

Random access preamble transmission method and apparatus in communication system operating multiple component carriers, TA transmission method and apparatus using same

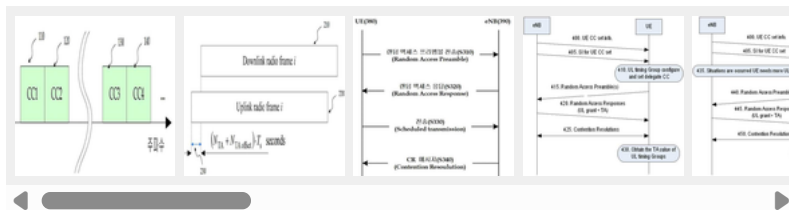
Abstract

translated from Korean

The present specification provides a method and apparatus for transmitting a random access preamble for uplink synchronization in a wireless communication system operating a plurality of CCs, and a method and apparatus for transmitting TA using the same.

According to an embodiment of the present disclosure, in a state in which uplink timing groups for a plurality of CCs are set in a wireless communication system, group setting basic information (which may be Timing Advance) for some carriers becomes invalid. In this case, the present invention provides an apparatus and method for selectively using one or more of various transmission schemes in transmitting synchronization acquisition information to update them.

Images (16)



Classifications

H04W56/0045 Synchronisation arrangements compensating for timing error of reception due to propagation delay compensating for timing error by altering transmission time

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Claims (14)

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translated from Korean

A random access preamble (RAP) transmission method in a communication system using a multi-component carrier (CC),

Determining a RAP transmission method for transmitting RAPs of all CCs or representative uplink CCs requiring updating when TA update for one or more CCs or groups is required when the initial uplink timing group is set;

And transmitting the RAPs of all the CCs or representative uplink CCs requiring the update according to the determined scheme.

The method of claim 1,

The RAP transmission method is a method of simultaneously transmitting the RAP of all the CC or the representative uplink CC that needs to be updated, a method of individually transmitting the RAP of all the CC or the representative uplink CC that needs to be updated, all CC or representative up to the update Random access preamble (RAP) transmission method, characterized in that it comprises one or more of the scheme of transmitting some of the RAP of the link CC at the same time, the other part separately.

The method of claim 2,

The RAP transmission method is a random access preamble (RAP) transmission method, characterized in that determined by the priority information or reference information transmitted from the eNB, the SI transmitted from the eNB, and a predetermined appointment between the eNB and the UE.

The method of claim 1,

The method further includes detecting the occurrence of a TA update condition indicating whether a TA update for one or more CCs or groups is needed,

The TA update condition is for each group if the eNB requests synchronous reset for all downlink CCs, initializes and retries the transmission of all uplink data, and when the UE TimeAlignment timer expires. Random access preamble (RAP) transmission method characterized in that at least one of when the set group time alignment timer expires.

A random access preamble (RAP) transmission method in a communication system using a multi-component carrier (CC),

Determining a TA acquisition method for one or more CCs when reorganization of the uplink timing group is required with an initial uplink timing group set;

And transmitting a RAP for the one or more CCs according to the TA acquisition method.

The method of claim 5,

The method of acquiring TA may include obtaining a TA by transmitting RAPs for all CCs ungrouped, obtaining a TA by transmitting RAPs of all CCs included in a specific group that is ungrouped, and in a specific group. Random access preamble (RAP) transmission method, characterized in that at least one of the method for obtaining a TA by transmitting only the RAP for a specific CC that has not been validated.

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The method of claim 5,

The method further comprises detecting the occurrence of a group regrouping condition indicating whether regrouping of the uplink timing group is necessary,

The group regrouping condition is when there is no response for uplink transmission data for some uplink CCs of CCs in the group of the UE, or when the eNB requires resetting for some CCs in the group for downlink synchronization. Or when the CC TimeAlignment timer set for each CC has expired, when the downlink / uplink connection setting in the eNB is changed, or when the uplink timing group is changed and the downlink / uplink connection setting in the group is changed. If this is changed, the random access preamble (RAP) transmission method, characterized in that one or more of the case where the UE further configured a new additional uplink CC.

The method of claim 5,

The transmitting of the RAPs for the one or more CCs may include transmitting RAPs for all CCs according to the TA acquisition scheme, transmitting RAPs for all CCs included in a specific group in which grouping is released, or validity within a specific group. Random access preamble (RAP) transmission method, characterized in that for transmitting only the RAP for a specific CC that has not secured.

A TA (Timing Advance) transmission method in a communication system using a multi-component carrier (CC),

Receiving a RAP for one or more CCs or group representative CCs from a UE that detects a realignment or TA update condition of the uplink timing group while an initial uplink timing group is established;

Generating a TA value for the CC having received the RAP and transmitting the TA value to the UE;

TA transmission method comprising a.

10. The method of claim 9,

The receiving of the RAP may include receiving all or part of RAPs for one or more CCs or group representative CCs simultaneously, or individually receiving all of the RAPs for one or more CCs or group representative CCs.

A random access preamble (RAP) transmitter in a communication system using a multi-component carrier (CC),

A RAP transmission method determination unit configured to determine a RAP transmission method for transmitting RAPs of all CCs or representative uplink CCs requiring update, when a TA update for one or more CCs or groups is required while the initial uplink timing group is set;

RAP transmission simultaneously transmitting all or part of the RAPs of all the CCs or the representative uplink CCs requiring update according to the determined RAP transmission method, or individually transmitting all of the RAPs of all the CCs or representative uplink CCs requiring update part;

Random access preamble (RAP) transmitting apparatus comprising a

A random access preamble (RAP) transmitter in a communication system using a multi-component carrier (CC),

A TA acquisition method determination unit configured to determine a TA acquisition method for one or more CCs when reorganization of the uplink timing group is required in a state where an initial uplink timing group is set;

A RAP transmitter for transmitting the RAP for the one or more CCs according to the determined TA acquisition scheme;

Random access preamble (RAP) transmitting apparatus comprising a

The method of claim 12,

The RAP transmitter transmits RAPs for all CCs according to the determined TA acquisition scheme, transmits RAPs for all CCs included in a specific group in which grouping is released, or for a specific CC that does not secure validity in a specific group. Random access preamble (RAP) transmitter, characterized in that for transmitting only RAP

A TA (Timing Advance) transmitter in a communication system using a multi-component carrier (CC),

A RAP receiver configured to receive a RAP for one or more CCs or a group representative CC from a UE that detects a realignment or TA update condition of the uplink timing group in an initial uplink timing group set;

A TA value generator for generating a TA value for the CC that has received the RAP;

Transmitting and receiving unit for transmitting the generated TA value to the UE;

TA transmission apparatus comprising a.

Description

translated from Korean

Random access preamble transmission method and apparatus in a communication system operating a plurality of component carriers, and TA transmission method and apparatus using the same. ADVANCE USING THE SAME}

The present invention relates to a random access preamble transmission method and apparatus for uplink synchronization in a wireless communication system operating a plurality of component carriers, and a TA transmission method and apparatus using the same. In particular, a random access preamble is applied to a plurality of component carriers. A method and apparatus for transmitting.

In a wireless communication system, synchronization between a user terminal and a base station is an important problem. This is because the user terminal and the base station cannot exchange normal information without synchronization.

On the other hand, unlike conventional wireless communication systems that support one component carrier (hereinafter referred to as 'CC' or 'component carrier') or one service band, the current wireless communication system uses a plurality of component carriers. To satisfy user service needs. However, there is no specific discussion on how to perform synchronization for the plurality of CCs.

In other words, in order to perform communication, synchronization is a factor that greatly affects the efficiency of a network, and an effective synchronization scheme in a wireless communication system in which a plurality of component carriers exist in consideration of these factors is required.

An object of the present invention is to provide an apparatus and method for transmitting synchronization acquisition information for establishing an uplink timing group for a plurality of CCs in a wireless communication system.

In addition, when the uplink timing group for a plurality of component carriers is set in the wireless communication system, when the group setting basic information (which may be Timing Advance) for some carriers becomes invalid, An apparatus and method for updating are provided.

The present invention also provides an apparatus and method for selectively transmitting synchronization acquisition information in consideration of a triggering condition of a UE in transmitting synchronization acquisition information for setting uplink timing groups for a plurality of CCs in a wireless communication system. To provide.

In order to achieve the above object, according to an embodiment of the present specification, a random access preamble (RAP) transmission method in a communication system using a multi-component carrier (CC), wherein at least one initial uplink timing group is set, If a TA update for a CC or group is required, determining a RAP transmission method for transmitting a RAP of all CCs or representative uplink CCs that need to be updated, and according to the determined method, for all CCs or representative uplink CCs requiring the update. It provides a random access preamble (RAP) transmission method comprising the step of transmitting the RAP.

In another embodiment of the present invention, a random access preamble (RAP) transmission method in a communication system using a multi-component carrier (CC), when the reorganization of the uplink timing group is required in a state where the initial uplink timing group is set A method for transmitting a random access

preamble (RAP), comprising: determining a TA acquisition method for at least one CC and transmitting a RAP for the at least one CC according to the TA acquisition method.

In another embodiment of the present invention, as a TA (Timing Advance) transmission method in a communication system using a multi-component carrier (CC), a realignment or TA update condition of the uplink timing group is set in a state where an initial uplink timing group is set. Receiving a RAP for at least one CC or group representative CC from the detected UE, and generating a TA value for the CC receiving the RAP, and transmitting to the UE.

In another embodiment of the present invention, a random access preamble (RAP) transmitter in a communication system using a multi-component carrier (CC), wherein a TA update for one or more CCs or groups is performed while an initial uplink timing group is set. If necessary, a RAP transmission method determination unit for determining a RAP transmission method for transmitting RAPs of all CCs or representative uplink CCs requiring updating, and the RAPs of all CCs or representative uplink CCs requiring update according to the determined RAP transmission method. The present invention provides a random access preamble (RAP) transmitter including a RAP transmitter for transmitting all or part of the same time or individually transmitting all of the RAPs of all the CCs or the representative uplink CCs.

In another embodiment of the present invention, a random access preamble (RAP) transmitting apparatus in a communication system using a multi-element carrier (CC), when the uplink timing group needs to be reorganized with an initial uplink timing group configured A random access preamble (RAP) transmitter including a TA acquiring method determining unit determining a TA acquiring method for at least one CC and a RAP transmitting unit transmitting a RAP for the at least one CC according to the determined TA acquiring method; to provide.

In another embodiment of the present invention, a TA (Timing Advance) transmission apparatus in a communication system using a multi-component carrier (CC), in which an initial uplink timing group is set, a realignment or TA update condition of the uplink timing group is set. A RAP receiver for receiving a RAP for at least one CC or a group representative CC from the detected UE, a TA value generator for generating a TA value for the CC that has received the RAP, and transmitting the generated TA value to the UE Provided is a TA transmitter including a transceiver.

- 1 is a view showing an example of a system using a plurality of component carriers to which the present invention is applied.
- 2 is a diagram illustrating an example related to a timing advance (TA) in a synchronization process to which the present invention is applied.
- 3 is a diagram illustrating a random access procedure between a user terminal and a base station to which the present invention is applied.
- 4A to 4C are diagrams illustrating a process of acquiring uplink synchronization to which an embodiment of the present specification can be applied.
- 5A to 5B illustrate a process of acquiring uplink synchronization to which an embodiment of the present specification can be applied.
- 6 is a diagram illustrating an operation of a UE to which an embodiment of the present disclosure is applied.
- 7 is a signal flow diagram of a UE when initial grouping to which an embodiment of the present disclosure is applied.
- 8 is a signal flow diagram of a UE when a TA value needs to be updated according to an embodiment of the present invention.
- 9 relates to the operation of a UE when it is necessary to reorganize an uplink timing group according to another embodiment of the present invention.
- 10 is a signal flow diagram of an eNB according to an embodiment of the present invention.
- 11 is a configuration diagram of a TA transmitter according to an embodiment of the present invention.
- 12 is a block diagram of a RAP transmitter or receiver according to an embodiment of the present invention.
- 13 is a block diagram of a RAP transmitter or receiver according to another embodiment of the present invention.

Hereinafter, some embodiments will be described in detail with reference to exemplary drawings. In adding reference numerals to the components of each drawing, it should be noted that the same reference numerals are used to refer to the same components as much as possible even if displayed on different drawings. In the following description of the embodiments of the present invention, a detailed description of known functions and configurations incorporated herein will be omitted when it may make the subject matter of the present disclosure rather unclear.

In addition, in describing the component of this specification, terms, such as 1st, 2nd, A, B, (a), (b), can be used. These terms are only for distinguishing the components from other components, and the nature, order or order of the components are not limited by the terms. If a component is described as being "connected", "coupled" or "connected" to another component, that component may be directly connected or connected to that other component, but between components It will be understood that may be "connected", "coupled" or "connected".

In addition, the present invention will be described with respect to a wireless communication network. The work performed in the wireless communication network may be performed in a process of controlling a network and transmitting data by a system (e.g., a base station) Work can be done at a terminal connected to the network.

Wireless communication systems are widely deployed to provide various communication services such as voice and packet data.

