

METHOD AND APPARATUS FOR DETERMINING HARQ FEEDBACK DELAY, ~~AND STORAGE MEDIUM~~

TECHNICAL FIELD

[0001] The present disclosure relates to the field of communication, and in particular to a method and an apparatus for determining HARQ feedback delay and a storage medium.

BACKGROUND

[0002] In the 5G (5th generation mobile networks, 5th generation mobile communication technology) NR (New Radio, new air interface) protocol, a base station schedules downlink data through DCI (Downlink Control Information), enables the downlink data to be transmitted on the PDSCH (Physical Downlink Shared Channel, Physical Downlink Shared Channel) in a time unit n , and instructs, in the DCI, a terminal to feedback an HARQ (Hybrid Automatic Repeat reQuest) result for the downlink data transmitted in the time unit n , on the PUCCH (Physical Uplink Control Channel) in the time unit $(n+k1)$.

[0003] Here, the value of $k1$ represents the feedback delay of the HARQ result, that is, the HARQ result corresponding to the terminal receiving the PDSCH in the time unit n and sending the PDSCH on the PUCCH in the time unit $(n+k1)$, which requires the terminal to be able to complete demodulation of the PDSCH and generation of HARQ result information in the number $k1$ of time units.

[0004] The currently formulated NR protocol is generally applicable to communication systems of low frequency bands below 52.6GHz.

SUMMARY

[0005] In order to overcome the problems existing in related technologies, embodiments of the present disclosure provide a method and an apparatus for determining HARQ feedback delay and a storage medium.

[0006] According to a first aspect of embodiments of the present disclosure, a method for determining HARQ feedback delay is provided. The method is applied to a base station and includes:

WHAT IS CLAIMED IS:

1. A method for determining HARQ feedback delay, applied to a base station, comprising:
determining a target set of HARQ feedback delays among more than one set of HARQ feedback delays, which are predefined in a protocol and correspond to downlink control information (DCI) of a preset format; wherein the more than one set of HARQ feedback delays correspond to different subcarrier bandwidths;
sending the DCI of the preset format configured to indicate a target delay value, to a terminal, wherein the target delay value is one of more than one delay value included in the target set of HARQ feedback delays.
2. The method of claim 1, wherein, determining the target set of HARQ feedback delays comprises:
determining a set of HARQ feedback delays corresponding to a currently used subcarrier bandwidth as the target set of HARQ feedback delays.
3. The method of claim 1, wherein, in the more than one set of HARQ feedback delays, the larger the subcarrier bandwidth is, the greater a maximum delay value in the corresponding set of HARQ feedback delays is.
4. The method of claim 1, further comprising:
determining a number of bits occupied by a designated information field in the DCI of the preset format according to a total number of delay values included in the target set of HARQ feedback delays, which is predefined in the protocol; wherein the designated information field is an information field in the DCI, which is configured to indicate the target delay value;
determining an order value of the target delay value in the target set of HARQ feedback delays;
setting a bit value of the designated information field occupying the number of bits to be equal to the order value.
5. A method for determining HARQ feedback delay, applied to a terminal, comprising:
receiving downlink control information (DCI) of a preset format sent by a base station;
determining a target delay value for performing HARQ feedback according to the DCI

of the preset format.

6. The method of claim 5, wherein determining the target delay value for performing HARQ feedback according to the DCI of the preset format comprises:

determining a target set of HARQ feedback delays among more than one set of HARQ feedback delays, which are predefined in a protocol and correspond to downlink control information (DCI) of the preset format; wherein the more than one set of HARQ feedback delays correspond to different subcarrier bandwidths;

determining a number of bits occupied by a designated information field in the DCI of the preset format according to a total number of delay values included in the target set of HARQ feedback delays, which is predefined in the protocol; wherein the designated information field is an information field in the DCI, which is configured to indicate the target delay value;

determining a bit value of the designated information field occupying the number of bits;

determining a delay value with an order value equal to the bit value, in the target set of HARQ feedback delays, as the target delay value.

