QUICK TRANSMISSION POINT HANOVER METHOD, HANOVER DEVICE, SERVICE BASE STATION AND TERMINAL

Provided is a quick transmission point handover method, comprising: a service base station detects whether a current transmission point in use needs to be closed; if the service base station detects that the current transmission point in use needs to be closed, transmitting a target transmission point directive command to a terminal to inform the terminal about information of a new target transmission point to be monitored soon and/or to inform the terminal that the current transmission point in use will be closed. Correspondingly, also provided in the present invention is a quick transmission point handover device. The technical solution of the present invention can reduce communication interrupt time due to closing of a transmission point, thus improving user experience, and improving the overall resource utilization and output of the system.

Fig. 1
The present disclosure relates to the field of transmission point handover technology, and particularly to a quick transmission point handover method, a handover device, a service base station, and a terminal.

BACKGROUND

To improve network capacity of a service intensive area, in 3GPP (the 3rd Generation Partnership Project), the deployment of small cells has been allowed. An increase in the number of small cells leads to an increase in interference. Due to the small coverage of small cells, which are generally deployed in shopping malls, office buildings, and other locations whose business volume changes with time dynamically, 3GPP is vigorously carrying out the research of small cell switch (that is, on/off) so as to save energy when the amount of business is less and reduce the interference.

Currently, if there are still subscribers in connection with a small cell before the small cell is closed, these subscribers will be forced to switch out or the communication thereof will be interrupted when the small cell is closed and will be restored when the small cell open again.

If the subscribers in connection are switched out before the small cell is closed, it can be achieved via the following two methods: 1), through a Handover ("HO" for short) procedure; 2), through a Secondary service cell ("Scell" for short) removal/addition procedure.

For HO procedure, the subscriber must be switched out successfully in a time period from On to Off of the small cell. The time period from On to Off is relatively long, generally more than 200ms if a new measurement report is needed to select a target cell, or, generally around 50ms during which a handover execution process and a handover complicity process is performed if no measurement report is needed. Basically, for most of the opening time of the small cell, the subscriber is in the process of handover. Frequent on-and-off switching of the small cell will lead to frequent handover of the subscriber, as a result, the cumulative handover interrupt time is very long while the time for continuous communication is very short, thus make the user experience worse.

For Scell removal/addition procedure, the subscriber has to remove an old small cell at the first place and then add and activate a new small cell. Similar to the HO procedure, it will take a relatively long time to complete the procedure, specifically, generally more than 200ms if a new measurement report is needed to add a new small cell, or, generally around 30ms, which is equivalent to the activation time of the new small cell, if no measurement report is needed.

On the other hand, if the communication of the subscriber is interrupted when the small cell is closed and then restored when the small cell open again, the quality of user communication will be greatly affected. For example, there can be call disconnection, video download pause, etc.

The technical schemes described above will affect the performance of user communication seriously; therefore, a new solution is desired to reduce communication interrupt time due to closing of a transmission point, thus improving user experience, and improving the overall resource utilization and system throughput of the system.

SUMMARY

The present disclosure aims to provide a novel technical solution, which can reduce communication interrupt time due to closing of a transmission point, thus improving user experience, and improving the overall resource utilization and system throughput of the system.

In light of this, according to a first aspect of the disclosure, it is provided a quick transmission point handover method, which includes: detecting whether a current transmission point in use needs to be closed by a service base station; transmitting a target transmission point directive command to a terminal if it is detected that the current transmission point in use needs to be closed, so as to inform the terminal about information of a new target transmission point to be monitored soon and/or to inform the terminal that the current transmission point in use will be closed.

In the above-mentioned technical scheme, upon detecting that the current transmission point in use needs to be closed, the service base station will transmit the information of the target transmission point to be monitored soon to the terminal via the target transmission point directive command. The terminal will be informed through the target transmission point directive command that the current transmission point in use will be closed and the new target transmission point will be monitored; and then the terminal will monitor the new target transmission point. Compared with the technical scheme of the related art, in which the subscriber is switched out or the communication thereof is interrupted when the transmission point is closed, with the aid of the technical scheme of the present disclosure, communication interrupt time due to closing of the current transmission point can be reduced, thus improving user experience and the overall resource utilization and system throughput of the system.

The information of the new target transmission point to be monitored includes configuration information and/or configuration information and/or
The method can further comprise: the terminal monitoring channel information of the new target transmission point according to the information of the new target transmission point, wherein the channel information includes at least Physical Downlink Control Channel information and Physical Downlink Shared Channel information.

Before detecting whether the current transmission point in use needs to be closed by the service base station, the method further includes: determining whether on/off status change can be performed on the current transmission point in use; if yes, acquiring a measurement report from the terminal; selecting at least one candidate transmission point from a plurality of adjacent small cell transmission points in the measurement report, the at least one candidate transmission point forms a candidate transmission point set with the current transmission point in use; acquiring configuration information of each candidate transmission point in the candidate transmission point set, and numbering each candidate transmission point according to a preset numbering rule; transmitting the configuration information and number information of each candidate transmission point to the terminal, whereby the configuration information and the number information of each candidate transmission point will be stored in association with each other in the terminal. The above procedure can be executed at the service base station.

In the technical scheme described above, by numbering each candidate transmission point in the candidate transmission point set according to the preset numbering rule and transmitting the number information and the configuration information of each transmission point to the terminal respectively, these information can be stored in association with each other in the terminal. In this way, thereafter, only the target transmission point number has to be transmitted via the target transmission point directive command, and the terminal can search for the configuration information according to the number information. Waste of transmission resources caused by the transmission of the configuration information each time the target transmission point directive command is sent can be avoided, whereby the transmission time of the command and the interruption time of the terminal can be shorten. Specifically, if the number information and the configuration information has been stored in the terminal, upon receiving the number information and the configuration information of a candidate transmission point, the information received can be used to update the information previously stored. Wherein the candidate transmission point set includes at least two transmission points, one is the current transmission point in use, and the other one is the adjacent small cell transmission point.

The process of acquiring the measurement report from the terminal includes: transmitting measurement parameters to the terminal by the service base station; acquiring the measurement report of a plurality of adjacent small cell transmission points which is in the same carrier frequency with the current transmission point in use and with signal strength that meets a preset condition, and transmitting the measurement report to the service base station by the terminal.