The wireless communication system includes a user equipment (UE) and a base station (BS).

A terminal in the present specification is a comprehensive concept that means a user terminal in wireless communication. In addition to UE (User Equipment) in WCDMA, LTE, and HSPA, as well as MS (Mobile Station), UT (User Terminal), SS in GSM It should be interpreted as a concept that includes a subscriber station, a wireless device, and the like.

A base station or cell generally refers to a fixed station communicating with a terminal, and includes a Node-B, an evolved Node-B, a Base Transceiver System, and an Access Point. Access Point) may be called.

That is, in the present specification, a base station or a cell should be interpreted in a comprehensive sense indicating a part of a region covered by a base station controller (BSC) in a CDMA, a Node B in a WCDMA, and the like. It is meant to cover various coverage areas, such as a femtocell and a femtocell.

In the present specification, the terminal and the base station are two transmitting and receiving entities used in implementing the technology or the technical idea described in the present specification and are used in a comprehensive sense and are not limited by the terms or words specifically referred to.

There are no restrictions on multiple access schemes applied to wireless communication systems. Various multiple access techniques such as Code Division Multiple Access (CDMA), Time Division Multiple Access (TDMA), Frequency Division Multiple Access (FDMA), Orthogonal Frequency Division Multiple Access (OFDMA), OFDM-FDMA, OFDM-TDMA, OFDM-CDMA Can be used.

A TDD (Time Division Duplex) scheme in which uplink and downlink transmissions are transmitted using different time periods, or an FDD (Frequency Division Duplex) scheme in which they are transmitted using different frequencies can be used.

An embodiment of the present disclosure is to asynchronous radio communication evolving into Long Term Evolution (LTE) and LTE-advanced through GSM, WCDMA, HSPA, and synchronous radio communication evolving into CDMA, CDMA-2000 and UMB. Can be applied. The embodiments presented in this specification should not be construed as being limited or limited to a specific wireless communication field, but should be interpreted as including all technical fields to which the technical spirit of the present specification may be applied.

1 is a view showing an example of a system using a plurality of component carriers to which the present invention is applied.

Referring to FIG. 1, the wireless communication system to which the present invention is applied is an example of a LTE-Advanced (LTE-A) system as a next-generation communication system recently discussed. The LTE-Advanced (LTE-A) system is a scheme for extending a bandwidth for satisfying system requirements, that is, a high data rate required by LTE-A, and includes a component carrier or component that is a plurality of unit carriers. The use of a carrier (Component Carrier, CC) is defined. Here, one CC may have a bandwidth of up to 20 MHz, and resources may be allocated within 20 MHz according to a corresponding service.

In addition, it is possible to define the use of a carrier aggregation (hereinafter referred to as "CA") that combines up to five of one component carrier (Component Carriers) to use as one system band. As a result, next-generation communication systems can extend bandwidth up to 100 MHz to support quality of service. In this case, the frequency band that may be determined by each component carrier, that is, the assignable frequency band may be contiguous or non-contiguous according to the scheduling of the actual CA.

That is, in the present specification, in order to distinguish a plurality of component carriers, CCs may be indicated and indicated as CC0 and CC1. However, the numbers included in these component carriers do not coincide with the order of the component carriers or the positions of the frequency bands of the component carriers.

In FIG. 1, the first component carriers CC1 and 110, the second component carriers CC2 and 120, the third component carriers CC3 and 130, and the fourth component carriers CC4 and 140 are configured. The carrier may be allocated differently uplink or downlink according to a scheduler, or the same uplink and downlink may be allocated and used together.

On the other hand, in a wireless communication environment, a radio wave is propagated at a transmitter and undergoes a propagation delay while being transmitted from a receiver. Therefore, even if both transmitters and receivers know exactly the time when radio waves propagate in the transmitter, the time that a signal arrives at the receiver is affected by the transmission / reception period distance, the surrounding radio wave environment, and changes with time when the receiver moves. If the receiver does not know exactly when the signal transmitted by the transmitter is received, even if the signal reception fails or is received, the receiver receives the distorted signal and communication is impossible.

Therefore, in a wireless communication system, synchronization between the base station and the UE, regardless of the downlink / uplink, must be preempted to receive the information signal. That is, the synchronization acquisition procedure is a very important procedure in the communication system, and maintaining it also greatly affects system stability and communication quality.

On the other hand, there are various types of synchronization, such as frame synchronization, information symbol synchronization, sampling period synchronization, etc. Among them, the sampling period synchronization may be the most basically obtained synchronization to distinguish physical signals.

In downlink transmission, which is a communication link in a direction from the base station to the UE, synchronization acquisition is performed based on a signal of the base station at the UE. The base station transmits a specific signal mutually promised to facilitate downlink synchronization at the UE, and based on this, the UE should be able to accurately identify the time when the specific signal transmitted from the base station is transmitted. In the case of the downlink, since one base station transmits the same synchronization signal to multiple UEs at the same time, each of the UEs may independently acquire synchronization through the synchronization signal.

However, in the uplink, the base station receives signals transmitted from a plurality of UEs and thus cannot acquire synchronization based on any one UE. Therefore, downlink and other acquisition procedures are needed.

Therefore, when the distance between each UE and the base station is different, the transmission delay time is different, and when uplink information is transmitted based on the acquired downlink synchronization, the information of each UE is received at the corresponding base station at different times. Will be.

That is, even if the transmission method used in the wireless communication system uses a CDMA-like method that can receive the uplink information of each UE at a different time, it can increase the complexity but without any problems. In the wireless communication system based on OFDMA or FDMA, the base station receives the uplink transmission information of all UEs at the same time and demodulates them all at the same time. As the difference in signal reception time increases, the reception performance deteriorates rapidly.

Therefore, in the system using OFDMA or SC-FDMA as the uplink transmission scheme as in the conventional LTE, a random access scheme is used for each UE to obtain the transmission delay time in the downlink and the transmission delay time in the uplink. The timing alignment value is calculated and notified to each UE to obtain uplink synchronization.

2 is a diagram illustrating an example related to a timing advance (TA) in a synchronization process to which the present invention is applied.

In general, in order for the base station and the terminal to communicate with each other, the uplink radio frame i 220 must be transmitted to coincide with the point in time when the downlink radio frame i 210 is transmitted. However, a time difference occurs due to a propagation delay between the user terminal and the base station.

Therefore, in consideration of such propagation delay, TA (Timing Advance) 230 is applied as a method of synchronizing the UEs of the base station by transmitting the uplink radio frame i 220 slightly earlier than the downlink frame i 210. Can be. Looking at the formula for calculating the TA is as follows.

[Equation 1]

$$T_A = (N_{TA} + N_{TAoffset}) \cdot T_s \text{ seconds}$$

$$T_A = (N_{TA} + N_{TAoffset}) \cdot T_s \text{ seconds}$$

Here, N_{TA} is a variable value controlled according to TA command information from a base station, and $N_{TAoffset}$ is a value fixedly set according to a frame structure. On the other hand, T_s means the sampling period. As can be seen in Figure 2, in order to achieve the uplink synchronization, the user terminal may receive the TA command information provided by the base station and proceed with the TA based on this. Thus, synchronization for wireless communication with the base station is obtained.

3 is a diagram illustrating a random access procedure between a user terminal and a base station to which the present invention is applied.

Referring to FIG. 3, a user equipment (UE) 380 needs uplink synchronization to transmit / receive data with the base station 390. A process of receiving information necessary for synchronization from the base station 390 may be performed for uplink synchronization. 3 illustrates a process of performing a random access procedure for receiving information necessary for synchronization.

The random access procedure may be applied to a case where the user terminal newly joins the network through a handover or the like, and after joining the network, may be performed in various situations such as synchronization or state change (RRC_IDLE to RRC_CONNECTED).

First, the user terminal 380 first selects a preamble signature randomly to generate a random access preamble. The selected preamble is transmitted to the base station 390 (S310). The preamble signature selection may proceed contention-based.

Meanwhile, the random access process may also use a contention-free manner. In this case, the base station informs the terminal of the pre-booked random access preamble and the corresponding terminal transmits the selected preamble to the base station 390 based on the received information (S310). When random access is performed on a non-competitive basis, a procedure such as a CR message required in the aforementioned contention-based scheme does not need to be performed.

Here, the user terminal 380 may recognize a random access-radio network temporary identifier (RA-RNTI) in consideration of a frequency resource and a transmission time point temporarily selected for preamble selection or RACH transmission.

The base station 390 performs a random access response (RAR) on the preamble of the received UE. In this case, the random access response message is transmitted through a physical downlink shared channel (PDSCH). Send. The information transmitted through the RAR message may include, for example, identification information of a UE preamble received by a base station, an identifier (ID) of a base station, a temporary C-RANI (Temporary-Cell Radio Network Temporary Identifier), and the UE preamble. The information on the received time slot and TA information may be included.

Accordingly, since timing information for uplink synchronization is received through the RAR message, the user terminal 380 may perform uplink synchronization with the base station 390.

The user terminal 380 performs scheduled transmission at a scheduled time point determined using the TA information received in step S320 (S330). Data is transmitted through a physical uplink shared channel (PUSCH), and may also perform a hybrid automatic repeat request (HARQ).

The message transmitted in step S330 may include, for example, an RRC connection request, a tracking area update, a scheduling request, and the like. In addition, one of the messages may include temporary C-RNTI, if the UE already has one, or UE identifier information.

Meanwhile, since collision may occur in steps S310 to 330, when the base station 390 transmits a contention resolution message (S340), the UE 380 i) a message received by the UE 380. May confirm that it is its own and send an ACK, or ii) confirm that the received message is that of another UE and do not send response data. Of course, the response data may not be sent if the downlink assignment is missed or the message cannot be decoded. The CR message may include C-RNTI or UE identifier information.

In a wireless system operating a plurality of component carriers to which the present invention is applied, as shown in FIG. 1, when the positions of the center frequencies between the component carriers are greatly separated from each other, or devices in the network supporting the component carriers are not the same, The value of TA between each component carrier is likely to be different from each other.

Therefore, when the synchronization acquisition scheme used in the single carrier is used as it is, it is difficult to obtain uplink synchronization for all component carriers of the plurality of component carriers. Therefore, the user terminal performs stable uplink communication only for some component carriers that have acquired uplink synchronization among usable component carriers.

In addition, if the user terminal transmits information through the same uplink synchronization criteria for component carriers having different uplink synchronization criteria, a transmission error is very likely to occur and may cause time and resource waste to recover it. . In such a case, it may be difficult to satisfy the uplink quality of service (QoS) for the application required in the system.

In addition, if a plurality of component carriers are operated in a wireless communication system, the transmission delay time in the downlink may be different from each other according to the characteristics of each component carrier and a support method in a wireless network for a single UE. In the case of configuring a component carrier or component carriers having the same TA value, uplink synchronization criteria for each component carrier set may be different from each other, resulting in uplink performance degradation.

In addition, in a state in which a plurality of CCs are grouped into one or more uplink timing groups, the TA value of some CCs becomes invalid without reorganization of the group, and a TA value update is necessary or the TA values of one or more CCs are invalid. This may result in the need to regroup the entire uplink timing group.

Accordingly, in an embodiment of the present invention, in a situation where a plurality of CCs are grouped into one or more uplink timing groups, in a situation where TA values are required to be updated due to the TA value of some CCs becoming invalid without group reorganization, the TA value is updated. Determine the RAP transmission method to transmit the RAPs of all required CCs or representative uplink CCs, and depending on the RAP transmission method, simultaneously transmit the RAPs of all CCs or representative uplink CCs that need to be updated, or all CCs or representatives that need to be updated. A hybrid RAP transmission method is provided in which RAPs of uplink CCs are individually transmitted, or some of the RAPs of all CCs or representative uplink CCs requiring updating are simultaneously transmitted while others are individually transmitted.

In another embodiment of the present invention, in a state where a plurality of CCs are grouped into one or more uplink timing groups, the TA value of one or more CCs becomes invalid, resulting in the need to reorganize the entire uplink timing group. In this case, the RAP is transmitted for all CCs according to the TA acquisition scheme, the RAP of all CCs included in a specific group that is ungrouped, or only RAPs for a specific CC that do not have validity in a specific group. A hybrid scheme can be used.

Hereinafter, a user terminal will be described as a UE and a base station as an eNB.

4 and 5 are diagrams illustrating an uplink synchronization acquisition procedure to which the present invention can be applied. When an eNB transmits information regarding a plurality of CCs to a UE, the UE sets a group related to timing for each CCs. Next, a process of performing a random access procedure (RAP) through a representative component carrier of each timing group is shown.

4A is a diagram illustrating a process of obtaining uplink synchronization to which an embodiment of the present invention can be applied.

Referring to FIG. 4A, when the UE is connected to the eNB (RRC_CONNECTED), step S400 is performed.

If the radio resource control connection state is IDLE or needs to be reset, the radio resource control connection is performed. When the radio resource control connection state between the eNB and the UE is in IDLE mode, or when the radio resource control connection needs to be reset, the eNB may call a component carrier set (CC Set) of the UE. This is because it cannot be defined and transmitted. Accordingly, the eNB selects at least one component carrier for radio resource control connection, configures component carrier aggregation information, and performs radio resource control connection with the UE.

