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Petitioner's Exhibit 1007

Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/KR2009/007858

International filing date: 29 December 2009 (29.12.2009)

Document type: Certified copy of priority document

Document details: Country/Office: US
Number: 61/141,211
Filing date: 29 December 2008 (29.12.2008)

Date of receipt at the International Bureau: 15 January 2010 (15.01.2010)

Remark: Priority document submitted or transmitted to the International Bureau in
compliance with Rule 17.1(a) or (b)



World Intellectual Property Organization (WIPO) - Geneva, Switzerland
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse

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APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A
FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: *61/141,211*

FILING DATE: *December 29, 2008*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY
APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS
CONVENTION, IS *US61/141,211*

By Authority of the
Under Secretary of Commerce for Intellectual Property
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Electronic Acknowledgement Receipt	
EFS ID:	4532577
Application Number:	61141211
International Application Number:	
Confirmation Number:	7988
Title of Invention:	CQI REQUEST METHOD FOR MULTIPLE COMPONENT CARRIER AGGREGATION
First Named Inventor/Applicant Name:	Dong Youn SEO
Customer Number:	67487
Filer:	Andrew S. Park/Soyoun MOON
Filer Authorized By:	Andrew S. Park
Attorney Docket Number:	UT08-0892
Receipt Date:	29-DEC-2008
Filing Date:	
Time Stamp:	20:50:59
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 220
RAM confirmation Number	6273
Deposit Account	504198
Authorized User	
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)</p> <p>Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)</p>	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)					
Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)					
Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)					
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	UT08-892_ADS.pdf	1154988 a025273353f8bc2326867560b04aaf29855c3ba	no	5
Warnings:					
Information:					
2	Specification - Not in English	UT08892_SPEC.pdf	1551253 f78ae951c26ffaa0c288da249fd6a71bf5eff58	no	11
Warnings:					
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3	Fee Worksheet (PTO-06)	fee-info.pdf	29632 4e05eba2a8114446439bdcdd461c599226c1b	no	2
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Total Files Size (in bytes):			2735873		
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**PROVISIONAL APPLICATION FOR UNITED STATES PATENT
IN THE NAMES OF**

Dong Youn SEO, Joon Kui AHN and Jung Hoon LEE

for

**CQI REQUEST METHOD FOR MULTIPLE COMPONENT
CARRIER AGGREGATION**

prepared by:

KBK & Associates

Customer Number: 67487

Attorney Docket Number: UT08-0892

Total Number of pages: 11 (including cover)

Provisional Application

Inventors	Dong Youn Seo, Joon Kui Ahn, Jung Hoon Lee	
Title of Invention	CQI Request Method for Multiple Component Carrier Aggregation	

1. Objective of the Invention

This invention proposes a signaling method for uplink transmission of downlink channel information in the cellular wireless communication system using multiple frequency bandwidth.

2. Composition of the Invention

A) CQI; Channel Quality Indicator Summary

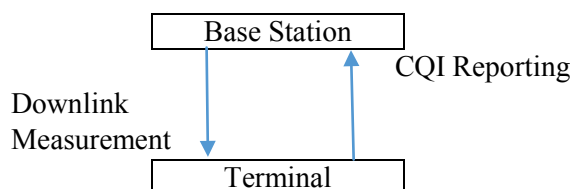
For efficient communication, it is essential to have a feedback mechanism to provide channel information. Generally, downlink channel information is sent up via uplink and uplink channel information is sent down via downlink. This form of providing channel information is called CQI for Channel Quality Indicator. Such CQI can be generated by a number of different methods.

For example, there is a method to upload directly quantized channel condition, a method to upload after calculating the SINR, a method that informs the condition of channels actually being applied with MCS (Modulation Coding Scheme), and others.

Among a number of CQI generation methods, in actuality, since we can see numerous instances of CQI being generated using MCS as the base, we need to examine this further. We can use as an example CQI generation for HSDPA transmission method and others from 3GPP. Accordingly, when CQI is generated using MCS as the base, in detail, MCS will include modulation method and coded method and corresponding coding rate and others. In addition, since CQI has to change if modulation method and coded method changes, CQI will need a minimum of one per each code word unit.

