

CLAIMS

1. A terminal device (1) comprising:
 - a reception unit (105) configured to:
 - receive first information used to allow simultaneous transmission of Channel State Information, CSI, and Hybrid Automatic Repeat Request Acknowledgment, HARQ-ACK, using a Physical Uplink Control Channel, PUCCH, format 3, and
 - receive second information used to allow simultaneous transmission of the CSI and the HARQ-ACK using a PUCCH format 4; and
 - receive third information used to configure a first behavior or a second behavior for transmission of the HARQ-ACK, the first behavior being a behavior which uses the PUCCH format 3 or the PUCCH format 4, the second behavior being a behavior which always uses the PUCCH format 4; and
 - a transmission unit (107) configured to:
 - transmit one or more of the HARQ-ACK and the CSI;

wherein, based on at least the first information, the second information, the third information, and whether or not the HARQ-ACK corresponds to Physical Downlink Shared Channel, PDSCH, transmission on a secondary cell, any of the following processing operations (1) to (4) are executed:

 - a processing operation (1) in which the CSI multiplexed with the HARQ-ACK is transmitted with a first PUCCH resource using the PUCCH format 3,
 - a processing operation (2) in which the CSI multiplexed with the HARQ-ACK is transmitted with a second PUCCH resource using the PUCCH format 4,
 - a processing operation (3) in which the HARQ-ACK is transmitted with a first PUCCH resource using the PUCCH format 3 and the CSI is dropped, and
 - a processing operation (4) in which the HARQ-ACK is transmitted with a second PUCCH resource using the PUCCH format 4 and the CSI is dropped.
2. A base station device (3) comprising:
 - a transmission unit (307) configured to:
 - transmit first information used to allow simultaneous transmission of Channel State Information, CSI, and Hybrid Automatic Repeat Request, HARQ-ACK, using a Physical Uplink Control Channel, PUCCH, format 3, and
 - transmit second information used to allow simultaneous transmission of the CSI and the HARQ-ACK using a PUCCH format 4; and
 - transmit third information used to configure a first behavior or a second behavior for

transmission of HARQ-ACK, the first behavior being a behavior which uses the PUCCH format 3 or the PUCCH format 4, the second behavior being a behavior which always uses the PUCCH format 4; and

a reception unit (305) configured to:

receive one or more of the HARQ-ACK and the CSI;

wherein, based on at least the first information, the second information, the third information, and whether or not the HARQ-ACK corresponds to Physical Downlink Shared Channel, PDSCH, transmission on a secondary cell, any of the following processing operations (1) to (4) are executed:

a processing operation (1) in which the CSI multiplexed with the HARQ-ACK is transmitted with a first PUCCH resource using the PUCCH format 3,

a processing operation (2) in which the CSI multiplexed with the HARQ-ACK is transmitted with a second PUCCH resource using the PUCCH format 4,

a processing operation (3) in which the HARQ-ACK is transmitted with a first PUCCH resource using the PUCCH format 3 and the CSI is dropped, and

a processing operation (4) in which the HARQ-ACK is transmitted with a second PUCCH resource using the PUCCH format 4 and the CSI is dropped.

3. A communication method for a terminal device (1), the communication method comprising:

receiving first information used to allow simultaneous transmission of Channel State Information, CSI, and Hybrid Automatic Repeat Request Acknowledgment, HARQ-ACK, using a Physical Uplink Control Channel, PUCCH, format 3;

receiving second information used to allow simultaneous transmission of the CSI and the HARQ-ACK using a PUCCH format 4; and

receiving third information used to configure a first behavior or a second behavior for transmission of HARQ-ACK, the first behavior being a behavior which uses the PUCCH format 3 or the PUCCH format 4, the second behavior being a behavior which always uses the PUCCH format 4; and

transmitting one or more of the HARQ-ACK and the CSI;

wherein, based on at least the first information, the second information, the third information, and whether or not the HARQ-ACK corresponds to Physical Downlink Shared Channel, PDSCH, transmission on a secondary cell, any of the following processing operations (1) to (4) are executed:

a processing operation (1) in which the CSI multiplexed with the HARQ-ACK is transmitted with a first PUCCH resource using the PUCCH format 3,

a processing operation (2) in which the CSI multiplexed with the HARQ-ACK is transmitted with a second PUCCH resource using the PUCCH format 4,

a processing operation (3) in which the HARQ-ACK is transmitted with a first PUCCH resource using the PUCCH format 3 and the CSI is dropped, and

a processing operation (4) in which the HARQ-ACK is transmitted with a second PUCCH resource using the PUCCH format 4 and the CSI is dropped.

