[DESCRIPTION]

[Title]

INFORMATION PROCESSING APPARATUS, COMMUNICATION SYSTEM, INFORMATION PROCESSING METHOD, AND PROGRAM

[Technical Field]

[0001]

The present invention relates to an information processing apparatus, a communication system, an information processing method, and a program. More particularly, the invention relates to an information processing apparatus, a communication system, and an information processing method for exchanging information by wireless communication, as well as a program for causing a computer to execute the information processing method.

[Background Art]

[0002]

In the past, multiple information processing apparatuses exchanging information (frames) therebetween by wireless communication have used a system to set a transmission inhibition time for averting collisions between their transmissions. For example, a data source station transmits a frame (RTS frame) for requesting the transmission of data to another station and for requesting other stations to set a transmission inhibition time. Thereafter, the station as the destination of the data transmits a frame (CTS frame) to enable the data transmission. What has been studied in implementing this system is how to add to the CTS frame the information regarding the power for transmitting the data.

There have been proposed systems that enable data to be transmitted with the power determined on the basis of the information about the data transmitting power, the information being added to the frame by the data source station (e.g., see PTL 1).

[Citation List]

[Patent Literature]

[0003]

[PTL 1]

JP 2004-533158T

[Summary]

[Technical Problem]

[0004]

A problem with the existing technology outlined above is that the technology lets the RTS frame and other information be transmitted with predetermined power and does not provide suitable control over the transmitting power. Presumably, the existing technology may leave the RTS frame transmitted with excess transmitting power. Thus there is a possibility that the transmission inhibition time may be set over a wider range of stations than necessary. With the existing technology above, the transmission inhibition time is not set appropriately, which leads to a drop in the efficiency of utilization of communication resources.

[0005]

Embodiments of the present invention improve the efficiency of utilization of communication resources by suitably setting the transmission inhibition time.

[Solution to Problem]

[0006]

According to a first aspect of the present invention, there is provided an information processing apparatus including: a control part configured to: receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame; acquire surrounding environment information regarding an environment surrounding the information processing apparatus based on the signal and a receiving power of the signal; and transmit a frame for requesting transmission of data to a first information processing apparatus and for requesting second information processing apparatuses to set a transmission inhibition time, wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information regarding the environment surrounding the information processing apparatus transmitting the frame.

[0007]

In an embodiment of the first aspect of the present invention, the control part may perform control to transmit a communication end frame for notifying the end of communication of the data and for requesting the transmission inhibition time to be canceled, the communication end frame being transmitted with the transmitting power determined on the basis of the surrounding environment information. This provides an advantageous effect of determining the power for transmitting the communication end frame on the basis of the surrounding environment information.

[0008]

In an embodiment of the first aspect of the present

invention, the control part may perform control to transmit the communication end frame using the transmitting power determined on the basis of transmitting power information transmitted from the first information processing apparatus and of the surrounding environment information. This provides an advantageous effect of determining the transmitting power for the communication end frame on the basis of the transmitting power information transmitted from the information processing apparatus as the destination and of the surrounding environment information.

[0009]

According to a second aspect of the present invention, there is provided an information processing apparatus including: a control part configured to: receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame; acquire surrounding environment information regarding an environment surrounding the information processing apparatus based on the signal and a receiving power of the signal; transmit a frame for enabling a first information processing apparatus as a source of data to transmit the data and for requesting second information processing apparatuses to set a transmission inhibition time, wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information regarding the environment surrounding the information processing apparatus transmitting the frame.

[0010]

In an embodiment of the second aspect of the present invention, the control part may perform control to transmit the frame in which information regarding the transmitting

power is stored. This provides an advantageous effect of transmitting the frame having the transmitting power information stored therein.

[0011]

In an embodiment of the second aspect of the present invention, the control part may perform control to transmit a communication end frame for notifying the end of communication of the data and for requesting the transmission inhibition time to be canceled, the communication end frame being transmitted with the transmitting power determined on the basis of the surrounding environment information. This provides an advantageous effect of determining the transmitting power for the communication end frame on the basis of the surrounding environment information.