If a MIMO is applied to the system, the necessary number of CQI will also change. Since MIMO system uses multiple antennas to generate multiple channels, normally, it is possible to use many code words. Accordingly, subsequent CQI also needs to use many. When a multiple CQI is used like this, the amount of subsequently generated control information will increase proportionally.

Illustration 1 is a conceptual diagram of CQI generation and transmission. The terminal measures downlink quality and sends the selected CQI value based on the measurement to the base station through uplink control channel. The base station, based on the reported CQI, executes the scheduling (terminal selection, resource allocation, and others) for downlink. Here, the CQI value can be modified to reflect SINR (Signal to Interference and Noise Ratio), CINR (Carrier to Interference and Noise Ratio), BER (Bit Error Rate), FER (Frame Error Rate) and other transmittable data. And for MIMO system, RI (Rank Information), PMI (Precoding Matrix Information) and other information can be added that reflect the channel condition.



<Illustration 1> Overview of Transmission of Uplink CQI for Cellular Communication System

B) Specifics on Digital Radio Frequency for Channel Quality Indicator (CQI)

In order to maximize the usage of channel capacity assigned for each channel used in cellular communication system, link adaptation is used to control MCS (Modulation and Coding Set) and transmission power according to each channel. In order for these link adaptations to be executed at the base station, inevitably, the user has to provide feedback to the base station with channel quality information.

If the frequency bandwidth used by the system can get bandwidth that exceeds the coherence bandwidth, within one bandwidth, channel can exhibit radical changes. Especially for multiple frequency systems like the Orthogonal Frequency Division Multiplexing (OFDM), within the allotted bandwidth, a number of sub-carriers exist, and since modulated symbols are transmitted through each sub-carrier mentioned above, each sub-carrier channel becomes the optimal channel transmission. Accordingly, since the number of sub-carriers in the majority of multi-carrier systems will see a dramatic increase in the amount of feedback of channel information, in order to reduce the control overhead, many methods have been proposed.

C) Channel Quality Indicator (CQI) Generation Method

Due to the increase in the volume of channel transmission, we will quickly review methods that have been proposed to date to reduce the information volume of channel quality indicators generated in order to reduce the control overhead.

The first method is to modify the channel information transmission unit. For example, for channel information transmitted by each sub-carrier in the Orthogonal Frequency Division Multiplexing (OFDM), there is a method to consolidate a number of sub-carriers to a group and transmit channel information based on the group unit above. If an Orthogonal Frequency Division Multiplexing system using 2,048 sub-carriers consolidates 12 sub-carriers per each sub-carrier group, a total of 171 sub-carrier group would be formed, and the actual amount of channel information transmitted will be reduced to 171 from 2,048.

In this patent, when frequency bandwidth is separated by each sub-carrier like in Orthogonal Frequency Division Multiplexing (OFDM), by consolidating one or many sub-carriers into sub-carrier groups, CQI is reported based on each sub-carrier group unit identified above and the basic unit in this method is defined as CQI sub-carrier group or sub-band. When it is not possible for frequency bandwidth to be identified with each sub-carrier in a group, the total frequency bandwidth is divided into sectional frequency bandwidth, and using the divided frequency bandwidth as the base, CQI is generated. The frequency bandwidth divided to generate CQI above is defined as CQI sub-band.

The second method is to generate Channel Quality Indicator by compressing the channel information. For example, in Orthogonal Frequency Division Multiplexing, this method transmits compressed data by using the compressing method for each sub-carrier's channel information. With the compressing method described above, one can consider a method like the DCT (Discrete Cosine Transform).

The third method is to generate CQI by selecting applicable frequency bandwidth needed to generate channel information. For example, in Orthogonal Frequency Division Multiplexing, instead of

transmitting channel information for all the sub-carriers, a Best-M method can be used by selecting and transmitting the best M number of frequency bandwidth for sub-carrier or sub-carrier group.

