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(71) Applicant(s)
InterDigital Technology Corporation

(72) Inventor(s)
Marinier, Paul;Castor, Douglas R.

(74) Agent / Attorney
Watermark Patent & Trademark Attorneys, Level 2, 302 Burwood Road, Hawthorn, VIC, 3122

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(71) Applicant *(for all designated States except US)*: **INTERDIGITAL TECHNOLOGY CORPORATION** [US/US]; 3411 Silverside Road, Concord Plaza, Suite 105, Hagley Building, Wilmington, Delaware 19810 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **MARINIER, Paul** [CA/CA]; 1805 Stravinski, Brossard, Québec J4X 2J7 (CA). **CASTOR, Douglas, R.** [US/US]; 8029 Fair View Lane, Norristown, Pennsylvania 19403 (US).

(74) Agent: **BALLARINI, Robert, J.**; Volpe and Koenig, P.C., United Plaza, Suite 1600, 30 South 17th Street, Philadelphia, Pennsylvania 19103 (US).

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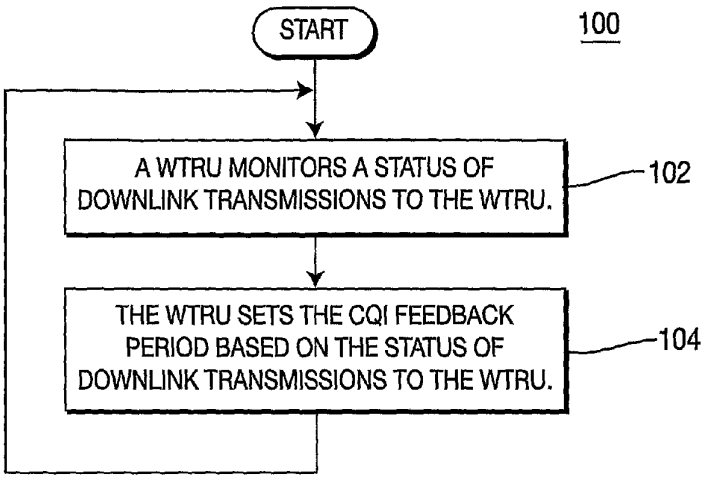

(57) Abstract: A method and apparatus for adjusting a channel quality indicator (CQI) feedback period to increase uplink capacity in a wireless communication system are disclosed. The uplink capacity is increased by reducing the uplink interference caused by CQI transmissions. A wireless transmit/receive unit (WTRU) monitors a status of downlink transmissions to the WTRU and sets the CQI feedback period based on the status of the downlink transmissions to the WTRU. A base station monitors uplink and downlink transmission needs. The base station determines the CQI feedback period of at least one WTRU based on the uplink and downlink transmission needs and sends a command to the WTRU to change the CQI feedback period of the WTRU.

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[0001] # METHOD AND APPARATUS FOR ADJUSTING CHANNEL QUALITY INDICATOR FEEDBACK PERIOD TO INCREASE UPLINK CAPACITY

[0002] ## FIELD OF INVENTION

[0003] The present invention is related to a wireless communication system. More particularly, the present invention is related to a method and apparatus for adjusting a channel quality indicator (CQI) feedback period to increase uplink capacity in a wireless communication system.

[0004] ## BACKGROUND

[0005] In a wireless communication system, such as universal mobile telecommunication services (UMTS) terrestrial radio access (UTRA), a wireless transmit/receive unit (WTRU) sends a channel quality indicator (CQI), (or channel quality estimates), to a base station. The CQI is used for adaptive modulation and coding (AMC), channel sensitive scheduling, or the like. The base station determines an optimal modulation scheme and coding rate for the WTRUs based on the reported CQIs. The base station also uses the reported CQIs when determining which WTRUs should be allowed for transmission.

[0006] The frequency of generation and transmission of the CQIs is controlled by parameters specified by a radio network controller (RNC). The parameters are given to the WTRU through radio resource control (RRC) signaling at call setup or upon reconfiguration.

[0007] The transmission of CQIs by the WTRUs, although beneficial for optimizing the capacity on the downlink, generates interference on the uplink. This interference may decrease the uplink capacity of the wireless communication system when the number of WTRUs that are required to transmit a CQI is large. Furthermore, it is often the case that the transmission of CQIs by certain WTRUs is superfluous. Such a situation arises when a WTRU has no pending transmission on the downlink due to a period of inactivity at the application level.

[0008] The interference caused by the transmission of CQIs from non-active WTRUs may be reduced by updating the CQI parameters so that the CQIs are generated by those WTRUs less frequently. However, this approach does not work well in practice because the CQI parameter update is performed through the RRC signaling, which is slow. By the time the CQI parameter update is communicated to the WTRU, the user of the WTRU may have resumed activity, and performance would suffer until a new update is sent to restore the original frequency of CQI generation.

[0009] In addition, in some circumstances it is desirable to reduce the interference from CQI transmissions during a limited period of time in order to increase the capacity available on the uplink when there is a temporary need for more capacity, (e.g., when one user has a large amount of data to upload, such as a picture).

