source port, and a destination port.

A communication apparatus for a wireless communications system is disclosed. The communication apparatus comprises a processing means; a storage unit; a program code, stored in the storage unit, wherein the program code instructs the processing means to execute the following steps: setting a protocol information to a terminal in the wireless communication system; and checking a packet received in the terminal according to the protocol information; wherein the packet comprises a protocol type, a source port, and a destination port.

These and other objectives of the present invention will no doubt become obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment that is illustrated in the various figures and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic diagram of a wireless communications system according to an example of the present invention.

FIG. **2** is a flowchart of a process according to an example of the present invention.

FIG. **3** is a flowchart of a process according to an example of the present invention.

DETAILED DESCRIPTION

Please refer to FIG. **1**, which is a schematic diagram of a wireless communications system **10** according to an example of the present invention. The wireless communications system **10** comprises a first communication apparatus **100** and a second communication apparatus **102**. The first communication apparatus **100** and the second communication apparatus **102** are terminals in the wireless communications system **10** and simply utilized for illustrating the structure of the wireless communications system **10**. Practically, the first communication apparatus **100** and the second communication apparatus **102** can communicate with each other by a wireless technique, such as Wireless Fidelity (Wi-Fi) or Bluetooth. For example, in a Wi-Fi system, the first communication apparatus **100** may be a source device and the second communication apparatus **102** may be a sink device. Besides, the first communication apparatus **100** may include a processor **104** such as a microprocessor or Application Specific Integrated Circuit (ASIC), a storage unit **106** and a communication interfacing module **108**. The storage unit **106** may be any data storage device that can store a program code **110**, accessed and executed by the processor **104**. Examples of the storage unit **106** include but are not limited to read-only memory (ROM), flash memory, random-access memory (RAM), CD-ROM/DVD-ROM, magnetic tape, hard disk and optical data storage device. The communication interfacing module **108** is preferably a transceiver and is used to transmit and receive signals (e.g., messages or packets) according to processing results of the processor **104**. Further, the second communication apparatus **100** may also include a processor **112**, a storage unit **114** and a communication interfacing module **116**, which are similar with those included in the first communication apparatus. The storage unit **114** can store a program code **118** and be accessed and executed by the processor **112**.

Please refer to FIG. **2**, which is a flowchart of a process **20** according to an example of the present invention. The process **20** is utilized in the wireless communications system **10** shown in FIG. **1**, for setting a secure connection. The process **20** can be utilized in the first communication apparatus **100**, such as a source device, and may be compiled into the program code **110**. The process **20** includes the following steps:

Step **200**: Start.

Step **202**: Set a protocol information according to an application.

Step **204**: Check if a protocol type of a received packet is user datagram protocol (UDP)? If yes, go to step **206**; if not, go to step **208**.

Step **206**: Drop the received packet and go to step **220**.

Step **208**: Check if the protocol type of the received packet is transmission control protocol (TCP)? If yes, go to step **212**; if not, go to step **210**.

Step **210**: Forward the received packet to a host and go to step **220**.

Step **212**: Check if the destination port of the received packet is a control port? If yes, go to step **210**; if not, go to step **214**.

Step **214**: Check if the destination port of the received packet is a user input back channel (UIBC) port? If yes, go to step **210**; if not, go to step **216**.

Step **216**: Check if the source port of the received packet is an Inter-Integrated Circuit (I2C) port? If yes, go to step **210**; if not, go to step **218**.

Step **218**: Check if the source port of the received packet is a high-bandwidth digital content protection (HDCP) port? If yes, go to step **210**; if not, go to step **206**.

Step **220**: End.

According to the process **20**, the first communication apparatus **100** sets the protocol information according to the application and checks the received packet according to the protocol information. If the information of the received packet does not match to the protocol information, drop the received packet; otherwise, forward the received packet to the host. Since malwares is not able to know the legal protocol information of the application in the first communication apparatus **100**, the first communication apparatus **100** can resist the attack from the malwares and keep secure.

In the process **20**, in the step **202**, the protocol information includes the control port and combinations of the UIBC port, the I2C port or the HDCP port. Besides, in the steps **214**, **216** and **218**, the UIBC port, the I2C port and the HDCP port are determined via the control port.

Note that, the process **20** is an example of the present invention, and those skilled in the art should readily make combinations, modifications and/or alterations on the above-mentioned description and examples. For example, the information about the control port in the protocol information is broadcast from the second communication apparatus **102** connected to the first communication apparatus **100** and scanned by the first communication apparatus **100** in the air. Besides, ports other than the UIBC port, the I2C port and the HDCP port in the protocol information can also be determined and negotiated via the control port. Moreover, the connection is built for the point-to-point transmissions, but not limited herein.

