Patent Literature 2: JP 2009-232464A

## Disclosure of Invention

### Technical Problem

[0006]

In non-orthogonal multiple access, however, radio resources can be wastefully used. As an example, when the same radio resources are allocated to a certain terminal device and another terminal device, sizes of transmission data transmitted using the radio resources can be significantly different between the certain terminal device and the other terminal device. In this case, more radio resources than necessary are used to transmit the transmission data of the smaller size, and thus the radio resources can be said to be wastefully used.

[0007]

Thus, it is desirable to provide a mechanism which enables radio resources to be used more efficiently in non-orthogonal multiple access.

### Solution to Problem

[0008]

According to the first aspect of the present invention, there is provided a device including: a grouping unit configured to perform grouping of a plurality of terminal devices that support non-orthogonal multiple access on the basis of a size of transmission data of each of the plurality of terminal devices; an allocation unit configured to allocate the same radio resources to each of groups obtained as a result of the grouping, wherein the transmission data is transmission data transmitted by each of the plurality of terminal devices, and wherein the same radio resources are the same uplink resources; and a transmission power control unit configured to, when two or more terminal devices belong to a group obtained as a result of the grouping, control transmission power of transmission data transmitted by the two or more terminal devices such that the difference in levels of reception power of the transmission data transmitted by the two or more terminal devices is large.

[0009]

According to the second aspect of the present invention, there is provided a method performed by a processor, the method including: performing grouping of a plurality of terminal devices that support non-orthogonal multiple access on the basis of a size of transmission data of each of the plurality of terminal devices; allocating the same radio resources to each of groups obtained as a result of the grouping, wherein the transmission data is transmission data transmitted by each of the plurality of terminal devices, and wherein the same radio resources are the same uplink resources; and when two or more terminal devices belong to a group obtained as a result of the grouping, controlling transmission power of transmission data

transmitted by the two or more terminal devices such that the difference in levels of reception power of the transmission data transmitted by the two or more terminal devices is large.

[0010]

According to the third aspect of the present invention, there is provided a device including: an acquisition unit configured to acquire information indicating radio resources to be allocated to a terminal device; and a communication processing unit configured to perform a process for transmitting or receiving transmission data of the terminal device using the radio resources, wherein the terminal device is included in a plurality of terminal devices that support non-orthogonal multiple access, and belongs to a group obtained as a result of grouping of the plurality of terminal devices performed on the basis of a size of transmission data of each of the plurality of terminal devices, wherein radio resources are radio resources allocated to one or more terminal devices that belong to the group, and wherein the transmission data is transmission data transmitted by each of the plurality of terminal devices, and wherein the transmission data is received by the two or more terminal devices having a large difference in levels of reception power of the transmission data, and wherein the communication processing unit is further configured to decode the transmission data of the two or more terminal devices in descending order of the levels of the reception power.

## Advantageous Effects of Invention

[0011]

According to the present disclosure described above, radio resources can be used more efficiently in non-orthogonal multiple access. Note that the effects described above are not necessarily limitative. With or in the place of the above effects, there may be achieved any one of the effects described in this specification or other effects that may be grasped from this specification.

## Brief Description of Drawings

[0012]

[FIG. 1] FIG. 1 is an explanatory diagram for describing an example of a configuration of a transmission device that supports IDMA.

[FIG. 2] FIG. 2 is an explanatory diagram for describing an example of a configuration of a reception device that supports IDMA.

[FIG. 3] FIG. 3 is an explanatory diagram for describing an example of resource blocks in LTE.

[FIG. 4] FIG. 4 is an explanatory diagram illustrating an example of the schematic configuration of a system according to an embodiment of the present disclosure.

[FIG. 5] FIG. 5 is a block diagram illustrating an example of a configuration of a base station according to the embodiment.

