NPL 3

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Summary

[0004] However, there is room for study on a method for improving reception performance of an uplink signal.

[0005] A non-limiting example of the present disclosure facilitates providing a terminal, a base station, and a communication method each capable of improving reception performance of an uplink signal.

[0006] A terminal according to an example of the present disclosure includes: reception circuitry, which in operation, receives control information corresponding to a downlink message in a random access procedure; control circuitry, which in operation, determines a configuration of repetitive transmission of an uplink control signal for the downlink message based on a value of a field in the control information, the field being related to a configuration different from the configuration of repetitive transmission.

[0006A] In one example, the present disclosure refers to a terminal comprising a receiver, which in operation, receives control information indicating a number of repetitions for an uplink control signal, in a random access procedure, circuitry, which in operation, determines the number of repetitions of the uplink control signal based on the control information, the control information being transmitted in downlink control information (DCI) scheduling a physical downlink shared channel (PDSCH) that includes UE contention resolution identity.

[0006B] In another example, the present disclosure refers to a communication method comprising receiving control information indicating a number of repetitions for an uplink control signal, in a random access procedure, determining the number of repetitions of the uplink control signal based on the control information, the control information being transmitted in downlink control information (DCI) scheduling a physical downlink shared channel (PDSCH) that includes UE contention resolution identity.

[0006C] In yet another example, the present disclosure refers to a base station comprising, a transmitter, which in operation, transmits control information indicating a number of repetitions for an uplink control signal, in a random access procedure, a receiver, which in operation, receives repetitions of the uplink control signal determined based on the control information, the control information being transmitted in downlink control information (DCI) scheduling a physical downlink shared channel (PDSCH) that includes UE contention resolution identity.

[0006D] In yet another example, the present disclosure refers to a communication method comprising, transmitting control information indicating a number of repetitions for an uplink control signal, in a random access procedure, receiving repetitions of the uplink control signal determined based on the control information, the control information being transmitted in downlink control information (DCI) scheduling a physical downlink shared channel (PDSCH) that includes UE contention resolution identity.

[0006E] In yet another example, the present disclosure refers to an integrated circuit comprising, reception circuitry, which in operation, controls a reception of control information indicating a number of repetitions for an uplink control signal, in a random access procedure, determination circuitry, which in operation, controls of a determination of the number of repetitions of the uplink control signal based on the control information, the control information being transmitted in downlink control information (DCI) scheduling a physical downlink shared channel (PDSCH) that includes UE contention resolution identity.

[0006F] In yet another example, the present disclosure refers to an integrated circuit comprising, transmission circuitry, which in operation, controls of a transmission of control information indicating a number of repetitions for an uplink control signal, in a random access procedure, reception circuitry, which in operation, controls of a reception of repetitions of the uplink control signal determined based on the control information, the control information being transmitted in downlink control information (DCI) scheduling a physical downlink shared channel (PDSCH) that includes UE contention resolution identity.

[0006G] In an aspect, the present disclosure refers to a terminal, comprising:

a receiver, which in operation, receives control information indicating a number of repetitions of a physical uplink control channel (PUCCH) for a Msg4 physical downlink shared channel (PDSCH), in a random access procedure, the Msg4 PDSCH including a UE contention resolution identity;

circuitry, which in operation, determines a number of repetitions of a Msg3 physical uplink shared channel (PUSCH) based on another control information indicated in a field related to a modulation and coding scheme (MCS) of a RAR UL grant, and determines the number of repetitions of the PUCCH based on the control information indicated in a field related to a downlink assignment index of downlink control information (DCI) scheduling the Msg4 PDSCH, the field related to the downlink assignment index being different from the field related to the MCS of the RAR UL grant.

[0006H] In an aspect, the present disclosure refers to a communication method, comprising:

receiving control information indicating a number of repetitions of a physical uplink control channel (PUCCH) for a Msg4 physical downlink shared channel (PDSCH), in a random access procedure, the Msg4 PDSCH including a UE contention resolution identity;

determining a number of repetitions of a Msg3 physical uplink shared channel (PUSCH) based on another control information indicated in a field related to a modulation and coding scheme (MCS) of a RAR UL grant, and determining the number of repetitions

of the PUCCH based on the control information indicated in a field related to a downlink assignment index of downlink control information (DCI) scheduling the Msg4 PDSCH, the field related to the downlink assignment index being different from the field related to the MCS of the RAR UL grant.