On the other hand, the method for selecting at least one component carrier to perform the radio resource control connection may use one of the following a) conditions.

- a.i) The UE may select the most suitable component carrier (CC) to attempt a radio resource control connection based on the measured information.
- a.ii) A radio resource control connection may be attempted using information fixedly set by a system stored in a UE internal memory.
- a.iii) The eNB may attempt a radio resource control connection using the information transmitted to the UE through the system information.
- a.iv) A radio resource control connection may be attempted through corresponding CCs using system information of valid CCs stored in the UE internal memory.

If the radio resource control connection progress is completed through one of the above methods and the radio resource control connection state between the eNB and the UE is set (RRC_CONNECTED mode), the procedure of S400 is performed.

The eNB may allow the UE to use a plurality of CCs in consideration of hardware capability of the UE, available frequency resources of the eNB, etc., which is referred to as CC set or CC set. Can be defined). Accordingly, the eNB transmits information about the CC set allowed to use the UE to the UE (S400).

Here, the information on the CC set, the CC ID of the corresponding CC included in the CC set, index information indicating the CC, or difference information indicating another CC based on at least one CC (offset information) And the like. Alternatively, the apparatus may further include CC set ID information for identifying each CC set including at least one CC.

Therefore, the UE receives CC set information determined based on the above criteria from the eNB (S400). Here, in the transmission / reception scheme of the CC set information, the eNB may transmit the CC set information to the UE in the radio resource control reconfiguration message, and a message other than this may be used.

Thereafter, the UE receives system information about component carriers in the CC set (hereinafter, referred to as 'SI') based on the received component carrier set information (S405).

Here, the SI may include new information for configuring an uplink timing group for the TA in the UE. In addition, the SI may preferably further include information on how to establish a linkage between the downlink and uplink CCs, and may obtain the TA value of the uplink CC that cannot perform the procedure for acquiring the TA. The information may further include information about a reference uplink CC.

The SI may include center frequency information for each CC, information on the entire frequency band of the corresponding CC, and the like. If there is a component carrier, for example, an extension component carrier (ECC), which cannot transmit system information among corresponding component carriers in the component carrier set, the system information may be received. The system information of the ECC may be converted into a control information of a component carrier or a component carrier capable of receiving the system information. Alternatively, the current step may proceed without receiving system information on the ECC CC.

The UE configures an uplink timing group by using the UE CC set information and the SI received from the eNB and configures a representative CC (Delegate CC) for each group (410).

In configuring the uplink timing group, a CC that satisfies at least one or more of the following conditions 1) to 4) may always be set to another group when setting the group, but is not limited thereto. Meanwhile, CCs that do not satisfy the following conditions may be set to the same group when setting a group, but are not limited thereto.

1) First, CCs having a difference in a center frequency value of CCs above a threshold may be set in different groups. The threshold may be defined as an absolute frequency difference value, or may be defined as a relative frequency difference value.

For example, the relative frequency difference value may be expressed as a function for defining a difference of multiples (when $N > 1$) or more or a center frequency difference between CCs with respect to a center frequency of a predetermined CC. Therefore, when the threshold is defined as a case where the difference between the center frequencies is more than two times, assuming that the center frequency value of CC1 is 700 MHz and the center frequency value of CC2 is 2 GHz, the center frequency values of the two CCs are more than two times. Can be set to different groups.

2) In addition, CCs having different beamforming may be set to different groups.

For example, when each CC is mapped to a different antenna to generate the different beamforming to transmit a signal through the CC, the CCs having the different beamforming may be set to different groups. Alternatively, all CCs may be mapped to the same antennas so that the eNB may generate different beamforming for each CC through logical beamforming for the frequency band of each CC.

3) In addition, the macro cell (CC), which does not serve in the macro cell (femto cell), pico cell (pico cell), micro cell (micro cell), repeater (relay), repeater (repeater), etc. CCs that are serviced in the overlapped space with the macro cell and CCs that are only serviced in the macro cell may be set in different groups. In addition, CCs that are serviced in all of the cells (femto cell, pico cell, micro cell, relay, repeater, etc.) serviced in the overlapped space with the macro cell and the macro cell, all other CCs Differentiate from (CC only used in Macro cell or CC served in cells overlapping with Macro cell), and set to different group.

4) In addition, CCs configured differently with respect to the operation of the CC TimeAlignment timer may be set in different groups. Here, the different groups include those in which the corresponding CC timer operates by applying different TA values, or the operation of the actual CC timer itself is different.

On the other hand, CCs that do not satisfy all the above conditions are set to the same group when setting the group.

In each of the configured uplink timing groups, the UE configures a representative component carrier (referred to as a delegate CC 'representative CC' or 'representative uplink CC') in each group (410). The CC that may be the representative CC in each group in the UE should be a CC capable of a TA value acquisition procedure for uplink synchronization acquisition. It may also be determined by the frequency characteristic of the CCs in the group.

For example, the CC having the lowest center frequency value, the CC having the center frequency value closest to the average, or the CC having the highest center frequency value may be set as the representative CC. Alternatively, the representative CC may be set according to the frequency band. Alternatively, it may be set to CC having the widest frequency band. The representative CC setting method for each group may be selected based on the same criteria by selecting one of the above methods, or a different method may be applied for each group. In this case, when the UE configures a representative CC in a group including a primary CC (hereinafter referred to as 'PCC'), the UE may set the PCC as a representative CC in the group regardless of the eNB's standard.

The UE sets a random access preamble (RAP) for each representative uplink CCs in order to secure a valid TA value of the representative CCs in the uplink timing group, and performs random access to the SI of each representative CC. In operation 415, one of the defined resources is selected from the set time / frequency resources.

Here, transmission of the RAP signal of the UE may be determined by the eNB or by the UE.

More specifically, when information about CCs (eg, 'RACH transmission' priority of CCs) to transmit RAP is determined by the eNB, the UE receives and confirms information on the CCs, and the CCs Check the group set for. RAP may be transmitted through a representative uplink CC of a group including a CC having a higher priority among the identified groups. In this case, the UE may transmit the RAP randomly or simultaneously / sequentially with respect to the CCs for transmitting the RAP.

That is, the UE may select a representative uplink CC to send the RAP and transmit the RAP randomly or sequentially / simultaneously. Transmitting the RAPs simultaneously means that the CCs have the same RACH transmission priority, that is, they have the same priority.

Here, the UE simultaneously transmits RAPs of all CCs or representative uplink CCs requiring update, individually transmits RAPs of all CCs or representative uplink CCs requiring update, or all CCs or representative uplink CCs requiring update. Some of the RAPs can be sent at the same time, and some others individually.

In addition, the eNB may determine a time / frequency resource for transmitting a signal including the RAP or the RAP. Accordingly, the UE may set the RAP based on the information received from the eNB, and set the RAP transmission time / frequency resource for each representative uplink CC.

On the other hand, when there is no special signaling for RAP from the eNB, or when the signaling of the control mode of the eNB (off) is received, the UE is connected to each representative uplink CC for the random access for downlink CC RAP setting and RAP transmission time / frequency resources are determined using the parameters of each representative uplink CC set in the received SI.

The RAP transmission configuration may be a form in which the eNB places additional restrictions on a specific UE or a plurality of UEs in each RAP configuration range or a selection range of RAP transmission time / frequency resources for each representative uplink CC or directly for each representative uplink CC. You can also set the RAP to send.

The UE selects a CC to transmit data on the uplink in order to select a time / frequency resource for transmitting the RAP signal of each representative uplink CC, and transmits the RAP through the representative uplink CC only in groups including the corresponding CCs. Can be.

On the other hand, if it is determined that all uplink CCs configured to transmit data on the current uplink are needed, the UE may simultaneously transmit RAPs to all representative uplink CCs. On the other hand, if it is determined that some uplink CCs are needed, the RAPs of the representative uplink CCs for the remaining groups are simultaneously transmitted through the representative uplink CCs only in groups including some uplink CCs. Alternatively, the TA value acquisition procedure may be performed by random transmission.

More specifically, the UE may receive priority information of the uplink CC to send the RAP from the eNB, and may sequentially transmit the RAP based on the received priority information. Alternatively, the UE may receive the reference information that sets the priority of the uplink CC to send the RAP via the PCC. In this case, the UE may determine the priority of the representative uplink CC to transmit the RAP using the SI of each uplink CC received at 405 according to the reference information.

The reference information for setting the priority may be received as MAC control information. In this case, the MAC control information may be received through the PDSCH or may be received through the PDCCH. In addition, the reference information for setting the priority may be received through an RRC message. The RRC message includes received via PDSCH. Here, the reference information may be, for example, a bandwidth (BW), but is not limited thereto.

Accordingly, the UE may transmit the RAP by setting the priority by applying the bandwidth to the secondary CC SCC. In this case, the UE may transmit the RAP through the representative CC in the group including the PCC by setting the highest priority for the PCC regardless of the reference information.

On the other hand, if the reference information is previously promised between the UE and the eNB, the UE may determine the priority of the CC to send the RAP without special signaling from the eNB. As an example, if the UE has two or more SCCs to transmit the RAP, the UE may transmit the RAP by giving priority to a CC having a wide bandwidth.

On the other hand, after receiving the SI of each CC from the eNB, the UE may randomly select a representative uplink CC in the group and transmit the RAP. This is because the SI of each CC includes preamble (RAP) information for RACH (Random Access Channel) (hereinafter referred to as 'RACH') and information about time frequency resources. Accordingly, the UE checks the information on the preamble (RAP) and the time frequency resource for the representative uplink CC in each group, randomly selects a specific preamble and time frequency resource, and then selects the RACH as the representative uplink CC in the selected group. To perform.

On the other hand, if the UE is in the process of handover, the UE uses the RAP set by the eNB, ignores the existing set uplink timing group, and sets up one uplink CC to obtain a TA value through this. Proceed with the TA value acquisition procedure.

Here, the selection of the uplink CC may be an uplink CC set in connection with the channel quality or signal strength of downlink CCs between eNBs measured by the UE. Alternatively, the UE may select the uplink CC through mobility control information or information in an RRC reconfiguration message transmitted from the eNB.

Meanwhile, in order to proceed with a procedure for acquiring a TA value, linkage between downlink / uplink CCs, which is a reference for measuring TA values, for a single uplink CC is one of the following b) conditions. You can select to set.

b.i) Fixed statically throughout the system.

b.ii) It is set for each base station (eNB).

b.iii) For each user group set as needed by the base station.

If the downlink component carrier associated with the uplink component carrier cannot perform a procedure for receiving a TA value, or whether the downlink component carrier can perform a procedure for receiving a TA value If the uplink component carrier established without a TA value cannot perform the procedure for receiving the TA value, the downlink component carrier connected with the downlink component carrier that can perform the TA value acquisition procedure by selecting one of the following c) conditions: The TA value obtained from the carrier can be set to always be shared. In this case, when the procedure for receiving the aforementioned TA value cannot be performed, for example, the type of the corresponding CC may be an ECC or a CC in which synchronization acquisition is impossible among incompatible CCs.

c.i) System uplink component carriers that reference the TA value are configured.

c.ii) Set uplink CCs referring to the same TA value to all users in each base station.

c.iii) Set uplink component carriers that refer to TA values flexibly for each user or group of users.

The eNB calculates a TA value of each CC based on the received RAP. The calculated TA value of each CC is included in random access responses (hereinafter referred to as 'RAR') and transmitted to the UE (S420). In this case, the eNB may further transmit uplink allocation information (hereinafter, referred to as 'UL grant') of the UE.

The UL grant may include resource information, power control information, reference signal generation information, and channel quality information feedback request (CQI request) that can be used as an uplink by the UE, but is not limited thereto. no.

The UE checks the TA value of each CC in the received RAR and determines the validity of the received TA value (425). That is, the UE checks the validity of the received TA value through a content resolution (CR) procedure.

Here, the content resolution (CR) procedure, the UE transmits a MAC signaling or RRC message including the C-RNTI, T_C-RNTI or UE identity to the eNB. The eNB sends an ACK message containing the C-RNTI, T_C-RNTI or UE identity to the UE. Thereafter, the UE checks whether the C-RNTI, T_C-RNTI, or UE ID included in the ACK message received from the eNB is the same as the C-RNTI, T_C-RNTI, or UE ID assigned thereto. Thus, the validity of the received TA can be simultaneously verified.

As a result, when it is determined that the received TA value is valid, the TA value in each uplink timing group in which the corresponding CC is set as the representative CC is updated (430).

4B illustrates another example of an uplink synchronization acquisition procedure to which an embodiment of the present invention can be applied. FIG. 4B includes a synchronization acquisition procedure after the UE sets an uplink timing group and receives a TA value for each group to complete the update as shown in FIG. 4A. Also, unless otherwise noted, the procedure of FIG. 4B assumes that handover does not proceed. In addition, FIG. 4B may be distinguished and additionally applied after performing other procedures without performing the operation of FIG. 4A.

