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(54) **BASE STATION, USER EQUIPMENT AND WIRELESS COMMUNICATION METHOD**

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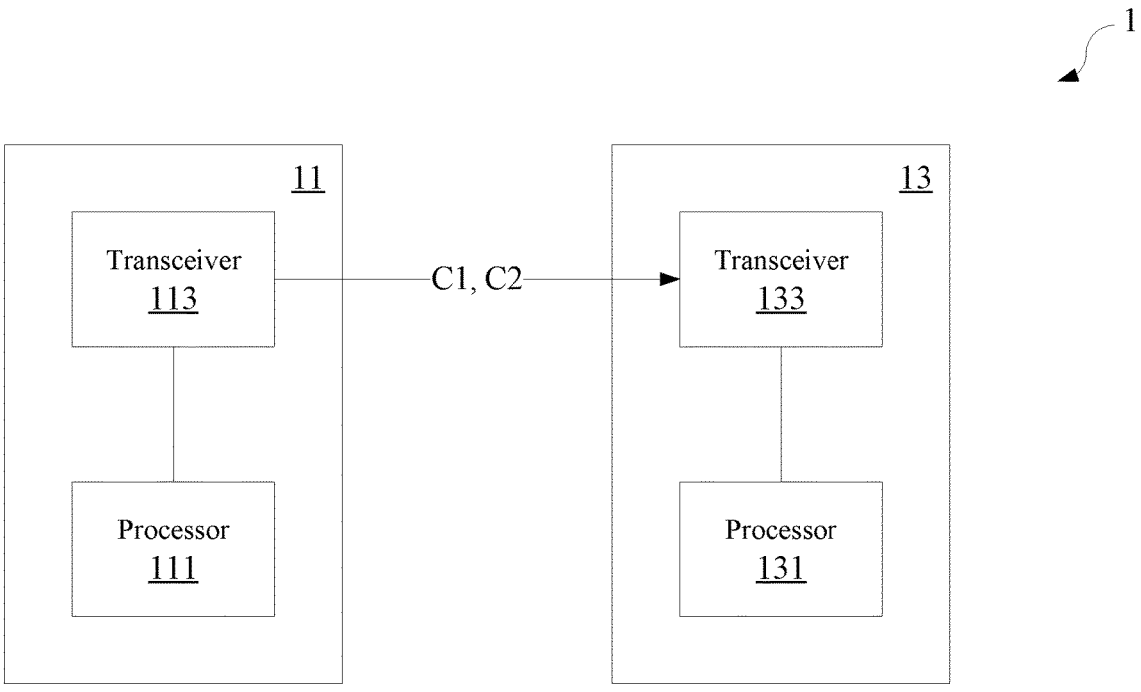
(57) **ABSTRACT**

A base station, a user equipment and a wireless communication method are disclosed. The base station sends a first resource configuration to the user equipment so that the base station and the user equipment perform a wireless communication procedure according to the first resource configuration. The base station sends a second resource configuration to the user equipment within a modification period which is used to notify the user equipment that system information will be updated so that the base station and the user equipment perform the wireless communication procedure according to the second resource configuration.



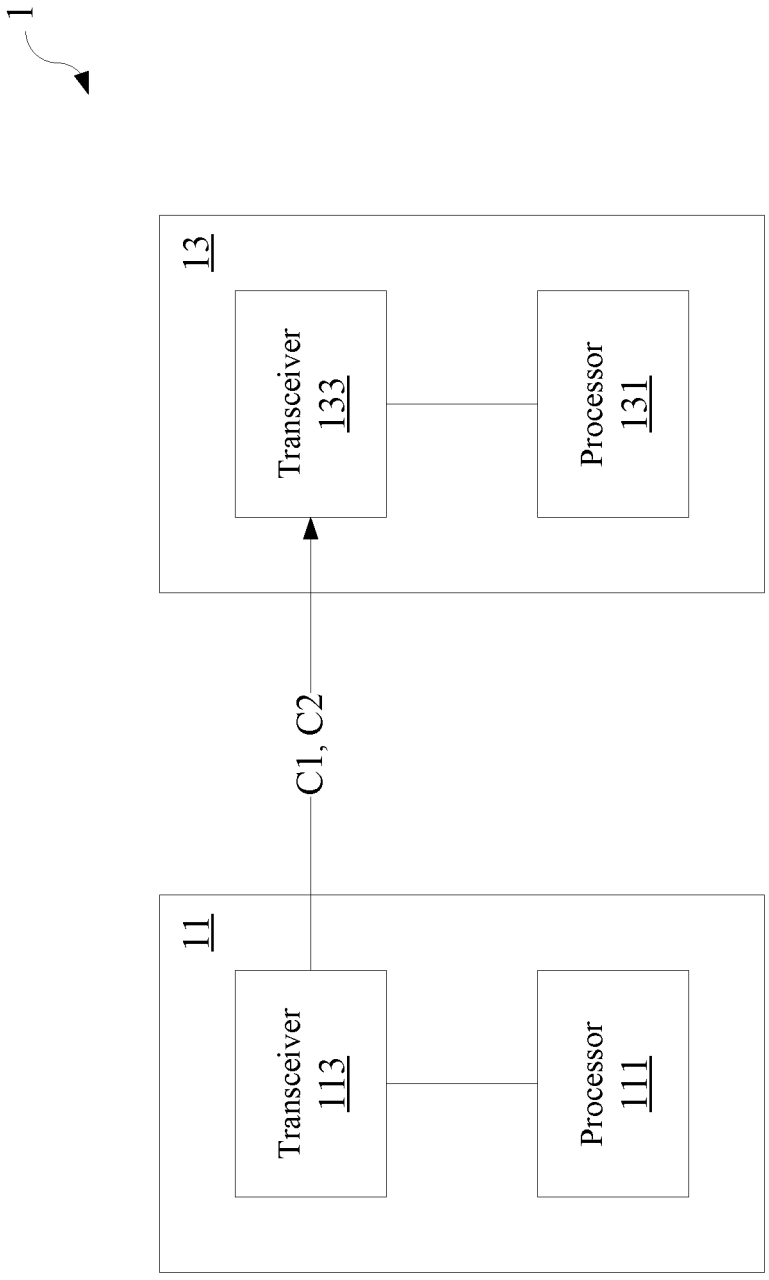

1
13
Transceiver
133
Processor
131
C1, C2
11
Transceiver
113
Processor
111

FIG. 1

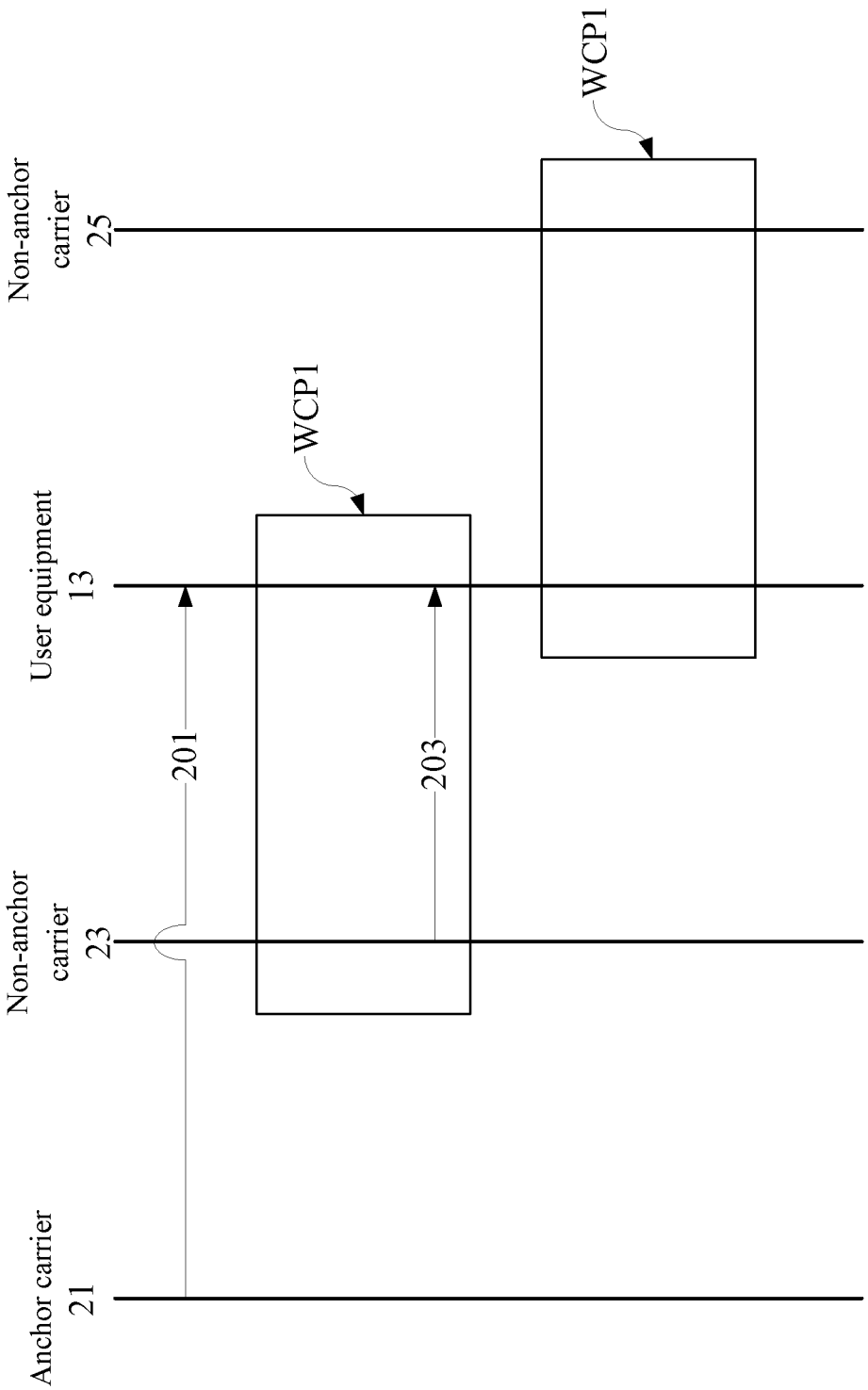

Anchor carrier
21
Non-anchor
carrier
23
User equipment
13
Non-anchor
carrier
25
201
203
WCP1
WCP1

