

METHOD, APPARATUS, AND SYSTEM FOR ADJUSTING CQI FEEDBACK CYCLE

~~This application claims priority to Chinese Patent Application No. 201110456025.9,
filed with the Chinese Patent Office on December 30, 2011 and entitled "METHOD,
APPARATUS, AND SYSTEM FOR ADJUSTING CQI FEEDBACK CYCLE", which is
incorporated herein by reference in its entirety.~~

TECHNICAL FIELD

The present invention relates to field of communications technologies, and in particular,
to a method and an apparatus for adjusting a CQI feedback cycle.

BACKGROUND

High speed downlink packet access (High Speed Downlink Packet Access, HSDPA) is
an important feature of the 3rd Generation Partnership Project (The 3rd Generation
Partnership Project, 3GPP) R5 version, and downlink high speed data transmission is
implemented by using a series of key technologies. In an HSDPA algorithm, a user
equipment feeds back a channel quality indicator (Channel Quality Indicator, CQI) of a high
speed downlink shared channel on an uplink high speed dedicated physical control channel,
to represent an upper limit of data transmission under a current channel condition. After
receiving the CQI fed back by the user equipment, a base station may compare currently
available power resource with an assumptive power value, and then adjust a final CQI, to
ensure that the power resource is made full use of. Usually, for a certain type of service, a
CQI feedback cycle is configured with a fixed value.

SUMMARY

Embodiments of the present invention provide a method, an apparatus, and a system for adjusting a CQI feedback cycle, so as to dynamically adjust a CQI feedback cycle of a user equipment, and increase an uplink throughput rate and cell uplink coverage.

5 In one aspect, a method for adjusting a CQI feedback cycle is provided and includes:

receiving a CQI adjustment parameter fed back by a base station, and determining, according to the CQI adjustment parameter, whether a CQI feedback cycle of a user equipment needs to be adjusted; and

10 when it is determined that the CQI feedback cycle needs to be adjusted, adjusting the CQI feedback cycle of the user equipment, and sending an adjusted CQI feedback cycle to the user equipment.

In another aspect, an apparatus for adjusting a CQI feedback cycle is provided and includes:

15 a receiving module, configured to receive a CQI adjustment parameter fed back by a base station;

a judging module, configured to determine, according to the CQI adjustment parameter received by the receiving module, whether a CQI feedback cycle of a user equipment needs to be adjusted; and

20 a processing module, configured to, when the judging module determines that the CQI feedback cycle needs to be adjusted, adjust the CQI feedback cycle of the user equipment, and send an adjusted CQI feedback cycle to the user equipment.

In still another aspect, a system for adjusting a CQI feedback cycle is provided and includes:

25 a base station controlling apparatus and a base station, where the base station is configured to feed back a CQI adjustment parameter to a base station controlling apparatus, and when the base station controlling apparatus determines that a CQI feedback cycle needs to be adjusted, forward a CQI feedback cycle adjusted by the base station controlling apparatus to the user equipment.

In the method, apparatus, and system provided by the embodiments of the present

non-busy state, a network load is relatively small, and the uplink capacity encounters no bottleneck, and execute step 204: decrease the CQI feedback cycle of the user equipment. That is, the base station controlling apparatus adjusts the long cycle to the short cycle.

Further, the foregoing first load threshold value and second load threshold value are set by the base station controlling apparatus, and the first load threshold value is greater than the second load threshold value. The foregoing threshold values can be adjusted in real time according to different services.

FIG. 3 is a schematic flowchart of a method for adjusting a CQI feedback cycle according to another embodiment of the present invention, including:

Step 301: Receive a cell user number reported by a base station.

The cell user number is monitored by the base station and reported by the base station to a base station controlling apparatus.

Step 302: Determine whether the cell user number is greater than a first user number load threshold value, or is smaller than a second user number load threshold value.

If the base station controlling apparatus determines that the cell user number is greater than a the first user number threshold value, it indicates that there are a relatively large number of services, and an uplink capacity may encounter a bottleneck, and execute step 303: increase a CQI feedback cycle of a user equipment. That is, the base station controlling apparatus adjusts a short cycle to a long cycle.

Further, if the base station controlling apparatus determines that the fed back cell user number is smaller than a the second user number threshold value, it indicates that a network is in a non-busy state, a network load is relatively small, and the uplink capacity encounters no bottleneck, and execute step 304: decrease the CQI feedback cycle of the user equipment. That is, the base station controlling apparatus adjusts the long cycle to the short cycle.