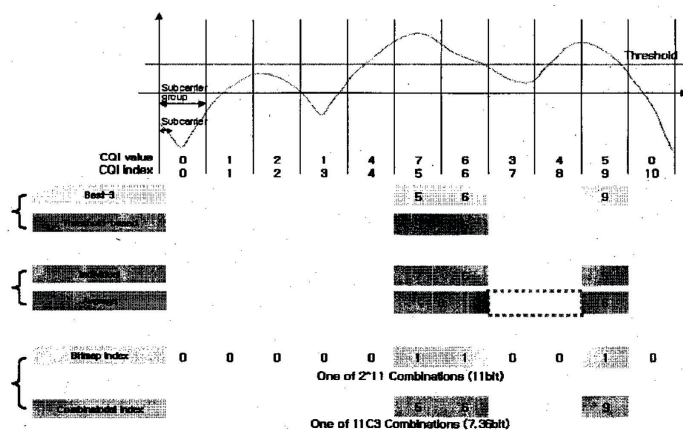
When transmitting the CQI generated by selecting the frequency bandwidth like this, transmitting sections can be largely divided into two sections. The first is the CQI value section and the second is the CQI index section.

D) Generating CQI through Frequency Bandwidth Selection Method

The Illustration 2 below describes the method of generating CQI by selecting CQI sub-band among the frequencies. The frequency bandwidth selected CQI method is composed of 3 major sections. The first is the method of selecting the frequency bandwidth, or CQI sub-band, to be used in CQI generation. The second method is to generate and transmit by manipulating the CQI value for frequency bandwidth selected above. The third method is to transmit the index of frequency bandwidth selected above or CQI sub-band.

In Illustration 2, first, it includes the Best-M and Threshold-based methods as examples for the CQI sub-band selection method. The Best-M technique is a method of selecting M number of CQI sub-bands with good channel condition. In the example, by using the Best-3 technique, it selected CQI sub-bands of index 5, 6, and 9 where the channel conditions were good. In addition, since the threshold-based method uses the technique of selecting CQI sub-bands that have higher channel condition than the established threshold, in this case, CQI sub-bands for index 5 and 6 that were higher than the threshold were selected.

As examples of a second method to generating and transmitting CQI values, Individual Transmission method and Average Transmission method are described. The Individual Transmission method is a method of transmitting all the CQI values of CQI sub-band selected in the first step described above. Accordingly, for the Individual Transmission method, when the number of CQI sub-band selected above increases, CQI values that need to be transmitted also increase. On the other hand, the Average Transmission method is a method of transmitting the average of CQI values of CQI sub-bands selected above. Accordingly, although the Average method has the benefit of transmitting only one CQI value regardless of the number of CQI sub-bands selected above, but by transmitting the average of many CQI sub-bands, it has the drawback of having lower accuracy. Here, the Average method can be a simple arithmetic average method or an average method taking into account channel capacity.



<Illustration 2> Frequency Bandwidth Selection CQI Generation and Transmission Technique

Thirdly, as an example of a method of transmitting CQI sub-band index, there is a Bitmap Index method and a general Combinatorial Index method. A Bitmap Index method allocates one bit to every CQI sub-band. If the relevant CQI sub-band is used, it is allocated as 1, and if it is not used, it is allocated as 0, and therefore, this method identifies which sub-band CQI was used. For this Bitmap Index method, although the number of bits necessary must match the total number of CQI sub-bands, regardless of the number of CQI sub-bands used, it can always be displayed with a fixed number of bits. As for Combinatorial Index method, it selects the number of CQI sub-bands to be used. And among all the CQI sub-bands, this method displays by mapping to each index of the combination of the number of CQI sub-bands used. To explain in more detail, when there are N number of CQI sub-bands, and when M number of CQI sub-band index from N above is used, the total number of possible combinations are as below.

$${}_N C_M = \frac{N!}{(N-M)!M!} \quad \text{Formula (1)}$$

For Formula (1), the number of bits needed to display the number can be calculated through Formula (2).

$$\lceil \log_2({}_N C_M) \rceil = \left\lceil \log_2 \left(\frac{N!}{(N-M)!M!} \right) \right\rceil \quad \text{Formula (2)}$$

For the example in Illustration 2, the number, when it is possible to select 3 CQI sub-bands among the total of 11 CQI sub-bands is ${}_{11}C_3=165$, and there are 8 bits to display 165 above. ($2^7 \leq {}_{11}C_3 \leq 2^8$)

E) Increase of CQI Transmission volume from Multiple Dimensions

The number of CQI, due to the increase in the number of transmissions from a variety of dimensions, can generate a great deal of overhead.