In the above-mentioned process, the service base station configures and transmits measurement parameters to the terminal. Measurement parameters are used to trigger the measurement report when the signal strength of the current transmission point in use and the signal strength of other transmission points which are in the same carrier frequency both meet the preset condition. For example, if a difference between the signal strength of the adjacent small cell transmission point and the signal strength of the current transmission point in use is within a certain range, the measurement report will be triggered.

Preferably, the target transmission point directive command includes a target transmission point number. The method further includes: receiving the target transmission point number; determining the configuration information of the target transmission point according to the target transmission point number and a stored association relationship between the number information and the configuration information of each candidate transmission point; and monitoring the channel information of the target transmission point according to the configuration information of the target transmission point. The above procedure can be executed at the terminal.

In the technical scheme described above, by numbering each candidate transmission point in the candidate transmission point set according to the preset numbering rule and transmitting the number information and the configuration information of each transmission point to the terminal respectively, these information can be stored in association with each other in the terminal. In this way, thereafter, only the target transmission point number has to be transmitted via the target transmission point directive command, and the terminal can search for the configuration information according to the number information. Waste of transmission resources caused by the transmission of the configuration information each time the target transmission point directive command is sent can be avoided, whereby the transmission time of the command and the interruption time of the terminal can be shorten.

In the above-mentioned technical scheme, preferably, the target transmission point directive command includes monitoring state of each candidate transmission point number. The method further includes: receiving the monitoring state corresponding to each candidate transmission point number, and determining the target transmission point number to be monitored according to the monitoring state received; determining the configuration information of the target transmission point according to the target transmission point number and a stored association relationship between the number information and the configuration information of each candidate transmission point; and monitoring the channel information of the target transmission point according to the configuration information of the target transmission point.
The above process can be performed at the terminal.  

[0021] In the technical scheme described above, by numbering each candidate transmission point in the candidate transmission point set according to the preset numbering rule and transmitting the number information and the configuration information of each transmission point to the terminal respectively, the configuration information and the number information of each transmission point can be stored in association with each other in the terminal. Thus, thereafter, only the monitoring state of the target transmission point number has to be transmitted via the target transmission point directive command. The terminal can determine the target transmission point number to be monitored according to the monitoring state and then search for the configuration information according to the number information. Waste of transmission resources caused by the transmission of the configuration information each time the target transmission point directive command is sent can be avoided, whereby the transmission time of the command and the interruption time of the terminal can be shortened.

[0022] The configuration information includes at least one of the following or a combination thereof: physical cell identification, identification assigned to a terminal by a transmission point, number of ports of a cell reference signal, frequency offset of a cell reference signal, multimedia broadcast/multicast service single frequency network sub-frame configuration list, zero power channel state information reference signal configuration number, Physical Downlink Shared Channel start symbol, and non-zero power channel state information reference signal configuration number for quasi-co-location.

[0023] Preferably, at the service base station, the method further includes: determining whether an identification assigned to each terminal in each candidate transmission point is the same with an identification assigned to another terminal in other candidate transmission points; and if yes, including the identification assigned to the terminal in the configuration information being transmitted. Correspondingly, at the terminal, the method can further includes: determining whether the identification assigned by the transmission point is included in the configuration information of the candidate transmission point; and if yes, using the identification assigned by the transmission point to monitor the target transmission point, otherwise, using a current identification of the terminal to monitor the target transmission point.

[0024] In the technical scheme described above, the blind detection position of a Physical Downlink Control Channel is related to an identification of a terminal when the terminal is in a cell; if the identification of the terminal in its own service cell is the same as an identification of an existing terminal in the new transmission point, collision may occur between the blind detection location of a Physical Downlink Control Channel from the new transmission point to the terminal and the blind detection location of a Physical Downlink Control Channel of the existing terminal in the new transmission point. Two solutions are provided to avoid such collision: 1) a plurality of transmission points can share identification resource of the terminal, that is to say, identifications of terminals in adjacent transmission points are different; 2) the identification assigned to the terminal is included in the configuration information of each transmission point; when at different transmission points, the terminal will select a corresponding identification to acquire the blind detection location of the Physical Downlink Control Channel.

[0025] Preferably, the target transmission point directive command is Radio Resource Control ("RRC" for short) signaling, wherein the RRC signaling is included in a RRC connection reconfiguration that does not contain mobility control information, and the indicative content of the RRC signaling is the configuration information of the target transmission point.

[0026] In the technical scheme described above, the RRC signaling is included in the RRC connection reconfiguration that does not contain mobility control information to indicate the configuration information of the new transmission point, and there is no need to indicate the configuration information of each transmission point via the RRC signaling prior to this.

[0027] Preferably, the target transmission point directive command is Media Access Control ("MAC" for short) signaling that contains an indicator corresponding to each transmission point number; the indicator is used to indicate the monitoring state of channel information of each candidate transmission point by the terminal. The service base station sets an indicator corresponding to the target transmission point number in the MAC signaling to "on" state, and sets indicators corresponding to other transmission point number to "off" state, so as to indicate that the channel information of the target transmission point will be monitored.

[0028] In the technical scheme described above, the signaling format of the MAC signaling can be the same as activation/deactivation signaling of a secondary service cell. In the MAC signaling, there is an indicator corresponding to each transmission point. For example, if there are eight candidate transmission points, an eight-bit group will be needed for indication, wherein the indicator can use 0 or 1 to indicate "on" or "off" of the monitoring state of the transmission point. For instance, if the eight-bit group MAC layer transmission point directive command is 00000010, it means that monitoring of a transmission point with transmission point number 2 will be turned on and monitoring of other transmission points will not be enabled. Understandably, if there are four candidate transmission points, a four-bit group will be needed.

[0029] Preferably, the target transmission point directive command is Physical Downlink Control ("PDC" for short) signaling. Wherein the PDC signaling is in downlink control information ("DCI" for short) format 2D of Transmission Mode 10 ("TM10" for short) and indicates the target transmission point number.

