SUMMARY OF THE INVENTION

EmbodimentsOne object of the invention is to suggest a mechanism for triggering channel quality feedback from a mobile terminal where the downlink control signaling overhead for the selection of component carrier(s) to be reported on is minimized.

The object is solved by the subject matter of the independent claims. Advantageous embodiments of the invention are subject to the dependent claims.

In a first aspect, there is provided a channel quality information (CQI) reporting method comprising: receiving CQI control information consisting of a plurality of bits, the plurality of bits indicating a CQI report request specifying whether a CQI report is requested or not and, when the CQI report is requested the plurality of bits further indicating a resource indication specifying one or more downlink component carriers among a plurality of downlink component carriers, for said one more downlink component carriers the CQI report is requested, wherein a combination of the plurality of bits jointly indicates both the CQI report request and the resource indication and no one bit of the plurality of bits alone indicates the CQI report request; and transmitting, when the CQI report is requested, the CQI report for said one or more downlink component carriers specified by the resource indication.

In a second aspect, there is provided a terminal apparatus comprising: a receiver configured to receive channel quality information (CQI) control information consisting of a plurality of bits, the plurality of bits indicating a CQI report request specifying whether a CQI report is requested or not and, when the CQI report is requested the plurality of bits further indicating a resource indication specifying one or more downlink component carriers among a plurality of downlink component carriers, for said one or more downlink component carriers the CQI report is requested, wherein a combination of the plurality of bits jointly indicates both the CQI report request and the resource indication and no one bit of the plurality of bits alone indicates the CQI report request; and a transmitter configured to transmit, when the CQI report is requested, the CQI report for said one or more downlink component carriers specified by the resource indication.

One embodimentaspect of the invention is to suggest a new interpretation of a predetermined format for dedicated control information (also referred to as downlink control information) comprising a CQI request flag, which is depending on the status of the CQI request flag. In case the CQI request flag is set, i.e. is requesting the provision of channel quality feedback from the mobile terminal, at least one further bit of the dedicated control information is interpreted as information indicative of the one or more component carriers available for downlink transmission to the mobile terminal and the mobile terminal is providing channel quality feedback on the channel quality experienced on the indicated component carrier or component carriers. Furthermore, in an alternative implementation, the combination of the CQI request flag and the at least one further bit of the dedicated control information is used to indicate the one or more component carriers available for downlink transmission to the mobile terminal on which the mobile terminal is to provide channel quality feedback.

According to another, alternative embodimentaspect of the invention, the indication of the component carrier or component carriers the mobile terminal is requested to provide channel quality feedback on is indicated by the time and/or frequency resources on which the dedicated control information is received at the terminal and/or the transport format of the dedicated control information.

Both embodimentaspects may be combined, i.e. the indication of the component carrier(s) for which channel quality feedback is to be sent may be indicated to the mobile terminal by means of the resource (in the time and/or frequency domain) and/or transport format utilized for transmitting the dedicated control information, and in addition at least one further bit of the dedicated control information. In one example where the both embodimentaspects are combined, the at least one further bit of the dedicated control information may be the CQI request flag.

Furthermore, the dedicated control information can be provided to the terminal using different messages and channels. In one exemplary embodiment, the dedicated control information is received by the terminal via a Physical Downlink Control CHannel (PDCCH). In another exemplary embodiment of the invention, the dedicated control information is comprised in a random access response grant message during non-contention based random access.

~~In accordance with the second aspect mentioned above, t~~The invention is also providing another embodiment related to another method for reporting on a downlink channel quality (channel quality feedback) experienced by a terminal by means of channel quality information for at least one of plural component carriers of a communication system available for downlink transmission to the terminal. In this method, the terminal receives dedicated control information having a predetermined format, wherein the dedicated control information comprises a CQI request flag for requesting channel quality reporting by the terminal. In this exemplary embodiment, if the CQI request flag is set, the terminal interprets time and/or frequency resources on which the dedicated control information is received at the terminal and/or the transport format of the dedicated control information as CQI control information indicative of one or more of the component carriers available for downlink transmission to the terminal on which the terminal is to report channel quality information, and transmits channel quality information for each indicated component carriers.

It should be noted that this solution is also applicable to situations, where the status of the CQI request flag is having no influence on the interpretation of the content of the dedicated control information. For example, in another embodiment, the dedicated control information are interpreted by the terminal according to the predetermined format, and the terminal interprets time and/or frequency resources on which the dedicated control information is received at the terminal and/or the transport format of the dedicated control information as CQI control information indicative of one or more of the component carriers available for downlink transmission to the terminal on which the terminal is to report channel quality information, and transmits channel quality information for each indicated component carriers

In another embodiment of the invention ~~in line with the second aspect of the invention mentioned above~~, the dedicated control information comprises at least one further, second control information field consisting of at least one bit, and in the step of interpreting interprets:

- at least one bit of the at least one further, second control information field and
- the time and/or frequency resources on which the dedicated control information is received at the terminal and/or the transport format of the dedicated control information as CQI control

as the CQI control information indicative of one or more of the component carriers available for downlink transmission to the terminal on which the terminal is to report channel quality information. Hence, the different embodiments of the invention ~~in line with the two aspects of the invention discussed above~~ can be readily combined.

