According to a first aspect of the present invention, there is provided a wireless communication device performing an inter-device wireless communication with another wireless communication device in accordance with the Wi-Fi (Wireless Fidelity) Direct specification, the wireless communication device comprising a receiving unit configured receive an action frame containing information about a role of the wireless communication device, the action frame being specified in the IEEE (Institute of Electrical and Electronic Engineers) 802.11 specification, wherein the receiving unit receives the action frame containing information about a fourth layer, and wherein the information about the role of the wireless communication device and the information about the fourth layer are arranged so that the information about the role of the wireless communication device comes before the information about the fourth layer in the action frame.

With the above aspect, an inter-device wireless communication can be performed with another wireless communication device in accordance with the Wi-Fi Direct specification, and an action frame that contains information about the role of the wireless communication and is specified in the IEEE802.11 specification can be received.

[0009]

In this first aspect, the receiving unit may perform the reception when the wireless communication device is P2P (Peer-to-Peer)-connected to the other wireless communication device. With this arrangement, the reception can be performed when a P2P connection to another wireless communication device is maintained.

[0010]

In this first aspect, the information about the role of the wireless communication device may be information about one of a source and a sink that are compliant with the Wi-Fi Display specification. With this arrangement, an action frame that contains information about a source or a sink compliant with the Wi-Fi Display specification and is specified in the IEEE802.11 specification can be received.

[0011]

process can be operated.

[0026]

In this second aspect, the communication unit may receive a FIN packet (finish packet) in TCP (Transmission Control Protocol) based on the timing of the start of operation of the second application. With this arrangement, a FIN packet in TCP can be received based on the timing of a start of operation of the second application.

[0027]

Embodiments of the present invention provide a communication method for the wireless communication device, and a program for causing a computer to implement the method.

According to a third aspect of the present invention, there is provided a wireless communication device performing an inter-device wireless communication with another wireless communication device in accordance with the Wi-Fi (Wireless Fidelity) Direct specification, the wireless communication device comprising: a receiving unit configured to receive an action frame containing information about a role of the wireless communication device, the action frame being specified in the IEEE (Institute of Electrical and Electronic Engineers) 802.11 specification; a display unit configured to display image data; ~~and~~ a protocol switching unit configured to switch a protocol using the inter-device wireless communication, and an operation accepting unit configured to accept a user operation, wherein the receiving unit receives the information about the role of the wireless communication device based on timing of acceptance of a user operation for starting a communication of image data, the user operation having been accepted by the operation accepting unit.

With the above aspect, an inter-device wireless communication can be performed with another wireless communication device in accordance with the Wi-Fi Direct specification, an action frame that contains information about the role of the wireless communication device and is specified in the IEEE802.11 specification can be received, image data can be

~~According to a fourth aspect of the present invention, there is provided a communication method comprising: a first procedure to perform an inter-device wireless communication with another wireless communication device in accordance with the Wi-Fi Direct specification; and a second procedure for the communication unit to receive an action frame containing information about a role of a current wireless communication device, the action frame being specified in the IEEE802.11 specification.~~

According to a fourth aspect of the present invention, there is provided an information processing device comprising: a processor; and a memory storing a program to be executed by the processor, wherein the program causes the processor to carry out: a first procedure to perform an inter-device wireless communication with another device in accordance with the Wi-Fi Direct specification; and a second procedure to receive an action frame containing information about a role of the wireless communication device using the information processing device, the action frame being specified in the IEEE802.11 specification, wherein the received action frame contains information about a fourth layer, and wherein the information about the role of the wireless communication device and the information about the fourth layer are arranged so that the information about the role of the wireless communication device comes before the information about the fourth layer in the action frame.

With the above aspect, an inter-device wireless communication can be performed with another device in accordance with the Wi-Fi Direct specification, and an action frame that contains information about the role of the wireless communication device using the information processing device and is specified in the IEEE802.11 specification can be received.

[0031]

In this fourth aspect, the program may further cause the processor to carry out a signal processing procedure to process image data. With this arrangement, signal processing can be performed to process image data.

[0032]

In this fourth aspect, the program may further cause the processor to carry out a procedure to adjust power consumption in accordance with operation of the processor. With this arrangement, power consumption can be adjusted in accordance with operation of the processor.

According to a fifth aspect of the present invention, there is provided a communication method comprising: a first procedure to perform an inter-device wireless communication with another wireless communication device in accordance with the Wi-Fi Direct specification; and a second procedure for the communication unit to receive an action frame containing information about a role of a current wireless communication device, the action frame being specified in the IEEE802.11 specification, wherein the received action frame contains information about a fourth layer, and wherein the information about the role of the wireless communication device and the information about the fourth layer are arranged so that the information about the role of the wireless communication device comes before the information about the fourth layer in the action frame

EFFECTS OF THE INVENTION

[0033]

Embodiments of the present invention can provide a great effect to allow users to readily use desired applications.

CLAIMS

1. A wireless communication device performing an inter-device wireless communication with another wireless communication device in accordance with the Wi-Fi (Wireless Fidelity) Direct specification, the wireless communication device comprising:

a receiving unit configured receive an action frame containing information about a role of the wireless communication device, the action frame being specified in the IEEE (Institute of Electrical and Electronic Engineers) 802.11 specification,

wherein the receiving unit receives the action frame containing information about a fourth layer, and

wherein the information about the role of the wireless communication device and the information about the fourth layer are arranged so that the information about the role of the wireless communication device comes before the information about the fourth layer in the action frame.