FIG. 2

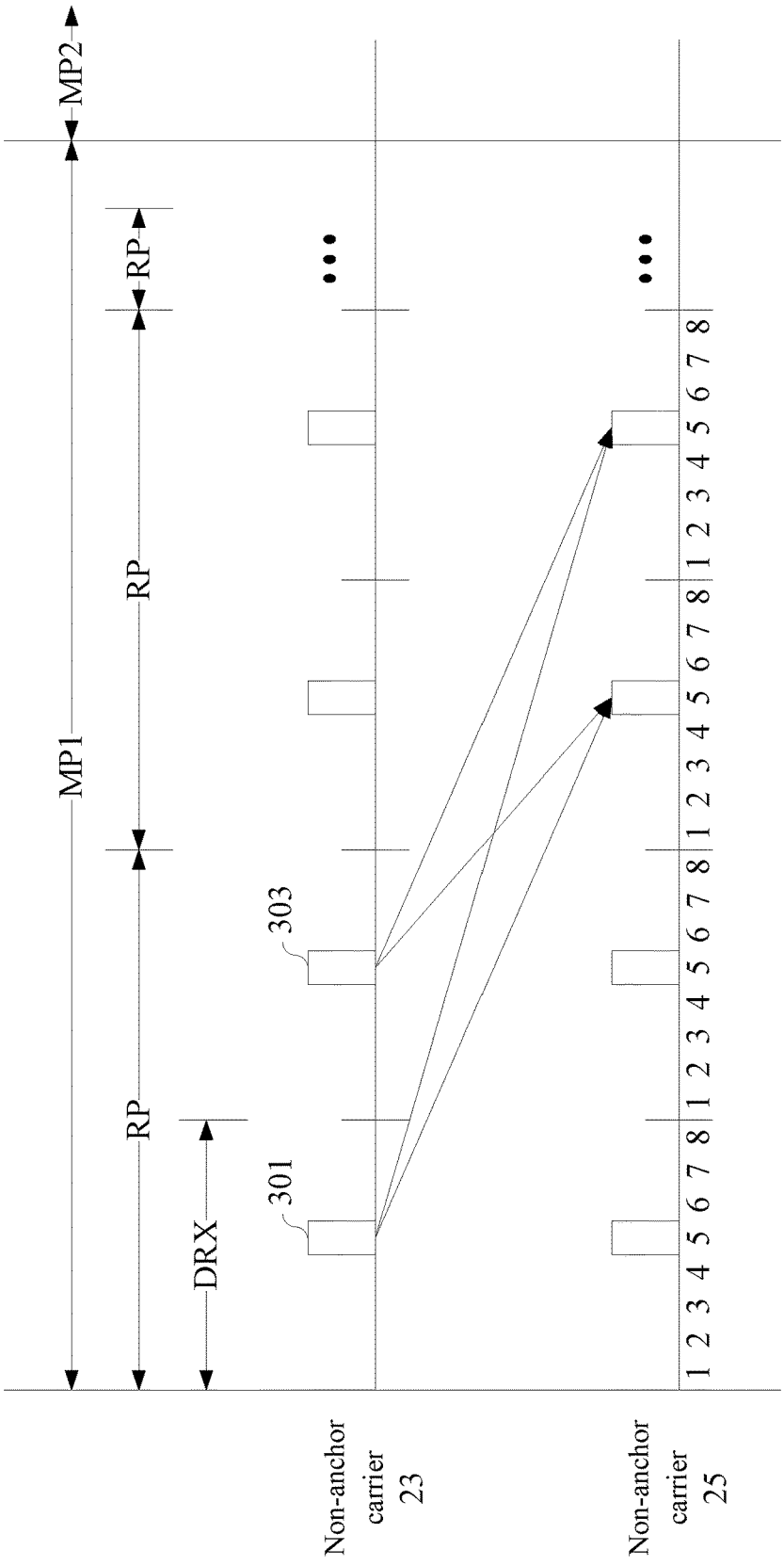

MP2
RP
RP
MP1
RP
DRX
303
301
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8
Non-anchor carrier 23
Non-anchor carrier 25

FIG. 3

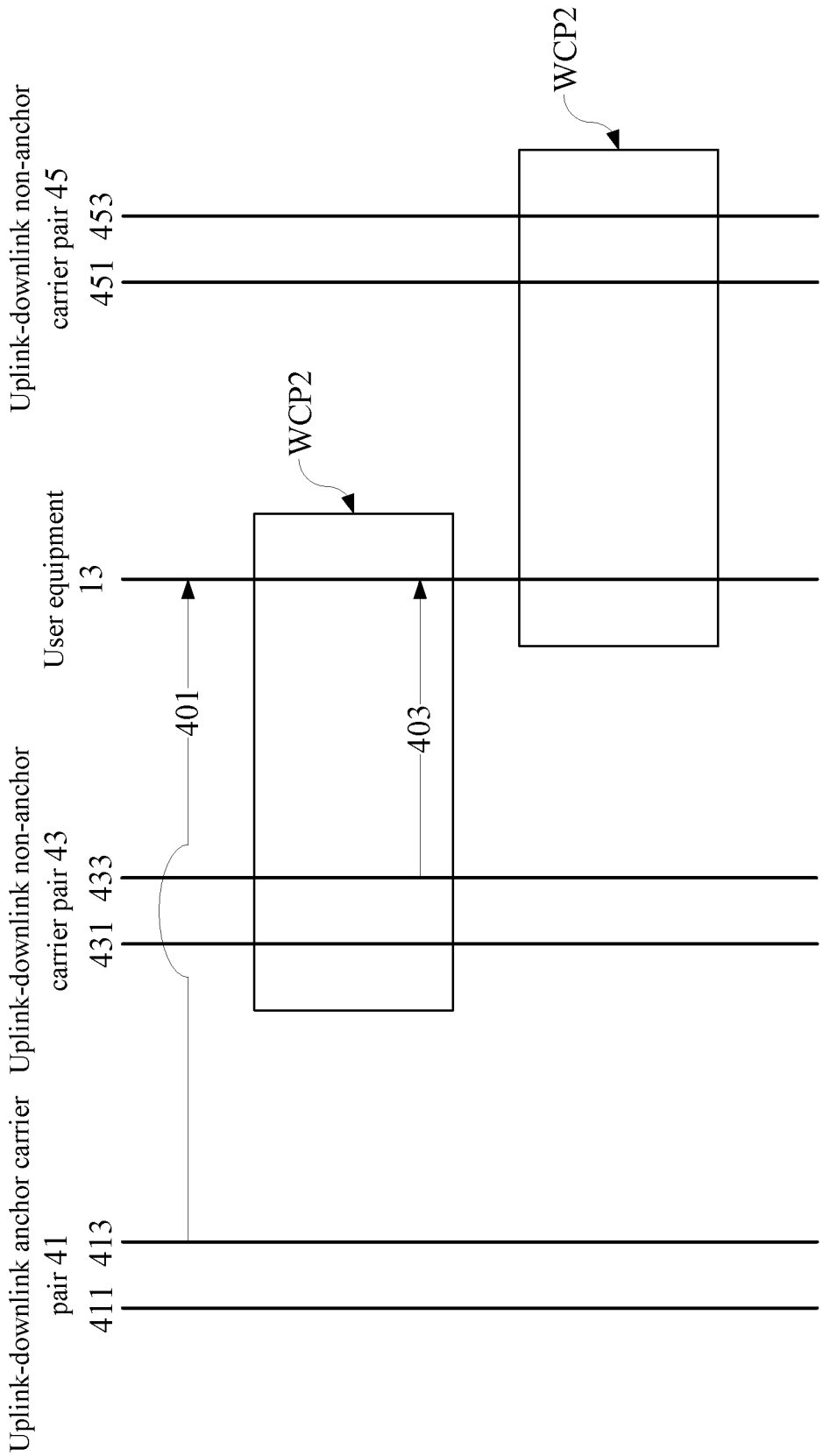

Uplink-downlink anchor carrier pair 41
411 413
Uplink-downlink non-anchor carrier pair 43
431 433
User equipment 13
Uplink-downlink non-anchor carrier pair 45
451 453
401
403
WCP2
WCP2