Further, the first user number threshold value and the second user number threshold value are set by the base station controlling apparatus, and the first user number threshold value is greater than the second user number threshold value. The foregoing threshold values can be adjusted in real time according to different services.

FIG. 4 is a schematic flowchart of a method for adjusting a CQI feedback cycle according to another embodiment of the present invention, including:

FIG. 8 is a schematic structural diagram of a system for adjusting a CQI feedback cycle according to an embodiment of the present invention, including a base station controlling apparatus 801 and a base station 802.

5 The base station controlling apparatus 801 is the apparatus described in the embodiment of FIG. 6 or FIG. 7.

The base station 802 is configured to feed back a CQI adjustment parameter to the base station controlling apparatus 801, and when the base station controlling apparatus 801 determines that a CQI feedback cycle needs to be adjusted, forward a CQI feedback cycle adjusted by the base station controlling apparatus 801 to a user equipment.

10 Further, the base station 802 is further configured to receive a transmit power headroom reported by the user equipment, calculate a user equipment transmit power using value according to the user equipment transmit power headroom and a maximum user equipment transmit power value, and report the transmit power using value to the base station controlling apparatus 801.

15 It can be understood that, relevant features of the foregoing methods and apparatuses may be cross-referenced.

Persons of ordinary skill in the art may understand that all or a part of the steps of the method embodiments may be implemented by a program instructing relevant hardware. The program may be stored in a computer readable storage medium. When the program runs, the steps of the method embodiments are performed. The foregoing storage medium includes:
20 any medium that can store program code, such as a ROM, a RAM, a magnetic disk, or an optical disc.

Finally, it should be noted that the foregoing embodiments are merely intended for describing the technical solutions of the present invention other than limiting the present invention. Although the present invention is described in detail with reference to the foregoing embodiments, persons of ordinary skill in the art should understand that they may still make modifications to the technical solutions described in the foregoing embodiments or make equivalent replacements to some technical features thereof, without departing from the
25 spirit and scope of the technical solutions of the embodiments of the present invention.

CLAIMS

What is claimed is:

1. A method for adjusting a channel quality indicator CQI feedback cycle, comprising:
receiving a CQI adjustment parameter fed back by a base station, and determining,
5 according to the CQI adjustment parameter, whether a CQI feedback cycle of a user
equipment needs to be adjusted; and

when it is determined that the CQI feedback cycle needs to be adjusted, adjusting the
CQI feedback cycle of the user equipment, and sending an adjusted CQI feedback cycle to
the user equipment.

10 2. The method for adjusting the channel quality indicator CQI feedback cycle according
to claim 1, wherein

the CQI adjustment parameter is a cell load value measured by the base station; and
the determining, according to the CQI adjustment parameter, whether the CQI feedback
cycle of the user equipment needs to be adjusted is:

15 determining whether the cell load value measured by the base station is greater than a
first load threshold value, and when the cell load value measured by the base station is greater
than the first load threshold value, the adjusting the CQI feedback cycle of the user
equipment is increasing the CQI feedback cycle of the user equipment; and

20 determining whether the cell load value measured by the base station is smaller than a
second load threshold value, and when the cell load value measured by the base station is
smaller than the second load threshold value, the adjusting the CQI feedback cycle of the user
equipment is decreasing the CQI feedback cycle of the user equipment; wherein

the first load threshold value is greater than the second load threshold value.

25 3. The method for adjusting the channel quality indicator CQI feedback cycle according
to claim 1, wherein

the CQI adjustment parameter is a cell user number measured by the base station; and
the determining, according to the CQI adjustment parameter, whether the CQI feedback
cycle of the user equipment needs to be adjusted is:

determining whether the cell user number measured by the base station is greater than a first user number threshold value, and when the cell user number measured by the base station is greater than the first user number threshold value, the adjusting the CQI feedback cycle of the user equipment is increasing the CQI feedback cycle of the user equipment; and

5 determining whether the cell user number measured by the base station is smaller than a second user number threshold value, and when the cell user number measured by the base station is smaller than the second user number threshold value, the adjusting the CQI feedback cycle of the user equipment is decreasing the CQI feedback cycle of the user equipment; wherein

10 the first user number threshold value is greater than the second user number threshold value.

