SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0005]

With the above conventional technique, a connection to another group can be made while the connections among the wireless communication devices forming the same group are maintained.

[0006]

While the wireless communication devices are wirelessly connected, various kinds of applications might be executed among those wireless communication devices. For example, an application might be designated by a user operation both before and after wireless connection establishment. In this case, it would be convenient if an application desired by a user can be readily used both before and after wireless connection establishment, for example.

[0007]

Embodiments of the present invention are developed in view of those circumstances, and aims to allow users to readily use desired applications.

SOLUTIONS TO PROBLEMS

[0008]

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

According to a first aspect of the present invention, there is provided a wireless communication device including a communication unit configured to perform a connected device discovery process before a wireless connection is established by transmitting/receiving one of a Probe Request and a Probe

Response specified in IEEE 802.11 specification, with information indicating an associated specific application being added to the one of the Probe Request and the Probe Response, and perform an establishment process to establish the wireless connection by transmitting/receiving data including an information element for designating the specific application when a connected device discovered through the connected device discovery process is determined to be associated with the specific application; and a control unit configured to perform control to designate the specific application by transmitting/receiving data including information equivalent to the information element without cutoff of the wireless connection when the specific application is designated after the wireless connection is established as the specific application is not designated at the time of the establishment process.

Accordingly, in a case where a specific application is not designated at the time of the establishment process but the specific application is designated after a wireless connection is established, the specific application can be designated by transmitting/receiving data including information equivalent to the information element for designating the specific application, without cutoff of the wireless connection.

[0009]

In this first aspect, when the specific application is designated by a user operation after the wireless connection is established as the specific application is not designated at the time of the establishment process, the control unit may perform the control to designate the specific application by transmitting the data including the information equivalent to the information element without cutoff of the wireless connection. Accordingly, in a case where a specific application is not designated at the time of the establishment

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

According to a second aspect of the present invention, there is provided a communication system including a first wireless communication device and a second wireless communication device configured to perform a connected device discovery process on each other before a wireless connection is established by being configured to transmit/receive one of a Probe Request and a Probe Response specified in IEEE 802.11 specification, with information indicating an associated specific application being added to the one of the Probe Request and the Probe Response, and to perform an establishment process to establish the wireless connection by being configured to transmit and receive, to and from each other, data including an information element for designating the specific application when a connected device discovered through the connected device discovery process is determined to be associated with the specific application, wherein, when the specific application is designated after the wireless connection is established as the specific application is not designated at the time of the establishment process, the first wireless communication device and the second wireless communication device are configured to transmit and receive, to and from each other, data including information equivalent to the information element without cutoff of the wireless connection.

Accordingly, in a case where a specific application is not designated at the time of the establishment process but the specific application is designated after a wireless connection is established, the specific application can be designated by exchanging data including information equivalent to the information element for designating the specific application, without cutoff of the wireless connection.

According to a third aspect of the present invention, there is provided a communication method including a first procedure to perform a connected device discovery process before a wireless connection is established by transmitting/receiving one of a Probe Request and a Probe Response specified in IEEE 802.11 specification, with information indicating an associated specific application being added to the one of the Probe Request and the Probe Response; a second procedure to perform an establishment process to establish the wireless connection by transmitting/receiving data including an information element for designating the specific application when a connected device discovered through the connected device discovery process is determined to be associated with the specific application; and a third procedure to perform control to designate the specific application by transmitting/receiving data including information equivalent to the information element without cutoff of the wireless connection when the specific application is designated after the wireless connection is established as the specific application is not designated at the time of the establishment process.

EFFECTS OF THE INVENTION

[0021]

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

BRIEF DESCRIPTION OF DRAWINGS

[0022]

Fig. 1 is a diagram showing an example structure of a communication system 10 in an embodiment of the present technique.

Fig. 2 is a block diagram showing an example functional structure of a first wireless communication device 100 in an embodiment of the present technique.

Fig. 3 is a diagram schematically showing an example structure of a peer list 180 stored in a memory 150 in an embodiment of the present technique.

Fig. 4 is a diagram showing an example display screen (a connection detail select screen 190) displayed on the display unit 170 of the first wireless communication device 100 in an embodiment of the present technique.

Fig. 5 is a sequence chart showing an example communication process to be performed by each device on which the present technique is based.

Fig. 6 is a sequence chart showing an example communication process to be performed by each device on which the present technique is based.

Fig. 7 is a diagram schematically showing an example structure of the format of a frame to be transmitted/received in a communication process by each device on which the present technique is based.