FIG. 4

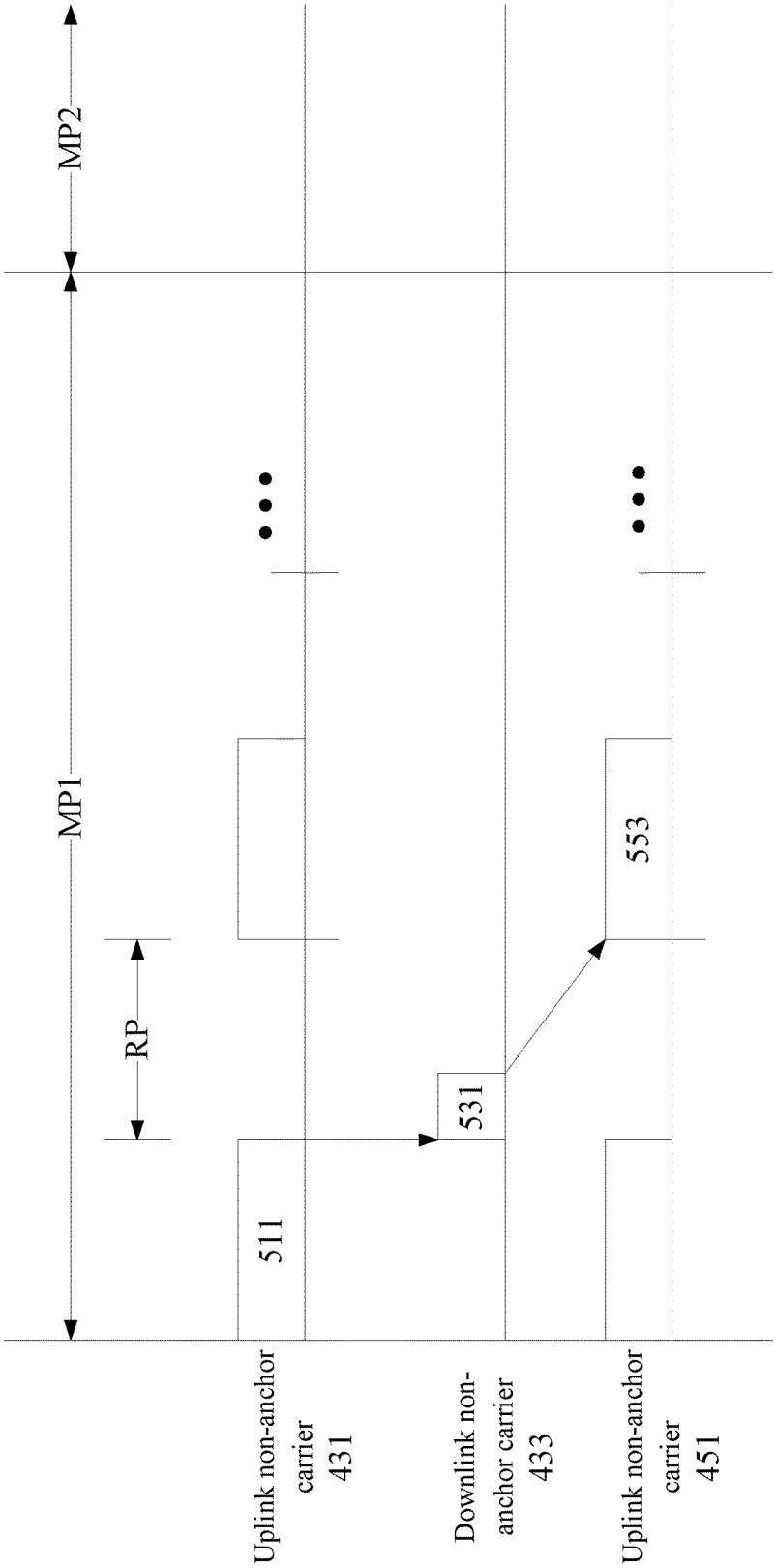

MP2
MP1
RP
511
531
553
Uplink non-anchor carrier 431
Downlink non-anchor carrier 433
Uplink non-anchor carrier 451

FIG. 5

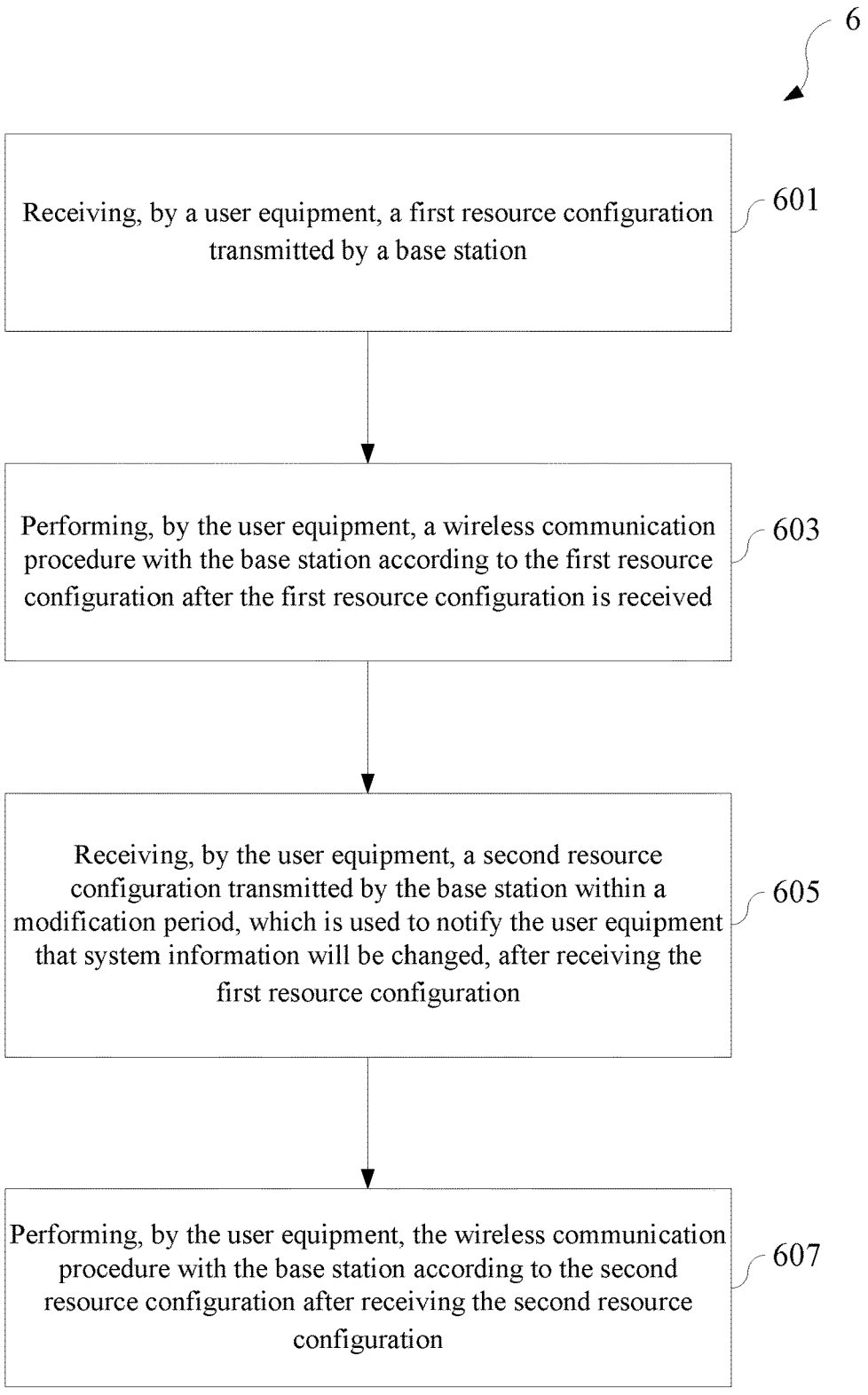

6
Receiving, by a user equipment, a first resource configuration transmitted by a base station
601
Performing, by the user equipment, a wireless communication procedure with the base station according to the first resource configuration after the first resource configuration is received
603
Receiving, by the user equipment, a second resource configuration transmitted by the base station within a modification period, which is used to notify the user equipment that system information will be changed, after receiving the first resource configuration
605
Performing, by the user equipment, the wireless communication procedure with the base station according to the second resource configuration after receiving the second resource configuration
607

FIG. 6

BASE STATION, USER EQUIPMENT AND WIRELESS COMMUNICATION METHOD

PRIORITY

[0001] This application claims the priority and benefit of U.S. Provisional Patent Application Ser. No. 62/428,546, filed Dec. 1, 2016, and titled "DYNAMIC CARRIER SELECTION FOR MASSIVE NB-IoT CONNECTION", the entirety of which is incorporated herein by reference.

FIELD

[0002] Embodiments of the present invention relate to a base station, a user equipment and a wireless communication method. More particularly, embodiments of the present invention relate to a base station, a user equipment and a wireless communication method that have dynamic resource configurations.

BACKGROUND

[0003] In conventional wireless communication systems, communication between a user equipment and a base station must rely on system information, especially a resource configuration loaded in the system information. Generally, the base station must first transmit (e.g., broadcast) the system information to the user equipment, and then the user equipment and the base station perform a specific wireless communication procedure together according to the resource configuration in the system information. Besides, in the conventional wireless communication system, if the system information needs to be updated, then the base station first notifies the user equipment that the system information will be updated within a first modification period and then transmits the updated system information to the user equipment within a second modification period that is adjacent to the first modification period. In other words, in the conventional communication system, the first modification period is used to notify the user equipment that the system information will be updated, and the second modification period is used to transmit the updated system information.

[0004] In order to change the original resource configuration, the original system information needs to be updated. Once the original system information needs to be updated, the user equipment has to wait for a period of time before receiving the updated system information and the resource configuration that has been changed and loaded in the updated system information. Thus, the above way in which the system information is updated obviously has the following problems. For example, the longer the first modification period is, the later the time at which the user equipment receives the updated system information and the resource configuration that has been changed and loaded in the updated system information is. Additionally, in the case where the system information needs to be updated immediately, e.g., in the case where the original resource configuration is overloaded because of the simultaneous access of a large number of user equipments, the user equipment cannot receive the updated system information and the resource configuration that has been changed and loaded in the updated system information immediately (or within a short period of time) so that the load of the original resource configuration cannot be reduced instantly. Accordingly, an urgent need exists in the art to enable the user equipment to receive the resource configuration that has been changed more efficiently.

SUMMARY

[0005] To solve at least the aforesaid problems, the disclosure includes a base station. The base station may comprise a processor and a transceiver electrically connected with the processor. The processor may be configured to decide a first resource configuration and a second resource configuration. The transceiver may be configured to transmit the first resource configuration to a user equipment, and transmit the second resource configuration to the user equipment within a modification period, which is used to notify the user equipment that system information will be updated, after the first resource configuration is transmitted. After the first resource configuration is received by the user equipment, the processor may perform a wireless communication procedure with the user equipment via the transceiver according to the first resource configuration, and after the second resource configuration is received by the user equipment, the processor may perform the wireless communication procedure with the user equipment via the transceiver according to the second resource configuration.

[0006] To solve at least the aforesaid problems, the disclosure also includes a user equipment. The user equipment may comprise a transceiver and a processor electrically connected with the transceiver. The transceiver may be configured to receive a first resource configuration transmitted by a base station and receive a second resource configuration transmitted by the base station within a modification period, which is used to notify the user equipment that system information will be updated, after the first resource configuration is received. The processor may be configured to perform a wireless communication procedure with the base station via the transceiver according to the first resource configuration after the first resource configuration is received by the transceiver, and perform the wireless communication procedure with the base station via the transceiver according to the second resource configuration after the second resource configuration is received by the transceiver.

[0007] To solve at least the aforesaid problems, the disclosure further includes a wireless communication method. The wireless communication method may comprise receiving, by a user equipment, a first resource configuration transmitted by a base station; performing, by the user equipment, a wireless communication procedure with the base station according to the first resource configuration after the first resource configuration is received; receiving, by the user equipment, a second resource configuration transmitted by the base station within a modification period, which is used to notify the user equipment that system information will be updated, after receiving the first resource configuration; and performing, by the user equipment, the wireless communication procedure with the base station according to the second resource configuration after receiving the second resource configuration.

[0008] To solve at least the aforesaid problems, the disclosure further includes a wireless communication method. The wireless communication method may comprise deciding a first resource configuration and transmitting the first resource configuration to a user equipment by a base station; performing, by the base station, a wireless communication

procedure with the user equipment according to the first resource configuration after the first resource configuration is received by the user equipment; deciding by the base station a second resource configuration and transmitting by the base station the second resource configuration to the user equipment within a modification period, which is used to notify the user equipment that system information will be updated, after the first resource configuration is transmitted; and performing, by the base station, the wireless communication procedure with the user equipment according to the second resource configuration after the second resource configuration is received by the user equipment.