[0006I] In an aspect, the present disclosure refers to a base station, comprising:

a transmitter, which in operation, transmits control information indicating a number of repetitions of a physical uplink control channel (PUCCH) for a Msg4 physical downlink shared channel (PDSCH), in a random access procedure, the Msg4 PDSCH including a UE contention resolution identity;

a receiver, which in operation, receives repetitions of a Msg3 physical uplink shared channel (PUSCH) determined based on another control information, and receives repetitions of the PUCCH determined based on the control information, the another control information being indicated in a field related to a modulation and coding scheme (MCS) of a RAR UL grant, the control information being indicated in a field related to a downlink assignment index of downlink control information (DCI) scheduling the Msg4 PDSCH, and the field related to the downlink assignment index being different from the field related to the MCS of the RAR UL grant.

[0006J] In an aspect, the present disclosure refers to a communication method, comprising:

transmitting control information indicating a number of repetitions of a physical uplink control channel (PUCCH) for a Msg4 physical downlink shared channel (PDSCH), in a random access procedure, the Msg4 PDSCH including a UE contention resolution identity;

receives repetitions of a Msg3 physical uplink shared channel (PUSCH) determined based on another control information, and receiving repetitions of the PUCCH determined based on the control information, the another control information being indicated in a field related to a modulation and coding scheme (MCS) of a RAR UL grant, the control

information being indicated in a field related to a downlink assignment index of downlink control information (DCI) scheduling the Msg4 PDSCH, and the field related to the downlink assignment index being different from the field related to the MCS of the RAR UL grant.

[0007] It should be noted that general or specific examples may be implemented as a system, an apparatus, a method, an integrated circuit, a computer program, a storage medium, or any selective combination thereof.

[0008] According to an example of the present disclosure, it is possible to improve reception performance of an uplink signal.

[0009] Additional benefits and advantages of the disclosed examples will become apparent from the specification and drawings. The benefits and/or advantages may be individually obtained by the various examples and features of the specification and drawings, which need not all be provided in order to obtain one or more of such benefits and/or advantages.

CLAIMS

[Claim 1] A terminal, comprising:

a receiver, which in operation, receives control information indicating a number of repetitions of a physical uplink control channel (PUCCH) for a Msg4 physical downlink shared channel (PDSCH), in a random access procedure, the Msg4 PDSCH including a UE contention resolution identity;

circuitry, which in operation, determines a number of repetitions of a Msg3 physical uplink shared channel (PUSCH) based on another control information indicated in a field related to a modulation and coding scheme (MCS) of a RAR UL grant, and determines the number of repetitions of the PUCCH based on the control information indicated in a field related to a downlink assignment index of downlink control information (DCI) scheduling the Msg4 PDSCH, the field related to the downlink assignment index being different from the field related to the MCS of the RAR UL grant.

[Claim 2] The terminal according to claim 1, wherein

the field related to the downlink assignment index is reserved bits in a condition in which capability information transmitted by the terminal indicates that a repetition of the PUCCH is not supported.

[Claim 3] The terminal according to claim 1, wherein

the control information is scrambled with Temporary Cell - Radio Network Temporary Identifier (TC-RNTI).

[Claim 4] A communication method, comprising:

receiving control information indicating a number of repetitions of a physical uplink control channel (PUCCH) for a Msg4 physical downlink shared channel (PDSCH), in a random access procedure, the Msg4 PDSCH including a UE contention resolution identity;

determining a number of repetitions of a Msg3 physical uplink shared channel (PUSCH) based on another control information indicated in a field related to a modulation and coding scheme (MCS) of a RAR UL grant, and determining the number of repetitions of the PUCCH based on the control information indicated in a field related to a downlink assignment index of downlink control information (DCI) scheduling the Msg4 PDSCH, the field related to the downlink assignment index being different from the field related to the MCS of the RAR UL grant.