7. The method of claim 6, wherein determining the target set of HARQ feedback delays comprises:

determining the set of HARQ feedback delays corresponding to a currently used subcarrier bandwidth as the target set of HARQ feedback delays.

8. The method of claim 7, wherein, in the more than one set of HARQ feedback delays, the larger the subcarrier bandwidth is, the greater a maximum delay value in the corresponding set of HARQ feedback delays is.

9. The method of claim 5, wherein, after determining the target delay value for performing HARQ feedback, the method further comprises:

determining a time domain unit receiving the DCI of the preset format;

determining a sum value of a serial number of the time domain unit receiving the DCI of the preset format and the target delay value;

determining a time domain unit indicated by the sum value as a target time domain unit for performing HARQ feedback for a physical downlink shared channel (PDSCH) scheduled

by the DCI of the preset format.

10. — ~~An apparatus for determining HARQ feedback delay, applied to a base station, comprising:~~

~~a first determining module configured to determine a target set of HARQ feedback delays among more than one set of HARQ feedback delays, which are predefined in a protocol and correspond to downlink control information (DCI) of a preset format; wherein the more than one set of HARQ feedback delays correspond to different subcarrier bandwidths;~~

~~a sending module configured to send the DCI of the preset format configured to indicate a target delay value, to a terminal; wherein the target delay value is one of more than one delay value included in the target set of HARQ feedback delays.~~

11. — ~~The apparatus of claim 10, wherein, the first determining module comprises:~~

~~a first determining submodule configured to determine the set of HARQ feedback delays corresponding to a currently used subcarrier bandwidth as the target set of HARQ feedback delays.~~

12. — ~~The apparatus of claim 10, wherein, in the more than one set of HARQ feedback delays, the larger the subcarrier bandwidth is, the greater a maximum delay value in the corresponding set of HARQ feedback delays is.~~

13. — ~~The apparatus of claim 10, wherein, the apparatus further comprises:~~

~~a second determining module configured to determine a number of bits occupied by a designated information field in the DCI of the preset format according to a total number of delay values included in the target set of HARQ feedback delays, which is predefined in the protocol; wherein the designated information field is an information field in the DCI, which is configured to indicate the target delay value;~~

~~a third determining module configured to determine an order value of the target delay value in the target set of HARQ feedback delays;~~

~~a setting module configured to set a bit value of the designated information field occupying the number of bits to be equal to the order value.~~

14. — ~~An apparatus for determining HARQ feedback delay, applied to a terminal, comprising:~~

~~a receiving module configured to receive downlink control information (DCI) of a preset format sent by a base station;~~

~~a fourth determining module configured to determine a target delay value for performing HARQ feedback according to the DCI of the preset format.~~

15. — The apparatus of claim 14, wherein, the fourth determining module comprises:

~~a second determining submodule configured to determine a target set of HARQ feedback delays among more than one set of HARQ feedback delays, which are predefined in a protocol and correspond to downlink control information (DCI) of a preset format; wherein the more than one set of HARQ feedback delays correspond to different subcarrier bandwidths;~~

~~a third determining submodule configured to determine a number of bits occupied by a designated information field in the DCI of the preset format according to a total number of delay values included in the target set of HARQ feedback delays, which is predefined in the protocol; wherein the designated information field is an information field in the DCI, which is configured to indicate the target delay value;~~

~~a fourth determining submodule configured to determine a bit value of the designated information field occupying the number of bits;~~

~~a fifth determining submodule configured to determine a delay value with an order value equal to the bit value, in the target set of HARQ feedback delays, as the target delay value.~~

16. — The apparatus of claim 15, wherein, the second determining submodule comprises:

~~a determining unit configured to determine the set of HARQ feedback delays corresponding to a currently used subcarrier bandwidth as the target set of HARQ feedback delays.~~

17. — The apparatus of claim 16, wherein, in the more than one set of HARQ feedback delays, the larger the subcarrier bandwidth is, the greater a maximum delay value in the corresponding set of HARQ feedback delays is.