The eNB may allow the UE to use a plurality of CCs in consideration of hardware capability of the UE, available frequency resources of the eNB, etc., and may define them as a set. The eNB transmits the CC set information of the UE to the UE (400). The above procedure is possible only when the RRC connection state of the eNB and the UE is in the connected mode (RRC_Connected). Here, the process 400 includes the conditions and configurations described in process 400 of FIG. 4A.

Then, the UE receives the system information (SI) of the CCs in the set based on the received CC set information (S405). The SI may include new information for configuring an uplink timing group for a TA at the UE. Preferably, it may be a method of establishing a linkage between downlink / uplink CCs and information about a reference uplink CC for obtaining a TA value of an uplink CC that cannot perform a procedure for acquiring TA. May be other information.

If there is a specific CC among CCs in the CC set that cannot transmit system information of the CC to the CC, a CC capable of receiving system information or a CC capable of receiving system information converted into control information format may be selected. In this step, select one of the methods that do not receive the system information for the specific CC or proceed with the procedure. Preferably, the specific CC may be an ECC or another CC type. Here, step 405 includes the conditions and configurations described in step 405 of FIG. 4A.

At this time, when a situation in which an existing TA value becomes invalid or a new uplink CC is added, such as when a TA value update of a specific CC or CC group is required without reorganization of an uplink timing group occurs. The UE detects that the TA value update is needed (435).

That is, the UE identifies a situation in which uplink synchronization acquisition is required for all or some groups, that is, a 'TA update condition' while maintaining the existing uplink timing group (435).

The 'TA update condition' may be, for example, when the eNB requests the UE to synchronize synchronously for all downlink CCs, or when the UE initiates and retries the transmission of all uplink data, or UE time. This includes the case where the alignment timer UE Specific has expired or the group time alignment timer set for each group has expired. Here, setting the group time alignment timer means that when there are a plurality of CCs in the same group and each time has a time alignment timer, the operation of the CC time alignment timer of the representative CC is set to the timers of all other CCs in the same group. Means to apply.

In addition, the situation of 435 which is the TA update condition may include a case in which a new uplink CC is additionally configured. Here, the newly added uplink CC may be included in an existing group or exist as a new group.

Upon detecting the need for TA update for uplink timing groups according to the situation 435, which is the TA update condition, the UE selects a random preamble (RAP) through the RACH parameter of the representative CC and SI of each CC. The RAP is transmitted by selecting one of the resources defined at 440.

Here, the transmission of the corresponding RAP signal, by using the time / frequency resources of each CC set by the eNB, simultaneously transmits the RAP of all the representative uplink CC by the UE, or sequentially or randomly RAPs of all the representative uplink CC. In this case, some of the RAPs of all representative uplink CCs may be transmitted at the same time, and some may be transmitted at random or sequentially.

More specifically, the case where the UE transmits the RAP through the representative CCs of all the uplink timing groups at the same time may include the case where the existing TA values of all the CCs become invalid while transmitting data on all the uplink CCs. Can be.

In addition, the case in which the UE transmits the RAPs in part randomly or sequentially and in part transmits the RAPs at the same time includes the case where all existing TA values become invalid while transmitting data on some uplink CCs. In this case, the RAP is simultaneously transmitted to uplink CCs that have been transmitting data when necessary, and other uplink CCs select and transmit time / frequency resources for transmitting the RAP by the eNB or the UE. In case of transmitting data through some uplink CC, priority is obtained to acquire TA.

On the other hand, if there is no data to be transmitted on the uplink or data that is not a problem for delay time, the RAP determined by the eNB or selected by the UE selects and transmits a time / frequency resource to be transmitted. That is, when there is no data to transmit, the TA is randomly obtained by the UE. Or acquiring the TA in the order determined by the eNB.

In addition, in case of sequentially transmitting the RAP, the priority may be determined by the number of CCs in each group and then transmitted. For example, the number of CCs in a group may be ranked in ascending order, or the number may be ranked in order of decreasing number. In addition, the rank may be determined in consideration of the center frequency of the representative CC of the CCs in the group, or the frequency bandwidth size.

The eNB calculates a TA value of each CC with respect to the RAP received from the UE, and transmits a RAR including the TA value and the UL grant of each CC (445).

The UE obtains a TA value for each CC (450) through validation through a content resolution (CR) procedure (450), and then applies the updated TA value to the uplink timing group (455).

In order to proceed with the procedure for acquiring the TA value, a method of establishing a linkage between downlink / uplink CCs as a reference for measuring TA values for a single uplink CC is similar to the method described with reference to FIG. 4A.

In this case, when the UE acquires the TA value by the representative CC, the UE may apply the TA value acquired to the CCs in each uplink timing group at the same time.

When applying the updated TA value to the uplink timing group (455), if only one of the TAs in one or more uplink timing groups has been updated, it may be updated with the new TA value.

Meanwhile, when a new uplink CC is additionally configured as a 'TA update condition', the TA value of the additional configuration CC is applied only to the additional configuration CC, and the TA value of the CC is compared with the TA value of the existing uplink timing groups. If there is a group determined to be below the threshold, the UE resets the group. That is, when the difference between the obtained TA value and the TA value of the CC exists within a predetermined threshold, it may be set as the corresponding group, and if not, it may be set as a new group.

4c illustrates another example of an uplink synchronization acquisition procedure to which an embodiment of the present invention can be applied.

FIG. 4C illustrates that after the procedure of FIG. 4A is performed, the UE establishes an uplink timing group, receives a TA value for each group, and completes an update. Unless otherwise specified, this procedure assumes that handover does not proceed. . In addition, FIG. 4C may be distinguished and additionally applied after performing other procedures without performing the operation of FIG. 4A.

The eNB may allow the UE to use a plurality of CCs in consideration of hardware capability of the UE, available frequency resources of the eNB, etc., and may define them as a set. The eNB transmits the CC set information of the UE to the UE (400). The above procedure is possible only when the RRC connection state of the eNB and the UE is in the connected mode. Here, the process 400 includes the conditions and configurations described in process 400 of FIG. 4A.

The UE receives the system information (SI) of the CCs in the set based on the received CC set information (S405). The SI may include new information for configuring an uplink timing group for a TA at the UE. Preferably, it may be a method for establishing a linkage between downlink and uplink CCs, or information about a reference uplink CC for obtaining a TA value of an uplink CC that cannot perform a procedure for acquiring TA. May be other information.

If there is a specific CC among CCs that cannot transmit system information of the CC to the CC, a CC capable of receiving system information or a CC capable of receiving system information converted into control information format may be selected. In this step, the procedure is performed by selecting one of the methods that do

not receive the system information for the specific CC. Preferably, the specific CC may be an ECC or another CC type. Here, step 405 includes the conditions and configurations described in step 405 of FIG. 4A.

In this case, when a situation in which the existing uplink timing group needs to be reset or reorganized occurs, such as a situation in which an existing TA value becomes invalid for some of the CCs in the uplink timing group, the UE Re-establishing the uplink timing group of the UE detects that a situation in which uplink synchronization acquisition for all or some CCs is required occurs (460).

Such a situation is referred to herein as a 'group regrouping condition', and the UE detects a situation in which regrouping of the uplink timing group is necessary by checking whether the group regrouping condition is present (460).

The 'group regrouping condition' may be, for example, when there is no response to uplink transmission data for some uplink CCs among CCs in a group of the UE, or when the eNB selects some CCs in the group for downlink synchronization. In case of requesting a reset for the UE or when the CC TimeAlignment timer set for each CC has expired, the downlink / uplink connection setting in the eNB is changed, or the uplink timing group is changed and in the group. Downlink / uplink connection settings may be changed. The 'group reorganization condition' is not limited thereto, and the concept includes all cases in which the uplink timing group needs to be set again. In addition, the group reorganization includes synchronous reset in units of CC.

On the other hand, if the UE physically handovers some CCs to another eNB, the UE determines that it is necessary to obtain uplink synchronization for some handovered CCs while resetting the existing uplink timing group.

For uplink timing groups for which a valid TA value for some CCs is not obtained due to a situation 460 corresponding to the 'group reorganization condition', the UE is a group for all uplink CCs in each group. The configuration may be released and RAPs may be simultaneously transmitted to the CCs. In addition, the UE maintains group configuration for CCs in an uplink timing group having a valid TA value, and releases group configuration only for uplink CCs that do not have a valid TA value in each group. The RAP may be simultaneously transmitted for uplink CCs that do not have a valid TA value de-configured.

If the RAP cannot be transmitted at the same time due to different resource settings for each CC, the UE may recognize the occurrence of such a situation and then select the time resource that can be transmitted most quickly and transmit the RAP (S465).

As in the case of FIG. 4B, the RAP signal may be simultaneously transmitted with the RAPs of all representative uplink CCs requiring transmission, or may be sequentially or randomly individually transmitted with the RAPs of all the representative uplink CCs requiring transmission. Some of the necessary RAPs of the representative uplink CC can be transmitted simultaneously, while others are sequentially or randomly transmitted.

The eNB calculates the TA value of each CC with respect to the RAP received from the UE, and transmits an RAR (445), where the eNB further includes uplink allocation information (hereinafter, referred to as 'UL grant') of the UE. .

In operation 470, the UE acquires a TA value for the olfactory CC, which performs validation through a content resolution (CR) procedure. Here, the procedure for obtaining the TA value may be applied to the linkage setting between the downlink / uplink CC as a reference for measuring the TA value for the single uplink CC mentioned in FIG.

Thereafter, the UE may reconfigure the timing group associated with the TA (480).

In the timing group reconfiguration process 480 of the UE, if a TA value update has obtained a valid TA value for the uplink CCs required, the group setting for all uplink CCs in each group is released. The TA value of the CC is compared with the TA values of existing uplink timing groups to set the group determined to be equal to or less than the threshold to the same group, and otherwise set to a new group.

In addition, if the CCs in the uplink timing group that have a valid TA value maintain the group configuration and only the uplink CCs that do not have a valid TA value in each group release the group configuration, the UE may determine the TA of the CC. The value is compared with the TA value of the existing uplink timing groups to set the group determined to be less than or equal to the threshold group, otherwise set to a new group.

In addition, if all uplink timing groups are released, the UE sets a new group based on the TA value.

Of course, in the timing group reconstruction process 480, as described in step 410 of FIG. 4A, as in the setup of the initial uplink timing group, a CC that satisfies at least one or more of the conditions of 1) to 4) described above. Is always set to a different group when setting a group, and CCs that do not satisfy the conditions 1) to 4) may be set to the same group when setting the group, but are not limited thereto.

5A is a diagram illustrating an uplink synchronization acquisition procedure to which an embodiment of the present invention can be applied. Here, unless otherwise stated, this procedure assumes that no handover is performed.

Referring to FIG. 5A, the eNB transmits CC set information (CC Set) of the UE set in consideration of hardware capability of the corresponding UE, available frequency resources of the eNB, etc. (500). This works similar to 400 of FIG. 4A.

The eNB transmits the SI of the CCs in the set to the UE based on the set CC set information (505). That is, the eNB allocates a RAP reserved in advance for the UE or allocates a specific time / frequency resource to only a single UE and transmits it to the corresponding UE through SI. Or it transmits via an RRC message (505). This works similarly to 405 of FIG. 4A.

Accordingly, the UE sets a RAP for each uplink CCs to secure valid TA values of the uplink CCs, and selects one of resources defined among time / frequency resources configured for random access to the SI of each CC. The RAP signal is transmitted (510). Here, transmission of the RAP signal of the UE is as described with reference to 415 of FIG. 4.

For example, the UE sets the RAP to use and informs each UE of this. In this case, the eNB may inform the information on the validity of the RAP, the number of times of use, and the like. In addition, the eNB may separately set a time / frequency resource to be used for initial uplink group setup and inform each UE of this. In this case, the eNB may inform information on the validity of the set time / frequency resource, the number of times of use, and the like. . Here, the information on the validity of the RAP and time / frequency resources, and the number of times of use may be used according to a predetermined rule between the UE and the eNB.

In addition, when the eNB receives a RAP for all CCs in a set of UE CCs from a single UE through a RAP or a time / frequency resource designated by the eNB, the eNB recognizes that initial uplink timing group configuration is required from the UE, and calculates a calculated TA value. Based on the uplink timing group can be configured.

Accordingly, the eNB confirms that the RAP received from each CC is a signal transmitted from a single UE based on the received RAP; that is, confirms that the RAP is received through a specific time / frequency resource, and based on the uplink timing group Set 515. In addition, the eNB sets a representative CC for the uplink timing group based on the TA value (515).

In addition, when configuring the uplink timing group of the eNB, a method as described in step 410 of FIG. 4A may be used.

The eNB transmits the configured uplink timing group information to the UE (520). The uplink timing group information may be transmitted in the form of L1 control information such as PDCCH, or in the form of L2 control information such as MAC, or in the form of L3 control information such as RRC.

The eNB transmits the TA value for the representative CC of each group to the UE in the RAR (525). In this case, the TA value may be simultaneously transmitted to each representative CC. Accordingly, the UE recognizes that the uplink CC configured to be connected with the downlink CC through which the RAR is received is set as the representative CC, and receives information included in the received RAR.