[0010] Therefore, it is desirable to provide a method to adjust the CQI feedback period more quickly and efficiently to increase uplink capacity.

[0011] SUMMARY

[0012] The present invention is related to a method and apparatus for adjusting a CQI feedback period to increase uplink capacity in a wireless communication system. The uplink capacity is increased by reducing the uplink interference caused by CQI transmissions. In accordance with a first embodiment of the present invention, a WTRU monitors a status of downlink transmissions to the WTRU and sets the CQI feedback period based on the status of the downlink transmissions to the WTRU. In accordance with a second embodiment of the present invention, a base station monitors uplink and downlink transmission needs. The base station determines the CQI feedback period of at least one WTRU based on the uplink and downlink transmission needs and sends a command to the WTRU to change the CQI feedback period of the WTRU.

In one aspect the present invention provides a method for adjusting a channel quality indicator (CQI) feedback period, the method including:

monitoring uplink and downlink transmission requirements;

determining whether to change the CQI feedback period of a wireless transmit/receive unit (WTRU) based on the uplink and downlink transmission requirements; and

if it is determined to change the CQI feedback period, sending a command to the WTRU to change the CQI feedback period of the WTRU, wherein the uplink transmission requirements are determined based on an amount of data buffered in the WTRU for uplink transmission or a time required to transmit the data buffered in the WTRU, and the downlink transmission requirements are determined based on an amount of data buffered in a base station for downlink transmission to the WTRU or a time required to transmit the data buffered in the base station for the WTRU.

In a further aspect the present invention provides a base station for adjusting a channel quality indicator (CQI) feedback period, the base station including:

a monitor for monitoring uplink and downlink transmission requirements of a wireless transmit/receive unit (WTRU); and

a CQI feedback controller for determining whether to change a CQI feedback period of the WTRU based on the uplink and downlink transmission requirements and sending a command to the WTRU to change the CQI feedback period of the WTRU, wherein the uplink transmission requirements are determined based on an amount of data buffered in the WTRU, for uplink transmission of a time required to transmit the data buffered in the WTRU and the downlink transmission requirements are determined based on an amount of data buffered in a base station for downlink transmission to the WTRU or a time required to transmit the data buffered in the base station for the WTRU.

[0013] BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Figure 1 is a flow diagram of a process for adjusting a CQI feedback period in accordance with a first embodiment of the present invention.

[0015] Figure 2 is a flow diagram of a process for adjusting a CQI feedback period in accordance with a second embodiment of the present invention.

[0016] Figure 3 is a block diagram of a WTRU which implements the process of Figure 1.

[0017] Figure 4 is a block diagram of a base station which implements the process of Figure 2.

[0018] DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] When referred to hereafter, the terminology "WTRU" includes but is not limited to a user equipment, a mobile station (STA), a fixed or mobile subscriber unit, a pager, or any other type of device capable of operating in a wireless environment. When referred to hereafter, the terminology "base station" includes but is not limited to a Node-B, a site controller, an access point (AP) or any other type of interfacing device in a wireless environment.

[0020] The features of the present invention may be incorporated into an integrated circuit (IC) or be configured in a circuit comprising a multitude of interconnecting components.

[0021] Figure 1 is a flow diagram of a process 100 for adjusting a CQI feedback period in accordance with a first embodiment of the present invention. In accordance with the first embodiment, a WTRU autonomously adjusts the CQI feedback period based on downlink transmission status. The WTRU is initially configured with a normal CQI feedback period, and the WTRU reports a CQI to a base station via an uplink channel every CQI feedback period.

[0022] The WTRU monitors the status of downlink transmissions to the WTRU (step 102). In monitoring the downlink transmission status, the WTRU may maintain a counter for counting the number of consecutive transmission time intervals (TTIs) that do not include a transmission for the WTRU. For example, in high speed downlink packet access (HSDPA), the number of TTIs

that do not include a transmission for the WTRU may be determined by detecting a valid cyclic redundancy check (CRC) on downlink transmissions on a high speed shared control channel (HS-SCCH). The counter is reset when a valid downlink transmission to the WTRU is detected, (e.g., in HSDPA, a valid CRC is detected on the HS-SCCH).

[0023] The WTRU then adjusts the CQI feedback period based on the status of the downlink transmissions (step 104). A piece-wise function or a look-up table (LUT) may be used to select a new CQI feedback period based on the counter value, such that the CQI feedback period is increased as the counter value increases, and the CQI feedback period is decreased as the counter value decreases. An exemplary mapping scheme for mapping the counter value to the CQI feedback period is shown in Table 1. As shown in Table 1, the increased CQI feedback periods may be a factor of the normal CQI feedback period. The base station may monitor and detect CQIs from the WTRU every normal CQI feedback period regardless of the CQI feedback period setting in the WTRU. With this scheme, it is avoidable to miss CQIs due to inconsistent CQI feedback period settings in the WTRU and the base station. The parameters in Table 1 are configurable via a higher layer signaling, which is preferably performed at call setup.