[0030] In the technical scheme described above, the target transmission point directive command is DCI signaling, in
other words, PDC signaling, it can be the same as a Physical Downlink Shared Channel ("PDSCH" for short) Re Mapping
and Quasi-Co-Location Indicator ("PQI" for short) in the DCI format 2D of TM10. For example, if there are eight trans-
mission points, three-bit DCI signaling will be needed. Similarly, if there are four transmission points, two-bit DCI signaling
will be needed. Bits of the target transmission point directive command can be new bits, or can multiplex PQI signaling,
or multiplex PQI signaling partially and use new bits partially.

[0031] Preferably, when it is detected that the current transmission point in use is to be closed, the service base station can
transmit separate closing signaling to the terminal to inform that the current transmission point in use will be closed;
in addition, the terminal can determine that the new target transmission point will be monitored according to the target
transmission point directive command. Based on this, the method further includes: transmitting the closing signaling to
the terminal upon detecting that the current transmission point in use needs to be closed by the service base station,
whereby the terminal can determine that the current transmission point in use will be closed according to the closing
signaling; wherein the target transmission point directive command and the closing signaling can be transmitted to the
terminal concurrently or not concurrently.

[0032] Alternatively, instead of transmitting the closing signaling, the service base station can transmit the target
transmission point directive command only; when received by the terminal, it can be determined that the current trans-
mission point in use will be closed and the new target transmission point will be monitored soon. Preferably, the target
transmission point directive command can be transmitted to the terminal by the service base station or by the current
transmission point in use, wherein the service base station can be a main service base station in a main service cell, or
can be a secondary service base station, that is, an auxiliary service base station.

[0033] According to another aspect of the disclosure, it is provided a quick transmission point handover device for a
service base station. The device includes: a detecting unit, configured to detect whether a current transmission point in
use needs to be closed; a transmitting unit, configured to transmit a target transmission point directive command to a
terminal if it is detected that the current transmission point in use needs to be closed by the detecting unit, so as to inform
the terminal about information of a new target transmission point to be monitored and/or to inform the terminal that the
current transmission point in use will be closed.

[0034] In the above-mentioned technical scheme, upon detecting that the current transmission point in use needs to be
closed, the device will transmit the information of the target transmission point to be monitored soon to the terminal
via the target transmission point directive command. The terminal will be informed through the target transmission point
directive command that the current transmission point in use will be closed and the new target transmission point will
be monitored; and then the terminal will monitor the new target transmission point. Compared with the technical scheme
of the related art, in which the subscriber is switched out or the communication thereof is interrupted when the transmission
point will be closed, with the aid of the technical scheme of the present disclosure, communication interrupt time due to
closing of the current transmission point can be reduced, thus improving user experience and the overall resource
utilization and system throughput of the system.

[0035] The device as described above can further includes: a determining unit, configured to determine whether on/off
status change can be performed on the current transmission point in use; an acquiring unit, configured to acquire a
measurement report from the terminal if the on/off status change can be performed on the current transmission point in
use; a selecting unit, configured to select at least one candidate transmission point from a plurality of adjacent small sell
transmission points in the measurement report, the at least one candidate transmission point forms a candidate trans-
mision point set with the current transmission point in use; a number unit, configured to acquire configuration informa-
ion of each candidate transmission point in the candidate transmission point set, and number each candidate trans-
mision point according to a preset numbering rule; the transmitting unit is further configured to transmit the configuration
information and the number information of each candidate transmission point to the terminal respectively, whereby the
configuration information and the number information of each candidate transmission point will be stored in association
with each other in the terminal.

[0036] In the technical scheme described above, by numbering each candidate transmission point in the candidate
transmission point set according to the preset numbering rule and transmitting the number information and the config-
uration information of each transmission point to the terminal respectively, these information can be stored in association
with each other in the terminal. In this way, thereafter, only the target transmission point number has to be transmitted
via the target transmission point directive command, and the terminal can search for the configuration information
according to the number information. Waste of transmission resources caused by the transmission of the configuration
information each time the target transmission point directive command is sent can be avoided, whereby the transmission
time of the command and the interruption time of the terminal can be shortened.

[0037] In the above-mentioned technical scheme, preferably, the acquiring unit is configured to: transmit measurement
parameters to the terminal if the on/off status change can be performed on the current transmission point in use; whereby
the terminal can acquire the measurement report of a plurality of adjacent small sell transmission points which is in the
same carrier frequency with the current transmission point in use and with signal strength that meets a preset condition
according to the measurement parameters, and transmit the measurement report to the service base station.
As can be seen from the above description, the service base station configures and transmits the measurement parameters to the terminal. The measurement parameters are used to trigger the measurement report when the signal strength of the current transmission point in use and the signal strength of other transmission points which are in the same carrier frequency both meet the preset condition. For example, if a difference between the signal strength of the adjacent small cell transmission point and the signal strength of the current transmission point in use is within a certain range, the measurement report will be triggered.

Preferably, the target transmission point directive command includes a target transmission point number. The transmitting unit is configured to transmit the target transmission point number to the terminal, whereby the terminal can determine the configuration information of the target transmission point according to the target transmission point number and a stored association relationship between the number information and the configuration information of each transmission point, and monitor the channel information of the target transmission point according to the configuration information of the target transmission point; wherein the channel information includes at least Physical Downlink Control Channel information and Physical Downlink Shared Channel information.

In the technical scheme described above, by numbering each candidate transmission point in the candidate transmission point set according to the preset numbering rule and transmitting the number information and the configuration information of each transmission point to the terminal respectively, the configuration information and the number information of each transmission point can be stored in association with each other in the terminal. In this way, only the target transmission point number has to be transmitted via the target transmission point directive command thereafter, and the terminal can search for the configuration information according to the number information. Waste of transmission resources caused by the transmission of the configuration information each time the target transmission point directive command is sent can be avoided, whereby the transmission time of the command and the interruption time of the terminal can be shortened.

Preferably, the target transmission point directive command includes the monitoring state corresponding to each candidate transmission point number. The transmitting unit is further configured to transmit the monitoring state corresponding to each candidate transmission point number to the terminal, whereby the terminal can determine the target transmission point number to be monitored according to the monitoring state received, and then determine the configuration information of the target transmission point according to the target transmission point number and the stored association relationship between the number information and the configuration information of each candidate transmission point; thereafter, the terminal can monitor the channel information of the target transmission point according to the configuration information of the target transmission point.