Thereafter, the eNB and the UE perform a validation procedure (530), and the UE applies the received TA value to another uplink CC in the group (535). Accordingly, the UE applies a TA value to obtain uplink synchronization with the eNB.

5B illustrates another example of an uplink synchronization acquisition procedure to which an embodiment of the present invention can be applied.

FIG. 5B illustrates that after the procedure of FIG. 5A is performed, the UE establishes an uplink timing group, receives a TA value for each group, and completes an update. If there is no special mention, this procedure assumes that handover does not proceed. .

The eNB transmits CC set information (CC Set) of the UE set in consideration of hardware capability of the UE, available frequency resources of the eNB, etc. (500). This works similar to 400 of FIG. 4A.

The eNB transmits the SI of the CCs in the set to the UE based on the set CC set information (505). That is, the eNB allocates a RAP reserved in advance for the UE or allocates a specific time / frequency resource to only a single UE and transmits it to the corresponding UE through SI. Or it transmits via an RRC message (505). This works similarly to step 405 of FIG. 4A.

Then, at this time, if a situation occurs that requires resetting or reorganizing the existing uplink timing group, such as a situation in which the existing TA value becomes invalid for some of the CCs in the uplink timing group. The UE detects that a situation in which uplink synchronization acquisition for all or some CCs occurs while resetting an existing uplink timing group occurs (560).

Such a situation is referred to herein as a 'group reorganization condition', and the UE detects a situation in which an uplink timing group needs to be reorganized by checking whether the group reorganization condition is performed (565).

The 'group regrouping condition' may be, for example, when there is no response to uplink transmission data for some uplink CCs among CCs in a group of the UE, or when the eNB selects some CCs in the group for downlink synchronization. In case of requesting a reset for the UE or when the CC TimeAlignment timer set for each CC has expired, the downlink / uplink connection setting in the eNB is changed, or the uplink timing group is changed and in the group. Downlink / uplink connection settings may be changed.

On the other hand, if the UE physically handovers some CCs to another eNB, the UE reconfigures the existing uplink timing group to detect the need for uplink synchronization acquisition for the handed-over CCs.

When a group realignment condition occurs, the UE generates and transmits an RAP of all uplink CCs included in an uplink CC that requires TA update, that is, all uplink CCs included in an uplink timing group that does not have a valid TA value (570).

That is, in step 570, for the uplink timing groups in which the UE does not secure a valid TA value for some CCs, the UE releases group setting for all uplink CCs in each group and assigns the CCs to the CCs. RAP can be transmitted simultaneously. In addition, the UE maintains group configuration of CCs in an uplink timing group having a valid TA value, and releases group configuration only for uplink CCs that do not have valid TA values in each group. You can also send RAP at the same time.

In addition, if the RAP cannot be simultaneously transmitted due to different resource settings for each CC random access, the UE may preferentially select a time resource that can be transmitted fastest after the situation occurs and transmit the RAP.

Of course, in the RAP transmission process 570, as in the case of Figure 4b, the RAP of the uplink CC that needs to be transmitted at the same time, the RAP of all the uplink CC that needs to be transmitted in sequence, or all that needs to be transmitted Some of the RAPs of the uplink CC may be sequentially transmitted while others are simultaneously transmitted at random.

Next, the eNB confirms that RAPs received simultaneously from each CC are signals transmitted from a single UE. In this case, when the eNB detects a situation in which an existing TA value becomes invalid for some of the CCs in the uplink timing group, the eNB separately sets a RAP to be used by the UE when resetting the uplink timing group. Notify the UE. In addition, the eNB separately sets a time / frequency resource to be used when resetting the uplink group, informs each UE of this, and detects the UE by checking whether the RAP is received through the set time / frequency resource.

That is, when the eNB receives the RAP for all CCs in the UE CC set from a single UE for a designated RAP or time / frequency resource, the eNB recognizes that an uplink timing group reset is required from the UE, and based on the calculated TA value, Reconfigure the link timing group. Accordingly, the eNB resets or reorganizes the representative CC for the uplink timing group based on the TA value (575).

The eNB sends the reset or reorganized uplink timing group information to the UE (580). The reset uplink timing group information may be transmitted through a PDCCH, or in the form of MAC control information, or may be transmitted through RRC signaling.

The eNB may transmit the TA value to the UE by including the TA value in the RAR only for the representative CC of each group including the CC whose TA value is not valid (585). In operation 590, the UE recognizes that the uplink CC connected to the downlink CC received through the RAR is set as the representative CC, receives information included in the received RAR, and performs a validation procedure (590).

The UE applies 595 the received TA value to another uplink CC in the group, so that the UE acquires uplink synchronization with the eNB.

6 is a diagram illustrating an operation of a UE according to an embodiment of the present invention. Here, FIG. 6 illustrates the operation of the UE when the setup of the initial uplink timing group is performed at the eNB.

Referring to FIG. 6, the UE receives CC set information from an eNB (600). The CC set information may be received via PCC. The CC set information may be transmitted through an RRC message.

The UE receives an SI for CCs in the CC set based on the received CC set information (605). The SI may be transmitted to a plurality of UEs in common through a broadcasting channel, or may be transmitted in the form of a dedicated channel through an RRC message. The SI may be transmitted via PCC. Accordingly, the UE configures uplink CCs in the CC set using the SI.

In operation 605, the UE may receive information on RAP or time / frequency resources of each CC to be used from the eNB. The UE may set an initial uplink timing group by using information on the received RAP or time / frequency resource of each CC. The information on the RAP or time / frequency resource may be included in the SI

and transmitted through a PCC, or may be transmitted in the form of an RRC message.

The UE checks whether the RAP can be simultaneously transmitted through all uplink CCs configured for uplink synchronization based on the RACH information and CC parameters in the received SI (610).

Here, the UE checks the UE specific RACH parameter among the RACH parameters of 'configured uplink CCs' set by the eNB. When the RAP information is set among the UE dedicated RACH parameters, the UE checks its own RAP information and sets the RAP to be transmitted to each configured uplink CCs. Here, the RAP information is preamble information that the eNB sets differently for each UE for distinguishing each UE. Or, if time / frequency resource information is set among the UE-dedicated RACH parameters, the UE checks its time / frequency resource information and configures a RAP to be transmitted to each configured uplink CCs. In this case, the time / frequency resource information is information that eNB sets differently for each UE.

As a result of the check in step 610, the UE confirms that it is possible to transmit the RAP at the same time through all the configured uplink CC, and transmits the RAP at the same time (615). On the other hand, if it is confirmed in step 610 that the UE cannot transmit the RAP simultaneously through all uplink CCs, the UE proceeds to step 645.

In connection with the RAP simultaneous transmission, the UE checks the RACH parameters present in the SI of each uplink CC of the plurality of uplink CCs, and identifies the plurality of time / frequency resources defined in the RACH parameter. It is possible to select a RAP transmission time (rach_t) to transmit the RACH at the same time. The RAP transmission time rach_t is a time at which the RAPs are equally transmitted on all uplink CCs by the UE.

However, when the UE cannot set the RAP transmission time (rach_t), that is, when the UE cannot transmit the RAP through all uplink CCs configured at the same time, the UE transmits a RAP resource information request message to the eNB (645). For example, it is assumed that time for transmitting RAP by checking RACH parameters of all uplink CCs is limited to t0 and t1. The UE confirms that the RAP can be transmitted at time t0 through CC1, CC3, and CC4, and confirms that the RAP cannot be transmitted at time t1, confirms that the RAP can be transmitted at time t1 through CC2, and cannot transmit at time t0. If confirmed, the UE may transmit a RAP resource information request message to the eNB.

Thereafter, in response to the RAP resource information request, the UE receives a RAP resource information response message from the eNB (650). This means that an eNB receiving the RAP resource information request message cannot simultaneously transmit a RAP through all CCs by the UE, and as a result, the eNB transmits a transmission time frequency resource to be used in the RAP transmission of the UE and Selecting a frame type and including the selected information in the RAP resource information response message;

Upon receiving the RAP resource information response message, the UE transmits the RAP through all configured uplink CCs based on the information in the RAP resource information response message (655). On the other hand, if the RAP resource information does not exist in the RAP resource information response message received from the eNB, select the fastest time to transmit the RAP at the same time through all the uplink CCs configured at the time to send the RAP. At this time, the same RAP may be selected in all CCs to simultaneously transmit the RAP.

Thereafter, uplink timing group information is received from the eNB via the PCC (620). That is, the eNB confirms the RAPs transmitted from the UE to confirm that the UE requests the setup of an uplink timing group, calculates a TA value using the preambles received through the RAP, and then calculates the calculated TA. Create an uplink timing group of the UE based on the value. The generated uplink timing group information is transmitted to the UE.

The uplink timing group information may be in the form of control information of a downlink control channel (hereinafter referred to as 'PDCCH'), a media access control (hereinafter referred to as 'MAC') message through a PCC, or It may be received via an RRC message.

The UE may simultaneously receive an RAR on some or all downlink CCs of the downlink CCs that are connected with all uplink CCs configured from the eNB (625). The connection setting may be fixed in a wireless communication system, may be set for each eNB using an SI, or may be set for each UE or UE group through an RRC message. The RAR message is, for example, identification information of a UE preamble received by an eNB, an identifier (ID) of a base station, a Temporary Cell Radio Network Temporary Identifier (C-RNTI), and a time slot for receiving the UE preamble. Information, uplink grant information (UL grant), and timing information (TA) for uplink synchronization.

Accordingly, the UE transmits data through a physical uplink shared channel (PUSCH) using time frequency resource information included in uplink grant information at a schedule time determined using the received TA information. In addition, HARQ (Hybrid Automatic Repeat reQuest) may be performed.

The UE may simultaneously verify TA validity for CCs that have received the RAR (630). At this time, when RAP information is set among the UE dedicated RACH parameters, the UE may omit TA validation.

As already mentioned, the UE checks whether the C-RNTI, T_C-RNTI, or UE identity included in the ACK message received from the eNB is the same as the C-RNTI, T_C-RNTI, or UE identity assigned to the TA. The validity of can be verified simultaneously. Here, the UE transmits an L2 / L3 message including a C-RNTI, T_C-RNTI, or UE identity to the eNB, and receives an L1 / L2 message from the eNB. This is because the ACK message is based on the HARQ operation.

The UE, through RAR reception, recognizes that the eNB has configured uplink CCs connected to the downlink CC from which the RAR is received as the representative CC in the group, and sets the uplink CCs as the representative CC in the group (635).).

The UE updates the other CCs in each group by reflecting the TA value of the representative CC received in step 660.

7 is a signal flowchart of a UE when initial grouping is performed in the UE according to the present invention.

Referring to FIG. 7, a UE receives 700 CC set information from an eNB and receives SI information for CCs included in a CC set from an eNB (702).

The UE checks (704) the group configuration related information in the SI received from the eNB, sets uplink timing group based on the confirmed information, and sets the representative CC in the group (706). The uplink timing group setting and the representative CC setting in the group may use the same or similar configuration as described above, and description thereof is omitted to avoid duplication.

Then, the UE determines a transmission scheme of the RAP signal on the representative uplink CC in each group (708). Here, the determination of the transmission scheme of the RAP signal of the UE may be performed by the eNB or by the UE.

The RAP signal transmission method includes a method 710 for simultaneously transmitting RAPs for all representative CCs requiring transmission, and some RAPs of all representative CCs requiring transmission simultaneously and randomly for the remaining parts. A method 720 for sequentially transmitting and a method 730 for individually transmitting the RAPs for all the representative CCs that need to be transmitted can be included.

An example of a method of determining the RAP transmission scheme may be determined by using signaling information (priority information or reference information) from an eNB, using an SI received by a UE, or a predetermined appointment between an eNB and a UE. It may include, but is not limited to.

That is, when the representative uplink CC to send the RAP is selected by the eNB, the UE receives and confirms it, and the UE may randomly or sequentially transmit the RAP according to the received selection information. Alternatively, the UE may select a representative uplink CC to transmit the RAP and may transmit the RAP randomly or sequentially. Alternatively, the UE may simultaneously transmit RAPs for all representative uplink CCs, or some may sequentially and some may simultaneously transmit RAPs.

Here, the eNB may determine the type of RAP, time / frequency resources for transmitting the RAP. Accordingly, the UE sets the RAP and sets the RAP transmission time / frequency resource for each representative uplink CC based on the information received from the eNB.

On the other hand, when there is no special signaling for RAP from the eNB, or when the signaling that the eNB control mode is off (off) is received, the UE through the downlink CC that is connected to each representative uplink CC for random access It is determined by the UE using the parameters of each representative uplink CC set in the received SI.

The RAP transmission configuration may be in a form in which the eNB further restricts a specific UE or a plurality of UEs to the RAP configuration range or the selection range of the RAP transmission time / frequency resource for each representative uplink CC, or directly to each representative uplink CC. You can also set the RAP to send every time.

The UE selects a CC to transmit data on the uplink in order to select a time / frequency resource for transmitting the RAP signal of each representative uplink CC, and transmits the RAP through the representative uplink CC only in groups including the corresponding CCs. Can be.