2. The wireless communication device according to claim 1, wherein the receiving unit performs the reception when the wireless communication device is P2P (Peer-to-Peer)-connected to the another wireless communication device.

3. The wireless communication device according to claim 1, wherein the information about the role of the wireless communication device is information about one of a source and a sink that are compliant with the Wi-Fi Display specification.

4. The wireless communication device according to claim 1, wherein the action frame is a vendor specific action frame specified in the IEEE802.11 specification.

5. The wireless communication device according to claim 4, wherein the information about the role of the wireless communication device is incorporated into a vendor specific content area in the vendor specific action frame.

6. The wireless communication device according to claim 1, wherein the action frame includes a type information portion and an information element portion.

~~7. The wireless communication device according to claim 1, wherein the receiving unit receives the action frame containing information about a fourth layer.~~

~~8~~7. The wireless communication device according to claim ~~7~~1, wherein the information about the fourth layer includes at least information about RTSP.

~~9~~8. The wireless communication device according to claim ~~8~~7, wherein the information about the fourth layer includes at least information about a port number used in the RTSP.

~~10. The wireless communication device according to claim 7, wherein the information about the role of the wireless communication device and the information about the fourth layer are arranged so that the information about the role of the wireless communication device comes before the~~

~~information about the fourth layer in the action frame.~~

~~11~~9. The wireless communication device according to claim 1, wherein the receiving unit receives the action frame containing capability information.

~~12~~10. The wireless communication device according to claim ~~11~~9, wherein the capability information includes at least information about existence or non-existence of compatibility with content protection compliant with the Wi-Fi Display specification.

~~13~~11. A wireless communication device comprising:

a communication unit configured to perform an inter-device wireless communication with another device discovered through a connection discovery process; and

a control unit configured to operate a first application designated in the connection discovery process based on timing of establishment of a connection of the inter-device wireless communication, wherein,

when a second application is executed while the first application is being operated, the communication unit receives an action frame containing information about the second application, the action frame being specified in the IEEE802.11 specification.

~~14~~12. The wireless communication device according to claim ~~13~~11, wherein the control unit ends the first application based on timing of a start of operation of the second application.

~~15~~13. The wireless communication device according to claim ~~13~~11, wherein the control unit reduces an amount of data being communicated about the first application based on timing of a start of operation of the second application.

~~16~~14. The wireless communication device according to claim ~~15~~13, wherein the control unit regularly or irregularly checks an operation state of the first application after the start of operation of the second application.

~~17~~15. The wireless communication device according to claim ~~13~~11, wherein the second application is Wi-Fi CERTIFIED Miracast.

~~18~~16. The wireless communication device according to claim ~~13~~11, wherein the first application is DLNA (Digital Living Network Alliance).

~~19~~17. The wireless communication device according to claim ~~18~~16, wherein the communication unit receives a FIN packet (finish packet) in TCP (Transmission Control Protocol) based on timing of a start of operation of the second application.

~~20~~18. A wireless communication device performing an inter-device wireless communication with another wireless communication device in accordance with the Wi-Fi (Wireless Fidelity) Direct specification, the wireless communication device comprising:

a receiving unit configured to receive an action frame

containing information about a role of the wireless communication device, the action frame being specified in the IEEE (Institute of Electrical and Electronic Engineers) 802.11 specification;

a display unit configured to display image data; ~~and~~

a protocol switching unit configured to switch a protocol using the inter-device wireless communication, and

an operation accepting unit configured to accept a user operation, wherein the receiving unit receives the information about the role of the wireless communication device based on timing of acceptance of a user operation for starting a communication of image data, the user operation having been accepted by the operation accepting unit.

~~21. The wireless communication device according to claim 20, further comprising an operation accepting unit configured to accept a user operation, wherein the receiving unit receives the information about the role of the wireless communication device based on timing of acceptance of a user operation for starting a communication of image data, the user operation having been accepted by the operation accepting unit.~~

~~22~~19. The wireless communication device according to claim ~~20~~18 wherein the receiving unit receives image data to be displayed on the display unit, by using the protocol switched by the protocol switching unit.

~~23~~20. An information processing device comprising:

a processor; and

a memory storing a program to be executed by the processor, wherein the program causes the processor to carry out:

a first procedure to perform an inter-device wireless communication with another device in accordance with the Wi-Fi Direct specification; and

a second procedure to receive an action frame containing information about a role of the wireless communication device using the information processing device, the action frame being specified in the IEEE802.11 specification,

wherein the received action frame contains information about a fourth layer, and

wherein the information about the role of the wireless communication device and the information about the fourth layer are arranged so that the information about the role of the wireless communication device comes before the information about the fourth layer in the action frame.

~~24~~21. The information processing device according to claim ~~23~~20, wherein the program further causes the processor to carry out a signal processing procedure to process image data.

~~25~~22. The information processing device according to claim ~~23~~20, wherein the program further causes the processor to carry out a procedure to adjust power consumption in accordance with operation of the processor.

~~26~~23. A communication method comprising:

a first procedure to perform an inter-device wireless communication with another wireless communication device in accordance with the Wi-Fi Direct specification; and

a second procedure for the communication unit to receive an action frame containing information about a role of a current wireless communication device, the action frame being specified in the IEEE802.11 specification,

wherein the received action frame contains information about a fourth layer, and

wherein the information about the role of the wireless communication device and the information about the fourth layer are arranged so that the information about the role of the wireless communication device comes before the information about the fourth layer in the action frame.