The number of TTIs without a transmission for the WTRU	CQI feedback period
0-31	normal feedback period, P
32-63	2P
64-127	3P
128-511	4P
512 or higher	5P

Table 1

[0024] Alternatively, the WTRU may be given multiple CQI feedback periods, (for example, two (2) CQI feedback periods: an active CQI feedback period and an inactive CQI feedback period), via RRC signaling, and may switch between the CQI feedback periods in accordance with the counter value, (i.e., the number of TTIs without a transmission for the WTRU). For example, when the

counter value is below a threshold, the active CQI feedback period is selected, and when the counter value is equal to or above the threshold, the inactive CQI feedback period is selected.

[0025] After the WTRU adjusts the CQI feedback period based on the status of the downlink transmissions, the process 100 returns to step 102 to further monitor the downlink transmission status.

[0026] Figure 2 is a flow diagram of a process 200 for adjusting a CQI feedback period in accordance with a second embodiment of the present invention. In accordance with the second embodiment, a base station sends a command to increase or decrease the CQI feedback period of the WTRUs based on uplink and downlink transmission needs. The base station increases the CQI feedback period, (which means less frequent CQI feedbacks), when the uplink transmission needs increase, while the downlink transmission needs can still be supported with the less frequent CQI feedbacks. As frequent CQI feedbacks are beneficial to downlink performance, the base station trades downlink capacity for uplink capacity on a short term basis.

[0027] The base station monitors uplink transmission needs and downlink transmission needs (step 202). The uplink and downlink transmission needs are determined based on an amount of data buffered in each of the WTRUs for uplink transmissions and an amount of data buffered in a base station for downlink transmissions to each of the WTRUs, respectively. The amount of data buffered in the WTRU for uplink transmission is indicated by the WTRU. For example, such indication may be given by a scheduling request, a happy bit or traffic volume measurement as in UTRA Release 6.

[0028] Alternatively, the base station may estimate the time required to transmit the data currently in the buffer of each WTRU and the time required to transmit the data buffered in the base station for each WTRU based on average downlink and uplink throughput to and from each of the WTRUs.

[0029] The base station determines whether it is desirable to change the CQI feedback period of at least one WTRU based on the uplink transmission needs and the downlink transmission needs (step 204). The base station may

increase the CQI feedback period when the uplink transmission needs are high and the downlink transmission needs are low, and may decrease the CQI feedback period, (or restore the original CQI feedback period), when the uplink transmission needs are low or the downlink transmission needs are high.

[0030] For example, if, for at least one WTRU, the estimated time required to transmit data in a buffer of the WTRU exceeds a pre-determined threshold, (i.e., the uplink transmission needs are high), it is desirable to reduce the interference caused by CQI transmissions by increasing the CQI feedback period. Therefore, the base station determines if some or all of the downlink transmissions could afford less frequent CQI feedbacks. In order to determine this, the base station may determine if the estimated time required to transmit the data in the buffer of the base station on the downlink is within a pre-determined threshold. If it is determined that some or all of the downlink transmissions may afford less frequent CQI transmissions, (e.g., the estimated time required to transmit the data in the buffer of the base station is within the predetermined threshold), the base station determines to increase the CQI feedback period.

[0031] If it is determined at step 204 that it is not desirable to change the CQI feedback period, the process returns to step 202 to further monitor the uplink and downlink transmission needs. If it is determined at step 204 that it is desirable to change the CQI feedback period, the base station then sends a command to at least one WTRU to change the CQI feedback period of the WTRU (step 206). After sending the command, the process 200 returns to step 202 to monitor the uplink and downlink transmission needs.

[0032] If the base station subsequently determines that restoring the original CQI feedback period is desirable for some or all of the WTRUs, (i.e., if the base station determines that the estimated time required to transmit the data in the buffer of the base station on the downlink exceeds the pre-determined threshold, or if the base station determines that the estimated time required to transmit the data in the buffer of each of the WTRUs on the uplink is below the

pre-determined threshold), the base station sends a command to some or all WTRUs to restore the original CQI feedback period of their CQI transmissions.

[0033] The command must be transmitted quickly, (e.g., within a few tens of milliseconds), to the concerned WTRUs or all WTRUs after a decision is made by the base station. The command may be transmitted by any suitable means. For example, in UTRA Release 6, the command may be sent via an HS-SCCH. During each 2ms TTI, the HS-SCCH includes information necessary for each WTRU to determine if any data will be transmitted to the WTRU in the next TTI. The HS-SCCH includes bits for indicating a channelization code set combination for the WTRU. Currently, there are eight (8) unused bit combinations for the channelization code set combinations. One of the 8 unused bit combinations may be used for the purpose of sending the command to change the CQI feedback period. For example, one of the unused bit combinations may be used to signal an increase of the CQI feedback period and another to signal a restoration of the original CQI feedback period.

[0034] The amount of change of the CQI feedback period in response to the command from the base station may be pre-determined, (e.g., by a factor of 2). Increase of the CQI feedback period by a factor of 2 means that every other CQI that would normally be transmitted with the original configuration is now not transmitted. Alternatively, the amount of change of the CQI feedback period in response to the command may be signaled upon call setup or reconfiguration. For example, two sets of CQI feedback periods may be given to the WTRU, and switched in accordance with the command.