On the other hand, if it is determined that all uplink CCs configured to transmit data on the current uplink are needed, the UE may simultaneously transmit RAPs to all representative uplink CCs. On the other hand, if it is determined that some uplink CCs are necessary, only the groups including some uplink CCs simultaneously transmit the RAP through the representative uplink CCs, and the representative uplink CCs for the remaining groups are sequentially or randomly selected. You can choose how to send RAP.

More specifically, the UE may receive the priority information of the uplink CC for transmitting the RAP from the eNB, and may select a method of sequentially transmitting the RAP based on the received information.

Alternatively, the UE may receive the reference information that sets the priority of the uplink CC to send the RAP via the PCC. In this case, the UE may determine the priority of the representative uplink CC to transmit the RAP using the SI of each uplink CC received at 704 according to the reference information.

The reference information for setting the priority may be received as MAC control information. In this case, the MAC control information may be received through the PDSCH or may be received through the PDCCCH. In addition, the reference information for setting the priority may be received through an RRC message. The RRC message includes received via PDSCH. Here, the reference information may be, for example, a bandwidth (BW). Accordingly, the UE may select a method of setting priority by applying the bandwidth to the SCC.

On the other hand, if the reference information is previously promised between the UE and the eNB, the UE can determine the priority of the CC to send the RAP without special signaling from the eNB. For example, if the UE has two or more SCCs to transmit the RAP, a method of transmitting the RAP by giving priority to a CC having a wide bandwidth may be selected. In addition, the UE may transmit the RAP first through the representative CC in the group including the PCC by setting the highest priority for the PCC regardless of the reference information.

On the other hand, after receiving the SI of each CC from the eNB, the UE may randomly select a method of transmitting the RAP by selecting a representative uplink CC in the group. This is because the SI of each CC includes preamble information for RACH and information on time frequency resources. Accordingly, the UE may check information about the preamble and time frequency resources for the representative uplink CC in each group, randomly select a specific preamble and time frequency resources, and then perform RACH with the representative uplink CC in the selected group. have.

If it is determined in step 708 as a method 710 for transmitting the RAPs of all the representative CC at the same time, the UE generates the RAP of the representative CC that needs to be transmitted, and then transmits to the eNB at the same time (712), the RAR from the eNB simultaneously or sequentially After reception, the TA validation using the CR is performed (714).

If it is confirmed that the TA is validated, the UE updates the TA value for each uplink timing group using the corresponding TA (716), and uses the corresponding TA value to uplink through one or more CCs included in the uplink timing group. Link data transmission is performed (718).

On the other hand, if it is determined in step 708 as the method 720 for transmitting the RAP of some representative CC at the same time, the UE generates the RAP of the representative CC, and after determining the RAP of the representative CC to be transmitted simultaneously according to the above criteria, such as priority, The determined RAP is simultaneously transmitted to the eNB, and the RAPs of the remaining representative CCs are individually transmitted to the eNB in sequential or random order (722). Then, after receiving the RAR simultaneously or separately from the eNB, the UE performs TA validation using CR and the like (724). If the validity of the TA is verified, the TA value of each uplink timing group is updated using the corresponding TA (726).

Thereafter, the UE checks whether the TA of the required uplink CC is secured (728), and if the TA of the required uplink CC is secured, using the corresponding TA value, one or more CCs included in the uplink timing group. If uplink data transmission is performed through 718, and the required uplink CC is not secured, the process proceeds to step 722 again. Here, securing the required uplink CC means that a sufficient number or band of CCs for transmitting uplink data is secured.

On the other hand, if it is determined in the method 730 to transmit the RAPs of all the representative CC individually in step 708, the UE generates the RAP of all the representative CC and then sequentially or randomly sent to the eNB (732), the UE is After receiving the RAR simultaneously or separately from the eNB, the TA validation using the CR is performed (734). If the validity of the TA is verified, the TA value of each uplink timing group is updated using the corresponding TA (736). After checking whether the TA of the required uplink CC is secured (738), if the TA of the required uplink CC is secured, uplink data through one or more CCs included in the uplink timing group using the corresponding TA value. Perform the transfer (718). On the other hand, if the required uplink CC is not secured to step 732 again.

The required uplink CCs may be all configured uplink CCs or may be uplink CCs required for transmitting data on the uplink. If the TA value is not obtained for the required uplink CCs, the RAP is transmitted through the representative uplink CCs of the groups for which the TA value is not obtained. The method used when transmitting the RAP of the representative uplink CCs The same rule applied to the RAP transmission of the representative uplink CCs is applied in the same manner.

If the UE confirms that the valid TA value acquisition is completed for the required uplink CCs, the UE transmits data to the eNB through the uplink CCs allocated resources by the eNB scheduler (718).

If the contention-based uplink transmission is possible, the UE selects CCs and resources to be transmitted to the eNB in consideration of time / frequency resource related information capable of contention-based transmission received from the eNB through the SI or through the RRC message. Send data to the eNB.

8 is a signal flowchart of a UE for updating a TA value according to an embodiment of the present invention.

The RAP transmission method according to FIG. 8 illustrates a RAP transmission method for transmitting RAPs of all CCs or representative uplink CCs requiring update when TA update for one or more CCs or groups is required in a state where an initial uplink timing group is largely set. The method may include determining and transmitting the RAPs of all the CCs or the representative uplink CCs requiring the update according to the determined method. Detailed configuration is as follows.

Referring to FIG. 8, when the validity of the TA value is lost for all or some of the configured uplink CCs, the UE triggers the start of a procedure for obtaining the validity of the TA for the uplink CCs of the UE. (802)

At this time, if the UE detects that a situation in which an existing TA value becomes invalid or a new uplink CC is added, the UE acquires uplink synchronization for all or some groups while maintaining the existing uplink timing group. Confirm that this is the necessary situation (804). In other words, in step 804, the UE checks the 'TA update condition' that should update only the TA of the specific CC or the specific representative CC without resetting the uplink timing group.

One example of the situation of 802 or 804, i.e. TA update condition, is when the eNB requests synchronous reset for all downlink CCs, or when initializing and retrying transmission of all uplink data, or UE time. This may include, but is not limited to, when an Alignment Timer expires, a Group Time Alignment timer set for each group expires, or a new uplink CC is additionally configured.

Due to the above situation, a UE that fails to obtain a valid TA value for all or some uplink timing groups selects an arbitrary RAP through the RACH parameter of the representative CC in each group and is defined in the SI of each CC. One of the selected resources is selected to determine a RAP transmission method for transmitting the RAP (806).

In the method of transmitting the RAP signal in step 806, a method 810 of simultaneously transmitting the RAPs for all the representative CCs that need to be transmitted and a RAP of some of the representative CCs that need to be transmitted are simultaneously transmitted and the remaining part of the RAP signal is transmitted. In this case, the method may include a method 820 for individually or sequentially transmitting randomly and a method 830 for individually transmitting each RAP for all representative CCs requiring transmission.

An example of a method of determining the RAP transmission method is to use signaling information (priority information or reference information) from the eNB, determine using the SI received by the UE, or comply with a predetermined appointment between the eNB and the UE. Methods, and the like, but are not limited thereto.

The transmission method determination of the RAP signal includes a scheme that is randomly or sequentially transmitted by the UE in the time / frequency resources of each CC set by the eNB. Or simultaneous transmission. Or some are random but some are sequentially transmitted simultaneously.

More specifically, the method of simultaneously transmitting the RAP is a method of transmitting the RAP through the representative CCs of all configured groups when all existing TA values become invalid while transmitting data through the uplink CCs. That is, the UE simultaneously transmits the RAP through the representative CCs of all groups. In this case, the newly added CC may exist as a new group, and the added CC may operate as the representative CC of the newly defined group.

In addition, some of the random but some of the sequential transmission method is applied to the uplink CCs that were transmitting data when necessary when all existing TA values became invalid while transmitting data through some uplink CCs. This is a case where the RAP is simultaneously transmitted and other uplink CCs select and transmit a time / frequency resource for transmitting the RAP by the eNB or the UE.

On the other hand, if there is no data to be transmitted on the uplink or data that does not matter with respect to delay time, the UE may transmit the RAP by selecting a time / frequency resource for transmitting the RAP by the eNB or the UE.

Here, when the UE sequentially transmits the RAP, the priority may be determined by the number of CCs in each group. For example, the rank may be determined in ascending order of the number of CCs in the group, or the rank may be determined in order of decreasing number of CCs. In addition, the ranking may be determined in consideration of the center frequency of the representative CC of the CCs in the group, or the frequency bandwidth, but is not limited thereto.

If it is determined in step 806 that the method of transmitting the RAP of all the representative CC at the same time (810), the UE generates the RAP of the representative CC that needs to be transmitted, and then transmits to the eNB at the same time (812), the RAP from the eNB simultaneously or sequentially After reception, TA validation using CR and the like is performed (814). Once the TA is validated, the TA value for each uplink timing group is updated using the corresponding TA (816), and the uplink data transmission is performed through one or more CCs included in the uplink timing group using the TA value. (818).

On the other hand, if it is determined in the method 820 to simultaneously transmit the RAP of some representative CC in step 806, after the UE generates the RAP of the representative CC, after determining the RAP of the representative CC to be transmitted simultaneously based on the aforementioned criteria, such as priority, The RAP is simultaneously transmitted to the eNB, and the RAPs of the remaining representative CCs are individually transmitted to the eNB in sequential or random order (822). Then, after receiving the RAP simultaneously or separately from the eNB, the UE performs TA validation using CR or the like (824).

If the validity of the TA is verified, the TA value of each uplink timing group is updated using the corresponding TA (826). After determining whether the TA of the required uplink CC is secured (828), if the TA of the required uplink CC is secured, uplink data through one or more CCs included in the uplink timing group using the corresponding TA value. If the required uplink CC has not been secured (818), the process proceeds to step 822 again.

Here, securing the required uplink CC means that a sufficient number or band of CCs for transmitting uplink data is secured.

Meanwhile, if it is determined in step 806 that the RAPs of all the representative CCs are individually transmitted in step 806, the UE generates the RAPs of all the representative CCs and then sequentially or randomly transmits them to the eNB, and the UEs simultaneously from the eNB. Alternatively, after receiving the RAP individually, TA validation using CR or the like is performed (832).

If the validity of the TA is verified, the TA value for each uplink timing group is updated using the corresponding TA (834). After determining whether the TA of the required uplink CC is secured (836), if the TA of the required uplink CC is secured, uplink data through one or more CCs included in the uplink timing group using the corresponding TA value. If the required uplink CC has not been secured (818), the process proceeds to step 832 again.

Here, the required uplink CCs may be all configured uplink CCs or may be uplink CCs required for transmitting data on the uplink. If the TA value is not obtained for the required uplink CCs, the RAP is transmitted through the representative uplink CCs of the groups for which the TA value is not obtained. The method used when transmitting the RAP of the representative uplink CCs The same rule applied to the RAP transmission of the representative uplink CCs is applied in the same manner.

The UE transmits data to the eNB through the uplink CCs allocated resources by the eNB scheduler when the valid TA value acquisition is completed for the required uplink CCs (818). If the contention-based uplink transmission is possible, the UE selects CCs and resources to be transmitted to the eNB in consideration of time / frequency resource related information capable of contention-based transmission received from the eNB through the SI or through the RRC message. Send data to the eNB.

9 relates to the operation of a UE when it is necessary to reorganize an uplink timing group according to the present invention.

In the RAP transmission method of FIG. 9, the TA acquisition method for one or more CCs is determined when the uplink timing group needs to be reorganized when the initial uplink timing group is set. Accordingly, the method may include transmitting a RAP for the one or more CCs, and a detailed configuration thereof is as follows.

The UE triggers the start of a procedure for acquiring the validity of the TA for the uplink CCs of the UE when the validity of the TA value is lost for all or some of the configured uplink CCs (902).

The UE indicates that the UE has an existing uplink timing, such as a situation in which the existing TA value becomes invalid for some of the CCs in the uplink timing group or a new CC is added. When resetting the group, if it is necessary to acquire uplink synchronization for all or some of the CCs in the group, it is confirmed that the group reorganization is a 'group reorganization condition' requiring the group reorganization (904).

In the situation of 904, that is, the group reorganization condition, for example, when the UE further configures a new uplink CC, the response to the uplink transmission data may be changed for some uplink CCs among the CCs in the UE group. If none, or if the eNB requests a reset for some CCs in the group for downlink synchronization, or if the CC TimeAlignment timer set for each CC has expired, downlink / uplink in eNB It may include, but is not limited to, when the connection setting is changed, or when the uplink timing group is changed and when the downlink / uplink connection setting in the group is changed, the UE additionally configures a new additional uplink CC. .

On the other hand, if the UE physically handovers some CCs to another eNB, the UE reconfigures the existing uplink timing group to detect the need for uplink synchronization acquisition for the handed-over CCs.

The UE determines whether the generated situation is the case where the UE further configures a new additional uplink CC among the group reorganization conditions (906).

If the UE further configures a new additional uplink CC, the UE transmits the RAP only through the additional uplink CC (908). At this time, the selection of the RAP and the selection of time / frequency resources depend on the information in the SI of the corresponding additional uplink CC.

