

[0006]

The access point allows a plurality of terminals to perform random access by TF-R. A terminal having uplink data (UL Data) in the transmission buffer randomly selects one RU from among the RA RUs specified by the TF-R. Thereafter, the terminal transmits a UL response signal including the transmission buffer information to the access point by using the selected RU. The access point can get to know the transmission buffer state of each of terminals on the basis of the transmission buffer information received through random access and, thus, can efficiently schedule the UL Data after random access.

[0007]

The second use of random access is to transmit an uplink signal by OFDMA even when a terminal operating in a power saving mode (also referred to as a "Power Saving (PS) terminal") returns from the power saving state, and the access point does not know that the terminal holds uplink data in the transmission buffer. This use can prevent a decrease in transmission efficiency caused by a plurality of terminals performing uplink transmission separately as a single user (SU) (refer to, for example, NPL 3).

Citation List

Non Patent Literature

[0008]

NPL 1: IEEE 802.11-15/0875r1 "Random Access with Trigger frames using OFDMA"

NPL 2: IEEE 802.11-15/0843r1 "UL MU Random Access Analysis"

NPL 3: IEEE 802.11-15/1107r0 "Power Save with Random Access"

NPL 4: IEEE 802.11-15/1066r0, "HE-SIG-B Contents"

NPL 5: IEEE Std 802.11-2012

Summary

[0009]

According to an aspect, there is a communication apparatus, comprising:

signal generation circuitry which, in operation, generates a control signal including a plurality of user specific fields, each of the plurality of user specific fields including an Association ID (AID) subfield for specifying a corresponding

terminal station, and a resource unit allocation subfield indicating at least one resource unit available for the corresponding terminal station; and
transmission circuitry which, in operation, transmits the control signal, wherein one of a plurality of AIDs for scheduled access or one of a plurality of random access IDs for random access is assigned to the AID subfield in each of the plurality of user specific fields,
values for the plurality of random access IDs are different from any of values of the plurality of the AIDs for the scheduled access, and
each value of the plurality of random access IDs indicates a type of a terminal station which can perform random access to the at least one resource unit.

According to an aspect, there is a terminal station, comprising:

signal receiving circuitry which, in operation, receives a control signal including a plurality of user specific fields, each of the plurality of user specific fields including an Association ID (AID) subfield for specifying a corresponding terminal station, and a resource unit allocation subfield indicating at least one resource unit available for the corresponding terminal station; and

selection circuitry which, in operation, randomly selects one resource unit from the at least one resource unit indicated by a corresponding resource unit allocation subfield when the received control signal includes the user specific field including AID subfield to which one of the plurality of random access IDs is allocated,

transmission circuitry which, in operation, transmits an uplink signal by using the selected one resource unit, wherein values for the plurality of random access IDs are different from any of values of the plurality of the AIDs for the scheduled access, and each value of the plurality of random access IDs indicates a type of a terminal station which can perform random access to the at least one resource unit.

According to an aspect, there is a communication method, comprising:

generating a control signal including a plurality of user specific fields, each of the plurality of user specific fields including an Association ID (AID) subfield for specifying a corresponding terminal station, and a resource unit allocation subfield indicating at least one resource unit available for the corresponding terminal station; and

transmitting the control signal, wherein one of a plurality of AIDs for scheduled access or one of a plurality of random access IDs for random access is assigned to the AID subfield in each of the plurality of user specific fields, values for the plurality of random access IDs are different from any of values of the plurality of the AIDs for the scheduled access, and each value of the plurality of random access IDs indicates a type of a terminal station which can perform random access to the at least one resource unit.

According to an aspect, there is a communication method, comprising:

receiving a control signal including a plurality of user specific fields, each of the plurality of user specific fields including an Association ID (AID) subfield for specifying a corresponding terminal station, and a resource unit allocation subfield indicating at least one resource unit available for the corresponding terminal station; and

randomly selecting one resource unit from the at least one resource unit indicated by a corresponding resource unit allocation subfield when the received control signal includes the user specific field including AID subfield to which one of the plurality of random access IDs is assigned

transmitting an uplink signal by using the selected one resource unit, wherein values for the plurality of random access IDs are be different from any of values of the plurality of the AIDs for the scheduled access, and each value of the plurality of random access IDs indicates a type of a terminal station which can perform random access to the at least one resource unit.

However, as the amount of information of the control signal (the UL response signal) transmitted by a terminal increases due to the above-described random access, the resource (for example, the time length) required for transmitting the UL response signal increases. Consequently, the resource used to transmit UL/DL Data decreases and, thus, the system throughput decreases. In contrast, if the amount of information of the control signal transmitted through random access decreases, efficient scheduling of the UL/DL Data transmission after the random access cannot be performed. As a result, the system throughput

decreases.

[0010]

Embodiments of the present disclosure is to provide a communication device, a terminal, and a communication method capable of increasing the system throughput without an increase in the amount of information of a control signal transmitted through random access.

Solution to problem

[0011]

According to an embodiment of the present disclosure, a communication device includes a storage unit that stores a plurality of random access IDs used to instruct a terminal which transmission frequency resources to use for random-access, where each of the random access IDs is uniquely associated with the state of communication between a terminal that performs random access and the communication device, a generation unit that generates a random access control signal including allocation information indicating at least one transmission frequency resource, where each of the at least one transmission frequency resource has one of the random access IDs assigned thereto, and a transmission unit that transmits the random access control signal.

[0012]

According to an embodiment of the present disclosure, a terminal includes a storage unit that stores a plurality of random access IDs used to instruct a terminal which transmission frequency resources to use for random access, where each of the random access IDs is uniquely associated with the state of communication between a terminal that performs random access and the communication device, a reception unit that receives a random access control signal including allocation information indicating at least one transmission frequency resource, where each of the at least one transmission frequency resource has one of the random access IDs assigned thereto, a selection unit that selects, from among the at least one transmission frequency resource, one of the transmission frequency resources each having a random access ID that is the same as the random access ID associated with the state of communication of the terminal, and a transmission unit that transmits a random access signal by using the selected transmission frequency resource.

[0013]