[0035] The information contained in a specific TTI in an HS-SCCH is normally only used by one specific WTRU, which is identified through bit-masking of the CRC field with a WTRU-specific sequence, (WTRU identity (ID)). In order to provide a significant interference reduction on the uplink within a short amount of time, it is desirable that all WTRUs monitoring a given HS-SCCH be commanded a change of the CQI feedback period at the same time. Therefore, a special WTRU ID for all WTRUs may be used to transmit the command via the HS-SCCH.

[0036] Figure 3 is a block diagram of a WTRU 300 which implements the process 100 of Figure 1. The WTRU 300 includes a downlink status monitor 302, a CQI feedback controller 304 and an LUT 306 (optional). The downlink status monitor 302 monitors a status of downlink transmissions to the WTRU. The downlink status monitor 302 may include a counter 308 to count the number of consecutive TTIs that do not include transmissions to the WTRU. The CQI feedback controller 304 sets the CQI feedback period based on the status of the downlink transmissions to the WTRU as stated hereinabove.

[0037] Figure 4 is a block diagram of a base station 400 which implements the process 200 of Figure 2. The base station 400 includes a monitor 402 and a CQI feedback controller 404. The monitor 402 monitors uplink transmission needs and downlink transmission needs. The CQI feedback controller 404 determines the CQI feedback period of at least one WTRU based on the uplink transmission needs and the downlink transmission needs and sends a command to at least one of the WTRUs to change the CQI feedback period.

[0038] EMBODIMENTS

[0039] 1. A method for adjusting the CQI feedback period to increase uplink capacity in a wireless communication system including a plurality of WTRUs and a base station wherein the WTRUs report a CQI to the base station every CQI feedback period.

[0040] 2. The method of embodiment 1 comprising the step of a WTRU monitoring a status of downlink transmissions to the WTRU.

[0041] 3. The method of embodiment 2 comprising the step of the WTRU setting the CQI feedback period based on the status of the downlink transmissions to the WTRU.

[0042] 4. The method as in any of the embodiments 2-3, wherein the status of downlink transmissions is monitored by counting the number of consecutive TTIs that have no transmissions to the WTRU.

[0043] 5. The method of embodiment 4 wherein the CQI feedback period is set based on the number of consecutive TTIs that have no transmissions to the WTRU.

[0044] 6. The method as in any of the embodiments 2-5, wherein the CQI feedback period is set by using an LUT to map the status of downlink transmission to one of a plurality of CQI feedback periods.

[0045] 7. The method of embodiment 6, wherein the LUT is configurable by a higher layer signaling.

[0046] 8. The method as in any embodiments 3-7, wherein the CQI feedback periods are a factor of a normal CQI feedback period.

[0047] 9. The method of embodiment 8 wherein the base station monitors CQI feedback from the WTRU every normal CQI feedback period.

[0048] 10. The method as in any embodiments 2-5, wherein the CQI feedback period is set by using a piece-wise function to map the status of downlink transmission to one of a plurality of CQI feedback periods.

[0049] 11. The method as in any embodiments 2-5, wherein the WTRU is given an active CQI feedback period and an inactive CQI feedback period, and the active CQI feedback period is selected when the number of consecutive TTIs that have no transmissions to the WTRU exceeds a threshold, otherwise the inactive CQI feedback period is selected.

[0050] 12. The method of embodiment 1 comprising the step of a base station monitoring uplink and downlink transmission needs.

[0051] 13. The method of embodiment 12 comprising the step of the base station determining whether it is desirable to change the CQI feedback period of at least one WTRU based on the uplink and downlink transmission needs.

[0052] 14. The method of embodiment 13 comprising the step of if it is determined that it is desirable to change the CQI feedback period, the base station sending a command to the WTRU to change the CQI feedback period of the WTRU.

[0053] 15. The method of embodiment 14 wherein the base station sends the command to increase the CQI feedback period of the WTRU when the uplink

transmission needs exceed a first threshold and the downlink transmission needs are within a second threshold.

[0054] 16. The method of embodiment 14 wherein the base station sends the command to decrease the CQI feedback period when either the uplink transmission needs are within the first threshold or the downlink transmission needs exceed the second threshold.

[0055] 17. The method as in any of the embodiments 15-16, wherein the uplink transmission needs are determined based on an amount of data buffered in each of the WTRUs for uplink transmissions.

[0056] 18. The method as in any of the embodiments 15-17, wherein the downlink transmission needs are determined based on an amount of data buffered in the base station for downlink transmissions to each of the WTRUs.

[0057] 19. The method as in any of the embodiments 15-16, wherein the uplink transmission needs are determined based on a time required to transmit the data buffered in each of the WTRUs.

[0058] 20. The method as in any of the embodiments 15-16, wherein the downlink transmission needs are determined based on a time required to transmit the data buffered in the base station for each of the WTRUs.

[0059] 21. The method as in any of the embodiments of claim 17-20, wherein the amount of data buffered in the WTRU is reported by the WTRU.

[0060] 22. The method of embodiment 21 wherein the amount of data buffered in the WTRU is indicated by a scheduling request sent by the WTRU.