Please refer to FIG. **3**, which is a flowchart of a process **30** according to an example of the present invention. The process **30** is utilized in the wireless communications system **10** shown in FIG. **1**, for setting a secure connection. The process **30** can be utilized in the second communication apparatus **102**, such as a sink device, and may be compiled into the program code **118**. The process **30** includes the following steps:

Step **300**: Start.

Step **302**: Set a protocol information according to an application.

Step **304**: Check if a protocol type of a received packet is UDP? If yes, go to step **306**; if not, go to step **310**.

Step **306**: Check if the destination port of the received packet is a video or audio port? If yes, go to step **312**; if not, go to step **308**.

Step **308**: Drop the received packet and go to step **322**.

Step **310**: Check if the protocol type of the received packet is TCP? If yes, go to step **314**; if not, go to step **312**.

Step **312**: Forward the received packet to a host and go to step **322**.

Step **314**: Check if the source port of the received packet is a control port? If yes, go to step **312**; if not, go to step **316**.

Step **316**: Check if the source port of the received packet is a UIBC port? If yes, go to step **312**; if not, go to step **318**.

Step **318**: Check if the destination port of the received packet is an I2C port? If yes, go to step **312**; if not, go to step **320**.

Step **320**: Check if the destination port of the received packet is a HDCP port? If yes, go to step **312**; if not, go to step **308**.

Step **322**: End.

According to the process **30**, the second communication apparatus **102** sets the protocol information according to the application and checks the received packet according to the protocol information. If the information of the received packet does not match to the protocol information, drop the received packet; otherwise, forward the received packet to the host. Since malwares is not able to know the legal protocol information of the application in the source device (i.e. the first communication apparatus **100**), the source device can resist the attack from the malwares and keep secure.

Note that, the steps of the process **30** are similar with those of the process **20**. The difference between the process **20** and the process **30** is that the second communication apparatus **102** further checks if the destination port is a video or audio port when the protocol type of the received frame is UDP. In other words, if the destination port is a video or audio port, the second communication apparatus **102** forwards the received packet to a host. If the destination port is not a video or audio port, the second communication apparatus **102** drops the received packet. Besides, the detail explanation is similar as that in the process **20**, so that no more explanation is described herein.

In the present invention, the first communication apparatus **100** or the second communication apparatus **102** sets the protocol information according to the application and checks the received packet according to the protocol information. Further, the first communication apparatus **100** or the second communication apparatus **102** drops or forwards the received packet according to the checking result. Since malwares is not able to know the legal protocol information of the application in the first communication apparatus **100** or the second communication apparatus **102**, the first communication apparatus **100** or the second communication apparatus **102** can resist the attack from the malwares and keep secure.

To sum up, the present invention provides a method and an apparatus for setting a secure connection, to resist the attack from the malwares and keep secure.

Those skilled in the art will readily observe that numerous modifications and alterations of the device and method may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims.

What is claimed is:

1. A method of setting a secure connection in a wireless communications system, the method comprising:

setting a protocol information to a terminal in the wireless communication system;

checking a protocol type of a packet received in the terminal;

checking a source port or a destination port of the packet according to the protocol information when the protocol type of the packet is transmission control protocol (TCP); and

dropping the packet when the protocol type of the packet is user datagram protocol (UDP).

2. The method of claim **1**, wherein the terminal is a source device or a sink device.

3. The method of claim **2**, further comprising checking if the destination port of the packet is a video or an audio port when the protocol type of the packet is user datagram protocol.

4. The method of claim **3**, further comprising:

dropping the packet when the destination port of the packet received in the sink is not a video or an audio port; and

forwarding the packet to a host when the destination port of the packet received in the sink is a video or an audio port.

5. The method of claim **1**, further comprising forwarding the packet to a host in the wireless system when the protocol type of the packet is neither user datagram protocol nor transmission control protocol.

6. The method of claim **1**, further comprising:

dropping the packet if the source port or the destination port of the packet is not comprised in the protocol information when the protocol type of the packet is TCP; and

forwarding the packet if the source port or the destination port of the packet is comprised in the protocol information when the protocol type of the packet is TCP.

7. The method of claim **1**, wherein the protocol information comprises a control port and combinations of a user input back channel (UIBC) port, an Inter-Integrated Circuit (I2C) port or a high-bandwidth digital content protection (HDCP) port.

8. A communication apparatus for a wireless communications system, comprising:

a processor;

a storage unit;

a program code, stored in the storage unit, wherein the program code instructs the processor to execute the following steps:

setting a protocol information to a terminal in the wireless communication system;

checking a protocol type of a packet received in the terminal;

checking a source port or a destination port of the packet according to the protocol information when the protocol type of the packet is transmission control protocol (TCP); and

dropping the packet when the protocol type of the packet is user datagram protocol.