4. The method for adjusting the channel quality indicator CQI feedback cycle according to claim 1, wherein

15 the CQI adjustment parameter is a value of power used by the user equipment reported by the base station; and

the determining, according to the CQI adjustment parameter, whether the CQI feedback cycle of the user equipment needs to be adjusted is:

20 determining whether the value of power used by the user equipment reported by the base station is greater than a first power threshold value, and when the value of power used by the user equipment is greater than the first power threshold value, the adjusting the CQI feedback cycle of the user equipment is increasing the CQI feedback cycle of the user equipment; and

25 determining whether the value of power used by the user equipment reported by the base station is smaller than a second power threshold value, and when the value of power used by the user equipment is smaller than the second power threshold value, the adjusting the CQI feedback cycle of the user equipment is decreasing the CQI feedback cycle of the user equipment; wherein

the first power threshold value is greater than the second power threshold value.

5. The method for adjusting the channel quality indicator CQI feedback cycle according to claim 1, wherein

30 the CQI adjustment parameter is a user event type reported by the base station; and

the determining, according to the CQI adjustment parameter, whether the CQI feedback cycle of the user equipment needs to be adjusted is:

determining whether the user event type reported by the base station is a 6B event, and when the user event type is the 6B event, the adjusting the CQI feedback cycle of the user equipment is increasing the CQI feedback cycle of the user equipment; and

determining whether the user event type reported by the base station is a 6A event, and when the user event type is the 6A event, the adjusting the CQI feedback cycle of the user equipment is decreasing the CQI feedback cycle of the user equipment.

6. The method for adjusting the CQI feedback cycle according to any one of claims 1 to 5, wherein

the sending an adjusted CQI feedback cycle to the user equipment is: sending an RB reconfiguration instruction to the user equipment, wherein the reconfiguration instruction carries an adjusted CQI feedback cycle, to enable the user equipment to perform CQI feedback according to the adjusted CQI feedback cycle.

7. An apparatus for adjusting a channel quality indicator CQI feedback cycle, comprising:

a receiving module, configured to receive a CQI adjustment parameter fed back by a base station;

a judging module, configured to determine, according to the CQI adjustment parameter received by the receiving module, whether a CQI feedback cycle of a user equipment needs to be adjusted; and

a processing module, configured to, when the judging module determines that the CQI feedback cycle needs to be adjusted, adjust the CQI feedback cycle of the user equipment, and send an adjusted CQI feedback cycle to the user equipment.

8. The apparatus for adjusting the channel quality indicator CQI feedback cycle according to claim 7, wherein the CQI adjustment parameter is a cell load value measured by the base station, and the judging module comprises:

a first judging sub-module, configured to determine whether the cell load value measured by the base station is greater than a first load threshold value, and when the cell load value measured by the base station is greater than the first load threshold value, the

adjusting the CQI feedback cycle of the user equipment is increasing the CQI feedback cycle of the user equipment; and

determine whether the cell load value measured by the base station is smaller than a second load threshold value, and when the cell load value measured by the base station is smaller than the second load threshold value, the adjusting the CQI feedback cycle of the user equipment is decreasing the CQI feedback cycle of the user equipment.

9. The method for adjusting the channel quality indicator CQI feedback cycle according to claim 7, wherein the CQI adjustment parameter is a cell user number measured by the base station, and the judging module comprises:

a second judging sub-module, configured to determine whether the cell user number measured by the base station is greater than a first user number threshold value, and when the cell user number measured by the base station is greater than the first user number threshold value, the adjusting the CQI feedback cycle of the user equipment is increasing the CQI feedback cycle of the user equipment; and

determine whether the cell user number measured by the base station is smaller than a second user number threshold value, and when the cell user number measured by the base station is smaller than the second user number threshold value, the adjusting the CQI feedback cycle of the user equipment is decreasing the CQI feedback cycle of the user equipment.

10. The method for adjusting the channel quality indicator CQI feedback cycle according to claim 7, wherein the CQI adjustment parameter is a value of power used by the user equipment reported by the base station, and the judging module comprises:

a third judging sub-module, configured to determine whether the value of power used by the user equipment reported by the base station is greater than a first power threshold value, and when the value of power used by the user equipment is greater than the first power threshold value, the adjusting the CQI feedback cycle of the user equipment is increasing the CQI feedback cycle of the user equipment; and

determine whether the value of power used by the user equipment reported by the base station is smaller than a second power threshold value, and when the value of power used by the user equipment is smaller than the second power threshold value, the adjusting the CQI

feedback cycle of the user equipment is decreasing the CQI feedback cycle of the user equipment.

11. The method for adjusting the channel quality indicator CQI feedback cycle according to claim 7, wherein the CQI adjustment parameter is a user event type reported by the base station, and the judging module comprises:

a fourth judging sub-module, configured to determine whether the user event type reported by the base station is a 6B event, and when the user event type is the 6B event, the adjusting the CQI feedback cycle of the user equipment is increasing the CQI feedback cycle of the user equipment; and

determine whether the user event type reported by the base station is a 6A event, and when the user event type is the 6A event, the adjusting the CQI feedback cycle of the user equipment is decreasing the CQI feedback cycle of the user equipment.