[0061] 23. The method of embodiment 21 wherein the amount of data buffered in the WTRU is indicated by a happy bit sent by the WTRU.

[0062] 24. The method of embodiment 21 wherein the amount of data buffered in the WTRU is indicated by traffic volume measurement.

[0063] 25. The method as in any of the embodiments 14-24, wherein the base station broadcasts the command to all WTRUs.

[0064] 26. The method as in any of the embodiments 14-24, wherein the base station sends the command only to concerned WTRUs.

[0065] 27. The method as in any of the embodiments 12-26, wherein the downlink transmissions is transmitted via HSDPA.

[0066] 28. The method of embodiment 27 wherein the command is transmitted via an HS-SCCH.

[0067] 29. The method of embodiment 28 wherein the command is transmitted by using an unused channelization code set combinations.

[0068] 30. The method as in any of the embodiments 28-29, wherein the command is transmitted using a special WTRU ID for all WTRUs.

[0069] 31. The method as in any of the embodiments 14-30, wherein an amount of change of the CQI feedback period in response to the command is predetermined and signaled to the WTRUs, whereby the WTRU changes the CQI feedback period based on the predetermined amount of change.

[0070] 32. The method as in any of the embodiments 14-31, wherein a plurality of CQI feedback periods are given to the WTRUs in advance and one of the CQI feedback periods is selected in accordance with the command.

[0071] 33. The method as in any of the embodiments 31-32, wherein the CQI feedback periods are determined as a factor of a normal CQI feedback period.

[0072] 34. The method of embodiment 33 wherein the base station monitors CQI feedback from the WTRU every normal CQI feedback period.

[0073] 35. A WTRU for adjusting the CQI feedback period to increase uplink capacity in a wireless communication system including a plurality of WTRUs and a base station wherein the WTRUs report a CQI to the base station via an uplink channel every CQI feedback period.

[0074] 36. The WTRU of embodiment 35 comprising a downlink status monitor for monitoring a status of downlink transmissions to the WTRU.

[0075] 37. The WTRU of embodiment 36 comprising a CQI feedback controller for setting the CQI feedback period based on the status of the downlink transmissions to the WTRU.

[0076] 38. The WTRU as in any of the embodiments 36-37, wherein the downlink status monitor includes a counter to count the number of consecutive

TTIs that have no transmissions to the WTRU, whereby the CQI feedback controller sets the CQI feedback period based on a counter value.

[0077] 39. The WTRU as in any of the embodiments 36-38, further comprises an LUT for mapping the counter value to one of a plurality of CQI feedback periods, whereby the CQI feedback controller sets the CQI feedback period by using the LUT.

[0078] 40. The WTRU of embodiment 39 wherein the LUT is configurable by a higher layer signaling.

[0079] 41. The WTRU as in any of the embodiments 36-40, wherein the CQI feedback periods are determined as a factor of a normal CQI feedback period.

[0080] 42. The WTRU as in any of the embodiments 37-38, wherein the CQI feedback controller sets the CQI feedback period by using a piece-wise function.

[0081] 43. The WTRU as in any of the embodiments 36-38, wherein the WTRU is given an active CQI feedback period and an inactive CQI feedback period, and the CQI feedback controller selects the active CQI feedback period when the number of consecutive TTIs that have no transmissions to the WTRU exceeds a threshold, otherwise selects the inactive CQI feedback period.

[0082] 44. A base station for adjusting CQI feedback period to increase uplink capacity in a wireless communication system including a plurality of WTRUs and a base station wherein the WTRUs report a CQI to the base station via an uplink channel every CQI feedback period.

[0083] 45. The base station of embodiment 44 comprising a monitor for monitoring uplink and downlink transmission needs.

[0084] 46. The base station of embodiment 45 comprising a CQI feedback controller for determining whether it is desirable to change the CQI feedback period of at least one WTRU based on the uplink and downlink transmission needs and sending a command to the WTRU to change the CQI feedback period of the WTRU.

[0085] 47. The base station of embodiment 46 wherein the CQI feedback controller sends a command to increase the CQI feedback period of the WTRU

when the uplink transmission needs exceed a first threshold and the downlink transmission needs are within a second threshold.

[0086] 48. The base station of embodiment 46 wherein the CQI feedback controller sends a command to decrease the CQI feedback period when either the uplink transmission needs are within the first threshold or the downlink transmission needs exceed the second threshold.

[0087] 49. The base station as in any of the embodiments 45-48, wherein the monitor monitors the uplink transmission needs based on an amount of data buffered in each of the WTRUs for uplink transmissions.

[0088] 50. The base station as in any of the embodiments 45-48, wherein the monitor monitors the downlink transmission needs based on an amount of data buffered in the base station for downlink transmissions to each of the WTRUs.

[0089] 51. The base station as in any of the embodiments 45-48, wherein the monitor monitors the uplink transmission needs based on a time required to transmit the data buffered in each of the WTRUs.

[0090] 52. The base station as in any of the embodiments 45-48, wherein the monitor monitors the downlink transmission needs based on a time required to transmit the data buffered in the base station for each of the WTRUs.

