

Claims:

1. A terminal apparatus which, in operation, communicates with a base station apparatus using a plurality of component carriers including at least a first component carrier and a second component carrier, the terminal apparatus comprising:

a decoder which, in operation, stores, in a retransmission buffer, first and second downlink data respectively received in the first and second component carriers, wherein a first configuration pattern of uplink and downlink subframes is set for the first component carrier and a second configuration pattern of uplink and downlink subframes is set for the second component carrier; determines a reference configuration pattern of uplink and downlink subframes based on the first and second configuration patterns; stores the second downlink data in the retransmission buffer in reference to a maximum number of downlink HARQ (hybrid automatic repeat request) retransmission processes executable in the determined reference configuration pattern; and decodes the first and second downlink data;

a signal generator which, in operation, generates a first response signal using a result of error detection of the first downlink data and a second response signal using a result of error detection of the second downlink data; and

a transmitter which, in operation, transmits the first and second response signals in the first component carrier.

2. The terminal apparatus according to claim 1, wherein the transmitter transmits the second response signal in the first component carrier at a timing of an uplink subframe of the reference configuration pattern.

3. The terminal apparatus according to claim 1, wherein, when the first configuration pattern and the second configuration pattern are different, the transmitter transmits the second response signal in the first component carrier at a timing of an uplink subframe of the reference configuration pattern.

4. The terminal apparatus according to claim 1, further comprising:

a first table which defines multiple reference configuration patterns respectively corresponding to multiple combinations of the first and second configuration patterns, wherein each of the first and second configuration patterns is selected from a set of configuration patterns, and

a second table which defines multiple maximum numbers of downlink HARQ retransmission processes respectively corresponding to the multiple reference configuration patterns, wherein,

the decoder refers to the first and second tables to determine the reference configuration pattern and the maximum number of downlink HARQ retransmission processes executable in the determined reference configuration pattern.

5. The terminal apparatus according to claim 1, wherein the first component carrier is a primary cell and the second component carrier is a secondary cell.

6. The terminal apparatus according to claim 1, wherein the decoder stores, in the retransmission buffer, an LLR (Log Likelihood Ratio) for the first or second downlink data when error is detected, and combines the stored LLR with an LLR of downlink data to be retransmitted.

7. A method implemented in a terminal apparatus configured to communicate with a base station apparatus using a plurality of component carriers including at least a first component carrier and a second component carrier, the method comprising steps of:

storing, in a retransmission buffer, first and second downlink data respectively received in the first and second component carriers, wherein a first configuration pattern of uplink and downlink subframes is set for the first component carrier and a second configuration pattern of uplink and downlink subframes is set for the second component carrier,

determining a reference configuration pattern of uplink and downlink subframes based on the first and second configuration patterns and storing the second downlink data in the retransmission buffer in reference to a maximum number of downlink HARQ (hybrid automatic repeat request) retransmission processes executable in the determined reference configuration pattern,

decoding the first and second downlink data,
generating a first response signal using a result of error detection of the first downlink data and a second response signal using a result of error detection of the second downlink data, and
transmitting the first and second response signals in the first component carrier.

8. The method according to claim 7, wherein the transmitting step includes transmitting the second response signal in the first component carrier at a timing of an uplink subframe of the reference configuration pattern.

9. The method according to claim 7, wherein, when the first configuration pattern and the second configuration pattern are different, the transmitting step includes transmitting the second response signal in the first component carrier at a timing of an uplink subframe of the reference configuration pattern.

10. The method according to claim 7, wherein the determining step includes referring to:
a) a first table which defines multiple reference configuration patterns respectively corresponding to multiple combinations of the first and second configuration patterns, wherein each of the first and second configuration patterns is selected from a set of configuration patterns, and

b) a second table which defines multiple maximum numbers of downlink HARQ retransmission processes respectively corresponding to the multiple reference configuration patterns,

to determine the reference configuration pattern and the maximum number of downlink HARQ retransmission processes executable in the determined reference configuration pattern.

11. The method according to claim 7, wherein the first component carrier is a primary cell and the second component carrier is a secondary cell.

12. The method according to claim 7, wherein the storing step includes storing, in the retransmission buffer, an LLR (Log Likelihood Ratio) for the first or second downlink data when

error is detected, and combining the stored LLR with an LLR of downlink data to be retransmitted.

CLAIMS

Claim 1 A terminal apparatus which communicates with a base station apparatus using a plurality of component carriers and for which a configuration pattern of subframes included in one frame is set for each of the plurality of component carriers, the configuration pattern including a downlink communication subframe used for downlink communication and an uplink communication subframe used for uplink communication, the terminal apparatus comprising:

a decoding section that stores, in a retransmission buffer, downlink data transmitted in each of the plurality of component carriers and decodes the downlink data;

a generating section that generates a response signal using a result of error detection of the downlink data; and

a transmitting section that transmits, using a first component carrier of the plurality of component carriers, a response signal for first downlink data received using the first component carrier and a response signal for second downlink data received using a second component carrier of the plurality of component carriers, wherein:

the buffer includes a first buffer that stores the first downlink data and a second buffer that stores the second downlink data; and

the second buffer is divided into regions respectively corresponding to retransmission processes based on a specific value determined by a combination of a first configuration pattern that is set in the first component carrier and a second configuration pattern that is set in the second component carrier.