The UE receives the RAR through the downlink CC connected with the additional uplink CC from the eNB in response to the RAP and verifies the validity of the TA value (910).

If the UE is determined to be below the threshold by comparing the TA value of the additional uplink CC with the TA value of the existing uplink timing groups based on the valid TA value of the additional uplink CC, the UE resets the group and The TA value of the additional uplink CC is updated with the TA value of the representative CC in the group. That is, if the difference between the obtained TA value and the TA value of the additional uplink CC exists within a predetermined threshold, it is set as the corresponding group, otherwise it is set as a new group (912).

If, due to the additional uplink CC needs to reset the representative CC in the group in accordance with the representative CC setting criteria in the group, it is possible to reset the representative CC in each group. If the grouping is determined by the eNB, the UE may inform the eNB of the changed group information through MAC signaling or an RRC message, if necessary.

On the other hand, if the UE does not additionally configure a new uplink CC, the UE determines a method for obtaining a TA value for group reorganization (920). The TA value acquisition method for group reorganization is performed for all uplink CCs in each group for uplink timing groups for which the UE has not obtained a valid TA value for some CCs according to the situation of procedure 804. First schemes 922 and 924 for releasing group setting and simultaneously transmitting RAPs to the CCs, and CCs in an uplink timing group in which the UE has a valid TA value maintain group setting and within each group. Only uplink CCs that do not have a valid TA value may include a second scheme of releasing group setting and simultaneously transmitting RAP only to the uplink CCs.

In the second scheme, again, the 2-1 schemes (926, 928) for simultaneously transmitting RAPs for all CCs in a specific uplink timing group in which group setting is released, and failing to secure a valid TA in a specific uplink timing group The method may include a 2-2 scheme 930 of releasing group setting only for the uplink CC and transmitting RAP only for the uplink CC.

The UE simultaneously transmits RAPs for all uplink CCs through all uplink CCs in case of the first scheme according to the determined TA value acquisition method for the group reorganization (924), and partially in case of the 2-1 scheme. The RAP is simultaneously transmitted for all CC uplink CCs in the group (928), and in the case of the 2-2 scheme, only uplink CCs that do not have a valid TA value in each group release the group setting and the uplink Only the CCs transmit the RAP at the same time (930).

The UE then checks 932 whether uplink timing grouping is performed by the eNB.

When the uplink timing grouping is performed by the eNB, the UE receives the uplink timing group information generated and transmitted by the eNB using the transmitted RAP (934) and verifies the TA after receiving the RAR simultaneously or separately. (936). Thereafter, the UE sets the received CC to the representative CC in the group using the received uplink timing group information and the RAR (938), and updates the TA value for each uplink timing group (940).

On the other hand, when the UE checks 932, when the UE itself needs to perform grouping, the UE receives the RAR for all CCs having transmitted the RAP and then obtains the TA value and uses the CR to validate the TA value. Verify (942). The UE then resets or reorganizes the uplink timing group using the aforementioned grouping scheme, sets up a representative CC in the group, and then updates 944 the TA value for the representative CC.

10 is a signal flow diagram of an eNB in an embodiment of the present invention.

In the TA transmission method of FIG. 10, the RAP for one or more CCs or group representative CCs is received from a UE that detects a realignment or TA update condition of the uplink timing group in a state where an initial uplink timing group is set. And generating a TA value for the CC having received the RAP and transmitting the generated TA value to the UE. The detailed configuration is as follows.

The eNB sets a CC set of the corresponding UE in consideration of available frequency resources of the eNB, device information of the UE, supportable communication schemes, etc. (1005).

The eNB transmits the SI for the CC to the UE in order to configure the CCs in the CC set configured in step 1005 (1010). In this case, the SI may be transmitted to the UE through a broadcasting channel or may be transmitted to the UE using an RRC message or the like. In addition, the RRC message may be transmitted through the downlink PCC or may be transmitted through other activated downlink CC.

If the eNB receives the RAP from the UE (1015), it is determined whether the specific UE requests the uplink timing group configuration in consideration of the received RAP type and time / frequency resources (1020).

The situation of the procedure 1020 may be determined by checking the type of RAP and time / frequency resources to be used when the eNB needs to set uplink timing group configuration request differently to each UE.

For example, the eNB allocates a RAP type and time / frequency resource to be used in setting up an uplink timing group for uplink CCs configured for a specific UE and informs the UE of this. If the UE needs to set uplink timing group for the first time, the RAP is transmitted to the eNB using the RAP type and time / frequency resource information received from the eNB. When the RAPs are received in the time frequency resource among the RAPs received by the eNB, the eNB recognizes that a specific UE requests the initial uplink timing group setup.

If it is confirmed in step 1020 as the setup request of the uplink timing group, it is determined whether the eNB itself performs uplink timing grouping (1025).

When the eNB itself performs uplink timing grouping, after generating 1040 TA values of all CCs received by the RAP, an uplink timing group is set using the aforementioned grouping scheme, and a representative CC in each group is used. In step 1045, RAR or uplink timing group information including the TA value for the determined representative CC in each group is generated and transmitted to the UE (1050).

On the other hand, when the uplink timing grouping is performed by the UE as a result of step 1025, the eNB generates TA values of all CCs received by the RAP (1030) and transmits the TA values generated through the RAR to the UE. (1055).

On the other hand, if it is determined in step 1020 that the eNB is not an uplink timing group setup request, the eNB generates TA values for the RAP received CCs 1035 and then transmits the TA values of the representative CCs in each group to the UE (1050).

11 is a block diagram of a transmitter according to the present invention.

TA transmission apparatus according to the present embodiment is preferably implemented in the eNB or in conjunction with it, but is not limited thereto.

The TA transmitter or the transmitter according to the present embodiment is a RAP for one or more CCs or group representative CCs from a UE that detects a realignment or TA update condition of the uplink timing group in a state where the initial uplink timing group is largely set. It may include a RAP receiver for receiving a, a TA value generator for generating a TA value for the CC receiving the RAP, and a transceiver for transmitting the generated TA value to the UE, the detailed configuration is as follows.

The TA transmitter 1100 according to the present embodiment includes a CC set setting unit 1110, a RAP receiver 1120, a TA value generator 1130, and a transceiver 1140. If it performs it, the uplink timing group setting unit 1150 may be further included.

In addition, although not shown, by checking the connection state of the UE and the eNB, if the connection is not established, that is, the UE RRC_IDLE, or if the uplink synchronization is not performed, change the connection state of the UE to RRC_CONNECTED or up A link mode check unit for link synchronization may be further provided, and an SI transmitter for generating and transmitting the SI of the CC to be used.

The CC set setting unit 1110 identifies at least one or more CCs that can be used by the UE and sets a CC set of the UE. In this case, the CC set for the UE is the uplink sync time difference between CCs that can be used (configured), type information of each CC, the center frequency location of each CC, service support type of each CC, and for each CC The CC set of the UE may be set in consideration of the network service.

The RAP receiver 1120 performs a function of receiving a RAP generated and transmitted by the UE when a TA update condition or a group realignment condition without group realignment is satisfied.

More specifically, in a method in which the UE determines the RAP transmission method corresponding to the TA update condition and then simultaneously transmits the RAPs of all the representative CCs requiring TA update, the RAPs of all the representative CCs are simultaneously received, and some representatives When the RAP of the CC is transmitted simultaneously and the RAPs of the remaining representative CCs are transmitted separately, the RAP of each representative CC is simultaneously or separately received, and the RAPs of the representative CCs requiring TA update are randomly or sequentially transmitted. You receive him individually.

Meanwhile, the RAP receiving unit 1120 corresponds to a group reorganization condition and the UE determines a TA acquisition method, and accordingly receives the RAP when transmitting the RAP, and specifically, transmits the RAP for all CCs at the same time. Receiving at the same time (first method), when transmitting the RAP of all CCs included in the specific group that is ungrouped at the same time, receiving them at the same time (2-1 method), the specific that did not secure validity within a specific group If only the RAP for the CC is transmitted (2-2 scheme), the RAP is received.

The TA value generator 1130 may receive a TA update condition or a group realignment condition and, when the UE transmits RAPs for a plurality of CCs, receives the TA value and generates a new TA value.

Meanwhile, the uplink timing group setting unit 1150 resets a group using a TA value for a RAP for a plurality of CCs transmitted by a UE corresponding to a group realignment condition, and determines a representative CC of each group. This is a necessary component only when the eNB performs uplink timing grouping.

The transmitter / receiver 1140 transmits or receives all information or signals transmitted and received with the UE in this embodiment. Specifically, the transceiver 1140 corresponds to a TA update condition or a group reorganization condition. And a function of transmitting a TA value for each CC generated by the TA setting unit to the UE, and a function of transmitting uplink timing group information reorganized by the eNB under the group reorganization condition to the UE. .

12 is a block diagram of a receiving apparatus according to an embodiment of the present invention.

The reception device according to FIG. 12 is preferably implemented in the UE or in conjunction with it, but is not limited thereto.

The RAP transmitting apparatus or the receiving apparatus according to the present embodiment is a RAP for transmitting a RAP of all CCs or representative uplink CCs requiring update when TA update for one or more CCs or groups is required when the initial uplink timing group is set. A RAP transmission method determination unit for determining a transmission method and all or part of the RAP of all CCs or representative uplink CCs requiring update at the same time or all CCs or representative uplinks requiring update according to the determined RAP transmission method It may include a RAP transmitter for individually transmitting all of the RAP of the CC, the detailed configuration is as follows.

The receiving apparatus 1200 of FIG. 12 includes a TA update condition checking unit 1210, a RAP transmission method determining unit 1220, a RAP transmitting unit 1230, a RAR receiving unit 1240, a TA validating unit 1250, and a TA. It may be configured to include an update unit 1260 and the like.

In addition, when the UE performs initial uplink timing grouping, the uplink timing group setting unit 1270 may be further included.

The TA update condition check unit 1210 may determine that the eNB requests synchronization reset for all downlink CCs, or initiates and retries transmission of all uplink data, or a UE TimeAlignment timer. Performs a function to check whether a 'TA update condition' is issued, such as when it expires or when a group time alignment timer set for each group expires.

The RAP transmission method determination unit 1220 determines a method using signaling information (priority information or reference information) from the eNB, a decision using an SI received by the UE, or a method according to a predetermined appointment between the eNB and the UE. By using this method, the RAPs for all the

representative CCs that need to be updated are simultaneously transmitted, the RAPs of some of the representative CCs that need to be transmitted are transmitted simultaneously and the others are randomly or sequentially transmitted, This function determines one of the methods of individually transmitting the RAPs for all the representative CCs that need to be transmitted.

According to the determined RAP transmission method, the RAP transmitting unit 1230 transmits the RAPs for all representative CCs that need updating to the parallel eNB, or transmits the RAPs of some of the representative CCs all requiring transmission at the same time, For a random or sequential transmission to the eNB, or to transmit the RAP for all the representative CC that needs to be transmitted to each eNB individually.

After receiving the RAR for the representative CC transmitted from the eNB, the RAR receiver 1240 and the TA validity verifier 1250 calculate a new TA value of the representative CC that needs to be updated, and perform a function of verifying the validity thereof.

The TA updater 1260 updates the old TA value of the representative CC that needs to be updated with the new TA value.

Meanwhile, the uplink timing group setting unit 1270 is a configuration required when the UE performs initial uplink timing grouping, and initially transmits RAPs for all CCs to the eNB and then receives RARs to calculate TA values. After that, all the CCs are grouped into one or more uplink timing groups according to the grouping condition.

13 is a block diagram of a receiving apparatus according to another embodiment of the present invention.

The reception device according to FIG. 13 is preferably implemented in the UE or in conjunction with it, but is not limited thereto.

The RAP transmitting apparatus or the receiving apparatus according to the present embodiment includes a TA acquiring method determining unit that determines a TA acquiring method for one or more CCs when reorganization of the uplink timing group is required in a state where an initial uplink timing group is set; According to the determined TA acquisition scheme, it may include a RAP transmitter for transmitting the RAP for the one or more CC, the detailed configuration is as follows.

The receiving apparatus 1300 according to FIG. 13 includes a group reorganization condition check unit 1310, a TA acquisition method determiner 1320, a RAP transmitter 1330, a RAR receiver 1340, a TA validator 1350, and a TA. It may be configured to include an update unit 1360 and the like.

In addition, the UE may include an uplink timing group reset unit 1370 when the UE performs the group reset, and an uplink timing group information receiver 1380 when the eNB performs the group reset.

That is, according to the subject of group resetting, the receiving apparatus according to the present embodiment may selectively include an uplink timing group resetting unit 1370 or a timing group information receiving unit 1380.

The group realignment condition checking unit 1310 may be configured when there is no response to the uplink transmission data for some uplink CCs in the group of the UE, or the eNB is reset for some CCs in the group for downlink synchronization. , Or when the CC TimeAlignment timer set for each CC expires, when the downlink / uplink connection setting in the eNB changes, or when the uplink timing group changes and the downlink / in the group changes. When the uplink connection setting is changed, the UE performs a function of checking whether an uplink timing group realignment condition such as a case in which the UE additionally configures a new additional uplink CC.