[0091] 53. The base station of embodiment 49 wherein the amount of data buffered in the WTRU is reported by the WTRU.

[0092] 54. The base station of embodiment 53 wherein the amount of data buffered in the WTRU is indicated by a scheduling request sent by the WTRU.

[0093] 55. The base station of embodiment 53 wherein the amount of data buffered in the WTRU is indicated by a happy bit sent by the WTRU.

[0094] 56. The base station of embodiment 53 wherein the amount of data buffered in the WTRU is indicated by traffic volume measurement.

[0095] 57. The base station as in any of the embodiments 46-56, wherein the CQI feedback controller broadcasts the command to all WTRUs.

[0096] 58. The base station as in any of the embodiments 46-56, wherein the CQI feedback controller sends the command only to concerned WTRUs.

[0097] 59. The base station as in any of the embodiments 44-58, wherein the downlink transmissions is transmitted via HSDPA.

[0098] 60. The base station of embodiment 59 wherein the CQI feedback controller sends the command via an HS-SCCH.

[0099] 61. The base station of embodiment 60 wherein the CQI feedback controller sends the command using an unused channelization code set combinations.

[00100] 62. The base station of embodiment 60 wherein the CQI feedback controller sends the command using a special WTRU ID for all WTRUs.

[00101] 63. The base station as in any of the embodiments 45-62, wherein the monitor monitors CQI feedback from the WTRU every normal CQI feedback period.

[00102] Although the features and elements of the present invention are described in the preferred embodiments in particular combinations, each feature or element can be used alone without the other features and elements of the preferred embodiments or in various combinations with or without other features and elements of the present invention.

* * *

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CLAIMS:

1. A method for adjusting a channel quality indicator (CQI) feedback period, the method including:

monitoring uplink and downlink transmission requirements;

determining whether to change the CQI feedback period of a wireless transmit/receive unit (WTRU) based on the uplink and downlink transmission requirements; and

if it is determined to change the CQI feedback period, sending a command to the WTRU to change the CQI feedback period of the WTRU, wherein the uplink transmission requirements are determined based on an amount of data buffered in the WTRU for uplink transmission or a time required to transmit the data buffered in the WTRU, and the downlink transmission requirements are determined based on an amount of data buffered in a base station for downlink transmission to the WTRU or a time required to transmit the data buffered in the base station for the WTRU.

2. The method of claim 1 wherein the command is sent to increase the CQI feedback period of the WTRU when the uplink transmission requirements exceed a first threshold and the downlink transmission requirements do not exceed a second threshold.

3. The method of claim 2 wherein the command is sent to decrease the CQI feedback period when either the uplink transmission requirements do not exceed the first threshold or the downlink transmission requirements exceed the second threshold.

4. The method of claim 2 further including receiving a report indicating the amount of data buffered in the WTRU.

5. The method of claim 4 further including receiving a scheduling request indicating the amount of data buffered in the WTRU.

6. The method of claim 4 further including receiving a happy bit indicating the amount of data buffered in the WTRU.

7. The method of claim 4 further including receiving a traffic volume measurement indicating the amount of data buffered in the WTRU.

8. The method of claim 1 wherein the command is broadcast to a plurality of WTRUs.

9. The method of claim 1 wherein the command is transmitted only to a particular WTRU.

10. The method of claim 1 wherein the command is transmitted via a high speed shared control channel (HS-SCCH).

11. The method of claim 10 wherein the command is transmitted by using an unused channelization code set combinations.

12. The method of claim 10 wherein the command is transmitted using a special WTRU identity (ID) for a plurality of WTRUs.

13. The method of claim 1 wherein an amount of change of the CQI feedback period in response to the command is preconfigured.

14. The method of claim 1 wherein a plurality of CQI feedback periods are preconfigured and one of the CQI feedback periods is selected in accordance with the command.

15. The method of claim 14 wherein the CQI feedback periods are determined as a factor of a normal CQI feedback period.

16. The method of claim 15 further including monitoring CQI feedback from the WTRU every normal CQI feedback period.

17. A base station for adjusting a channel quality indicator (CQI) feedback period, the base station including:

a monitor for monitoring uplink and downlink transmission requirements of a wireless transmit/receive unit (WTRU); and

a CQI feedback controller for determining whether to change a CQI feedback period of the WTRU based on the uplink and downlink transmission requirements and sending a command to the WTRU to change the CQI feedback period of the WTRU, wherein the uplink transmission requirements are determined based on an amount of data buffered in the WTRU for uplink transmission of a time required to transmit the data buffered in the WTRU, and the downlink transmission requirements are determined based on an amount of data buffered in a base station for downlink transmission to the WTRU or a time required to transmit the data buffered in the base station for the WTRU.

18. The base station of claim 17 wherein the CQI feedback controller sends a command to increase the CQI feedback period of the WTRU when the uplink transmission needs requirements exceed a first threshold and the downlink transmission requirements do not exceed a second threshold.

19. The base station of claim 18 wherein the CQI feedback controller sends a command to decrease the CQI feedback period when either the uplink transmission requirements do not exceed the first threshold or the downlink transmission requirements exceed the second threshold.