The invention according to another embodiment is also providing a mobile terminal for reporting on a downlink channel quality experienced by the terminal by means of channel quality information for at least one of plural component carriers of a communication system available for downlink transmission to the mobile terminal. The mobile terminal comprises a receiver for receiving dedicated control information having a predetermined format. The dedicated control information comprises a CQI request flag for requesting channel quality reporting by the terminal and at least one further, second control information field consisting of at least one bit.

Furthermore, the mobile terminal further comprises a processing unit for interpreting, if the CQI request flag is set, at least one bit of the second control information field as CQI control information indicative of one or more of the component carriers available for downlink transmission to the terminal on which the terminal is to report channel quality information, and a transmitter for transmitting channel quality information for each indicated component carrier.

Another alternative embodiment of the invention is related to a mobile terminal for reporting on a downlink channel quality experienced by the terminal by means of channel quality information for at least one of plural component carriers of a communication system available for downlink transmission to the mobile terminal. This mobile terminal comprises a receiver for receiving dedicated control information having a predetermined format, wherein the dedicated control information comprises a CQI request flag for requesting channel quality reporting by the terminal, a processing unit for interpreting, if the CQI request flag is set, time and/or frequency resources on which the dedicated control information is received at the terminal and/or the transport format of the dedicated control information as CQI control information indicative of one or more of the component carriers available for downlink transmission to the terminal on which the terminal is to

CLAIMS

1. A channel quality information (CQI) reporting method comprising:

receiving CQI control information consisting of a plurality of bits, the plurality of bits indicating a CQI report request which shows whether a CQI report is requested or not and when the CQI report is requested, the plurality of bits further indicating a resource indication specifying one or more component carriers, the CQI report of which is requested, among a plurality of component carriers; and

transmitting, when the CQI report is requested, the CQI report of the one or more component carriers specified by the resource indication .

2. The CQI reporting method according to claim 1, wherein

the plurality of bits are two bits.

3. The CQI reporting method according to claim 2, wherein

the CQI control information indicates the CQI report request and the resource indication by using a combination of the two bits.

4. The CQI reporting method according to claim 3, wherein

the combination of the two bits includes a first combination which indicates that the CQI report is not requested and a second combination which indicates that the CQI report is requested for a component carrier that was used for transmission of the CQI control information.

5. The CQI reporting method according to one of claims 1-4, wherein

the CQI report request shows a request of an aperiodic CQI report.

6. The CQI reporting method according to one of claims 1-5, wherein

the transmission of the CQI report is performed over a physical uplink shared channel (PUSCH).

7. A terminal apparatus comprising:

a receiving section configured to receive channel quality information (CQI) control information consisting of a plurality of bits, the plurality of bits indicating a CQI report request which shows whether a CQI report is requested or not and when the CQI report is requested, the plurality of bits further indicating a resource indication specifying one or more component carriers, the CQI report of which is requested, among a plurality of component carriers; and

a transmitting section configured to transmit, when the CQI report is requested, the CQI report of the one or more component carriers specified by the resource indication.

8. The terminal apparatus according to claim 7, wherein

the plurality of bits are two bits.

9. The terminal apparatus according to claim 8, wherein

the CQI control information indicates the CQI report request and the resource indication by using a combination of the two bits.

10. The terminal apparatus according to claim 9, wherein

the combination of the two bits includes a first combination which indicates that the CQI report is not requested and a second combination which indicates that the CQI report is requested for a component carrier that was used for transmission of the CQI control information.

11. The terminal apparatus according to one of claims 7-10, wherein

the CQI report request shows a request of an aperiodic CQI report.

12. The terminal apparatus according to one of claims 7-11, wherein

the transmitting section transmits the CQI report over a physical uplink shared channel (PUSCH).

13. A channel quality information (CQI) acquiring method comprising:

transmitting CQI control information consisting of a plurality of bits to a terminal apparatus, the plurality of bits indicating a CQI report request which shows whether a CQI report is requested or not and when the CQI report is requested, the plurality of bits further indicating a resource indication specifying one or more component carriers, the CQI report of which needs to be performed by the terminal apparatus, among a plurality of component carriers; and

receiving, when the CQI report is requested, the CQI report of the one or more component carriers specified by the resource indication.