18. — The apparatus of claim 14, wherein the apparatus further comprises:

~~a fifth determining module configured to determine a time domain unit receiving the DCI of the preset format;~~

~~a sixth determining module configured to determine a sum value of a serial number of the time domain unit receiving the DCI of the preset format and the target delay value;~~

~~a seventh determining module configured to determine a time domain unit indicated by the sum value as a target time domain unit for performing HARQ feedback for a physical downlink shared channel (PDSCH) scheduled by the DCI of the preset format.~~

190. A computer-readable storage medium, wherein the storage medium stores a computer program, which is configured to perform the method for determining HARQ feedback delay according to any one of claims 1-4.

2011. A computer-readable storage medium, wherein the storage medium stores a computer program, which is configured to perform the method for determining HARQ feedback delay according to any one of claims 5-9.

212. An apparatus for determining HARQ feedback delay, applied to a base station, comprising:

a processor;

a memory for storing processor-executable instructions;

wherein the processor is configured to:

determine a target set of HARQ feedback delays among more than one set of HARQ feedback delays, which are predefined in a protocol and correspond to downlink control information (DCI) of a preset format; wherein the more than one set of HARQ feedback delays correspond to different subcarrier bandwidths;

send the DCI of the preset format configured to indicate a target delay value, to a terminal; wherein the target delay value is one of more than one delay value included in the target set of HARQ feedback delays.

13. The apparatus of claim 12, wherein the processor is configured to determine a set of HARQ feedback delays corresponding to a currently used subcarrier bandwidth as the target set of HARQ feedback delays.

14. The apparatus of claim 12, wherein, in the more than one set of HARQ feedback delays, the larger the subcarrier bandwidth is, the greater a maximum delay value in the corresponding set of HARQ feedback delays is.

15. The apparatus of claim 12, wherein the processor is further configured to:

determine a number of bits occupied by a designated information field in the DCI of the preset format according to a total number of delay values included in the target set of HARQ feedback delays, which is predefined in the protocol; wherein the designated information field is an information field in the DCI, which is configured to indicate the target delay value;

determine an order value of the target delay value in the target set of HARQ feedback delays;

set a bit value of the designated information field occupying the number of bits to be equal to the order value.

2216. An apparatus for determining HARQ feedback delay, applied to a terminal, comprising:
a processor;

a memory for storing processor-executable instructions;

wherein the processor is configured to:

receive downlink control information (DCI) of a preset format sent by a base station;

determine a target delay value for performing HARQ feedback according to the DCI of the preset format.

17. The apparatus of claim 16, wherein the processor is configured to:

determine a target set of HARQ feedback delays among more than one set of HARQ feedback delays, which are predefined in a protocol and correspond to downlink control information (DCI) of the preset format; wherein the more than one set of HARQ feedback delays correspond to different subcarrier bandwidths;

determine a number of bits occupied by a designated information field in the DCI of the preset format according to a total number of delay values included in the target set of HARQ feedback delays, which is predefined in the protocol; wherein the designated information field is an information field in the DCI, which is configured to indicate the target delay value;

determine a bit value of the designated information field occupying the number of bits;

determine a delay value with an order value equal to the bit value, in the target set of HARQ feedback delays, as the target delay value.

18. The apparatus of claim 17, wherein the processor is configured to:

determine the set of HARQ feedback delays corresponding to a currently used

subcarrier bandwidth as the target set of HARQ feedback delays.

19. The apparatus of claim 18, wherein, in the more than one set of HARQ feedback delays, the larger the subcarrier bandwidth is, the greater a maximum delay value in the corresponding set of HARQ feedback delays is.

20. The apparatus of claim 16, wherein, after determining the target delay value for performing HARQ feedback, the processor is further configured to:

determine a time domain unit receiving the DCI of the preset format;

determine a sum value of a serial number of the time domain unit receiving the DCI of the preset format and the target delay value;

determine a time domain unit indicated by the sum value as a target time domain unit for performing HARQ feedback for a physical downlink shared channel (PDSCH) scheduled by the DCI of the preset format.