First, if you examine the increase of CQI from spatial dimension, it is as follows. For MIMO, through a number of layers, when a number of code words are transmitted, a number of CQI become necessary. For example, for 3GPP LTE, at most the use of 2 code words are possible with MIMO, and 2 CQI's become necessary. If one CQI is composed of 4 bits, and there are 2 code words, CQI must be composed of total of 8 bits. With this CQI, since all the users that need to notify channel conditions will transmit, from the total cellular resources perspective, it takes up many sections. Accordingly, from the channel capacity perspective, it is advisable to minimize the volume of such CQI.

Second, if you examine the increase of CQI from the frequency perspective, it is as follows. The content of CQI examined prior is only applicable to one frequency bandwidth. If the receiver selects the frequency bandwidth that displays the best channel condition, transmits only the frequency selected above, and if the transmitter provides services through the frequency bandwidth selected by the CQI above, CQI becomes necessary for only one bandwidth. For this scenario, although this is appropriate for a single user environment, it is not appropriate for multi-user environment, and hence more efficient method is required. In case when CQI is transmitted only on one preferred bandwidth, if the issues that arise from the scheduling process is examined in further detail, they are as follows. Although there would be no issues if frequency bandwidths preferred by multi-users are all different and do not overlap, but when a particular frequency bandwidth is selected by multiple users as the one with the best channel condition, issues arise. In this case, except for the selected user, other users will not be able to use the particular frequency bandwidth. Here, if each user transmits only through one preferred frequency bandwidth, opportunity for users that are not selected prior to getting service will inherently be blocked. Accordingly, in order to eliminate this issue and to effectively garner the benefits of diversity through multi-users, it is necessary to transmit CQI for a number of frequency bandwidths. With the transmission of relevant CQI for multiple frequency bandwidths like this, the volume of transmitted information will increase in accordance with the number of selected frequency bandwidth CQI. For example, when 3

frequency bandwidths are selected in the order of best channel condition, and when each CQI and frequency bandwidth indicators are transmitted, CQI transmission volume increases 3 times, and for indicators needed to display selected frequency bandwidths, additional transmission is necessary.

Third, when considering spatial and frequency modes, one needs to consider the increase in CQI. We need to consider that from spatial perspective, many CQI will be necessary, and from frequency perspective, many CQI will also be necessary.

Fourth, one needs to consider increase in CQI from other perspectives. For example, when Code Division Multiple Access (CDMA) method is utilized, since there will be changes in signal strength for each diffusion code, interference amount and others, CQI per diffusion code can be considered. Accordingly, increase in CQI from code perspective can be considered. In addition, increase in CQI from a variety of perspectives can be considered.

In order to decrease the transmission volume from transmitting all of these CQI, A concept called Delta CQI was introduced. Here, one CQI is transmitted normally, and for the other CQI, only the difference from the first CQI is transmitted. Hence, this uses method similar to Differential Modulation that is a part of modulation method.

F) Differential CQI

In above, the necessity of CQI was examined from a variety of perspectives. In cases when many CQI are necessary, in order to reduce the transmission volume for CQI, it is possible to use Delta CQI concept. By selecting one CQI that will serve as a base, the base CQI is transmitted normally. For subsequent CQIs, only the differences from the base CQI are transmitted. Hence, this uses method similar to Differential Modulation that is a part of modulation method. Here, when many CQI are displayed by a differential method, many bits are generally allocated to the base CQI value, and relatively fewer bits are allocated to differential values thereby decreasing the overall transmission volume in transmitting CQI.

G) CQI Transmission Mode

Uplink channel used for transmitting CQI in 3GPP LTE system is as follows in Chart 1.

Chart 1. Channel Used in CQI Transmission

Scheduling Method	Periodic CQI Transmission	Non Periodic CQI Transmission
Frequency Non Selection	PUCCH	
Frequency Selection	PUCCH	PUSCH

As illustrated in Chart 1, CQI, determined periodically by the higher layer, can be transmitted by using the Physical Uplink Control Channel (PUCCH). And based on the need of the scheduler, it can be transmitted non-periodically by using the Physical Uplink Shared Channel (PUSCH). When transmitting through PUSCH, it is possible only when frequency is selected.