[0009] According to the above descriptions, the base station transmits the resource configuration that has been modified to the user equipment directly within the first modification period (i.e., a modification period that is used to notify the user equipment that the system information will be updated in the conventional wireless communication system) among two adjacent modification periods, so the user equipment may not need to wait for the second modification period (i.e., a modification period that is used to transmit the updated system information in the conventional wireless communication system) among the two adjacent modification periods before receiving the resource configuration that has been modified. Therefore, in the embodiments disclosed herein, the influence caused by the length of the first modification period to the time at which the resource configuration that has been modified is received by the user equipment can be effectively reduced. Additionally, in these embodiments, in the case where the system information needs to be updated immediately, e.g., in the case where the original resource configuration is overloaded because of the simultaneous access of a large number of user equipments, the user equipment can receive the updated system information and the resource configuration that has been changed and loaded in the updated system information earlier (or within a short period of time) so that the load of the original resource configuration can be reduced instantly.

[0010] As compared to the conventional wireless communication system, the disclosed embodiments indeed provide a technology that enables the user equipment to receive the resource configuration that has been changed more efficiently and enables the user equipment to perform the relevant wireless communication procedure according to the resource configuration that has been changed more instantly.

[0011] This summary overall describes certain aspects of the present invention and covers the problem to be solved, the means to solve the problem and the effect of the present invention to provide a basic understanding of the present invention by those of ordinary skill in the art. However, it shall be appreciated that, this summary is not intended to encompass all embodiments of the present invention but is provided only to summarize certain aspects of the present invention in a simple form and as an introduction to the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. **1** illustrates a schematic view of a wireless communication system in one or more embodiments of the present invention;

[0013] FIG. **2** illustrates a schematic view of a wireless communication procedure about paging in one or more embodiments of the present invention;

[0014] FIG. **3** is a schematic view illustrating a resource configuration being changed in the wireless communication procedure shown in FIG. **2**, in one or more embodiments of the present invention;

[0015] FIG. **4** illustrates a schematic view of a wireless communication procedure about random access in one or more embodiments of the present invention;

[0016] FIG. **5** is a schematic view illustrating a resource configuration being changed in the wireless communication procedure shown in FIG. **4**, in one or more embodiments of the present invention; and

[0017] FIG. **6** illustrates a schematic view of a wireless communication method in one or more embodiments of the present invention.

DETAILED DESCRIPTION

[0018] Embodiments of the present invention described below are examples, and are not intended to limit the present invention to any specific example, embodiment, environment, applications, structures, processes or steps described in these example embodiments.

[0019] In the attached drawings, elements unrelated to the present invention are omitted from depiction; and dimensions of elements and proportional relationships among individual elements in the attached drawings are only exemplary examples but not intended to limit the present invention. Unless stated particularly, same (or similar) element symbols may correspond to same (or similar) elements in the following description.

[0020] One or more embodiments of the present invention provide a base station and a user equipment under a wireless communication system. FIG. **1** illustrates a schematic view of the wireless communication system in one or more embodiments of the present invention. However, contents shown in FIG. **1** are only for purpose of illustrating embodiments of the present invention instead of limiting the present invention.

[0021] Referring to FIG. **1**, the wireless communication system **1** may be one of various communication systems constructed under Internet of Things, and it may be for example but not limited to a Narrow Band-IoT (NB-IoT) system, an enhanced Machine-Type Communication (eMTC) system, a massive Machine-Type Communication (mMTC) system or the like.

[0022] The wireless communication system **1** may comprise one or more base stations **11**, one or more user equipment **13** and a core network (not shown). Each of the base stations **11** may comprise a processor **111** and a transceiver **113** electrically connected to the processor **111**. The electrical connection between the processor **111** and the transceiver **113** may be direct connection (i.e., connection not via other elements) or indirect connection (i.e., connection via other elements). Depending on different requirements, the base stations **11** may be various types of base stations which are for example but not limited to: Macrocells, Microcells or Picocells or the like. Each of the user equipments **13** may comprise a processor **131** and a transceiver **133** electrically connected to the processor **131**. The electrical connection between the processor **131** and the transceiver **133** may be direct connection (i.e., connection not via other elements) or indirect connection (i.e., connection via other elements). Depending on different requirements, the user equipments **13** may be various electronic devices capable of being networked which are for example

but not limited to: mobile phones, tablet computers, notebook computers, various IoT products or the like.

[0023] Each of the processors **111** and the processors **131** may be a microprocessor or a microcontroller capable of signal processing. The microprocessor or microcontroller is a programmable specific integrated circuit which is capable of operating, storing, outputting/inputting or the like and may receive and process various encoded instructions, thereby performing various logic operations and arithmetic operations and outputting corresponding operational results. The processor **111** may be programmed to interpret various instructions so as to process data in the base station **11** and execute various operational procedures or programs. The processor **131** may be programmed to interpret various instructions so as to process data in the user equipment **13** and execute various operational procedures or programs.

[0024] Each of the transceivers **113** and the transceivers **133** may be constituted by a transmitter and a receiver, and may comprise for example but not limited to communication elements such as an antenna, an amplifier, a modulator, a demodulator, a detector, an analog-to-digital converter, a digital-to-analog converter or the like. The transceiver **113** may be configured to enable the base station **11** to communicate and exchange data with an external device. The transceiver **133** may be configured to enable the user equipment **13** to communicate and exchange data with an external device. For example, as shown in FIG. **1**, the transceiver **113** of the base station **11** may communicate with the transceiver **133** of the user equipment **13**.

[0025] Still referring to FIG. **1**, in order to perform a wireless communication procedure with one or more user equipments **13**, each of the base stations **11** may decide a first resource configuration C**1** via the processor **111** and may transmit (e.g., broadcast) the first resource configuration C**1** via the transceiver **113**. For example, each of the base stations **11** may load the first resource configuration C**1** into system information broadcasted routinely by the base station **11**. After the first resource configuration C**1** is received by the one or more user equipments **13** via the transceiver **133**, the processor **131** can perform a wireless communication procedure with the base station **11** via the transceiver **133** according to the first resource configuration C**1**.

[0026] If the base station **11** wants to change the first resource configuration C**1** after the first resource configuration C**1** is transmitted, then the base station **11** may decide a second resource configuration C**2** via the processor **111** and additionally transmit (e.g., broadcast) the second resource configuration C**2** to the one or more user equipments **13** via the transceiver **131** within a modification period that is used to notify the user equipment **13** that the system information will be updated in the conventional communication system. After the second resource configuration C**2** is received by the one or more user equipments **13** via the transceiver **133**, the processor **131** may continue to perform the wireless communication procedure with the base station **11** via the transceiver **133** according to the second resource configuration C**2** instead of according to the first resource configuration C**1**. Accordingly, the one or more user equipments **13** can receive the second resource configuration C**2** (i.e., the resource configuration that has been modified) in advance within the first modification period among two adjacent modification periods in the conventional communication system, and does not need to wait for the second modification period in order to obtain the second resource configuration C**2** from the updated system information.

[0027] In some embodiments, in addition to the first resource configuration C**1** and the second resource configuration C**2**, the base station **11** may further decide a third resource configuration different from the second resource configuration C**2**, and transmit (e.g., broadcast) updated system information in which the third resource configuration is loaded to the one or more user equipments **13** via the transceiver **131** within a modification period that is used to transmit the updated system information to the user equipment **13** in the conventional communication system. For example, in the case where system resource congestion is improved because the base station **11** transmits the second resource configuration C**2** within the first modification period, the base station **11** can transmit updated system information in which the third resource configuration is loaded to the one or more user equipments **13** within the second modification period. Accordingly, in these embodiments, the one or more user equipments **13** not only can receive the second resource configuration C**2** within the first modification period among the two adjacent modification periods in the conventional communication system, but also can obtain the third resource configuration from the updated system information within the second modification period and perform a corresponding communication procedure according to the third resource configuration.

[0028] FIG. **2** illustrates a schematic view of a wireless communication procedure about paging in one or more embodiments of the present invention. However, contents shown in FIG. **2** are only for purpose of illustrating embodiments of the present invention instead of limiting the present invention.

[0029] Referring to FIG. **1** to FIG. **2**, in the case where the wireless communication system **1** provides a plurality of carriers, the base station **11** may place the first resource configuration C**1** into a system information message **201** and may transmit the system information message **201** to the user equipment **13** via an anchor carrier **21**. After the system information message **201** is received by the user equipment **13**, the base station **11** and the user equipment **13** can perform a wireless communication procedure WCP**1** about paging according to a certain carrier specified by the first resource configuration C**1** (e.g., a non-anchor carrier **23** shown in FIG. **2**). In other embodiments, the carrier specified by the first resource configuration C**1** may also be the anchor carrier **21**. Depending on different requirements, the first resource configuration C**1** may comprise different system resource blocks. For example, in order to perform the wireless communication procedure WCP**1** about paging, the first resource configuration C**1** may comprise: a System Information Block Type 2 (SIB2), a System Information Block Type 2-NB (SIB2-NB) or a System Information Block Type 22-NB (SIB22-NB).

[0030] If the base station **11** wants to change the first resource configuration C**1** after the system information message **201** is transmitted, then the base station **11** may place the second resource configuration C**2** into a downlink control message **203**, and transmit the downlink control message **203** to the user equipment **13** via the carrier specified by the first resource configuration C**1** (e.g., the non-anchor carrier **23** shown in FIG. **2**) within a modification period that is used to notify the user equipment **13** that

the system information will be updated in the conventional communication system. After the downlink control message **203** is received by the user equipment **13** via the carrier specified by the first resource configuration C**1**, the base station **11** can continue to perform the wireless communication procedure WCP**1** with the user equipment **13** according to a certain carrier specified by the second resource configuration C**2** (e.g., a non-anchor carrier **25** shown in FIG. **2**). In other embodiments, the carrier specified by the second resource configuration C**2** may also be the anchor carrier **21**.