In the technical scheme described above, by numbering each candidate transmission point in the candidate transmission point set according to the preset numbering rule and transmitting the number information and the configuration information of each transmission point to the terminal respectively, the configuration information and the number information of each transmission point can be stored in association with each other in the terminal. Thus, thereafter, only the monitoring state of the target transmission point number has to be transmitted via the target transmission point directive command, and the terminal can determine the target transmission point number to be monitored according to the monitoring state and search for the configuration information according to the number information. Waste of transmission resources caused by the transmission of the configuration information each time the target transmission point directive command is sent can be avoided, whereby the transmission time of the command and the interruption time of the terminal can be shortened.

The configuration information includes at least one of the following or a combination thereof: physical cell identification, identification assigned to a terminal by a transmission point, number of ports of a cell reference signal, frequency offset of a cell reference signal, multimedia broadcast/multicast service single frequency network sub-frame configuration list, zero power channel state information reference signal configuration number, Physical Downlink Shared Channel start symbol, and non-zero power channel state information reference signal configuration number for quasi co-location.

Preferably, the determining unit is further configured to determine whether an identification assigned to each terminal in each candidate transmission point is the same with an identification assigned to another terminal in other candidate transmission points; the transmitting unit is further configured to include the identification assigned to the terminal in the configuration information being transmitted if the result of the determining unit is yes.

In the technical scheme described above, the blind detection position of a Physical Downlink Control Channel is related to an identification of a terminal when the terminal is in a cell; if the identification of the terminal in its own service cell is the same as an identification of an existing terminal in the new transmission point, collision may occur between the blind detection location of a Physical Downlink Control Channel from the new transmission point to the terminal and the blind detection location of a Physical Downlink Control Channel of the existing terminal in the new transmission point. Two solutions are provided to avoid such collision: 1) a plurality of transmission points can share identification resource of the terminal, that is to say, identifications of terminals in adjacent transmission points are different; 2) the identification assigned to the terminal is included in the configuration information of each transmission
Preferably, the target transmission point directive command is Radio Resource Control ("RRC" for short) signaling, wherein the RRC signaling is included in a RRC connection reconfiguration that does not contain mobility control information, and the indicative content of the RRC signaling is the configuration information of the target transmission point.

In the technical scheme described above, the RRC signaling is included in the RRC connection reconfiguration that does not contain mobility control information to indicate the configuration information of the new transmission point, and there is no need to indicate the configuration information of each transmission point via the RRC signaling prior to this.

Preferably, the target transmission point directive command is Media Access Control ("MAC" for short) signaling which contains an indicator corresponding to each transmission point number; the indicator is used to indicate the monitoring state of the channel information of each candidate transmission point by the terminal. The service base station sets an indicator corresponding to the target transmission point number in the MAC signaling to "on" state, and sets indicators corresponding to other transmission point number to "off" state, so as to indicate that the channel information of the target transmission point will be monitored.

In the technical scheme described above, the signaling format of the MAC signaling can be the same as activation/deactivation signaling of a secondary service cell. In the MAC signaling, there is an indicator corresponding to each transmission point. For example, if there are eight candidate transmission points, an eight-bit group will be needed for indication, wherein the indicator can use 0 or 1 to indicate "on" or "off" of the monitoring state of the transmission point. For instance, if the eight-bit group MAC layer transmission point directive command is 00000010, it means that monitoring of a transmission point with transmission point number 2 will be turned on and monitoring of other transmission points will not be enabled. Understandably, if there are four candidate transmission points, a four-bit group will be needed.

Preferably, the device further includes a monitoring unit, configured to monitor channel information of the new transmission point. When the macro layer receives a MAC signaling, wherein the MAC signaling is included in a MAC reconfiguration that does not contain mobility control information to indicate the configuration information of the new transmission point, the terminal can determine that the current transmission point in use will be closed according to the closing signaling; wherein the target transmission point directive command and the closing signaling can be transmitted to the terminal concurrently or not concurrently.

Alternatively, instead of transmitting the closing signaling, the transmitting unit can transmit the target transmission point directive command only; when received by the terminal, it can be determined that the current transmission point in use will be closed according to the closing signaling; wherein the target transmission point directive command will be needed. Bits of the target transmission point directive command can be new bits, or can multiplex PQI signaling, or multiplex PQI signaling partially and use new bits partially.

In the technical scheme described above, the target transmission point directive command is DCI signaling, in other words, PDC signaling, it can be the same as a Physical Downlink Shared Channel ("PDSCH" for short) Re Mapping and Quasi-Co-Location Indicator ("PQI" for short) in the DCI format 2D of TM10. For example, if there are eight transmission points, three-bit DCI signaling will be needed. Similarly, if there are four transmission points, two-bit DCI signaling will be needed. Bits of the target transmission point directive command can be new bits, or can multiplex PQI signaling, or multiplex PQI signaling partially and use new bits partially.

In the above-mentioned technical scheme, upon detecting that the current transmission point in use needs to be closed, the service base station will transmit the information of the target transmission point to be monitored to the terminal via the target transmission point directive command. The terminal will be informed through the target transmission point directive command that the current transmission point in use will be closed and the new target transmission point will be monitored; and then the terminal will monitor the new target transmission point. Compared with the technical scheme of the related art, in which the subscriber is switched out or the communication thereof is interrupted when the transmission point will be closed, with the aid of the technical scheme of the present disclosure, communication interrupt time due to closing of the current transmission point can be reduced, thus improving user experience and the overall resource utilization and system throughput of the system.

Preferably, the device further includes a monitoring unit, configured to monitor channel information of the new target transmission point according to the information of the new target transmission point, wherein the channel infor-
Preferably, the receiving unit is further configured to receive measurement parameters transmitted from the service base station; and the device further includes: a measurement report acquiring unit, configured to acquire a measurement report of a plurality of adjacent small cell transmission points which is in the same carrier frequency with the current transmission point in use and with signal strength that meets a preset condition according to the measurement parameters; and a transmitting unit, configured to transmit the measurement report to the service base station.