20. The base station of claim 17 wherein the monitor monitors the uplink transmission requirements based on a report indicating the amount of data buffered in the WTRU.

21. The base station of claim 20 wherein the monitor monitors the uplink transmission requirements based on a scheduling request indicating the amount of data buffered in the WTRU.

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22. The base station of claim 20 wherein the monitor monitors the uplink transmission requirements based on a happy bit indicating the amount of data buffered in the WTRU.

23. The base station of claim 20 wherein the monitor monitors the uplink transmission requirements based on traffic volume measurement indicating the amount of data buffered in the WTRU.

24. The base station of claim 17 wherein the CQI feedback controller broadcasts the command to a plurality of WTRUs.

25. The base station of claim 17 wherein the CQI feedback controller sends the command only to a particular WTRU.

26. The base station of claim 17 wherein the CQI feedback controller sends the command via a high speed shared control channel (HS-SCCH).

27. The base station of claim 26 wherein the CQI feedback controller sends the command using unused channelization code set combinations.

28. The base station of claim 26 wherein the CQI feedback controller sends the command using a special WTRU identity (ID) for a plurality of WTRUs.

29. The base station of claim 17 wherein the monitor monitors CQI feedback from the WTRU every normal CQI feedback period.

30. The method of claim 1 substantially as herein before described with reference to the accompanying figures.

31. The base station of claim 17 substantially as hereinbefore described with reference to the accompanying figures.

WATERMARK PATENT & TRADE MARK ATTORNEYS

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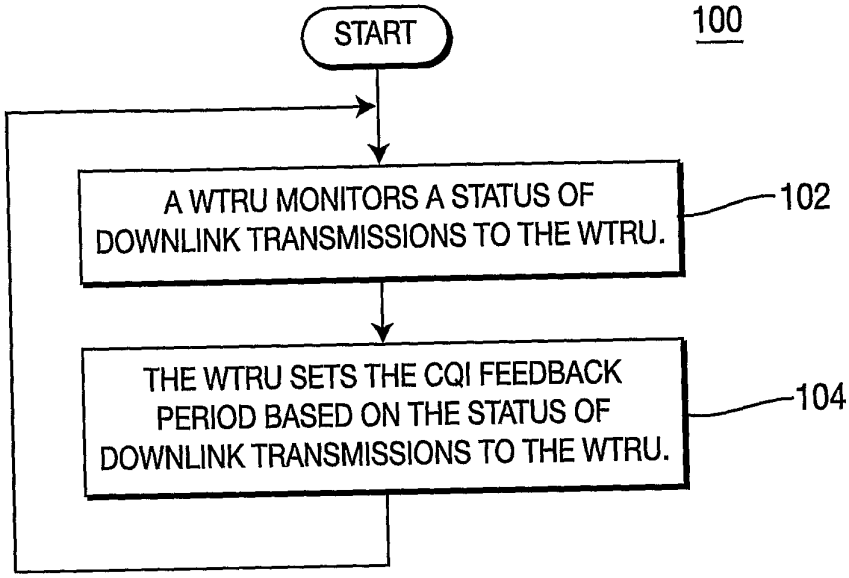
START
100
A WTRU MONITORS A STATUS OF DOWNLINK TRANSMISSIONS TO THE WTRU.
102
THE WTRU SETS THE CQI FEEDBACK PERIOD BASED ON THE STATUS OF DOWNLINK TRANSMISSIONS TO THE WTRU.
104