In particular, the group regrouping condition check unit 1310 performs a function of checking whether the generated group regrouping condition is a case where the UE additionally configures a new additional uplink CC or another group regrouping condition. This is because the RAP transmission process varies depending on whether the group reorganization condition is addition of additional uplink CC.

The TA acquisition method determination unit 1320 simultaneously transmits RAPs for all CCs ungrouped according to a condition such as group ungrouping to acquire TAs (first method), or whether all the CCs included in a specific group whose grouping is released are acquired. It is determined whether TA is obtained by simultaneously transmitting RAPs (2-1 scheme), or TAs are obtained by transmitting only RAPs for a specific CC that have not obtained validity in a specific group (2-2 schemes).

The RAP transmitter 1330 simultaneously transmits RAPs for all CCs ungrouped according to the TA acquisition scheme determined by the TA acquisition method determination unit 1320, or simultaneously transmits RAPs of all CCs included in a specific group in which the grouping is released. It transmits or transmits only the RAP for a specific CC that does not secure validity in a specific group.

Meanwhile, when the generated group realignment condition is an additional configuration of an additional uplink CC, the RAP transmitter 1330 may transmit a RAP for the additional uplink CC to the eNB through the corresponding additional uplink CC.

After receiving the RAR of the CC that transmitted the RAP, the RAR receiving unit 1340 and the TA validating unit 1350 calculate a TA value of the corresponding CC and perform a function of verifying the validity thereof.

On the other hand, when the UE performs the group reset, the uplink timing group reset unit 1370 uses the TA value of the CC calculated from the RAR of all CCs that have transmitted the RAP, and according to the aforementioned grouping scheme or the like, the uplink timing group reset unit 1370. Perform a function to reset or regroup.

On the contrary, when the eNB performs the group reconfiguration, the uplink timing group information receiver 1380 receives the uplink timing group information reset and transmitted from the eNB, and the TA values of the CCs receiving the RAR are determined by the representative CCs in the group. Performs the function of applying TA value.

The TA updater 1360 performs a function of setting the newly created TA value for each group to the TA value of the corresponding group according to the group reset by the UE or eNB.

Using the present embodiments, there is an effect that the TA value of a specific CC can be updated in an efficient and simple manner with the initial uplink timing group set, without regrouping the group.

In addition, using the embodiments, there is an effect that the uplink timing group can be reorganized by a simple and efficient process when a reorganization condition of the group occurs while the initial uplink timing group is set.

The above description is merely illustrative of the technical idea of the present invention, and those skilled in the art to which the present invention pertains may make various modifications and changes without departing from the essential characteristics of the present invention. Therefore, the embodiments disclosed in the present invention are not intended to limit the technical idea of the present invention but to describe the present invention, and the scope of the technical idea of the present invention is not limited by these embodiments. The protection scope of the present invention should be interpreted by the following claims, and all technical ideas within the equivalent scope should be interpreted as being included in the scope of the present invention.

Patent Citations (5)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
US7570962B2 *	2006-07-12	2009-08-04	Intel Corporation	Wireless access network base station and method for determining location information for a mobile station using uplink time-difference of arrival
US8295243B2	2006-08-21	2012-10-23	Qualcomm Incorporated	Method and apparatus for random access in an orthogonal multiple-access communication system
CN101448313B *	2007-11-27	2011-04-13	大唐移动通信设备有限公司	Method and device for synchronizing communication system
KR101447750B1	2008-01-04	2014-10-06	엘지전자 주식회사	How to Perform a Random Access Procedure
KR101468742B1	2008-05-06	2014-12-04	엘지전자 주식회사	A method for transmitting data in a wireless communication system

* Cited by examiner, † Cited by third party

Cited By (48)

Publication number	Priority date	Publication date	Assignee	Title
WO2013066102A1 *	2011-11-03	2013-05-10	Pantech Co., Ltd.	Apparatus and method for performing uplink synchronization in multiple component carrier system
WO2013095003A1 *	2011-12-20	2013-06-27	엘지전자 주식회사	Method and apparatus for acquiring uplink synchronization in wireless communication system
US9955491B2	2014-12-30	2018-04-24	Electronics And Telecommunications Research Institute	Method and apparatus for initial access in mobile communication system
US10448403B2	2015-10-06	2019-10-15	Sony Corporation	Apparatus and method for beam selection in downlink transmission
Family To Family Citations				
US9084195B2 *	2010-04-01	2015-07-14	Nokia Technologies Oy	Multiple timing advance and carrier aggregation
CN103238362B *	2010-11-11	2017-02-22	瑞典爱立信有限公司	Group message based carrier aggregation control
WO2012135992A2 *	2011-04-02	2012-10-11	Renesas Mobile Corporation	Method, apparatus and computer program product for triggering the determination of a timing advance for one component carrier based upon another component carrier
CN102740494A *	2011-04-02	2012-10-17	上海贝尔股份有限公司	Method for carrying out random access
US9042315B2 *	2011-05-03	2015-05-26	Mediatek Inc.	SCELL radio link monitoring and radio link failure handling
US8395985B2	2011-07-25	2013-03-12	Ofinno Technologies, Llc	Time alignment in multicarrier OFDM network
EP2739099B1 *	2011-07-29	2019-09-25	NEC Corporation	Wireless station, wireless terminal, and time alignment timer control method in wireless communication system
KR20130045169A *	2011-10-24	2013-05-03	주식회사 팬택	Apparatus and method for performing uplink synchronization in multiple component carrier system
US8995405B2	2012-01-25	2015-03-31	Ofinno Technologies, Llc	Pathloss reference configuration in a wireless device and base station
US9237537B2	2012-01-25	2016-01-12	Ofinno Technologies, Llc	Random access process in a multicarrier base station and wireless device
US8897248B2	2012-01-25	2014-11-25	Ofinno Technologies, Llc	Multicarrier signal transmission in wireless communications
US9001780B2 *	2012-01-27	2015-04-07	Qualcomm Incorporated	Physical layer issues related to multi-TA group support
WO2013119160A1 *	2012-02-07	2013-08-15	Telefonaktiebolaget L M Ericsson (Publ)	Method and apparatus for transmit timing adjustment
US9084270B2	2012-04-01	2015-07-14	Ofinno Technologies, Llc	Radio access for a wireless device and base station
US11943813B2	2012-04-01	2024-03-26	Comcast Cable Communications, Llc	Cell grouping for wireless communications
US11825419B2	2012-04-16	2023-11-21	Comcast Cable Communications, Llc	Cell timing in a wireless device and base station

US11582704B2	2012-04-16	2023-02-14	Comcast Cable Communications, Llc	Signal transmission power adjustment in a wireless device
US11252679B2	2012-04-16	2022-02-15	Comcast Cable Communications, Llc	Signal transmission power adjustment in a wireless device
US11882560B2	2012-06-18	2024-01-23	Comcast Cable Communications, Llc	Carrier grouping in multicarrier wireless networks
US9107206B2	2012-06-18	2015-08-11	Ofinne Technologies, LLC	Carrier grouping in multicarrier wireless networks
US11622372B2	2012-06-18	2023-04-04	Comcast Cable Communications, Llc	Communication device
US9210673B2 *	2012-09-06	2015-12-08	Apple Inc.	Recovery from uplink timing alignment failures in cellular communications
US9807800B2 *	2012-10-08	2017-10-31	Mediatek Singapore Pte. Ltd.	Data transmission method
JP6225552B2 *	2013-08-08	2017-11-08	富士通株式会社	Wireless communication method, wireless communication system, and communication apparatus
JP2015216502A *	2014-05-09	2015-12-03	株式会社Ｎｔｔドコモ	User device and method
CN105530685B	2014-10-24	2020-01-07	中兴通讯股份有限公司	Message sending and receiving method, sending and receiving device, base station and terminal
KR102341215B1	2014-11-26	2021-12-20	삼성전자주식회사	Scheme for random access in mobile communication system using beam forming
US9603165B2	2015-01-30	2017-03-21	Telefonaktiebolaget L M Ericsson (Publ)	Random-access response with analog beamforming
WO2016131475A1 *	2015-02-17	2016-08-25	Nokia Solutions And Networks Oy	Communication efficiency
JP6644810B2	2015-04-24	2020-02-12	ノキア テクノロジーズ オーユー	Cooperative random access based on common random access channel resources
KR102318225B1 *	2015-06-02	2021-10-27	삼성전자주식회사	Method for processing random access and device thereof
JP6608051B2 *	2015-07-10	2019-11-20	エルジー エレクトロニクス インコーポレイティド	Data burst transmission method and apparatus in wireless connection system supporting unlicensed band and carrier combination
CN107113747B *	2015-08-17	2020-06-26	江苏星地通通信科技有限公司	Communication method, device, terminal and base station
CN108633107B9 *	2015-12-08	2019-08-20	华为技术有限公司	A kind of data transmission method for uplink, base station and terminal device
US20170196025A1 *	2016-03-23	2017-07-06	Mediatek Inc.	Random Access Probing Enhancement During State Mismatch Between User Equipment And Network
US10904784B2 *	2016-06-15	2021-01-26	Qualcomm Incorporated	Beam reporting and scheduling in multicarrier beamformed communications
WO2018023086A1 *	2016-07-29	2018-02-01	Intel IP Corporation	Timing advance for beam forming systems
CN111511011B *	2016-11-03	2024-04-23	华为技术有限公司	Wireless communication method and device
US20180234839A1	2017-02-13	2018-08-16	Futurewei Technologies, Inc.	System and Method for User Equipment Identification and Communications
WO2018188626A1 *	2017-04-13	2018-10-18	Huawei Technologies Co., Ltd.	Methods and apparatus for determining network identifier for use by user equipment
US20190075597A1 *	2017-09-01	2019-03-07	Qualcomm Incorporated	Methods, apparatuses and systems for supporting long term channel sensing in shared spectrum
CN110475338B	2018-05-11	2021-09-07	华为技术有限公司	Uplink transmission method and user equipment
US20210153262A1 *	2018-08-07	2021-05-20	Mitsubishi Electric Corporation	Communication system, communication terminal, and base station
CN110831145B *	2018-08-09	2021-05-18	华为技术有限公司	Method and apparatus for wireless communication

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
-------------	------------------	-------

KR20110108536A	2011-10-06	Random access preamble transmission method and apparatus in communication system operating multiple component carriers, TA transmission method and apparatus using same
US11659503B2	2023-05-23	Apparatus and method for establishing uplink synchronization in a wireless communication system
US10952165B2	2021-03-16	Apparatus and method for performing uplink synchronization wireless communication system
US11089525B2	2021-08-10	Change of a handover threshold for a handover from a first beam to a second beam
US20130114576A1	2013-05-09	Apparatus and method for performing uplink synchronization in multiple component carrier system
KR20110093402A	2011-08-18	Method and apparatus for establishing uplink synchronization in wireless communication system operating multiple component carriers
KR20110113897A	2011-10-19	Method and apparatus for transmitting / receiving information on uplink timing group in wireless communication system operating multiple component carriers
KR102092560B1	2020-03-25	Methods of Random Access Procedure based on multi-beam in wireless networks and Apparatuses thereof
JP2013502810A	2013-01-24	Carrier component resource allocation method and system in wireless communication system
KR20120111358A	2012-10-10	Apparatus and method for transmitting and receiving uplink synchronization information in wireless communication system
KR20130083708A	2013-07-23	Apparatus and method for performing random access in wireless communication system

Priority And Related Applications

Priority Applications (6)

Application	Priority date	Filing date	Title
KR1020100027782A	2010-03-29	2010-03-29	Random access preamble transmission method and apparatus in communication system operating multiple component carriers, TA transmission method and apparatus using same
JP2013502471A	2010-03-29	2011-03-29	Apparatus and method for performing random access in a wireless communication system
PCT/KR2011/002159	2010-03-29	2011-03-29	Apparatus and method for performing random access in a wireless communication system
EP11763006.1A	2010-03-29	2011-03-29	Apparatus and method for performing random access in a wireless communication system
CN2011800265990A	2010-03-29	2011-03-29	Apparatus and method for performing random access in a wireless communication system
US13/638,507	2010-03-29	2011-03-29	Apparatus and method for performing random access in a wireless communication system

Applications Claiming Priority (1)

Application	Filing date	Title
KR1020100027782A	2010-03-29	Random access preamble transmission method and apparatus in communication system operating multiple component carriers, TA transmission method and apparatus using same

Legal Events

Date	Code	Title	Description
2010-03-29	PA0109	Patent application	Patent event code: PA01091R01D Comment text: Patent Application Patent event date: 20100329
2011-10-06	PG1501	Laying open of application	
2015-04-30	PC1203	Withdrawal of no request for examination	

Concepts

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method		title,claims,abstract,description	213	0.000
biological transmission		title,claims,abstract,description	116	0.000

■ communication	title,claims,abstract,description	50	0.000
■ carrier	title,abstract,description	34	0.000
■ Theraps	claims,description	41	0.000
■ Brassica napus	claims,description	35	0.000
■ reorganization	claims,description	26	0.000
■ response	claims,description	17	0.000
■ synchronised effect	claims,description	4	0.000
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