In the technical scheme described above, correspondingly, the service base station configures and transmits the measurement parameters to the terminal. The measurement parameters are used to trigger the measurement report when the signal strength of the current transmission point in use and the signal strength of other transmission points which are in the same carrier frequency both meet the preset condition. For example, if a difference between the signal strength of the adjacent small cell transmission point and the signal strength of the current transmission point in use is within a certain range, the measurement report will be triggered.

Preferably, the receiving unit is further configured to receive configuration information and number information of each candidate transmission point transmitted by the service base station and store the configuration information and the number information of each candidate transmission point in association with each other.

Preferably, the target transmission point directive command includes a target transmission point number, and the monitoring unit is further configured to: receive the target transmission point number transmitted by the service base station; determine the configuration information of the target transmission point according to the target transmission point number and the stored association relationship between the configuration information and number information; and then monitor the channel information of the target transmission point according to the configuration information of the target transmission point.

In the technical scheme described above, correspondingly, the service base station configures and transmits the number information of each candidate transmission point respectively by the service base station, the configuration information and the number information of each transmission point can be stored in association with each other in the terminal. Thus, thereafter, only the target transmission point number has to be transmitted via the target transmission point directive command, and the terminal can search for the configuration information according to the target transmission point number and the stored association relationship between the configuration information and number information; and then monitor the channel information of the target transmission point according to the configuration information of the target transmission point.

Preferably, the target transmission point directive command includes monitoring state of each candidate transmission point number. The monitoring unit is configured to: receive the monitoring state corresponding to each candidate transmission point number; and then monitor the channel information of the target transmission point according to the configuration information of the target transmission point.

Specifically, if the number information and the configuration information has been stored in the terminal, upon receiving the number information and the configuration information of a candidate transmission point, the information received can be used to update the information previously stored. Wherein the candidate transmission point set includes at least two transmission points, one is the current transmission point in use, and the other one is the adjacent small cell transmission point.

Preferably, the target transmission point directive command includes monitoring state of each candidate transmission point number. The monitoring unit is configured to: receive the monitoring state corresponding to each candidate transmission point number; and then monitor the channel information of the target transmission point according to the configuration information of the target transmission point.

In this technical scheme, by numbering each candidate transmission point in the candidate transmission point set according to the preset numbering rule and transmitting the number information and the configuration information of each transmission point to the terminal respectively, these information can be stored in association with each other in the terminal. Thus, thereafter, only the target transmission point number has to be transmitted via the target transmission point directive command, and the terminal can search for the configuration information according to the number information. Waste of transmission resources caused by the transmission of the configuration information each time the target transmission point directive command is sent can be avoided, whereby the transmission time of the command and the interruption time of the terminal can be shorten.

Preferably, the target transmission point directive command includes monitoring state of each candidate transmission point number. The monitoring unit is configured to: receive the monitoring state corresponding to each candidate transmission point number; and then monitor the channel information of the target transmission point according to the configuration information of the target transmission point.

In the technical scheme described above, correspondingly, the service base station configures and transmits the number information of each candidate transmission point respectively by the service base station, the configuration information and the number information of each transmission point can be stored in association with each other in the terminal. Thus, thereafter, only the target transmission point number has to be transmitted via the target transmission point directive command thereafter, and the terminal can determine the target transmission point number to be monitored according to the monitoring state received; determine the configuration information of the target transmission point according to the target transmission point number and the stored association relationship between the configuration information and number information; and then monitor the channel information of the target transmission point according to the configuration information of the target transmission point.

Specifically, if the number information and the configuration information has been stored in the terminal, upon receiving the number information and the configuration information of a candidate transmission point, the information received can be used to update the information previously stored. Wherein the candidate transmission point set includes at least two transmission points, one is the current transmission point in use, and the other one is the adjacent small cell transmission point.

Preferably, the target transmission point directive command includes monitoring state of each candidate transmission point number. The monitoring unit is configured to: receive the monitoring state corresponding to each candidate transmission point number; and then monitor the channel information of the target transmission point according to the configuration information of the target transmission point.

Specifically, if the number information and the configuration information has been stored in the terminal, upon receiving the number information and the configuration information of a candidate transmission point, the information received can be used to update the information previously stored. Wherein the candidate transmission point set includes at least two transmission points, one is the current transmission point in use, and the other one is the adjacent small cell transmission point.`
Preferably, the device further includes a determining unit, which is configured to determine whether an identification assigned to the terminal by the transmission point is included in the configuration information of each candidate transmission point; the monitoring unit is further configured to use the identification assigned to the terminal by the transmission point to monitor the channel information of the target transmission point if the identification is included in the configuration information, or use a current identification of the terminal to monitor the channel information of the target transmission point if the identification is not included in the configuration information.

In the technical scheme described above, the blind detection position of a Physical Downlink Control Channel is related to an identification of a terminal when the terminal is in a cell; if the identification of the terminal in its own service cell is the same as an identification of an existing terminal in the new transmission point, collision may occur between the blind detection location of a Physical Downlink Control Channel from the new transmission point to the terminal and the blind detection location of a Physical Downlink Control Channel of the existing terminal in the new transmission point. Two solutions are provided to avoid such collision: 1) a plurality of transmission points can share identification resource of the terminal, that is to say, identifications of terminals in adjacent transmission points are different; 2) the identification assigned to the terminal is included in the configuration information of each transmission point; when at different transmission points, the terminal will select a corresponding identification to acquire the blind detection location of the Physical Downlink Control Channel.

According to a further aspect of the disclosure, it is provided a service base station, including the quick transmission point handover device for a service base station according to any aspect of the disclosure. The service base station has the same technical effect with the quick transmission point handover device for a service base station and will not be repeated here.

According to a further aspect of the disclosure, it is provided a terminal, including the quick transmission point handover device for a terminal according to any aspect of the disclosure. The terminal has the same technical effect with the quick transmission point handover device for a terminal and will not be repeated here.

In the technical schemes described above, by preparing candidate transmission points for the terminal in advance and informing the terminal about the configuration information of the candidate transmission points; and transmitting the target transmission point directive command to inform the terminal about the new target transmission point to be monitored when an old transmission point is to be closed, the terminal can acquire the configuration information of the new target transmission point according to the target transmission point directive command and prepare to monitor Physical Downlink Control Channel information and Physical Downlink Shared Channel information. Compared with the technical scheme of the related art, in which the subscriber is switched out or the communication thereof is interrupted when the transmission point will be closed, with the aid of the technical scheme of the present disclosure, communication interrupt time due to closing of the current transmission point can be reduced, thus improving user experience and the overall resource utilization and system throughput of the system.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is flowchart illustrating a quick transmission point handover method according to an embodiment of the disclosure.