[0012]

According to a third aspect of the present invention, there is provided an information processing apparatus including: a control part configured to: receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame; acquire surrounding environment information regarding an environment surrounding the information processing apparatus based on the signal and a receiving power of the signal; transmit a frame for requesting transmission data to a first information processing apparatus and for requesting second information processing apparatuses to set a transmission inhibition time; and transmit a frame for enabling the first information processing apparatus to transmit data and for requesting the second information processing apparatuses to set a transmission inhibition time, wherein the frames are transmitted with transmitting power determined on a basis of

the surrounding environment information regarding the environment surrounding the information processing apparatus.

[0013]

In an embodiment of the third aspect of the present invention, the control part may perform control to transmit a communication end frame for notifying the end of communication of the data and for requesting the transmission inhibition time to be canceled, the communication end frame being transmitted with the transmitting power determined on the basis of the surrounding environment information. This provides an advantageous effect of determining the power for transmitting the communication end frame on the basis of the surrounding environment information.

[0014]

In an embodiment of the third aspect of the present invention, the control part may, in the case of transmitting data, perform control to transmit the frame using the transmitting power determined on the basis of the surrounding environment information and on the basis of destination surrounding environment information regarding an environment surrounding a destination information processing apparatus as the destination of the data. This provides an advantageous effect of determining the transmitting power on the basis of the destination surrounding environment information and the surrounding environment information in the case of transmitting the data.

[0015]

In an embodiment of the third aspect of the present invention, the control part may perform control to transmit a communication end frame for notifying the end of communication of the data and for requesting the transmission

inhibition time to be canceled, the communication end frame being transmitted with the transmitting power determined on the basis of the destination surrounding environment information and the surrounding environment information. This provides an advantageous effect of determining the power for transmitting the communication end frame on the basis of the destination surrounding environment information and the surrounding environment information.

[0016]

According to a fourth aspect of the present invention, there is provided a communication system including: a first information processing apparatus including a first control part configured to: receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame; acquire a first surrounding environment information regarding an environment surrounding the first information processing apparatus based on the signal and a receiving power of the signal; and transmit a frame for requesting transmission of data to a first one of the other information processing apparatuses and for requesting a second one of the other information processing apparatuses to set a transmission inhibition time, wherein the frame is transmitted with transmitting power determined on a basis of the first surrounding environment information regarding an environment surrounding the first information processing apparatus; and a second information processing apparatus including a second control part configured to: receive a signal from the other information processing apparatuses including a receiving power threshold and transmitting power of a frame; acquire a second surrounding environment information regarding an environment

surrounding the second information processing apparatus based on the signal and a receiving power of the signal; transmit a frame for enabling the first one of the other information processing apparatuses as a source of the data to transmit the data and for requesting the second one of the other information processing apparatuses to set a transmission inhibition time, wherein the frame is transmitted with transmitting power determined on a basis of the second surrounding environment information regarding the environment surrounding the second information processing apparatus.

[0016a]

According to a fifth aspect of the present invention, there is provided an information processing method including: a control procedure for: receiving a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame; acquiring surrounding environment information regarding a surrounding environment based on the signal and a receiving power of the signal; and transmitting a frame for requesting transmission of data to a first information processing apparatus and for requesting second information processing apparatuses to set a transmission inhibition time, wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information.

[00016b]

According to a sixth aspect of the present invention, there is provided an information processing method including: a control procedure for: receiving a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame; acquiring surrounding environment information regarding a surrounding

environment based on the signal and a receiving power of the signal; and transmitting a frame for enabling a first information processing apparatus as a source of data to transmit the data and for requesting second information processing apparatuses to set a transmission inhibition time, wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information.

[00016c]

According to a seventh aspect of the present invention, there is provided an information processing method including: a control procedure for: receiving a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame; acquiring surrounding environment information regarding a surrounding environment based on the signal and a receiving power of the signal; transmitting a frame for requesting transmission data to a first information processing apparatus and for requesting second information processing apparatuses to set a transmission inhibition time; and transmitting a frame for enabling the first information processing apparatus to transmit data and for requesting the second information processing apparatuses to set a transmission inhibition time, wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information.

[00016d]

According to an eighth aspect of the present invention, there is provided a program for causing a computer to execute a control procedure to: receive a signal from other information processing apparatuses including a receiving

power threshold and transmitting power of a frame; acquire surrounding environment information regarding a surrounding environment based on the signal and a receiving power of the signal; and transmit a frame for requesting transmission of data to a first information processing apparatus and for requesting second information processing apparatuses to set a transmission inhibition time, wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information.