1) Transmitting CQI/PMI/RI through PUSCH after Receiving CQI Transmission Request Control Signal (CQI Request)

In this case, PUSCH scheduling control signal (UL Grant) transmitted through the Physical Downlink Control Channel (PDCCH) includes control signal requesting CQI transmission (CQI Request). Chart 2 below displays the mode when CQI/PMI/RI is transmitted through PUSCH.

Chart 2. Mode when CQI/PMI/RI is transmitted through PUSCH

		PMI Feedback Type		
		No PMI	Single PMI	Multiple PMI
PUSCH CQI feedback	Wideband (wideband CQI)			Mode 1-2
	UE Selected	Mode 2-0		Mode 2-2

	(subband CQI)			
	Higher Layer- configured	Mode 3-0	Mode 3-1	
	(subband CQI)			

The transmission mode in Chart 2 is selected at the higher layer, and CQI/PMI/RI gets transmitted together at the same PUSCH sub-frame.

1-1) Mode 1-2

- Under the assumption that data related to each sub-band is transmitted only through the sub-band, precoding matrix is selected.
- Under the assumption of the precoding matrix selected previously, the terminal generates CQI for system bandwidth or bandwidth designated by the higher layer (set S).
- The terminal transmits CQI and PMI value for each sub-band. At this time, the size of each sub-band can be different depending on the size of the system bandwidth.

1-2) Mode 2-0

- The terminal selects M number of sub-band that prefer system bandwidth or bandwidth designated by the higher layer (set S).
- The terminal, assuming that it will transmit data related to the M number of sub-band selected, generates one CQI value.
- The terminal generate one additional CQI (wideband CQI) value for system bandwidth or for set S.
- In case there are many code word for M number of sub-band selected, CQI value for each code word is defined in the differential form.
 - Differential CQI = Index associated with CQI value of M number of sub-band selected – wideband CQI index.
- The terminal transmits information on the location of M number of sub-band selected, one CQI value for M number of sub-band selected, and CQI value generated on overall bandwidth or set S. At this time, the size of sub-band and the value of M can change based on the size of the system bandwidth.

1-3) Mode 2-2

- With an assumption that the data will be transmitted through the M number of preferred sub-band, the terminal simultaneously selects the location of M number of preferred sub-band and single precoding matrix on M number of preferred sub-band.
- CQI value for M number of preferred sub-band is defined by the code word.
- The terminal will generate additional wideband CQI value for system bandwidth or on set S.
- The terminal transmits information on the location of M number of preferred sub-band, one CQI value for M number of sub-band selected, and CQI value generated for single precoding matrix index, wideband precoding matrix index and wideband CQI on M number of preferred sub-band. At this time, the size of sub-band and the value of M can change based on the size of the system bandwidth.

1-4) Mode 3-0

- The terminal generates wideband CQI value.
- With an assumption that the data will be transmitted through each sub-band, the terminal generates CQI value for each sub-band. At this time, even when RI > 1, CQI value will only display CQI value related to the first code word.

1-5) Mode 3-1

- Single precoding matrix is generated for system bandwidth or set S.
- UE assumes the single precoding matrix generated previously for each sub-band and generates sub-band CQI for each code word.
- Assuming single precoding matrix, UE generates wideband CQI.
- CQI for each sub-band is expressed in a differential form.
 - Sub-band CQI = Sub-band CQI Index – Wideband CQI Index
- The size of sub-band can change based on the size of system bandwidth.

2) Periodic Transmission of CQI/PMI/RI through PUCCH

In this case, CQI information is periodically transmitted through PUCCH. But when a control signal to transmit user data is received, it can be transmitted through PUSCH. Even when it is transmitted through PUSCH, content of CQI/PMI/RI is based on CQI generated and transmitted by one of the mode defined in the Chart 3 below. It can have transmission modes as described in Chart 3 below. In case of Mode 2-0 and Mode 2-1 in the Chart 3, the bandwidth part (BP), in the field of frequency, is the gathering of continuously located sub-band, and can cover both system bandwidth and set S. The size of each sub-band, the size of BP, and the number of BP can change based on the size of the system bandwidth. In addition, in order to cover system bandwidth and set S, CQI per BP is transmitted in an ascending order based on frequency.