Fig. 2 is a block diagram illustrating a quick transmission point handover device according to an embodiment of the disclosure.

Fig. 3 is a block diagram illustrating a quick transmission point handover method according to another embodiment of the disclosure.

Fig. 4 is a block diagram illustrating a service base station according to an embodiment of the disclosure.

Fig. 5 is a block diagram illustrating a terminal according to an embodiment of the disclosure.

Fig. 6 is a detailed flowchart of the quick transmission point handover method according to the embodiment of the disclosure.

Fig. 7 is a schematic diagram illustrating a transmission point directive command according to an embodiment of the disclosure.

Fig. 8 is a schematic diagram illustrating a transmission point directive command according to another embodiment of the disclosure.

Fig. 9 is a schematic diagram illustrating an example in which a closing command (that is, closing signaling) and a transmission point directive command are transmitted concurrently.

Fig. 10 is a schematic diagram illustrating an example in which the closing command and the transmission point directive command are transmitted non-concurrently.
In order to more clearly understand the above object, features, and advantages of the present invention, it will be described in further detail with refer to the accompanying drawings and the following embodiments. It should be noted that, the embodiments and the features thereof can be combined with each other without confliction.

In the following description, numerous specific details are set forth in order to fully understand the present invention, but the present invention can also be achieved in other ways different from the embodiments described herein, therefore, the scope of the present invention is not limited to the following specific embodiments.

FIG. 1 is flowchart illustrating a quick transmission point handover method according to an embodiment of the disclosure.

As shown in FIG. 1, the quick transmission point handover method according to the embodiment of the disclosure includes step 102 and step 104; specifically, step 102, a service base station detecting whether a current transmission point in use needs to be closed; and step 104, transmitting a target transmission point directive command if it is detected that the current transmission point in use needs to be closed in step 102, so as to a terminal to inform the terminal about information of a new target transmission point to be monitored soon and/or to inform the terminal that the current transmission point in use will be closed.

In the above-mentioned technical scheme, upon detecting that the current transmission point in use needs to be closed, the service base station will transmit the information of the target transmission point to be monitored soon to the terminal via the target transmission point directive command. The terminal will be informed through the target transmission point directive command that the current transmission point in use will be closed and the new target transmission point will be monitored; and then the terminal will monitor the new target transmission point. Compared with the technical scheme of the related art, in which the subscriber is switched out or the communication thereof is interrupted when the transmission point will be closed, with the aid of the technical scheme according to the embodiment of the disclosure, communication interrupt time due to closing of the current transmission point can be reduced, thus improving user experience and the overall resource utilization and system throughput of the system.

The information of the new target transmission point includes configuration information and/or number information (that is, transmission point number, which is the number corresponding to a transmission point) of the new target transmission point. After step 104, the terminal will monitor channel information of the new target transmission point according to the information thereof; wherein the channel information includes at least Physical Downlink Control Channel ("PDCCH" for short) information and Physical Downlink Shared Channel ("PDSCH" for short) information.

Preferably, before step 102, the following process can be executed at the service base station: determining whether on/off status change can be performed on the current transmission point in use; if yes, acquiring a measurement report from the terminal; selecting at least one candidate transmission point from a plurality of adjacent small sell transmission points in the measurement report, the at least one candidate transmission point forms a candidate transmission point set according to the preset numbering rule; transmitting the configuration information and the number information of each candidate transmission point to the terminal respectively, whereby the configuration information and the number information of each candidate transmission point will be stored in association with each other in the terminal.

In the technical scheme described above, by numbering each candidate transmission point in the candidate transmission point set according to the preset numbering rule and transmitting the number information and the configuration information of each transmission point to the terminal respectively, these information can be stored in association with each other in the terminal. In this way, thereafter, only the target transmission point number has to be transmitted via the target transmission point directive command, and the terminal can search for the configuration information according to the number information. Waste of transmission resources caused by the transmission of the configuration information each time the target transmission point directive command is sent can be avoided, whereby the transmission time of the command and the interruption time of the terminal can be shorten.

Specifically, if the number information and the configuration information has been stored in the terminal, upon receiving the number information and the configuration information of a candidate transmission point, the information received can be used to update the information previously stored. Wherein the candidate transmission point set includes at least two transmission points, one is the current transmission point in use, and the other one is the adjacent small cell transmission point.

Preferably, in the technical scheme described above, the process of acquiring the measurement report from the terminal includes: the service base station transmitting measurement parameters to the terminal, the terminal acquiring the measurement report of a plurality of adjacent small sell transmission points which is in the same carrier frequency with the current transmission point in use and with signal strength that meets a preset condition, and transmitting the measurement report to the service base station.

In the above-mentioned process, the service base station configures and transmits measurement parameters...
to the terminal. Measurement parameters are used to trigger the measurement report when the signal strength of the current transmission point in use and the signal strength of other transmission points which are in the same carrier frequency both meet the preset condition. For example, if a difference between the signal strength of the adjacent small cell transmission point and the signal strength of the current transmission point in use is within a certain range, the measurement report will be triggered.

[0083] The target transmission point directive command described above can includes the target transmission point number, or includes monitoring state of each candidate transmission point number. Examples are provided in the following.

[0084] The target transmission point directive command includes the target transmission point number. After step 104, the method further includes the following process performed at the terminal: receiving the target transmission point number; determining the configuration information of the target transmission point according to the target transmission point number and a stored association relationship between the number information and the configuration information of each candidate transmission point; and monitoring the channel information of the target transmission point according to the configuration information of the target transmission point.

[0085] In the technical scheme described above, by numbering each candidate transmission point in the candidate transmission point set according to the preset numbering rule and transmitting the number information and the configuration information of each transmission point to the terminal respectively, the configuration information and the number information of each transmission point can be stored in association with each other in the terminal. In this way, thereafter, only the target transmission point number has to be transmitted via the target transmission point directive command, and the terminal can search for the configuration information according to the number information. Waste of transmission resources caused by the transmission of the configuration information each time the target transmission point directive command is sent can be avoided, whereby the transmission time of the command and the interruption time of the terminal can be shortened.