12. A system for adjusting a channel quality indicator CQI feedback cycle, comprising: a base station controlling apparatus and a base station; wherein

the base station controlling apparatus is the base station controlling apparatus according to any one of claims 7 to 11; and

the base station is configured to feed back a CQI adjustment parameter to the base station controlling apparatus, and when the base station controlling apparatus determines that a CQI feedback cycle needs to be adjusted, forward a CQI feedback cycle adjusted by the base station controlling apparatus to a user equipment.

13. The system for adjusting the channel quality indicator CQI feedback cycle according to claim 12, wherein

the feedback CQI adjustment parameter is a cell load value, or a cell user number, or a user equipment transmit power value.

CLAIMS

1. A method for adjusting a channel quality indicator feedback cycle, comprising:

receiving (101) a channel quality indicator, CQI, adjustment parameter fed back by a base station, and determining (102), according to the CQI adjustment parameter, whether a CQI feedback cycle of a user equipment needs to be adjusted; and

when it is determined that the CQI feedback cycle needs to be adjusted, adjusting (103) the CQI feedback cycle of the user equipment, and sending an adjusted CQI feedback cycle to the user equipment.

2. The method for adjusting the channel quality indicator CQI feedback cycle according to claim 1, wherein

the CQI adjustment parameter is a cell load value measured by the base station; and

the determining, according to the CQI adjustment parameter, whether the CQI feedback cycle of the user equipment needs to be adjusted is:

determining (202) whether the cell load value measured by the base station is greater than a first load threshold value, or is smaller than a second load threshold value; and

the adjusting the CQI feedback cycle of the user equipment is increasing (203) the CQI feedback cycle of the user equipment when the cell load value measured by the base station is greater than the first load threshold value; or

the adjusting the CQI feedback cycle of the user equipment is decreasing (204) the CQI feedback cycle of the user equipment when the cell load value measured by the base station is smaller than the second load threshold value; wherein

the first load threshold value is greater than the second load threshold value.

3. The method for adjusting the channel quality indicator CQI feedback cycle according to claim 1, wherein

the CQI adjustment parameter is a cell user number measured by the base station; and

the determining, according to the CQI adjustment parameter, whether the CQI feedback cycle of the user equipment needs to be adjusted is:

determining (302) whether the cell user number measured by the base station is greater

than a first user number threshold value, or is smaller than a second user number threshold value; and

the adjusting the CQI feedback cycle of the user equipment is increasing (303) the CQI feedback cycle of the user equipment when the cell user number measured by the base station is greater than the first user number threshold value; or

the adjusting the CQI feedback cycle of the user equipment is decreasing (304) the CQI feedback cycle of the user equipment when the cell user number measured by the base station is smaller than the second user number threshold value; wherein

the first user number threshold value is greater than the second user number threshold value.

4. The method for adjusting the channel quality indicator CQI feedback cycle according to claim 1, wherein

the CQI adjustment parameter is a value of power used by the user equipment reported by the base station; and

the determining, according to the CQI adjustment parameter, whether the CQI feedback cycle of the user equipment needs to be adjusted is:

determining (402) whether the value of power used by the user equipment reported by the base station is greater than a first power threshold value, or is smaller than a second power threshold value; and

the adjusting the CQI feedback cycle of the user equipment is increasing (403) the CQI feedback cycle of the user equipment when the value of power used by the user equipment is greater than the first power threshold value; or

the adjusting the CQI feedback cycle of the user equipment is decreasing (404) the CQI feedback cycle of the user equipment when the value of power used by the user equipment is smaller than the second power threshold value; wherein

the first power threshold value is greater than the second power threshold value.

5. The method for adjusting the channel quality indicator CQI feedback cycle according to claim 1, wherein

the CQI adjustment parameter is a user event type reported by the base station; and

the determining, according to the CQI adjustment parameter, whether the CQI feedback

cycle of the user equipment needs to be adjusted is:

determining (502) whether the user event type reported by the base station is a 6B event or a 6A event, and

the adjusting the CQI feedback cycle of the user equipment is increasing (503) the CQI feedback cycle of the user equipment when the user event type is the 6B event; or

the adjusting the CQI feedback cycle of the user equipment is decreasing (504) the CQI feedback cycle of the user equipment when the user event type is the 6A event.