Chart 3. CQI, PMI Transmission Mode

PUCCH CQI Feedback Type		PMI Feedback Type	
		No PMI	Single PMI
		Mode 1-0	Mode 1-1
	Wideband (wideband CQI)		
	UE Selected (subband CQI)	Mode 2-0	Mode 2-1

According to the combination of CQI/PMI/RI transmission, there are the following 4 transmission types.

- Type 1: Transmit sub-band CQI for Mode 2-0, Mode 2-1
- Type 2: Transmit Wideband CQI and PMI.
- Type 3: Transmit RI.
- Type 4: Transmit Wideband CQI.

When transmitting RI and wideband CQI/PMI, they are transmitted from sub-frame that has different cycle and offset, and when RI and wideband CQI/PMI need to be transferred from the same sub-frame, CQI/PMI are not transmitted.

- Wideband CQI/PMI and sub-band CQI cycle is P, and has the following characteristics.

- Wideband CQI/PMI has the $H \cdot P$ cycle. At this time, $H = J \cdot K + 1$, J is BP value, and K is the total cycle value for BP. This is transmitted as $\{0, H, 2H, \dots\}$.
- Outside of the time of transmitting Wideband CQI/PMI, at the time of $J \cdot K$ sub-band CQI is transmitted.
- RI cycle is M times the wideband CQI/PMI cycle, and has the following characteristics.
 - RI and wideband CQI/PMI offset is O .
 - In case RI and wideband CQI/PMI are transmitted from the same sub-frame, wideband CQI/PMI are not transmitted.
- The above parameter P , H , K and O are all determined by the higher layer and signaled.

2-1) Mode 1-0

When transmitting RI, generate RI for system bandwidth or set S and transmit type 3 report. If transmitting CQI, transmit wideband CQI.

2-2) Mode 1-1

When transmitting RI, generate RI for system bandwidth or set S and transmit type 3 report. When transmitting CQI/PMI, assuming the most recently transmitted RI, select single precoding matrix. Transmit type 2 report containing Wideband CQI, single precoding matrix, and differential wideband CQI.

2-3) Mode 2-0

When transmitting RI, generate RI for system bandwidth or set S and transmit type 3 report. When transmitting Wideband CQI, assuming the most recently transmitted RI, generate wideband CQI and transmit type 4 report. If transmitting CQI on selected sub-band, UE, by selecting the most preferred sub-band for J number of BP composed of N number of sub-band, transmit type 1 report. For type 1 report, following BP, 1 additional sub-frame may be necessary.

2-4) Mode 2-1

When transmitting RI, generate RI on system bandwidth or set S and transmit type 3 report. When transmitting Wideband CQI, assuming the most recently transmitted RI, generate wideband CQI and transmit type 4 report. If transmitting CQI on selected sub-band, UE, for J number of BP composed of a number of N_j , by assuming the most recently transmitted PMI/RI, single CQI value for sub-band selected within BP, and when RI is greater than 1, assuming the most recently transmitted RI and assuming the use of single precoding matrix for the selected sub-band, generate difference in CQI per code word and use type 1 report to transmit.

Explanation provided up to this point is with one CC (Component Carrier) each for downlink and uplink as depicted in Illustration 3 (a). By corresponding with one another, a mapping relationship is established for transmitting uplink channel information regarding downlink.

Frequency bandwidth and downlink frequency correspond with one another. And with only one DL/UL CC each, when there is a CQI request for UL grant, according to the non-periodic CQI transmission mode established by the higher layer above, channel information on downlink can be transmitted through the scheduled PUSCH.