[FIG. 6] FIG. 6 is a block diagram illustrating an example of a configuration of a

CLAIMS

1. A device comprising:

a grouping unit configured to perform grouping of a plurality of terminal devices that support non-orthogonal multiple access on the basis of a size of transmission data of each of the plurality of terminal devices;

an allocation unit configured to allocate the same radio resources to each of groups obtained as a result of the grouping, wherein the transmission data is transmission data transmitted by each of the plurality of terminal devices, and wherein the same radio resources are the same uplink resources; and

a transmission power control unit configured to, when two or more terminal devices belong to a group obtained as a result of the grouping, control transmission power of transmission data transmitted by the two or more terminal devices such that the difference in levels of reception power of the transmission data transmitted by the two or more terminal devices is large.

2. The device according to claim 1, wherein the grouping unit performs the grouping for each of subframes on the basis of the size of the transmission data.

3. The device according to claim 1, wherein the grouping unit performs the grouping further on the basis of one or a combination of a modulation scheme and a coding rate applied to the transmission data.

4. The device according to claim 3, wherein the grouping unit performs the grouping for each modulation scheme or for each coding rate.

5. The device according to claim 1, wherein the grouping unit performs the grouping further on the basis of information regarding a position of each of the plurality of terminal devices.

6. The device according to claim 5, wherein the information regarding the position includes information indicating the position of each of the plurality of terminal devices, information indicating a timing advance of each of the plurality of terminal devices, or information indicating an angle of arrival of each of the plurality of terminal devices.

7. The device according to claim 5, wherein the grouping unit performs the grouping such that terminal devices positioned at a close distance do not belong to the same group.

8. The device according to claim 1, wherein the grouping unit performs the grouping further on the basis of information regarding a processing capability or a memory size of each of the plurality of terminal devices.

9. The device according to claim 8, wherein the grouping unit performs the grouping such that terminal devices having similar processing capabilities or memory sizes belong to the same group.

10. The device according to claim 1, wherein the non-orthogonal multiple access is interleave division multiple access.

11. The device according to claim 1, wherein the transmission data is a transport block.

12. The device according to claim 1,

wherein the same radio resources are radio resources included in a resource pool for radio communication using the non-orthogonal multiple access, and

the resource pool is a part of radio resources of a frequency band.

13. The device according to claim 12, wherein the same radio resources are radio resources limited in at least one of a frequency direction and a time direction among the radio resources.

14. The device according to claim 12, wherein the allocation unit allocates other radio resources that are not included in the resource pool to a terminal device that does not support the non-orthogonal multiple access.

15. The device according to claim 12, further comprising:

a reporting unit configured to report the resource pool to the plurality of terminal devices.

16. A method performed by a processor, the method comprising:

performing grouping of a plurality of terminal devices that support non-orthogonal multiple access on the basis of a size of transmission data of each of the plurality of terminal devices; allocating the same radio resources to each of groups obtained as a result of the grouping, wherein the transmission data is transmission data transmitted by each of the plurality of terminal devices, and wherein the same radio resources are the same uplink resources; and

when two or more terminal devices belong to a group obtained as a result of the grouping, controlling transmission power of transmission data transmitted by the two or more terminal devices such that the difference in levels of reception power of the transmission data transmitted by the two or more terminal devices is large.

17. A device comprising:

an acquisition unit configured to acquire information indicating radio resources to be allocated to a terminal device; and

a communication processing unit configured to perform a process for transmitting or receiving transmission data of the terminal device using the radio resources,

wherein the terminal device is included in a plurality of terminal devices that support non-orthogonal multiple access, and belongs to a group obtained as a result of grouping of the plurality of terminal devices performed on the basis of a size of transmission data of each of the plurality of terminal devices, and

wherein the radio resources are radio resources allocated to one or more terminal devices that belong to the group, and wherein the transmission data is transmission data transmitted by each of the plurality of terminal devices, and

wherein the transmission data is received by the two or more terminal devices having a large difference in levels of reception power of the transmission data, and wherein the communication processing unit is further configured to decode the transmission data of the two or more terminal devices in descending order of the levels of the reception power.