[00016e]

According to a ninth aspect of the present invention, there is provided a program for causing a computer to execute a control procedure to: receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame; acquire surrounding environment information regarding a surrounding environment based on the signal and a receiving power of the signal; and transmit a frame for enabling a first information processing apparatus as a source of data to transmit the data and for requesting second information processing apparatuses to set a transmission inhibition time, wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information.

[00016f]

According to a tenth aspect of the present invention, there is provided a program for causing a computer to execute a control procedure for performing control to: receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame; acquire surrounding environment information

regarding a surrounding environment based on the signal and a receiving power of the signal; transmit a frame for requesting transmission data to a first information processing apparatus and for requesting second information processing apparatuses to set a transmission inhibition time; and transmit a frame for enabling the first information processing apparatus to transmit data and for requesting the second information processing apparatuses to set a transmission inhibition time, wherein the frames are transmitted with transmitting power determined on a basis of the surrounding environment information.

[Advantageous Effects of Invention]

[0017]

Embodiments of the present invention provide the advantageous effect of improving the efficiency of utilization of communication resources by suitably setting the transmission inhibition time. There may be other advantageous effects derived from but not covered by this description.

[Brief Description of Drawings]

[0018]

[Fig. 1]

Fig. 1 is a schematic diagram depicting a typical configuration of a communication system 10 embodying the present technology.

[Fig. 2]

Fig. 2 is a schematic diagram depicting a typical

CLAIMS

1. An information processing apparatus comprising:

a control part configured to:

receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame;

acquire surrounding environment information regarding an environment surrounding the information processing apparatus based on the signal and a receiving power of the signal; and

transmit a frame for requesting transmission of data to a first information processing apparatus and for requesting second information processing apparatuses to set a transmission inhibition time,

wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information regarding the environment surrounding the information processing apparatus transmitting the frame.

2. The information processing apparatus according to claim 1, wherein the control part performs control to transmit a communication end frame for notifying the end of communication of the data and for requesting the transmission inhibition time to be canceled, the communication end frame being transmitted with the transmitting power determined on a basis of the surrounding environment information.

3. The information processing apparatus according to claim 2, wherein the control part performs control to transmit the communication end frame using the transmitting power determined on a basis of transmitting power information transmitted from the first information processing apparatus and of the surrounding environment information.

4. An information processing apparatus comprising:

a control part configured to:

receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame;

acquire surrounding environment information regarding an environment surrounding the information processing apparatus based on the signal and a receiving power of the signal;

transmit a frame for enabling a first information processing apparatus as a source of data to transmit the data and for requesting second information processing apparatuses to set a transmission inhibition time,

wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information regarding the environment surrounding the information processing apparatus transmitting the frame.

5. The information processing apparatus according to claim 4, wherein the control part performs control to transmit the frame in which information regarding the transmitting power is stored.

6. The information processing apparatus according to claim 4, wherein the control part performs control to transmit a communication end frame for notifying the end of communication of the data and for requesting the transmission inhibition time to be canceled, the communication end frame being transmitted with the transmitting power determined on a basis of the surrounding environment information.

7. An information processing apparatus comprising:

a control part configured to:

receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame;

acquire surrounding environment information regarding an environment surrounding the information processing apparatus based on the signal and a receiving power of the signal;

transmit a frame for requesting transmission data to a first information processing apparatus and for requesting second information processing apparatuses to set a transmission inhibition time; and

transmit a frame for enabling the first information processing apparatus to transmit data and for requesting the second information processing apparatuses to set a transmission inhibition time,

wherein the frames are transmitted with transmitting power determined on a basis of the surrounding environment information regarding the environment surrounding the information processing apparatus.

8. The information processing apparatus according to claim 7, wherein the control part performs control to transmit a communication end frame for notifying the end of communication of the data and for requesting the transmission inhibition time to be canceled, the communication end frame being transmitted with the transmitting power determined on a basis of the surrounding environment information.

9. The information processing apparatus according to claim 7, wherein the control part, in the case of transmitting data, performs control to transmit the frame using the transmitting power determined on a basis of the surrounding environment information and on the basis of destination surrounding environment information regarding an environment surrounding a destination information processing apparatus as the destination of the data.

10. The information processing apparatus according to claim 9, wherein the control part performs control to transmit a

communication end frame for notifying the end of communication of the data and for requesting the transmission inhibition time to be canceled, the communication end frame being transmitted with the transmitting power determined on a basis of the destination surrounding environment information and the surrounding environment information.