[0031] Depending on different requirements, the downlink control message **203** may be a message based on any of the following layers/categories: a physical layer (belonging to Layer 1), a Medium Access Control (MAC) layer (belonging to Layer 2), and a Radio Resource Control (RRC) layer (belonging to Layer 3) or the like. In other embodiments, the downlink control message **203** may also be a downlink control message based on other layers/categories instead of being limited to the aforesaid layers/categories.

[0032] In some embodiments, the base station **11** may transmit the downlink control message **203** to the user equipment **13** during the wireless communication procedure WCP**1**. For example, the downlink control message **203** may be a paging message that is transmitted to the user equipment **13** by the base station **11** during the wireless communication procedure WCP**1**, and the paging message is a message based on the radio resource control layer and may include paging records of one or more user equipments. As another example, the downlink control message **203** may be a direct instruction that is transmitted additionally to the user equipment **13** by the base station **11** during the wireless communication procedure WCP**1**, and the direct instruction is a message based on the physical layer. As yet another example, the downlink control message **203** may be an MAC control element (MAC CE) message that is transmitted additionally to the user equipment **13** by the base station **11** during the wireless communication procedure WCP**1**, or the downlink control message **203** may be an MAC control element message loaded in the paging message that is transmitted to other user equipments **13** by the base station **11** during the wireless communication procedure WCP**1**, and the MAC control element message is a message based on the medium access control layer.

[0033] In some embodiments, the base station **11** may transmit the downlink control message **203** to the user equipment **13** after the system information message **201** is transmitted but before the wireless communication procedure WCP**1** is performed. For example, the base station **11** may transmit the direct instruction based on the physical layer or the MAC control element message based on the medium access control layer to the user equipment **13** after the system information message **201** is transmitted but before any paging message is transmitted. In some embodiments, the base station **11** may determine whether to transmit the downlink control message **203** according to a resource utilization condition of the base station **11**. For example, the base station **11** may decide to transmit the downlink control message **203** to the user equipment **13** due to one or more of the following reasons: a certain paging message transmitted to the user equipment does not comprise a paging record that is consistent with the user equipment identity of the user equipment **13**, a certain carrier (e.g., the non-anchor carrier **23**) is overloaded, a certain carrier (e.g., the non-anchor carrier **23**) has a poor channel condition (e.g., there is much interference therein), and the base station **11** needs to reserve a certain carrier (e.g., the non-anchor carrier **23**) for other applications, or the like. The base station **11** may also determine whether to transmit the downlink control message **203** to the user equipment **13** due to other reasons instead of being limited to the aforesaid reasons.

[0034] In some embodiments, the user equipment **13** may decide whether to perform the wireless communication procedure WCP**1** according to the second resource configuration C**2** (i.e., instead of performing the wireless communication procedure WCP**1** according to the first resource configuration C**1**) depending on a communication condition of the user equipment **13** after the downlink control message **203** is received. For example, the user equipment **13** may perform the wireless communication procedure WCP**1** according to the second resource configuration C**2** instead of according to the first resource configuration C**1** because a certain paging message received from the base station **11** does not comprise a paging record that is consistent with the user equipment identity of the user equipment **13**. In some embodiments, the first resource configuration C**1** may comprise a first correspondence table regarding a plurality of user equipments **13** and a plurality of carriers, and each of the user equipments **13** can perform the wireless communication procedure WCP**1** with the base station **11** directly via a carrier specified in the first correspondence table after receiving the first resource configuration C**1**. Additionally, the second resource configuration C**2** may comprise a second correspondence table regarding the plurality of user equipments **13** and the plurality of carriers, and each of the user equipments **13** can perform the wireless communication procedure WCP**1** with the base station **11** directly via a carrier specified in the second correspondence table after receiving the second resource configuration C**2**.

[0035] In some embodiments, in order to reduce the data amount to be transmitted for indicating the aforesaid first correspondence table and the second correspondence table, the first resource configuration C**1** may instead comprise a first carrier list, and the first carrier list may record a plurality of carriers (e.g., the anchor carrier **21**, the non-anchor carrier **23** and the non-anchor carrier **25** or the like shown in FIG. **2**) and respective first weight factors of the plurality of carriers. In this case, the use equipment **13** may select a carrier (e.g., the non-anchor carrier **23** shown in FIG. **2**) from the plurality of carriers according to the plurality of first weight factors and the user equipment identity, and then perform the wireless communication procedure WCP**1** with the base station **11** via the carrier. Similarly, the second resource configuration C**2** may instead comprise a second carrier list, and the second carrier list may record the plurality of carriers and respective second weight factors of the plurality of carriers. In this case, the use equipment **13** may select another carrier (e.g., the non-anchor carrier **25** shown in FIG. **2**) from the plurality of carriers according to the plurality of second weight factors and the user equipment identity, and then perform the wireless communication procedure WCP**1** with the base station **11** via the another carrier.

[0036] In some embodiments, the aforesaid second carrier list may instead record a delta weight factor of each of the carriers. In this case, the user equipment **13** may perform the wireless communication procedure WCP**1** with the base

station **11** according to the first resource configuration C**1** (i.e., the first weight factors of the carriers recorded in the first carrier list) and the second resource configuration C**2** (i.e., the delta weight factors of the carriers recorded in the second carrier list).

[0037] In some embodiments, the user equipment **13** may select a carrier wi (e.g., the non-anchor carrier **23** or the non-anchor carrier **25** shown in FIG. **2**) from the plurality of carriers according to the following condition to perform the wireless communication procedure WCP**1** with the base station **11**:

$$\sum_{j=0}^{i-1} wj \le \text{floor}\left(\frac{\text{UE\_ID}}{N \times N_s}\right) \bmod\left(\sum_j wj\right) < \sum_{j=0}^{i} wj \quad (1)$$

where wj is a weight factor of the J^{th} carrier and is a positive integer, j=1, 2, 3 . . . , and w0=0;

N is the number of paging frames in a paging cycle of the user equipment **13**, and it is calculated by taking a minimum value from the number of frames (T) within a discontinuous receive cycle (DRX cycle) of the user equipment and the number of paging subframes (n_b) within each paging cycle of the user equipment **13**, i.e., min(T, n_b);

N_s is the number of paging subframes in a wireless frame for paging, and it is calculated by taking a maximum value from the value obtained through dividing the number of paging subframes in each paging cycle of the user equipment **13** by the number of frames within the DRX cycle of the user equipment **13** and 1, i.e., max(1, n_b/T);

UE_ID is the user equipment ID obtained through moding an international mobile subscriber identity (IMSI) of the user equipment **13** by **16384**;

mod operation is the modulo operation; and

floor function takes an integral value not greater than an incoming parameter thereof.

[0038] For example, it is assumed that in the first resource configuration C**1**, the weight factor of the anchor carrier **21** is w1=1, the weight factor of the non-anchor carrier **23** is w2=1, the weight factor of the non-anchor carrier **25** is w3=1, the number of frames (T) within the DRX cycle of the user equipment **13** is 128, the number of paging subframes (n_b) in each paging period of the user equipment **13** is 32 (i.e., the value obtained through dividing T by 4), and the number of paging frames (N) in the paging period of the user equipment **13** is 32, then the user equipment **13** of which the UE_ID satisfies the above condition will select the anchor carrier **21** for performing the wireless communication procedure WCP**1**, wherein i=0, 1, 2, ... In this example, a plurality of user equipments of which the UE_ID satisfies the above equation (e.g., the UE_ID is 96-127, 192-223, 288-319, 384-415, 480-511, . . .) will all select the anchor carrier **21** for performing the paging procedure. If the second resource configuration C**2** is transmitted in a paging occasion of a plurality of user equipments (e.g., the UE_ID is 97, 193, 289, 385, 481, . . .) having the same values calculated from UE_ID mod N and the weight factor w2 of the non-anchor carrier **23** is changed into 2 in the second resource configuration C**2**, then a plurality of user equipments which have received the second resource configuration C**2** and of which the UE_ID is 97, 481, . . . will instead select the non-anchor carrier **23** for performing the wireless communication procedure WCP**1**.

[0039] In some embodiments, after transmitting the system information message **201**, the base station **11** may repeatedly transmit the downlink control message **203** and the second resource configuration C**2** loaded in the downlink control message **203** to the user equipment **13** at a plurality of time points within a modification period that is used to notify the user equipment **13** that the system information will be updated in the conventional communication system, and the user equipment **13** may receive or attempt to receive the downlink control message **203** and the second resource configuration C**2** loaded in the downlink control message **203** at the plurality of time points within the modification period.

[0040] FIG. **3** is a schematic view illustrating a resource configuration being changed in the wireless communication procedure WCP**1** shown in FIG. **2**, in one or more embodiments of the present invention. However, contents shown in FIG. **3** are only for purpose of illustrating embodiments of the present invention instead of limiting the present invention.

[0041] Referring to FIG. **1** to FIG. **3**, after receiving the system information message **201** transmitted by the base station **11**, the user equipment **13** may receive or attempt to receive a paging message transmitted by the base station **11** at a specific paging occasion within each discontinuous receive cycle DRX on the non-anchor carrier **23** specified by the first resource configuration C**1** so as to perform the wireless communication procedure WCP**1** about paging with the base station **11**. Each discontinuous receive cycle DRX may comprise a plurality of paging occasions (e.g., eight paging occasions) therein, and the specific paging occasion may be any of the plurality of paging occasions (e.g., the fifth paging occasion among the eight paging occasions).

[0042] Still referring to FIG. **1** to FIG. **3**, after transmitting the system information message **201**, the base station **11** may transmit, on the non-anchor carrier **23** specified by the first resource configuration C**1**, a paging message in which the second resource configuration C**2** is loaded (i.e., a certain type of the downlink control message **203**) to the user equipment **13** at a specific paging occasion (e.g., specific paging occasions **301** and **303** shown in FIG. **3**) of each discontinuous receive cycle DRX in a redistribution period RP within the modification period MP**1**. After receiving the downlink control message **203** transmitted by the base station **11**, the user equipment **13** may receive or attempt to receive a paging message transmitted by the base station **11** at a specific paging occasion within each discontinuous receive cycle DRX on the non-anchor carrier **25** specified by the second resource configuration C**2** so as to continue the wireless communication procedure WCP**1** about paging with the base station **11**. Accordingly, the base station **11** may not need to wait for a modification period MP**2**, that is used to transmit the updated system information in the conventional communication system, before transmitting the second resource configuration C**2** to the user equipment **13**, and the user equipment **13** may not need to wait for the modification period MP**2** before receiving the second resource configuration C**2**.