[0086] The target transmission point directive command includes monitoring state of each candidate transmission point number. After step 104, the method further comprises the following process performed at the terminal: receiving the monitoring state corresponding to each candidate transmission point number, and determining the configuration information of the target transmission point according to the target transmission point number and the stored association relationship between the number information and the configuration information of each candidate transmission point; and monitoring the channel information of the target transmission point according to the configuration information of the target transmission point.

[0087] In the technical scheme described above, by numbering each candidate transmission point in the candidate transmission point set according to the preset numbering rule and transmitting the number information and the configuration information of each transmission point to the terminal respectively by the service base station, the configuration information and the number information of each transmission point can be stored in association with each other in the terminal. Thus, thereafter, only the monitoring state of the target transmission point number has to be transmitted via the target transmission point directive command. The terminal can determine the target transmission point number to be monitored according to the monitoring state received; determining the configuration information of the target transmission point according to the target transmission point number and the stored association relationship between the number information and the configuration information of each candidate transmission point; and monitoring the channel information of the target transmission point according to the configuration information of the target transmission point.

[0088] Preferably, the configuration information includes at least one of the following or a combination thereof: physical cell identification, identification assigned to a terminal by a transmission point, number of ports of a cell reference signal, frequency offset of a cell reference signal, multimedia broadcast/multicast service single frequency network sub-frame configuration list, zero power channel state information reference signal configuration number, PDSCH start symbol, and non-zero power channel state information reference signal configuration number for quasi co-location.

[0089] Preferably, before step 104, at the service base station, the method further includes: determining whether an identification assigned to each terminal in each candidate transmission point is the same with an identification assigned to another terminal in other candidate transmission points; and if yes, including the identification assigned to the terminal in the configuration information being transmitted. Correspondingly, after step 104, at the terminal, the method can further includes: determining whether the identification assigned by the transmission point is included in the configuration information of the candidate transmission point; and if yes, using the identification assigned by the transmission point to monitor the target transmission point; otherwise, using a current identification of the terminal to monitor the target transmission point.

[0090] In the technical scheme described above, the blind detection position of a PDCCH is related to an identification of a terminal when the terminal is in a cell; if the identification of the terminal in its own service cell is the same as an identification of an existing terminal in the new transmission point, collision may occur between the blind detection location of a PDCCH from the new transmission point to the terminal and the blind detection location of a PDCCH of the
existing terminal in the new transmission point. Two solutions are provided to avoid such collision: 1) a plurality of
transmission points can share identification resource of the terminal, that is to say, identifications of terminals in adjacent
transmission points are different; 2) the identification assigned to the terminal is included in the configuration information
each transmission point; when at different transmission points, the terminal will select a corresponding identification
to acquire the blind detection location of the PDCCH.

[0091] Preferably, the target transmission point can be any of the following: Radio Resource Control ("RRC" for short)
signaling; Media Access Control ("MAC" for short) signaling; Physical Downlink Control ("PDC" for short) signaling. Examples are provided in the following.

[0092] The target transmission point directive command is RRC signaling, wherein the RRC signaling is included in
a RRC connection reconfiguration that does not contain mobility control information, and the indicative content of the
RRC signaling is the configuration information of the target transmission point.

[0093] In one example, the RRC signaling is included in the RRC connection reconfiguration that does not contain
mobility control information to indicate the configuration information of the new transmission point, and there is no need
to indicate the configuration information of each transmission point via the RRC signaling prior to this.

[0094] The target transmission point directive command is MAC signaling that contains an indicator corresponding to
each transmission point number; the indicator is used to indicate the monitoring state of the channel information of each
candidate transmission point by the terminal. The service base station sets an indicator corresponding to the target
transmission point number in the MAC signaling to "on" state, and sets indicators corresponding to other transmission
point number to "off" state, so as to indicate that the channel information of the target transmission point will be monitored.

[0095] In one example, the signaling format of the MAC signaling can be the same as activation/deactivation signaling
of a secondary service cell. In the MAC signaling, there is an indicator corresponding to each transmission point. For
example, if there are eight candidate transmission points, an eight-bit group will be needed for indication, wherein the
indicator can use 0 or 1 to indicate "open" or "off" of the monitoring state of the transmission point. For instance, if the
eight-bits group MAC layer transmission point directive command is 00000010, it means that monitoring of a transmission
point with transmission point number 2 will be turned on and monitoring of other transmission points will not be enabled.

[0096] The target transmission point directive command is PDC signaling. Wherein the PDC signaling is in downlink
control information ("DCI" for short) format 2D of Transmission Mode 10 ("TM10" for short), and indicates the target
transmission point number.

[0097] In one example, the target transmission point directive command is DCI signaling, in other words, PDC signaling,
it can be the same as a Physical Downlink Shared Channel ("PDSCH" for short) Re Mapping and Quasi-Co-Location
Indicator ("PQI" for short) in the DCI format 2D of TM10. For example, if there are eight transmission points, three-bit
DCI signaling will be needed. Similarly, if there are four transmission points, two-bit DCI signaling will be needed. Bits
of the target transmission point directive command can be new bits, or can multiplex PQI signaling, or multiplex PQI
signaling partially and use new bits partially.

[0098] When it is detected that the current transmission point in use is to be closed, the service base station can transmit a separate closing signaling to the terminal to inform that the current transmission point in use will be closed; in addition, the terminal can determine that the new target transmission point will be monitored according to the target
transmission point directive command.

[0099] Based on this, after step 102, the method further includes: the service base station transmitting the closing
signaling to the terminal upon detecting that the current transmission point in use needs to be closed, whereby the
terminal can determine that the current transmission point in use will be closed according to the closing signaling; wherein the
target transmission point directive command and the closing signaling can be transmitted to the terminal concurrently
or not concurrently.

[0100] Alternatively, instead of transmitting the closing signaling, the service base station can transmit the target
transmission point directive command only; when received by the terminal, it can be determined that the current trans-
mission point in use will be closed and the new target transmission point will be monitored soon. Preferably, the target
transmission point directive command can be transmitted to the terminal by the service base station or by the current
transmission point in use, wherein the service base station can be a main service base station in a main service cell, or
can be a secondary service base station, that is, an auxiliary service base station.