Claim 2 The terminal apparatus according to claim 1, wherein:

when the first configuration pattern and the second configuration pattern are different, the transmitting section transmits the response signal for the second downlink data using the first component carrier at a timing of an uplink communication subframe of a third configuration

pattern to be determined based on the combination; and

the specific value is a maximum value of a number of retransmission processes defined in the third configuration pattern.

5 Claim 3 The terminal apparatus according to claim 2, wherein:

in the combination including the first configuration pattern in which a downlink communication subframe is set at least at a timing identical to a timing of a downlink communication subframe of the second configuration pattern, the third configuration pattern is the first configuration pattern;

10 in the combination in which the first configuration pattern and the second configuration pattern respectively include downlink communication subframes that are set at least at different timings, the third configuration pattern is a fourth configuration pattern in which downlink communication subframes are set at least at timings identical to the timings of both downlink communication subframes of the first configuration pattern and the second configuration
15 pattern; and

in the combination including the second configuration pattern in which a downlink communication subframe is set at least at a timing identical to a timing of downlink communication subframe of the first configuration pattern, the third configuration pattern is the second configuration pattern.

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Claim 4 The terminal apparatus according to claim 1, wherein:

when the first configuration pattern and the second configuration pattern are different, the transmitting section transmits the response signal for the second downlink data using the first component carrier at a timing of an uplink communication subframe of a third configuration
25 pattern to be determined based on the combination;

in a first combination including the first configuration pattern in which a downlink

communication subframe that is set at least at a timing identical to a timing of a downlink communication subframe of the second configuration pattern, or in a second combination in which the first configuration pattern and the second configuration pattern respectively include downlink communication subframes that are set at least at different timings, the specific value is
5 a value equal to or greater than a maximum value of a number of retransmission processes defined in the second configuration pattern but less than a maximum value of a number of retransmission processes defined in the third configuration pattern; and

in a third combination including the second configuration pattern in which a downlink communication subframe that is set at least at a timing identical to a timing of a downlink
10 communication subframe of the first configuration pattern, the specific value is a maximum value of a number of retransmission processes defined in the second configuration pattern.

Claim 5 The terminal apparatus according to claim 4, wherein: in the first combination, the third configuration pattern is the first configuration pattern; in the second combination, the third
15 configuration pattern is a fourth configuration pattern in which downlink communication subframes are set at least at timings identical to the timings of both downlink communication subframes of the first configuration pattern and the second configuration pattern; and in the third combination, the third configuration pattern is the second configuration pattern.

20 Claim 6 The terminal apparatus according to claim 1, wherein:

a scheduling method for the terminal apparatus is switchable between a first scheduling method that indicates resource assignment information on the first downlink data using the first component carrier and that indicates resource assignment information on the second downlink data using the second component carrier, and a second scheduling method that indicates
25 resource assignment information on both the first downlink data and the second downlink data using the first component carrier; and

the second buffer is divided based on the specific value when the first scheduling method is set.

Claim 7 The terminal apparatus according to claim 1, wherein the specific value is a maximum value among values respectively determined from candidate groups of the combinations allowed to be set for the terminal apparatus.

Claim 8 The terminal apparatus according to claim 1, wherein the second buffer is divided into a number of regions that is identical to a smaller one of the specific value and a predetermined threshold.

Claim 9 The terminal apparatus according to claim 1, wherein the first component carrier is a primary cell and the second component carrier is a secondary cell.

Claim 10 A buffer dividing method for a terminal apparatus which communicates with a base station apparatus, using a plurality of component carriers and in which a configuration pattern of subframes included in one frame is set for each of the plurality of component carriers, the configuration pattern including a downlink communication subframe used for downlink communication and an uplink communication subframe used for uplink communication, the method comprising:

storing, in a retransmission buffer, downlink data transmitted in each of the plurality of component carriers;

decoding the downlink data;

generating a response signal using a result of error detection of the downlink data; and

transmitting, using a first component carrier of the plurality of component carriers, a response signal for first downlink data received in the first component carrier and a response

signal for second downlink data received in a second component carrier of the plurality of component carriers, wherein:

the buffer includes a first buffer that stores the first downlink data and a second buffer that stores the second downlink data; and

5 the second buffer is divided into regions respectively corresponding to retransmission processes based on a specific value determined by a combination of a first configuration pattern that is set in the first component carrier and a second configuration pattern that is set in the second component carrier.

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