[0043] The length of the redistribution period RP may be the same as the length of the discontinuous receive cycle DRX, or may be an integral multiple of the discontinuous receive cycle DRX. In the case where the length of the redistribution period RP is the same as the length of the

discontinuous receive cycle DRX, the base station **11** may transmit the downlink control message **203** at a specific paging occasion of a single discontinuous receive cycle DRX (e.g., at the fifth paging occasion of a single discontinuous receive cycle DRX) within the redistribution period RP, and the user equipment **13** may receive or attempt to receive the downlink control message **203** at the specific paging occasion. In the case where the length of the redistribution period RP is an integral multiple of the length of the discontinuous receive cycle DRX, the base station **11** may transmit the downlink control message **203** at a specific paging occasion of each of a plurality of discontinuous receive cycles DRX (e.g., at the fifth paging occasion of each of a plurality of discontinuous receive cycles DRX), and the user equipment **13** may receive or attempt to receive the downlink control message **203** at the plurality of specific paging occasions. If the user equipment **13** receives the downlink control message **203** and the second resource configuration C**2** loaded in the downlink control message **203** at any of the plurality of transmission occasions, then the user equipment **13** may start to continue the wireless communication procedure WCP**1** about paging with the base station **11** instead on the non-anchor carrier **25** specified by the second resource configuration C**2** after the redistribution period RP in which the second resource configuration C**2** is received. In some embodiments, when the user equipment **13** is performing the wireless communication procedure WCP**1** about paging with the base station **11** according to the second resource configuration C**2**, the base station **11** may also transmit another resource configuration to the user equipment **13** on other redistribution period(s) RP within the modification period MP**1** so that the user equipment **13** can continue the wireless communication procedure WCP**1** about paging with the base station **11** instead on the carrier (e.g., the non-anchor carrier **23**) specified by the another resource configuration within the modification period MP**1**.

[0044] FIG. **4** illustrates a schematic view of a wireless communication procedure about random access in one or more embodiments of the present invention. However, contents shown in FIG. **4** are only for purpose of illustrating embodiments of the present invention instead of limiting the present invention.

[0045] Referring to FIG. **1** and FIG. **4**, in the case where the wireless communication system **1** provides a plurality of uplink-downlink carrier pairs, the base station **11** may place the first resource configuration C**1** in a system information message **401**, and transmit the system information message **401** to the user equipment **13** via a downlink anchor carrier **413** comprised in an uplink-downlink anchor carrier pair **41**. After the user equipment **13** receives the system information message **401**, the base station **11** and the user equipment **13** can perform a wireless communication procedure WCP**2** about random access according to a certain uplink-downlink carrier pair specified by the first resource configuration C**1** (e.g., an uplink-downlink non-anchor carrier pair **43** shown in FIG. **4**), and wherein the uplink-downlink non-anchor carrier pair **43** comprises an uplink non-anchor carrier **431** and a downlink non-anchor carrier **433**. In other embodiments, the carrier pair specified by the first resource configuration C**1** may also be the uplink-downlink anchor carrier pair **41**.

[0046] Depending on different requirements, the first resource configuration C**1** may comprise different system resource blocks. For example, in order to perform the wireless communication procedure WCP**2** about random access, the first resource configuration C**1** may comprise: a System Information Block Type 2 (SIB2), a System Information Block Type 2-NB (SIB2-NB) or a System Information Block Type 22-NB (SIB22-NB).

[0047] If the base station **11** wants to change the first resource configuration C**1** after the system information message **401** is transmitted, then the base station **11** may place the second resource configuration C**2** into a downlink control message **403**, and transmit the downlink control message **403** to the user equipment **13** via a downlink carrier specified by the first resource configuration C**1** (e.g., the downlink non-anchor carrier **433** shown in FIG. **4**) within a modification period that is used to notify the user equipment **13** that the system information will be updated in the conventional communication system. After the downlink control message **403** is received by the user equipment **13** via the downlink carrier specified by the first resource configuration C**1**, the base station **11** can continue to perform the wireless communication procedure WCP**2** with the user equipment **13** according to a certain uplink-downlink carrier pair specified by the second resource configuration C**2** (e.g., an uplink-downlink non-anchor carrier pair **45** shown in FIG. **4**), and wherein the uplink-downlink non-anchor carrier pair **45** comprises an uplink non-anchor carrier **451** and a downlink non-anchor carrier **453**. In other embodiments, the uplink-downlink carrier pair specified by the second resource configuration C**2** may also be the uplink-downlink anchor carrier pair **41**.

[0048] Depending on different requirements, the downlink control message **403** may be a message based on any of the following layers/categories: a physical layer and a Medium Access Control layer. In other embodiments, the downlink control message **403** may also be a downlink control message based on other layers/categories instead of being limited to the aforesaid layers/categories.

[0049] In some embodiments, the base station **11** may transmit the downlink control message **403** to the user equipment **13** during the wireless communication procedure WCP**2**. For example, the downlink control message **403** may be a random access response message that is transmitted by the base station **11** in response to a random access preamble message transmitted by the user equipment **13** during the wireless communication procedure WCP**2**, and the random access response message is a message based on the Medium Access Control layer. As another example, the downlink control message **403** may be a downlink control message, e.g., a message based on the physical layer, that is transmitted additionally to the user equipment **13** by the base station **11** during the wireless communication procedure WCP**2**.

[0050] In some embodiments, each of the plurality of uplink-downlink carrier pairs (e.g., the uplink-downlink anchor carrier pair **41**, the uplink-downlink non-anchor carrier pair **43** and the uplink-downlink non-anchor carrier pair **45** or the like) may be replaced by a single carrier, and the single carrier may process uplink transmission and downlink transmission by using Time-Division Duplexing (TDD). For example, the user equipment **13** may transmit a random access preamble message to the base station **11** via a certain carrier within a first time period (uplink transmission), and the base station **11** may transmit a random access

response message to the user equipment **13** subsequently via the same carrier within a second time period (downlink transmission).

[0051] In some embodiments, the base station **11** may transmit the downlink control message **403** to the user equipment **13** after the system information message **401** is transmitted but before the wireless communication procedure WCP**2** is performed. For example, the base station **11** may transmit a message based on the physical layer to the user equipment **13** after it transmits the system information message **401** but before the user equipment **13** transmits any random access preamble message.

[0052] In some embodiments, the base station **11** may determine whether to transmit the downlink control message **403** according to a resource utilization condition of the base station **11**. For example, the base station **11** may decide to transmit the downlink control message **403** to the user equipment **13** due to one or more of the following reasons: a random access response message transmitted in response to a random access preamble message transmitted by the user equipment **13** does not comprise a random access preamble ID (RAPID) that is consistent with the random access preamble message, a certain uplink-downlink carrier pair (e.g., the uplink-downlink non-anchor carrier pair **43**) is overloaded, a certain uplink-downlink carrier pair (e.g., the uplink-downlink non-anchor carrier pair **43**) has a poor channel condition (e.g., there is much interference therein), and the base station **11** needs to reserve a certain uplink-downlink carrier pair (e.g., the uplink-downlink non-anchor carrier pair **43**) for other applications, or the like. The base station **11** may also determine whether to transmit the downlink control message **403** to the user equipment **13** due to other reasons instead of being limited to the aforesaid reasons.

[0053] The base station **11** may determine whether a certain uplink-downlink carrier pair (e.g., the uplink-downlink non-anchor carrier pair **43**) is overloaded according to one or more of the following factors: the number and power level of random access preamble messages received on a certain uplink non-anchor carrier; and the success rate of contention resolution for the third type of messages (MSG3) received on a certain uplink non-anchor carrier or the like.

[0054] In some embodiments, the user equipment **13** may determine whether to perform the wireless communication procedure WCP**2** according to the second resource configuration C**2** (i.e., instead of performing the wireless communication procedure WCP**2** according to the first resource configuration C**1**) according to a communication condition of the user equipment **13**. For example, the user equipment **13** may decide to perform the wireless communication procedure WCP**2** according to the second resource configuration C**2** instead of according to the first resource configuration C**1** due to one or more of the following reasons: a random access response message received from base station **11** does not comprise a random access preamble ID that is consistent with the first random access preamble message transmitted by the user equipment **13**, a certain uplink-downlink carrier pair specified by the second resource configuration C**2** (e.g., the uplink-downlink non-anchor carrier pair **43**) has a poor channel condition (e.g., there is much interference therein) or the like. The user equipment **13** may also determine whether to perform the wireless communication procedure WCP**2** according to the second resource configuration C**2** instead of according to the first resource configuration C**1** due to other reasons instead of being limited to the aforesaid reasons.

[0055] In some embodiments, the first resource configuration C**1** may comprise a first correspondence table regarding a plurality of user equipments **13** and a plurality of uplink-downlink carrier pairs, and each of the user equipments **13** can perform the wireless communication procedure WCP**2** with the base station **11** directly via an uplink-downlink carrier pair specified in the first correspondence table after receiving the first resource configuration C**1**. Additionally, the second resource configuration C**2** may comprise a second correspondence table regarding the plurality of user equipments **13** and the plurality of uplink-downlink carrier pairs, and each of the user equipments **13** can perform the wireless communication procedure WCP**2** with the base station **11** directly via an uplink-downlink carrier pair specified in the second correspondence table after receiving the second resource configuration C**2**.

[0056] In some embodiments, in order to reduce the data amount to be transmitted for indicating the aforesaid first correspondence table and the second correspondence table, the first resource configuration C**1** may instead comprise a first carrier list, and the first carrier list may record a plurality of uplink-downlink carrier pairs (e.g., uplink-downlink anchor carrier pair **41**, the uplink-downlink non-anchor carrier pair **43**, the uplink-downlink non-anchor carrier pair **45** or the like shown in FIG. **4**) and respective first weight factors of the plurality of uplink-downlink carrier pairs. In this case, the use equipment **13** may select an uplink-downlink carrier pair (e.g., the uplink-downlink non-anchor carrier pair **43** shown in FIG. **4**) from the plurality of uplink-downlink carrier pairs according to the plurality of first weight factors, and then perform the wireless communication procedure WCP**2** with the base station **11** via the uplink-downlink carrier pair. Similarly, the second resource configuration C**2** may instead comprise a second carrier list, and the second carrier list may record the plurality of uplink-downlink carrier pairs and respective second weight factors of the plurality of uplink-downlink carrier pairs. In this case, the use equipment **13** may select another uplink-downlink carrier pair (e.g., the uplink-downlink non-anchor carrier pair **45** shown in FIG. **4**) from the plurality of uplink-downlink carrier pairs according to the plurality of second weight factors, and then continue the wireless communication procedure WCP**2** with the base station **11** via the another uplink-downlink carrier pair.