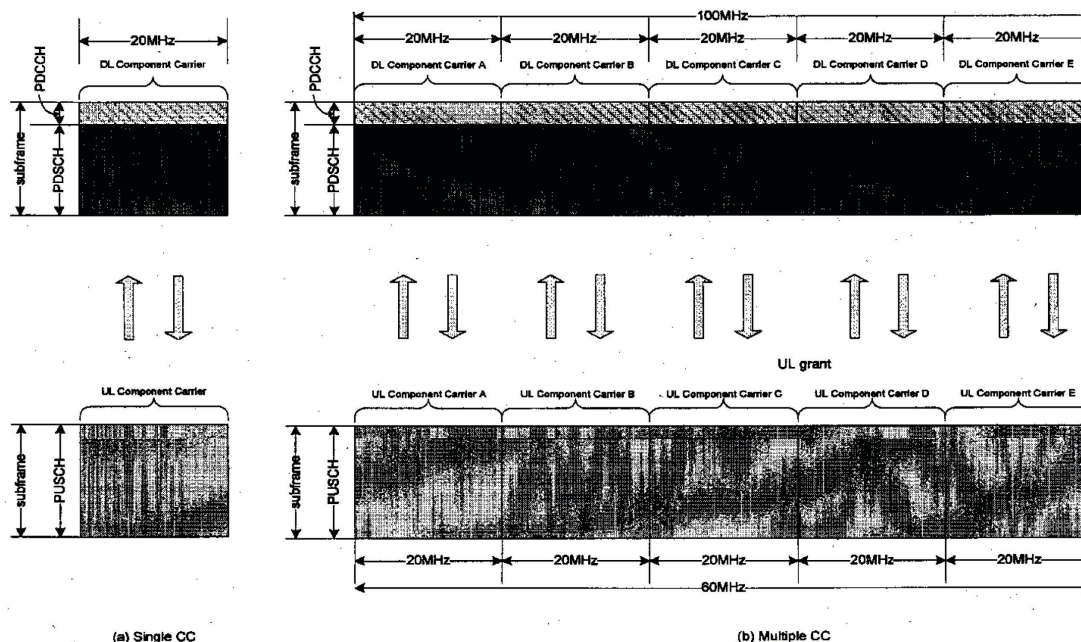


Illustration 3.

Since there are many DL CC with base station / terminal systems (for example, a system like LTE-A (LTE-Advance) which is an improved version of LTE) where there are simultaneous receiving and sending with a number of CC for downlink and uplink as depicted in Illustration 3 (b), there is a need to freshly define the composition and translation of CQI request included in UL grant for non-periodic CQI report.

When there is a CQI request in UL grant, there is overhead when entire CQI information for each DL CC is uploaded every time. Accordingly, Method 1 and Method 2 refers to Per-CC CQI request that limits CQI report for one CC with CQI request.

(Method 1) Together with CQI request to PDCCH that includes UL grant, provide explicit indication to CC for CQI transmission.

According to the composition method for PDCCH, we can consider establishing a control signal to transmit only through a specific DL for PDCCH that includes UL grant for all UL CC. In this case, an explicit indication to DL CC is necessary for reporting CQI through relevant PDCCH. In addition, a method like this is needed in order to independently select DL CC for reporting Per-CC CQI and independently selecting DL CC to send PDCCH that includes UL grant.

For example, if there are M number of DL CC, with the addition of 1 bit for Per-CC CQI request bit, $\lceil \log_2 M \rceil$ bit is used for CC indication for Per-CC request. For more efficient bit composition, compose the bit by bundling CC indication for Per-CC request for M states with CQI request off for 1 state $\lceil \log_2 (M+1) \rceil$.

(Method 2) CQI information transmission for DL CC that transmits PDCCH that includes UL grant (Implicit Indication)

Although only Per-CC CQI request for 1 bit is used, for CQI report, CQI is reported on DL CC that transmits PDCCH that includes UL grant. This method includes the benefit of directly using the format from existing LTE Rel 8, and compared to Method 1, it can reduce signaling. But, it has a downside in that it forces transmission of PDCCH that includes UL grant only through relevant DL CC for CQI request on DL CC.

Method 1 and Method 2 above refer to CQI reporting on one CC in order to reduce UL CQI report overhead. For this method, in order to receive CQI information on all CC, many PDCCH that include UL grant per CC need to be simultaneously transmitted, or consecutively transmitted in order to see CQI information on entire CC. But, when channel condition changes suddenly and there are frequent updating of CQI information on CC, it is advisable to instruct through one PDCCH (One-shot whole CC CQI request). Consider other methods such as Method 3 or 4.

(Method 3) Addition of One-shot whole CC CQI request to Method 1

Simultaneously supports Explicit CC indication for Per-CC CQI request and One-shot whole CC CQI request. For example, if there are M number of DL CC, by bundling CC indication for Per-CC CQI request for M states, and CQI request off for 1 state, with One-shot whole CC CQI request for 1 state, it can generate $\lceil \log_2 (M+2) \rceil$ bits.