Fig. 8 is a sequence chart showing an example communication process to be performed by each device on which

CLAIMS

1. A wireless communication device comprising:

a communication unit configured to perform a connected device discovery process before a wireless connection is established by transmitting/receiving one of a Probe Request and a Probe Response specified in IEEE 802.11 specification, with information indicating an associated specific application being added to the one of the Probe Request and the Probe Response, and perform an establishment process to establish the wireless connection by transmitting/receiving data including an information element for designating the specific application when a connected device discovered through the connected device discovery process is determined to be associated with the specific application; and

a control unit configured to perform control to designate the specific application by transmitting/receiving data including information equivalent to the information element without cutoff of the wireless connection when the specific application is designated after the wireless connection is established as the specific application is not designated at the time of the establishment process.

2. The wireless communication device according to claim 1, wherein when the specific application by a user operation after the wireless connection is established as the specific application is not designated at the time of the establishment process, the control unit performs the control to designate the specific application by transmitting the data including the information equivalent to the information element without cutoff of the wireless connection.

3. The wireless communication device according to claim 1, wherein the control unit is configured to receive the data including the information equivalent to the information element from a

wireless communication device with which the wireless connection is established after the wireless connection is established as the specific application is not designated at the time of the establishment process, and configured to perform control to designate the specific application by transmitting the data including the information equivalent to the information element as a response to the received data to the wireless communication device with which the wireless connection is established without cutoff of the wireless connection.

4. The wireless communication device according to claim 1, wherein the control unit is configured to transmit/receive a vendor specific action frame specified in the IEEE 802.11 specification as the data including the information equivalent to the information element.

5. The wireless communication device according to claim 4, wherein the control unit is configured to transmit a request frame as the vendor specific action frame, the request frame using a vendor specific Information Element as the information element including information for identifying the specific application to be started and information for specifying a role the wireless communication device transmitting the request frame is to play in the specific application.

6. The wireless communication device according to claim 4, wherein the control unit is configured to transmit a response frame as the vendor specific action frame, the response frame using a vendor specific Information Element as the information element including information for identifying the specific application to be started and information for specifying a role the wireless communication device transmitting the response frame in response to a request frame is to play in the specific application.

7. The wireless communication device according to claim 4, wherein the control unit is configured to encapsulate and transmit an association request frame body into the vendor specific action frame, the association request frame body using a vendor specific Information Element as the information element including information for identifying the specific application to be started and information for specifying a role the wireless communication device transmitting a request frame is to play in the specific application, the association request frame body containing the information element.

8. The wireless communication device according to claim 4, wherein the control unit is configured to encapsulate and transmit an association response frame body into the vendor specific action frame, the association response frame body using a vendor specific Information Element as the information element including information for identifying the specific application to be started and information for specifying a role the wireless communication device transmitting a response frame in response to a request frame is to play in the specific application, the association response frame body containing the information element.

9. The wireless communication device according to claim 1, wherein the control unit is further configured to transmit/receive an encrypted frame as the data including information element.

10. The wireless communication device according to claim 1, wherein the communication unit is configured to establish a connection as the wireless connection to use the specific application.

11. The wireless communication device according to claim 1, which is compliant with IEEE 802.11 specification for enabling Peer to Peer connections.

12. A communication system comprising a first wireless communication device and a second wireless communication device configured to perform a connected device discovery process on each other before a wireless connection is established by being configured to transmit/receive one of a Probe Request and a Probe Response specified in IEEE 802.11 specification, with information indicating an associated specific application being added to the one of the Probe Request and the Probe Response, and to perform an establishment process to establish the wireless connection by being configured to transmit and receive, to and from each other, data including an information element for designating the specific application when a connected device discovered through the connected device discovery process is determined to be associated with the specific application,

wherein, when the specific application is designated after the wireless connection is established as the specific application is not designated at the time of the establishment process, the first wireless communication device and the second wireless communication device are configured to transmit and receive, to and from each other, data including information equivalent to the information element without cutoff of the wireless connection.

13. A communication method comprising:

a first procedure to perform a connected device discovery process before a wireless connection is established by transmitting/receiving one of a Probe Request and a Probe Response specified in IEEE 802.11 specification, with information indicating an associated specific application being added to the one of the Probe Request and the Probe Response;

a second procedure to perform an establishment process to establish the wireless connection by transmitting/receiving data including an information element for designating the specific application when a connected device discovered through the connected device discovery process is determined to be associated with the specific application; and

a third procedure to perform control to designate the specific application by transmitting/receiving data including information equivalent to the information element without cutoff of the wireless connection when the specific application is designated after the wireless connection is established as the specific application is not designated at the time of the establishment process.