[0057] In some embodiments, the user equipment **13** may select an uplink-downlink carrier pair (e.g., the uplink-downlink non-anchor carrier pair **43** or the uplink-downlink non-anchor carrier pair **45** shown in FIG. **4**) from the plurality of uplink-downlink carrier pairs according to the following condition to perform the wireless communication procedure WCP**2** with the base station **11**:

$$\sum_{j=0}^{i-1} \frac{w_{jx_j}}{\sum w_{jx_j}} \le n < \sum_{j=0}^{i} \frac{w_{jx_j}}{\sum w_{jx_j}} \tag{2}$$

where w_{jx_j} is a weight factor of the x_j^{th} Random Access Channel resource (RACH resource) selected by the UE in the j^{th} carrier pair, wherein j=1, 2, 3, . . . , and $w_{0x_0}=0$; and

n is a number decided by the user equipment **13** randomly from 0 to 1.

[0058] For example, it is assumed that the weight factors of two random access channel resources of the uplink-downlink anchor carrier pair **41** under two different Coverage Enhancement (CE) levels are respectively w10=1 and w11=1, the weight factors of random access channel resources of the uplink-downlink non-anchor carrier pair **43** under three different CE levels are respectively w20=2, w21=2, and w22=3, and the weight factors of random access channel resources of the uplink-downlink non-anchor carrier pair **45** under three different CE levels are respectively w30=1, w31=2, and w32=2, then the user equipment **13** first decides the CE levels of the uplink anchor carrier **411** and the uplink non-anchor carriers **431** and **451** according to a reference signal received power (RSRP) measured on the downlink anchor carrier **413** and the downlink non-anchor carriers **433** and **453** as well as a result of comparing a power offset corresponding to the uplink anchor carrier **411** and the uplink non-anchor carriers **431** and **451** in the system information configuration with a threshold, and selects corresponding weight factors according to the decided CE levels, e.g., the user equipment **13** may select the weight factors w10, w21 and w32. Then, if the number n decided by the user equipment randomly from 0 to 1 is 0.5, then the user equipment **13** may select the uplink-downlink non-anchor carrier pair **43** of which the random access channel resource has a weight factor of w21=2 to perform the wireless communication procedure WCP**2** with the base station **11**.

[0059] In some embodiments, after transmitting the system information message **401**, the base station **11** may repeatedly transmit the downlink control message **403** and the second resource configuration C**2** loaded in the downlink control message **403** to the user equipment **13** at a plurality of time points within a modification period that is used to notify the user equipment **13** that the system information will be updated in the conventional communication system, and the user equipment **13** may receive the downlink control message **403** and the second resource configuration C**2** loaded in the downlink control message **403** at the plurality of time points within the modification period.

[0060] FIG. **5** is a schematic view illustrating a resource configuration being changed in the wireless communication procedure WCP**2** shown in FIG. **4**, in one or more embodiments of the present invention. However, contents shown in FIG. **5** are only for purpose of illustrating embodiments of the present invention instead of limiting the present invention. For ease of description, FIG. **5** only depicts the uplink non-anchor carrier pair **431**, the downlink non-anchor carrier pair **433** and the uplink non-anchor carrier pair **451** under a single CE level.

[0061] Referring to FIG. **1**, FIG. **4** and FIG. **5**, after receiving the system information message **401** transmitted by the base station **11**, the user equipment **13** may perform the wireless communication procedure WCP**2** with the base station **11** on the uplink-downlink non-anchor carrier pair **43** specified by the first resource configuration C**1**. In the wireless communication procedure WCP**2**, the user equipment **13** first transmits a random access preamble message (i.e., a first message (MSG1)) to the base station **11** on the uplink non-anchor carrier pair **431**, and then the base station **11** transmits a random access response message (i.e., the second message (MSG2)) to the user equipment **13** on the downlink non-anchor carrier pair **433**. If the random access response message comprises a random access preamble ID that is consistent with the random access preamble message, then the user equipment **13** and the base station **11** will continue the subsequent random access processing (i.e., the processing of the third message (MSG3) and the fourth message (MSG4)).

[0062] Still referring to FIG. **1**, FIG. **4** and FIG. **5**, after transmitting the system information message **401**, the base station **11** may define a redistribution period RP within a modification period MP**1** that is used to inform the user equipment **13** that the system information will be updated in the conventional communication system, and transmit the downlink control message **403** to the user equipment **13** on one or more time points or within a time period in the redistribution period RP. For example, if the user equipment transmits a random access preamble message within a time period **511** on the uplink non-anchor carrier **431** specified by the first resource configuration C**1**, then the base station **11** may transmit a random access response message (i.e., a certain type of the downlink control message **403**) in which the second resource configuration C**2** is loaded to the user equipment **13** within a time period **531** on the downlink non-anchor carrier **433** specified by the first resource configuration C**1**. In some embodiments, the redistribution period RP may be a random access response (RAR) window in which the user equipment **13** waits for a random access response message transmitted by the base station **11** on the downlink non-anchor carrier **433**.

[0063] After receiving the random access response message transmitted by the base station **11**, the user equipment **13** may continue the wireless communication procedure WCP**2** with the base station **11** instead on the uplink-downlink non-anchor carrier **45** specified by the second resource configuration C**2**. For example, after receiving the random access response message transmitted by the base station **11**, the user equipment **13** may transmit another random access preamble message to the base station **11** within a time period **553** on the uplink non-anchor carrier **451**, and wait for a corresponding random access response message transmitted by the base station **11** on the downlink non-anchor carrier **453** before performing the subsequent random access processing (i.e., the processing of the third message (MSG3) and the fourth message (MSG4)) with the base station **11**. Accordingly, the base station **11** may not need to wait for a modification period MP**2**, that is used to transmit the updated system information in the conventional communication system, before transmitting the second resource configuration C**2** to the user equipment **13**, and the user equipment **13** may not need to wait for the modification period MP**2** before receiving the second resource configuration C**2**.

[0064] FIG. **6** illustrates a schematic view of a wireless communication method in one or more embodiments of the present invention. However, contents shown in FIG. **6** are only for purpose of illustrating embodiments of the present invention instead of limiting the present invention.

[0065] Referring to FIG. **6**, a wireless communication method **6** may comprise the following steps:

[0066] receiving, by a user equipment, a first resource configuration transmitted by a base station;

[0067] performing, by the user equipment, a wireless communication procedure with the base station according to the first resource configuration after the first resource configuration is received;

[0068] receiving, by the user equipment, a second resource configuration transmitted by the base station within a modification period, which is used to notify the user equipment that system information will be updated, after receiving the first resource configuration; and

[0069] performing, by the user equipment, the wireless communication procedure with the base station according to the second resource configuration after receiving the second resource configuration.

[0070] In some embodiments, for the wireless communication method **6**, the user equipment may receive the second resource configuration at a plurality of time points within the modification period.

[0071] In some embodiments, for the wireless communication method **6**, the wireless communication procedure may be a paging procedure, and the user equipment may acquire the second resource configuration from a downlink control message transmitted by the base station. Besides, in these embodiments, the first resource configuration may comprise a first carrier list, and the first carrier list records a plurality of carriers and respective first weight factors of the plurality of carriers; and the second resource configuration may comprise a second carrier list, and the second carrier list records the plurality of carriers and respective second weight factors of the plurality of carriers. The wireless communication method **6** further comprises the following steps: performing, by the user equipment, the wireless communication procedure with the base station on one of the plurality of carriers according to the plurality of first weight factors after receiving the first resource configuration; and performing, by the user equipment, the wireless communication procedure with the base station on one of the plurality of carriers according to the plurality of second weight factors after receiving the second resource configuration.

[0072] In some embodiments, for the wireless communication method **6**, the wireless communication procedure may be a random access procedure, and the user equipment may acquire the second resource configuration from a downlink control message transmitted by the base station. Besides, in these embodiments, the first resource configuration comprises a first carrier list, and the first carrier list records a plurality of uplink-downlink carrier pairs and respective first weight factors of the plurality of uplink-downlink carrier pairs; and the second resource configuration comprises a second carrier list, and the second carrier list records a plurality of uplink-downlink carrier pairs and respective second weight factors of the plurality of uplink-downlink carrier pairs. The wireless communication method **6** further comprises the following steps: performing, by the user equipment, the wireless communication procedure with the base station on one of the plurality of uplink-downlink carrier pairs according to the plurality of first weight factors after receiving the first resource configuration; and performing, by the user equipment, the wireless communication procedure with the base station on one of the plurality of uplink-downlink carrier pairs according to the plurality of second weight factors after receiving the second resource configuration.

[0073] In some embodiments, the wireless communication method **6** may further comprise the following step: determining, by the user equipment according to a communication condition of the user equipment, whether to perform the wireless communication procedure with the base station according to the second resource configuration.

[0074] In some embodiments, the wireless communication method **6** may be implemented in the wireless communication system **1**. All corresponding steps comprised in the wireless communication method **6** shall be clearly appreciated by those of ordinary skill in the art based on the above description of the wireless communication system **1**, and thus will not be further described herein.

[0075] One or more embodiments of the present invention may further comprise another wireless communication method. The wireless communication method may comprise the following steps:

[0076] deciding a first resource configuration and transmitting the first resource configuration to a user equipment by a base station;

[0077] performing, by the base station, a wireless communication procedure with the user equipment according to the first resource configuration after the first resource configuration is received by the user equipment;

[0078] deciding by the base station a second resource configuration and transmitting by the base station the second resource configuration to the user equipment within a modification period, which is used to notify the user equipment that system information will be updated, after the first resource configuration is transmitted; and

[0079] performing, by the base station, the wireless communication procedure with the user equipment according to the second resource configuration after the second resource configuration is received by the user equipment.

[0080] In some embodiments, for the wireless communication method, the base station may repeatedly transmit the second resource configuration at a plurality of time points within the modification period.