11. A communication system comprising:

a first information processing apparatus including a first control part configured to:

receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame;

acquire a first surrounding environment information regarding an environment surrounding the first information processing apparatus based on the signal and a receiving power of the signal; and

transmit a frame for requesting transmission of data to a first one of the other information processing apparatuses and for requesting a second one of the other information processing apparatuses to set a transmission inhibition time,

wherein the frame is transmitted with transmitting power determined on a basis of the first surrounding environment information regarding an environment surrounding the first information processing apparatus; and

a second information processing apparatus including a second control part configured to:

receive a signal from the other information processing apparatuses including a receiving power threshold and transmitting power of a frame;

acquire a second surrounding environment information regarding an environment surrounding the second information processing apparatus based on the signal and a receiving power of the signal;

transmit a frame for enabling the first one of the other

information processing apparatuses as a source of the data to transmit the data and for requesting the second one of the other information processing apparatuses to set a transmission inhibition time,

wherein the frame is transmitted with transmitting power determined on a basis of the second surrounding environment information regarding the environment surrounding the second information processing apparatus.

12. An information processing method comprising:

a control procedure for:

receiving a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame;

acquiring surrounding environment information regarding a surrounding environment based on the signal and a receiving power of the signal; and

transmitting a frame for requesting transmission of data to a first information processing apparatus and for requesting second information processing apparatuses to set a transmission inhibition time,

wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information.

13. An information processing method comprising:

a control procedure for:

receiving a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame;

acquiring surrounding environment information regarding a surrounding environment based on the signal and a receiving power of the signal; and

transmitting a frame for enabling a first information processing apparatus as a source of data to transmit the data

and for requesting second information processing apparatusesto set a transmission inhibition time,

wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information.

14. An information processing method comprising:

a control procedure for:

receiving a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame;

acquiring surrounding environment information regarding a surrounding environment based on the signal and a receiving power of the signal;

transmitting a frame for requesting transmission data to a first information processing apparatus and for requesting second information processing apparatuses to set a transmission inhibition time; and

transmitting a frame for enabling the first information processing apparatus to transmit data and for requesting the second information processing apparatuses to set a transmission inhibition time,

wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information.

15. A program for causing a computer to execute a control procedure to:

receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame;

acquire surrounding environment information regarding a surrounding environment based on the signal and a receiving power of the signal; and

transmit a frame for requesting transmission of data to

a first information processing apparatus and for requesting second information processing apparatuses to set a transmission inhibition time,

wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information.

16. A program for causing a computer to execute a control procedure to:

receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame;

acquire surrounding environment information regarding a surrounding environment based on the signal and a receiving power of the signal; and

transmit a frame for enabling a first information processing apparatus as a source of data to transmit the data and for requesting second information processing apparatuses to set a transmission inhibition time,

wherein the frame is transmitted with transmitting power determined on a basis of the surrounding environment information.

17. A program for causing a computer to execute a control procedure for performing control to:

receive a signal from other information processing apparatuses including a receiving power threshold and transmitting power of a frame;

acquire surrounding environment information regarding a surrounding environment based on the signal and a receiving power of the signal;

transmit a frame for requesting transmission data to a first information processing apparatus and for requesting second information processing apparatuses to set a transmission inhibition time; and

transmit a frame for enabling the first information processing apparatus to transmit data and for requesting the second information processing apparatuses to set a transmission inhibition time,

wherein the frames are transmitted with transmitting power determined on a basis of the surrounding environment information.

18. The information processing apparatus according to any one of claims 1 to 10, wherein the surrounding environment information includes information regarding positions and distances from the information apparatus transmitting the frame to the first and second information processing apparatuses.

19. The information processing system according to claim 11, wherein the first and second surrounding environment information includes information regarding positions and distances from the information apparatus transmitting the frame to the first and second information processing apparatuses.

20. The information processing method according to any one of claims 12 to 14, wherein the transmitting power is determined on the basis of the surrounding environment information including information regarding positions and distances from the information apparatus to the first and second information processing apparatuses.

21. The program according to any one of claims 15 to 17, wherein the transmitting power is determined on the basis of the surrounding environment information including information regarding positions and distances from the information apparatus to the first and second information processing apparatuses.