9. The communication apparatus of claim **8**, wherein the terminal is a source device or a sink device.

10. The communication apparatus of claim **9**, wherein the steps further comprise:

checking if the destination port of the packet is a video or an audio port when the protocol type of the packet is user datagram protocol.

11. The communication apparatus of claim **10**, wherein the steps further comprise:

dropping the packet when the destination port of the packet is not a video or an audio port; and

forwarding the packet to a host in the wireless system when the destination port of the packet is a video or an audio port.

12. The communication apparatus of claim **8**, wherein the steps further comprise:

forwarding the packet to a host in the wireless system when the protocol type of the packet is neither user datagram protocol nor transmission control protocol.

13. The communication apparatus of claim **8**, wherein the steps further comprise:

dropping the packet if the source port or the destination port of the packet is not comprised in the protocol information when the protocol type of the packet is TCP; and

forwarding the packet if the source port or the destination port of the packet is comprised in the protocol information when the protocol type of the packet is TCP.

14. The communication apparatus of claim **8**, wherein the protocol information comprises a control port and combinations of a user input back channel (UIBC) port, an inter-integrated circuit (I2C) port and a high-bandwidth digital content protection (HDCP) port.

15. A method of setting a secure connection in a wireless communications system, the method comprising:

setting a protocol information to a terminal in the wireless communication system;

checking a packet received in the terminal according to the protocol information and generating at least a checking result; and

dropping or forwarding the packet according to the at least a checking result;

wherein the packet comprises a protocol type, a source port, and a destination port.

16. The method of claim **15**, further comprising:

forwarding the packet if a first checking result of the at least a checking result indicates that the protocol type of the packet is neither UDP nor transmission control protocol (TCP);

dropping the packet if the first checking result indicates that the protocol type of the packet is user datagram protocol (UDP) when the terminal is a source device;

dropping the packet if the first checking result indicates that the protocol type of the packet is UDP and a second checking result of the at least a checking result indicates that the destination port of the packet received in the terminal is not a video or an audio port when the terminal is a sink device;

forwarding the packet if the first checking result indicates that the protocol type of the packet is UDP and the second checking result indicates that the destination port of the packet received in the sink is a video or an audio port when the terminal is the sink device; and

checking the source port or the destination port of the packet according to the protocol information and generating at least a protocol information checking result when the first checking result indicates that the protocol type of the packet is TCP.

17. The method of claim **16**, further comprising:

dropping the packet if the at least a protocol information checking result indicates that the source port or the destination port of the packet is not comprised in the protocol information when the first checking result indicates that the protocol type of the packet is TCP; and

forwarding the packet if the at least a protocol information checking result indicates that the source port or the destination port of the packet is comprised in the protocol information when the first checking result indicates that the protocol type of the packet is TCP.

18. The method of claim **15**, wherein the protocol information comprises a control port and combinations of a user input back channel (UIBC) port, an Inter-Integrated Circuit (I2C) port or a high-bandwidth digital content protection (HDCP) port.

19. A communication apparatus for a wireless communications system, comprising:

a processor;

a storage unit;

a program code, stored in the storage unit, wherein the program code instructs the processor to execute the following steps:

setting a protocol information to a terminal in the wireless communication system;

checking a packet received in the terminal according to the protocol information and generating at least a checking result; and

dropping or forwarding the packet according to the at least a checking result;

wherein the packet comprises a protocol type, a source port, and a destination port.

20. The communication apparatus of claim **19**, wherein the steps further comprise:

forwarding the packet if a first checking result of the at least a checking result indicates that the protocol type of the packet is neither UDP nor transmission control protocol (TCP);

dropping the packet if the first checking result indicates that the protocol type of the packet is user datagram protocol (UDP) when the terminal is a source device;

dropping the packet if the first checking result indicates that the protocol type of the packet is UDP and a second checking result of the at least a checking result indicates that the destination port of the packet received in the terminal is not a video or an audio port when the terminal is a sink device;

forwarding the packet if the first checking result indicates that the protocol type of the packet is UDP and the second checking result indicates that the destination port of the packet received in the sink is a video or an audio port when the terminal is the sink device; and

checking the source port or the destination port of the packet according to the protocol information and generating at least a protocol information checking result when the first checking result indicates that the protocol type of the packet is TCP.

21. The communication apparatus of claim **20**, wherein the steps further comprise:

dropping the packet if the at least a protocol information checking result indicates that the source port or the destination port of the packet is not comprised in the protocol information when the first checking result indicates that the protocol type of the packet is TCP; and

forwarding the packet if the at least a protocol information checking result indicates that the source port or the destination port of the packet is comprised in the protocol information when the first checking result indicates that the protocol type of the packet is TCP.

22. The communication apparatus of claim **19**, wherein the protocol information comprises a control port and combinations of a user input back channel (UIBC) port, an Inter-Integrated Circuit (I2C) port or a high-bandwidth digital content protection (HDCP) port.

* * * * *