[0081] In some embodiments, for the wireless communication method, the wireless communication procedure may be a paging procedure, and the base station may load the second resource configuration into a downlink control message transmitted to the user equipment. Besides, in these embodiments, the first resource configuration may comprise a first carrier list, and the first carrier list records a plurality of carriers and respective first weight factors of the plurality of carriers; and the second resource configuration may comprise a second carrier list, and the second carrier list records the plurality of carriers and respective second weight factors of the plurality of carriers. The wireless communication method may further comprise the following steps: performing, by the base station, the wireless communication procedure with the user equipment on one of the plurality of carriers according to the plurality of first weight factors after the user equipment receives the first resource configuration; and performing, by the base station, the wireless communication procedure with the user equipment on one of the plurality of carriers according to the plurality of second weight factors after the user equipment receives the second resource configuration.

[0082] In some embodiments, for the wireless communication method, the wireless communication procedure may be a random access procedure, and the base station may load the second resource configuration into a downlink control message transmitted to the user equipment. Besides, in these embodiments, the first resource configuration may comprise a first carrier list, and the first carrier list records a plurality of uplink-downlink carrier pairs and respective first weight

factors of the plurality of uplink-downlink carrier pairs; and the second resource configuration may comprise a second carrier list, and the second carrier list records a plurality of uplink-downlink carrier pairs and respective second weight factors of the plurality of uplink-downlink carrier pairs. The wireless communication method may further comprise the following steps: deciding by the base station the plurality of first weight factors and, after the first resource configuration is received by the user equipment, performing by the base station the wireless communication procedure with the user equipment on one of the plurality of uplink-downlink carrier pairs according to the plurality of first weight factors; and deciding by the base station the plurality of second weight factors and, after the second resource configuration is received by the user equipment, performing by the base station the wireless communication procedure with the user equipment on one of the plurality of uplink-downlink carrier pairs according to the plurality of second weight factors.

[0083] In some embodiments, the wireless communication method may further comprise the following step: determining, by the base station, whether to transmit the second resource configuration according to a resource utilization condition of the base station.

[0084] In some embodiments, the wireless communication method may be implemented in the wireless communication system **1**. All corresponding steps comprised in the wireless communication method shall be clearly appreciated by those of ordinary skill in the art based on the above description of the wireless communication system **1**, and thus will not be further described herein.

[0085] The above disclosure is related to the detailed technical contents and inventive features thereof. People of ordinary skill in the art may proceed with a variety of modifications and replacements based on the disclosures and suggestions of the invention as described without departing from the characteristics thereof. Nevertheless, although such modifications and replacements are not fully disclosed in the above descriptions, they have substantially been covered in the following claims as appended.

What is claimed is:

1. A base station, comprising:

a processor, being configured to decide a first resource configuration and a second resource configuration; and

a transceiver electrically connected with the processor, being configured to transmit the first resource configuration to a user equipment, and transmit the second resource configuration to the user equipment within a modification period, which is used to notify the user equipment that system information will be updated, after the first resource configuration is transmitted;

wherein after the first resource configuration is received by the user equipment, the processor performs a wireless communication procedure with the user equipment via the transceiver according to the first resource configuration, and after the second resource configuration is received by the user equipment, the processor performs the wireless communication procedure with the user equipment via the transceiver according to the second resource configuration.

2. The base station of claim **1**, wherein the transceiver repeatedly transmits the second resource configuration to the user equipment at a plurality of time points within the modification period.

3. The base station of claim **1**, wherein the wireless communication procedure is a paging procedure, and the transceiver is configured to load the second resource configuration into a downlink control message transmitted to the user equipment.

4. The base station of claim **3**, wherein:

the first resource configuration comprises a first carrier list, and the first carrier list records a plurality of carriers and respective first weight factors of the plurality of carriers;

the second resource configuration comprises a second carrier list, and the second carrier list records the plurality of carriers and respective second weight factors of the plurality of carriers;

the processor is further configured to decide the first weight factors and, after the first resource configuration is received by the user equipment, perform the wireless communication procedure with the user equipment via the transceiver on one of the carriers according to the plurality of first weight factors; and

the processor is further configured to decide a plurality of second weight factors and, after the second resource configuration is received by the user equipment, perform the wireless communication procedure with the user equipment via the transceiver on one of the plurality of carriers according to the plurality of second weight factors.

5. The base station of claim **1**, wherein the wireless communication procedure is a random access procedure, and the transceiver is configured to load the second resource configuration into a downlink control message transmitted to the user equipment.

6. The base station of claim **5**, wherein:

the first resource configuration comprises a first carrier list, and the first carrier list records a plurality of uplink-downlink carrier pairs and respective first weight factors of the plurality of uplink-downlink carrier pairs;

the second resource configuration comprises a second carrier list, and the second carrier list records the plurality of uplink-downlink carrier pairs and respective second weight factors of the plurality of uplink-downlink carrier pairs;

the processor is further configured to decide the plurality of first weight factors and, after the first resource configuration is received by the user equipment, perform the wireless communication procedure with the user equipment via the transceiver on one of the plurality of uplink-downlink carrier pairs according to the plurality of first weight factors; and

the processor is further configured to decide the plurality of second weight factors and, after the second resource configuration is received by the user equipment, perform the wireless communication procedure with the user equipment via the transceiver on one of the plurality of uplink-downlink carrier pairs according to the plurality of second weight factors.

7. The base station of claim **1**, wherein the processor is further configured to determine whether to transmit the second resource configuration via the transceiver according to a resource utilization condition of the base station.

8. A user equipment, comprising:

a transceiver, being configured to receive a first resource configuration transmitted by a base station and receive

a second resource configuration transmitted by the base station within a modification period, which is used to notify the user equipment that system information will be updated, after the first resource configuration is received; and

a processor electrically connected with the transceiver, being configured to perform a wireless communication procedure with the base station via the transceiver according to the first resource configuration after the first resource configuration is received by the transceiver, and perform the wireless communication procedure with the base station via the transceiver according to the second resource configuration after the second resource configuration is received by the transceiver.

9. The user equipment of claim **8**, wherein the transceiver receives the second resource configuration transmitted by the base station at a plurality of time points within the modification period.

10. The user equipment of claim **8**, wherein the wireless communication procedure is a paging procedure, and the transceiver acquires the second resource configuration from a downlink control message transmitted by the base station.

11. The user equipment of claim **10**, wherein:

the first resource configuration comprises a first carrier list, and the first carrier list records a plurality of carriers and respective first weight factors of the plurality of carriers;

the second resource configuration comprises a second carrier list, and the second carrier list records the plurality of carriers and respective second weight factors of the plurality of carriers;

the processor is further configured to perform the wireless communication procedure with the base station via the transceiver on one of the plurality of carriers according to the plurality of first weight factors after the first resource configuration is received by the transceiver; and

the processor is further configured to perform the wireless communication procedure with the base station via the transceiver on one of the plurality of carriers according to the plurality of second weight factors after the second resource configuration is received by the transceiver.

12. The user equipment of claim **8**, wherein the wireless communication procedure is a random access procedure, and the transceiver acquires the second resource configuration from a downlink control message transmitted by the base station.

13. The user equipment of claim **12**, wherein:

the first resource configuration comprises a first carrier list, and the first carrier list records a plurality of uplink-downlink carrier pairs and respective first weight factors of the plurality of uplink-downlink carrier pairs;

the second resource configuration comprises a second carrier list, and the second carrier list records the plurality of uplink-downlink carrier pairs and respective second weight factors of the plurality of uplink-downlink carrier pairs;

the processor is further configured to perform the wireless communication procedure with the base station via the transceiver on one of the plurality of uplink-downlink carrier pairs according to the plurality of first weight factors after the first resource configuration is received by the transceiver; and

the processor is further configured to perform the wireless communication procedure with the base station via the transceiver on one of the plurality of uplink-downlink carrier pairs according to the plurality of second weight factors after the second resource configuration is received by the transceiver.

14. The user equipment of claim **12**, wherein the processor is further configured to, according to a communication condition of the user equipment, determine whether to perform the wireless communication procedure with the base station via the transceiver according to the second resource configuration.

15. A wireless communication method, comprising:

receiving, by a user equipment, a first resource configuration transmitted by a base station;

performing, by the user equipment, a wireless communication procedure with the base station according to the first resource configuration after the first resource configuration is received;

receiving, by the user equipment, a second resource configuration transmitted by the base station within a modification period, which is used to notify the user equipment that system information will be updated, after receiving the first resource configuration; and

performing, by the user equipment, the wireless communication procedure with the base station according to the second resource configuration after receiving the second resource configuration.

16. The wireless communication method of claim **15**, wherein the user equipment receives the second resource configuration at a plurality of time points within the modification period.

17. The wireless communication method of claim **15**, wherein the wireless communication procedure is a paging procedure, and the user equipment acquires the second resource configuration from a downlink control message transmitted by the base station.

18. The wireless communication method of claim **17**, wherein:

the first resource configuration comprises a first carrier list, and the first carrier list records a plurality of carriers and respective first weight factors of the plurality of carriers;

the second resource configuration comprises a second carrier list, and the second carrier list records the plurality of carriers and respective second weight factors of the plurality of carriers; and

the wireless communication method further comprises the following steps:

performing, by the user equipment, the wireless communication procedure with the base station on one of the plurality of carriers according to the plurality of first weight factors after receiving the first resource configuration; and

performing, by the user equipment, the wireless communication procedure with the base station on one of the plurality of carriers according to the plurality of second weight factors after receiving the second resource configuration.

19. The wireless communication method of claim **15**, wherein the wireless communication procedure is a random access procedure, and the user equipment acquires the second resource configuration from a downlink control message transmitted by the base station.

20. The wireless communication method of claim **19**, wherein:

the first resource configuration comprises a first carrier list, and the first carrier list records a plurality of uplink-downlink carrier pairs and respective first weight factors of the plurality of uplink-downlink carrier pairs;

the second resource configuration comprises a second carrier list, and the second carrier list records the plurality of uplink-downlink carrier pairs and respective second weight factors of the plurality of uplink-downlink carrier pairs; and

the wireless communication method further comprises the following steps:

performing, by the user equipment, the wireless communication procedure with the base station on one of the plurality of uplink-downlink carrier pairs according to the plurality of first weight factors after receiving the first resource configuration; and

performing, by the user equipment, the wireless communication procedure with the base station on one of the plurality of uplink-downlink carrier pairs according to the plurality of second weight factors after receiving the second resource configuration.

21. The wireless communication method of claim **19**, further comprising:

determining, by the user equipment according to a communication condition of the user equipment, whether to perform the wireless communication procedure with the base station according to the second resource configuration.

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