(Method 4) Addition of One-shot whole CC CQI request to Method 2

Simultaneously support Implicit CC indication for Per-CC CQI request and One-shot whole CC CQI request. For example, One-shot whole CC CQI request can be generated by adding an independent bit.

In case of non-periodic CQI transmission, there is a mode to transmit through PUSCH only CQI without UL Payload data from CQI request and combination of value for specifically designated PRB and specific MCS. This is defined as CQI only transmission. Since One-shot whole CC CQI report is a Burst information, during this instance, it can be advantageous to transmit without mixing with Payload data.

For example, in LTE-A system that contains multiple CC, when there is CQI request in 1 bit as in the existing LTE, when there is Payload data in PUSCH, execute Per-CC CQI report. And for CQI only transmission, executing One-shot whole CC CQI report can be considered. Here, CQI only transmission can be composed of the value for specifically designated PRB, specific MCS combination, and CQI request. Accordingly, with this composition, there is the advantage of not needing additional signaling bit for One-shot whole CC CQI request.

3. Effects of the Invention

This invention proposes non-periodic channel information transmission methods and related signaling methods for systems with a variety of CC. By using the proposed methods, channel information transmission signaling can be efficiently generated.

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	UT08-0892
		Application Number	
Title of Invention	CQI REQUEST METHOD FOR MULTIPLE COMPONENT CARRIER AGGREGATION		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1					Remove
Applicant Authority		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Dong	Youn	SEO		
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Seoul	Country Of Residenceⁱ	KR		
Citizenship under 37 CFR 1.41(b)ⁱ		KR			
Mailing Address of Applicant:					
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Address 2	533 Hoge-1dong, Dongan-gu, Anyang-si, Gyeonggi-do				
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Postal Code	431-080	Countryⁱ	KR		
Applicant 2					Remove
Applicant Authority		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Joon	Kui	AHN		
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Seoul	Country Of Residenceⁱ	KR		
Citizenship under 37 CFR 1.41(b)ⁱ		KR			
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City	Anyang	State/Province			
Postal Code	431-080	Countryⁱ	KR		
Applicant 3					Remove
Applicant Authority		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Jung	Hoon	LEE		
Residence Information (Select One) <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
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		Application Number	
Title of Invention	CQI REQUEST METHOD FOR MULTIPLE COMPONENT CARRIER AGGREGATION		

Citizenship under 37 CFR 1.41(b) i		KR	
Mailing Address of Applicant:			
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City	Anyang	State/Province	
Postal Code	431-080	Country	KR
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.			

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.			
Customer Number	67487		
Email Address	info@kpatent.com	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>
Email Address	sjpark@kpatent.com	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

Application Information:

Title of the Invention	CQI REQUEST METHOD FOR MULTIPLE COMPONENT CARRIER AGGREGATION		
Attorney Docket Number	UT08-0892	Small Entity Status Claimed	<input type="checkbox"/>
Application Type	Provisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

Publication Information:

<input type="checkbox"/> Request Early Publication (Fee required at time of Request 37 CFR 1.219)
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	UT08-0892
		Application Number	
Title of Invention	CQI REQUEST METHOD FOR MULTIPLE COMPONENT CARRIER AGGREGATION		
Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	67487		

Domestic Benefit Information:

This section allows for the applicant to claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c). Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)

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This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

			Remove
Application Number	Country ⁱ	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
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Assignee Information:

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Assignee 1				Remove
If the Assignee is an Organization check here. <input checked="" type="checkbox"/>				
Organization Name	LG Electronics Inc.			
Mailing Address Information:				
Address 1	20 Yeouido-dong, Yeongdeungpo-gu			
Address 2				
City	Seoul	State/Province		
Country ⁱ	KR	Postal Code	150-721	
Phone Number		Fax Number		
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	UT08-0892
		Application Number	
Title of Invention	CQI REQUEST METHOD FOR MULTIPLE COMPONENT CARRIER AGGREGATION		

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.					
Signature	/Andrew S. Park/			Date (YYYY-MM-DD)	2008-12-29
First Name	Andrew	Last Name	Park	Registration Number	47841

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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