[Claim 5] The communication method according to claim 4, wherein

the field related to the downlink assignment index is reserved bits in a condition in which capability information transmitted by a terminal indicates that a repetition of the PUCCH is not supported.

[Claim 6] The communication method according to claim 4, wherein

the control information is scrambled with Temporary Cell - Radio Network Temporary Identifier (TC-RNTI).

[Claim 7] A base station, comprising:

a transmitter, which in operation, transmits control information indicating a number of repetitions of a physical uplink control channel (PUCCH) for a Msg4 physical downlink shared channel (PDSCH), in a random access procedure, the Msg4 PDSCH including a UE contention resolution identity;

a receiver, which in operation, receives repetitions of a Msg3 physical uplink shared channel (PUSCH) determined based on another control information, and receives repetitions of the PUCCH determined based on the control information, the another control information being indicated in a field related to a modulation and coding scheme (MCS) of a RAR UL grant, the control information being indicated in a field related to a downlink assignment index of downlink control information (DCI) scheduling the Msg4 PDSCH, and the field related to the downlink assignment index being different from the field related to the MCS of the RAR UL grant.

[Claim 8] The base station according to claim 7, wherein

the field related to the downlink assignment index is reserved bits in a condition in which capability information transmitted by a terminal indicates that a repetition of the PUCCH is not supported.

[Claim 9] The base station according to claim 7, wherein

the control information is scrambled with Temporary Cell - Radio Network Temporary Identifier (TC-RNTI).

[Claim 10] A communication method, comprising:

transmitting control information indicating a number of repetitions of a physical uplink control channel (PUCCH) for a Msg4 physical downlink shared channel (PDSCH), in a random access procedure, the Msg4 PDSCH including a UE contention resolution identity;

receives repetitions of a Msg3 physical uplink shared channel (PUSCH) determined based on another control information, and receiving repetitions of the PUCCH determined based on the control information, the another control information being indicated in a field

related to a modulation and coding scheme (MCS) of a RAR UL grant, the control information being indicated in a field related to a downlink assignment index of downlink control information (DCI) scheduling the Msg4 PDSCH, and the field related to the downlink assignment index being different from the field related to the MCS of the RAR UL grant.

[Claim 11] The communication method according to claim 10, wherein

the field related to the downlink assignment index is reserved bits in a condition in which capability information transmitted by a terminal indicates that a repetition of the PUCCH is not supported.

[Claim 12] The communication method according to claim 10, wherein

the control information is scrambled with Temporary Cell - Radio Network Temporary Identifier (TC-RNTI).

[Claim 13] An integrated circuit, comprising:

reception circuitry, which in operation, controls a reception of control information indicating a number of repetitions of a physical uplink control channel (PUCCH) for a Msg4 physical downlink shared channel (PDSCH), in a random access procedure, the Msg4 PDSCH including a UE contention resolution identity;

determination circuitry, which in operation, controls of a determination of a number of repetitions of a Msg3 physical uplink shared channel (PUSCH) based on another control information indicated in a field related to a modulation and coding scheme (MCS) of a RAR UL grant, and a determination of the number of repetitions of the PUCCH based on the control information indicated in a field related to a downlink assignment index of downlink control information (DCI) scheduling the Msg4 PDSCH, the field related to the downlink assignment index being different from the field related to the MCS of the RAR UL grant.

[Claim 14] An integrated circuit, comprising:

transmission circuitry, which in operation, controls of a transmission of control information indicating a number of repetitions of a physical uplink control channel (PUCCH) for a Msg4 physical downlink shared channel (PDSCH), in a random access procedure, the Msg4 PDSCH including a UE contention resolution identity;

reception circuitry, which in operation, controls of a reception of repetitions of a Msg3 physical uplink shared channel (PUSCH) determined based on another control information, and a reception of repetitions of the PUCCH determined based on the control information, the another control information being indicated in a field related to a modulation and coding scheme (MCS) of a RAR UL grant, the control information being

indicated in a field related to a downlink assignment index of downlink control information (DCI) scheduling the Msg4 PDSCH, and the field related to the downlink assignment index being different from the field related to the MCS of the RAR UL grant.