6. The method for adjusting the CQI feedback cycle according to any one of claims 1 to 5, wherein

the sending an adjusted CQI feedback cycle to the user equipment is: sending an RB reconfiguration instruction to the user equipment, wherein the reconfiguration instruction carries an adjusted CQI feedback cycle, to enable the user equipment to perform CQI feedback according to the adjusted CQI feedback cycle.

7. An apparatus for adjusting a channel quality indicator feedback cycle, comprising:

a receiving module (601), configured to receive a channel quality indicator, CQI, adjustment parameter fed back by a base station;

a judging module (602), configured to determine, according to the CQI adjustment parameter received by the receiving module, whether a CQI feedback cycle of a user equipment needs to be adjusted; and

a processing module (603), configured to, when the judging module determines that the CQI feedback cycle needs to be adjusted, adjust the CQI feedback cycle of the user equipment, and send an adjusted CQI feedback cycle to the user equipment.

8. The apparatus for adjusting the channel quality indicator CQI feedback cycle according to claim 7, wherein the CQI adjustment parameter is a cell load value measured by the base station, and the judging module comprises:

a first judging sub-module (701), configured to determine whether the cell load value measured by the base station is greater than a first load threshold value, and when the cell load value measured by the base station is greater than the first load threshold value, the adjusting the CQI feedback cycle of the user equipment is increasing the CQI feedback cycle of the user equipment; and

determine whether the cell load value measured by the base station is smaller than a second load threshold value, and when the cell load value measured by the base station is smaller than the second load threshold value, the adjusting the CQI feedback cycle of the user equipment is decreasing the CQI feedback cycle of the user equipment.

5 9. The apparatus for adjusting the channel quality indicator CQI feedback cycle according to claim 7, wherein the CQI adjustment parameter is a cell user number measured by the base station, and the judging module comprises:

10 a second judging sub-module (702), configured to determine whether the cell user number measured by the base station is greater than a first user number threshold value, and when the cell user number measured by the base station is greater than the first user number threshold value, the adjusting the CQI feedback cycle of the user equipment is increasing the CQI feedback cycle of the user equipment; and

15 determine whether the cell user number measured by the base station is smaller than a second user number threshold value, and when the cell user number measured by the base station is smaller than the second user number threshold value, the adjusting the CQI feedback cycle of the user equipment is decreasing the CQI feedback cycle of the user equipment.

20 10. The apparatus for adjusting the channel quality indicator CQI feedback cycle according to claim 7, wherein the CQI adjustment parameter is a value of power used by the user equipment reported by the base station, and the judging module comprises:

25 a third judging sub-module (703), configured to determine whether the value of power used by the user equipment reported by the base station is greater than a first power threshold value, and when the value of power used by the user equipment is greater than the first power threshold value, the adjusting the CQI feedback cycle of the user equipment is increasing the CQI feedback cycle of the user equipment; and

30 determine whether the value of power used by the user equipment reported by the base station is smaller than a second power threshold value, and when the value of power used by the user equipment is smaller than the second power threshold value, the adjusting the CQI feedback cycle of the user equipment is decreasing the CQI feedback cycle of the user equipment.

11. The apparatus for adjusting the channel quality indicator CQI feedback cycle according to claim 7, wherein the CQI adjustment parameter is a user event type reported by the base station, and the judging module comprises:

a fourth judging sub-module (704), configured to determine whether the user event type reported by the base station is a 6B event, and when the user event type is the 6B event, the adjusting the CQI feedback cycle of the user equipment is increasing the CQI feedback cycle of the user equipment; and

determine whether the user event type reported by the base station is a 6A event, and when the user event type is the 6A event, the adjusting the CQI feedback cycle of the user equipment is decreasing the CQI feedback cycle of the user equipment.

12. A system for adjusting a channel quality indicator feedback cycle, comprising: a base station controlling apparatus (801) and a base station (802); wherein

the base station controlling apparatus (801) is configured to:

receive a channel quality indicator ,CQI, adjustment parameter fed back by the base station,

determine, according to the CQI adjustment parameter, whether a CQI feedback cycle of a user equipment needs to be adjusted, and

when the base station controlling apparatus determines that the CQI feedback cycle needs to be adjusted, adjust the CQI feedback cycle of the user equipment; and

the base station (802) is configured to feed back the CQI adjustment parameter to the base station controlling apparatus, and forward a CQI feedback cycle adjusted by the base station controlling apparatus to a user equipment.

13. The system for adjusting the channel quality indicator CQI feedback cycle according to claim 12, wherein

the feedback CQI adjustment parameter is a cell load value, or a cell user number, or a user equipment transmit power value.