FIG. 1

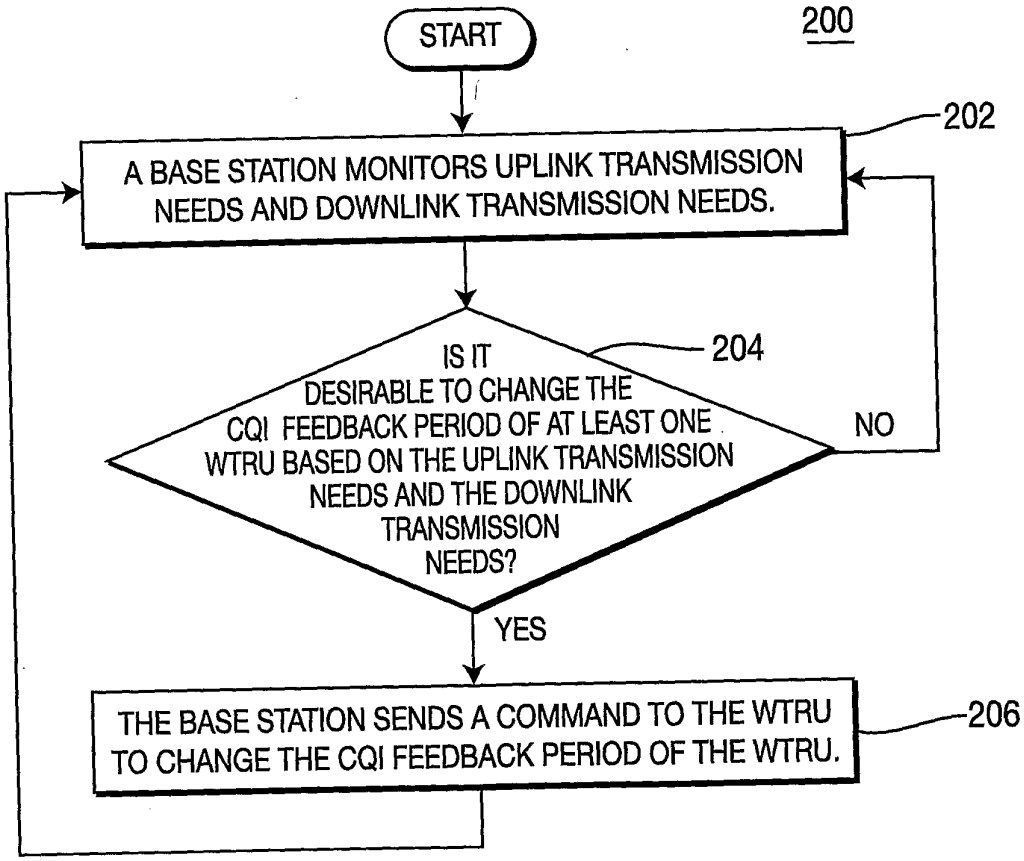
START
200
A BASE STATION MONITORS UPLINK TRANSMISSION NEEDS AND DOWNLINK TRANSMISSION NEEDS.
202
IS IT DESIRABLE TO CHANGE THE CQI FEEDBACK PERIOD OF AT LEAST ONE WTRU BASED ON THE UPLINK TRANSMISSION NEEDS AND THE DOWNLINK TRANSMISSION NEEDS?
204
NO
YES
THE BASE STATION SENDS A COMMAND TO THE WTRU TO CHANGE THE CQI FEEDBACK PERIOD OF THE WTRU.
206

FIG. 2

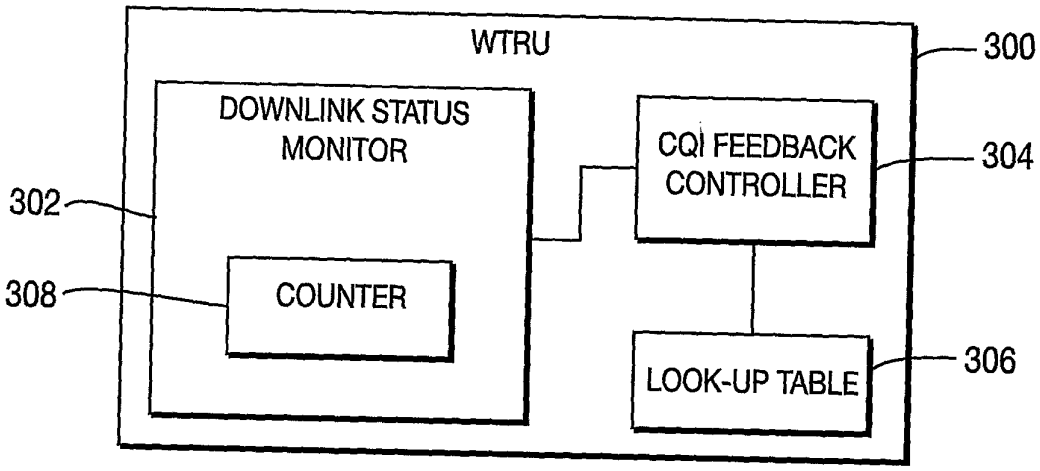
WTRU
300
DOWNLINK STATUS MONITOR
302
308
COUNTER
CQI FEEDBACK CONTROLLER
304
LOOK-UP TABLE
306

FIG. 3

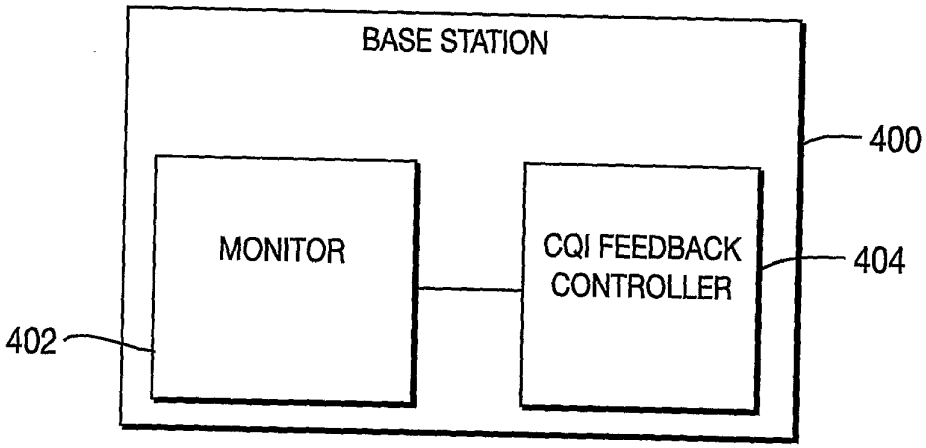
BASE STATION
400
MONITOR
402
CQI FEEDBACK CONTROLLER
404

FIG. 4