14. The CQI acquiring method according to claim 13, wherein

the plurality of bits are two bits, and the CQI control information indicates the CQI report request and the resource indicator by using a combination of the two bits.

15. The CQI acquiring method according to claim 14, wherein

the combination of the two bits includes a first combination which indicates that the CQI report is not requested and a second combination which indicates that the CQI report is requested for a component carrier that was used for transmission of the CQI control information.

16. A base station apparatus comprising:

transmitting section configured to transmit CQI control information consisting of a plurality of bits to a terminal apparatus, the plurality of bits indicating a CQI report request which shows whether a CQI report is requested or not and when the CQI report is requested, the plurality of bits further indicating a resource indication specifying one or more component carriers, the CQI report of which needs to be performed by the terminal apparatus, among a plurality of component carriers; and

receiving section configured to receive, when the CQI report is requested, the CQI report of the one or more component carriers specified by the resource indication.

17. The base station apparatus according to claim 16, wherein

the plurality of bits are two bits, and the CQI control information indicates the CQI report request and the resource indicator by using a combination of the two bits.

18. The base station apparatus method according to claim 17, wherein

the combination of the two bits includes a first combination which indicates that the CQI report is not requested and a second combination which indicates that the CQI report is requested for a component carrier that was used for transmission of the CQI control information.

19. An integrated circuit for controlling a process comprising:

receiving CQI control information consisting of a plurality of bits, the plurality of bits indicating a CQI report request which shows whether a CQI report is requested or not and when the CQI report is requested, the plurality of bits further indicating a resource indication specifying one or more component carriers, the CQI report of which is requested, among a plurality of component carriers; and

transmitting, when the CQI report is requested, the CQI report of the one or more component carriers specified by the resource indication.

20. An integrated circuit for controlling a process comprising:

transmitting CQI control information consisting of a plurality of bits to a terminal apparatus, the plurality of bits indicating a CQI report request which shows whether a CQI report is requested or not and when the CQI report is requested, the plurality of bits further indicating a resource indication specifying one or more component carriers, the CQI report of which needs to be performed by the terminal apparatus, among a plurality of component carriers; and

receiving, when the CQI report is requested, the CQI report of the one or more component carriers specified by the resource indicator.

CLAIMS:

1. A channel quality information (CQI) reporting method comprising:

receiving CQI control information consisting of a plurality of bits, the plurality of bits indicating a CQI report request specifying whether a CQI report is requested or not and, when the CQI report is requested the plurality of bits further indicating a resource indication specifying one or more downlink component carriers among a plurality of downlink component carriers, for said one more downlink component carriers the CQI report is requested, wherein a combination of the plurality of bits jointly indicates both the CQI report request and the resource indication and no one bit of the plurality of bits alone indicates the CQI report request; and

transmitting, when the CQI report is requested, the CQI report for said one or more downlink component carriers specified by the resource indication.

2. The CQI reporting method according to claim 1, wherein the plurality of bits are two bits.

3. The CQI reporting method according to claim 2, wherein the combination of the two bits includes a first combination which indicates that the CQI report is not requested and a second combination which indicates that the CQI report is requested for a downlink component carrier on which the CQI control information was transmitted to be received.

4. The CQI reporting method according to claim 1, wherein the CQI report request is a request for an aperiodic CQI report.

5. The CQI reporting method according to claim 1, wherein the CQI report is transmitted over a physical uplink shared channel (PUSCH).

6. A terminal apparatus comprising:

a receiver configured to receive channel quality information (CQI) control information consisting of a plurality of bits, the plurality of bits indicating a CQI report request specifying whether a CQI report is requested or not and, when the CQI report is requested the plurality of bits further indicating a resource indication specifying one or more downlink component carriers among a plurality of downlink component carriers, for said one or more downlink component carriers the CQI report is requested, wherein a combination of the plurality of bits jointly indicates

both the CQI report request and the resource indication and no one bit of the plurality of bits alone indicates the CQI report request; and

a transmitter configured to transmit, when the CQI report is requested, the CQI report for said one or more downlink component carriers specified by the resource indication.

7. The terminal apparatus according to claim 6, wherein the plurality of bits are two bits.

8. The terminal apparatus according to claim 7, wherein the combination of the two bits includes a first combination which indicates that the CQI report is not requested and a second combination which indicates that the CQI report is requested for a downlink component carrier on which the CQI control information was transmitted and received.

9. The terminal apparatus according to claim 6, wherein the CQI report request is a request for an aperiodic CQI report.

10. The terminal apparatus according to claim 6, wherein the transmitting section transmits the CQI report over a physical uplink shared channel (PUSCH).