4. A communication method for a base station device (3), the communication method comprising:

transmitting first information used to allow simultaneous transmission of Channel State Information, CSI, and Hybrid Automatic Repeat Request Acknowledgment, HARQ-ACK, using a Physical Uplink Control Channel, PUCCH, format 3;

transmitting second information used to allow simultaneous transmission of the CSI and the HARQ-ACK using a PUCCH format 4;

transmitting third information used to configure a first behavior or a second behavior for transmission of the HARQ-ACK, the first behavior being a behavior which uses the PUCCH format 3 or the PUCCH format 4, the second behavior being a behavior which always uses the PUCCH format 4; and

receiving one or more of the HARQ-ACK and the CSI;

wherein, based on at least the first information, the second information, the third information, and whether or not the HARQ-ACK corresponds to Physical Downlink Shared Channel, PDSCH, transmission on a secondary cell, any of the following processing operations (1) to (4) are executed:

a processing operation (1) in which the CSI multiplexed with the HARQ-ACK is transmitted with a first PUCCH resource using the PUCCH format 3,

a processing operation (2) in which the CSI multiplexed with the HARQ-ACK is transmitted with a second PUCCH resource using the PUCCH format 4,

a processing operation (3) in which the HARQ-ACK is transmitted with a first PUCCH resource using the PUCCH format 3 and the CSI is dropped, and

a processing operation (4) in which the HARQ-ACK is transmitted with a second PUCCH resource using the PUCCH format 4 and the CSI is dropped.

5. An integrated circuit mounted in a terminal device (1), the integrated circuit configured to cause the terminal device to perform a set of functions, comprising:

receiving first information used to allow simultaneous transmission of Channel State Information, CSI, and Hybrid Automatic Repeat Request Acknowledgment, HARQ-ACK, using a

Physical Uplink Control Channel, PUCCH, format 3;

receiving second information used to allow simultaneous transmission of the CSI and the HARQ-ACK using a PUCCH format 4;

receiving third information used to configure a first behavior or a second behavior for transmission of the HARQ-ACK, the first behavior being a behavior which uses the PUCCH format 3 or the PUCCH format 4, the second behavior being a behavior which always uses the PUCCH format 4; and

transmitting one or more of HARQ-ACK and CSI;

wherein, based on at least the first information, the second information, the third information, and whether or not the HARQ-ACK corresponds to Physical Downlink Shared Channel, PDSCH, transmission on a secondary cell, any of the following processing operations (1) to (4) are executed:

a processing operation (1) in which the CSI multiplexed with the HARQ-ACK is transmitted with a first PUCCH resource using the PUCCH format 3,

a processing operation (2) in which the CSI multiplexed with the HARQ-ACK is transmitted with a second PUCCH resource using the PUCCH format 4,

a processing operation (3) in which the HARQ-ACK is transmitted with a first PUCCH resource using the PUCCH format 3 and the CSI is dropped, and

a processing operation (4) in which the HARQ-ACK is transmitted with a second PUCCH resource using the PUCCH format 4 and the CSI is dropped.

6. An integrated circuit mounted in a base station device (3), the integrated circuit configured to cause the base station device to perform a set of functions, comprising:

transmitting first information used to allow simultaneous transmission of Channel State Information, CSI, and Hybrid Automatic Repeat Request Acknowledgement, HARQ-ACK, using a Physical Uplink Control Channel, PUCCH, format 3;

transmitting second information used to allow simultaneous transmission of the CSI and the HARQ-ACK using a PUCCH format 4, and

transmitting third information used to configure a first behavior or a second behavior for transmission of the HARQ-ACK, the first behavior being a behavior which uses the PUCCH format 3 or the PUCCH format 4, the second behavior being a behavior which always uses the PUCCH format 4; and

receiving, one or more of the HARQ-ACK and the CSI;

wherein, based on at least the first information, the second information, the third information, and whether or not the HARQ-ACK corresponds to Physical Downlink Shared Channel, PDSCH, transmission on a secondary cell, any of the following processing operations (1) to (4) are

executed:

a processing operation (1) in which the CSI multiplexed with the HARQ-ACK is transmitted with a first PUCCH resource using the PUCCH format 3,

a processing operation (2) in which the CSI multiplexed with the HARQ-ACK is transmitted with a second PUCCH resource using the PUCCH format 4,

a processing operation (3) in which the HARQ-ACK is transmitted with a first PUCCH resource using the PUCCH format 3 and the CSI is dropped, and

a processing operation (4) in which the HARQ-ACK is transmitted with a second PUCCH resource using the PUCCH format 4 and the CSI is dropped.