[0101] FIG. 2 is a block diagram illustrating a quick transmission point handover device according to the second
embodiment of the disclosure.

[0102] As shown in FIG. 2, the quick transmission point handover device 200 can be used for a service base station,
and includes a detecting unit 202 (for example, detector) and a transmitting unit 204 (for example, transmitter). The
detecting unit 202 is configured to detect whether a current transmission point in use needs to be closed; the transmitting
unit 204 is configured to transmit a target transmission point directive command to a terminal if the detecting unit 202
detects that the current transmission point in use needs to be closed, so as to inform the terminal about information of
a new target transmission point to be monitored and/or to inform the terminal that the current transmission point in use
In the above-mentioned technical scheme, upon detecting that the current transmission point in use needs to be closed, the device (for example, a service base station) will transmit the information of the target transmission point to be monitored soon to the terminal via the target transmission point directive command. The terminal will be informed through the target transmission point directive command that the current transmission point in use will be closed and the new target transmission point will be monitored; and then the terminal will monitor the new target transmission point. Compared with the technical scheme of the related art, in which the subscriber is switched out or the communication thereof is interrupted when the transmission point will be closed, with the aid of the technical scheme of the second embodiment, communication interrupt time due to closing of the current transmission point can be reduced, thus improving user experience and the overall resource utilization and system throughput of the system.

As shown in FIG. 2, the quick transmission point handover device 200 still includes a determining unit 206, an acquiring unit 208, a selecting unit 210, and a numbering unit 212. Wherein the determining unit 206 is configured to determine whether on/off status change can be performed on the current transmission point in use; the acquiring unit 208 is configured to acquire a measurement report from the terminal if the on/off status change can be performed on the current transmission point in use; the selecting unit 210 is configured to select at least one candidate transmission point from a plurality of adjacent small cell transmission points in the measurement report, the at least one candidate transmission point forms a candidate transmission point set with the current transmission point in use; the numbering unit 212 is configured to acquire configuration information of each candidate transmission point in the candidate transmission point set, and number each candidate transmission point according to a preset numbering rule. The transmitting unit 204 is further configured to transmit the configuration information and the number information of each candidate transmission point to the terminal respectively, whereby the configuration information and the number information of each candidate transmission point will be stored in association with each other in the terminal.

In this embodiment, by numbering each candidate transmission point in the candidate transmission point set according to the preset numbering rule and transmitting the number information and the configuration information of each transmission point to the terminal respectively, these information can be stored in association with each other in the terminal. In this way, thereafter, only the target transmission point number has to be transmitted via the target transmission point directive command that the current transmission point in use will be closed and the new target transmission point will be monitored; and then the terminal will monitor the new target transmission point. The terminal if the on/off status change can be performed on the current transmission point in use; the acquiring unit 208 is configured to acquire a measurement report from the terminal if the on/off status change can be performed on the current transmission point in use; the selecting unit 210 is configured to select at least one candidate transmission point from a plurality of adjacent small cell transmission points in the measurement report, the at least one candidate transmission point forms a candidate transmission point set with the current transmission point in use; the numbering unit 212 is configured to acquire configuration information of each candidate transmission point in the candidate transmission point set, and number each candidate transmission point according to a preset numbering rule. The transmitting unit 204 is further configured to transmit the configuration information and the number information of each candidate transmission point to the terminal respectively, whereby the configuration information and the number information of each candidate transmission point will be stored in association with each other in the terminal.

In this embodiment, preferably, the acquiring unit 208 is configured to: transmit measurement parameters to the terminal if the on/off status change can be performed on the current transmission point in use; whereby the terminal can acquire the measurement report of a plurality of adjacent small cell transmission points which is in the same carrier frequency with the current transmission point in use and with signal strength that meets a preset condition according to the measurement parameters, and transmit the measurement report to the service base station.

As can be seen from the above description, the service base station configures and transmits the measurement parameters to the terminal. The measurement parameters are used to trigger the measurement report when the signal strength of the current transmission point in use and the signal strength of other transmission points which are in the same carrier frequency both meet the preset condition. For example, if a difference between the signal strength of the adjacent small cell transmission point and the signal strength of the current transmission point in use is within a certain range, the measurement report will be triggered.

In one embodiment, the target transmission point directive command includes the target transmission point number. The transmitting unit is configured to transmit the target transmission point number to the terminal, whereby the terminal can determine the configuration information of the target transmission point according to the target transmission point number and a stored association relationship between the number information and the configuration information of each transmission point, and monitor the channel information of the target transmission point according to the configuration information of the target transmission point; wherein the channel information includes at least PDCCH information and PDSCH information.

In the technical scheme described above, by numbering each candidate transmission point in the candidate transmission point set according to the preset numbering rule and transmitting the number information and the configuration information of each transmission point to the terminal respectively, the configuration information and the number information of each transmission point can be stored in association with each other in the terminal. In this way, only the target transmission point number has to be transmitted via the target transmission point directive command thereafter, and the terminal can search for the configuration information according to the number information. Waste of transmission resources caused by the transmission of the configuration information each time the target transmission point directive command is sent can be avoided, whereby the transmission time of the command and the interruption time of the terminal can be shorten.

In one example, the target transmission point directive command includes monitoring state of each candidate
transmission point number. The transmitting unit 204 is further configured to transmit the monitoring state corresponding to each candidate transmission point number to the terminal, whereby the terminal can determine the target transmission point number to be monitored according to the monitoring state received, and then determine the configuration information of the target transmission point according to the target transmission point number and the stored association relationship between the number information and the configuration information of each candidate transmission point; thereafter, the terminal can monitor the channel information of the target transmission point according to the configuration information of the target transmission point.

In the technical scheme described above, by numbering each candidate transmission point in the candidate transmission point set according to the preset numbering rule and transmitting the number information and the configuration information of each transmission point to the terminal respectively, the configuration information and the number information of each transmission point can be stored in association with each other in the terminal. Thus, thereafter, only the monitoring state of the target transmission point number has to be transmitted via the target transmission point directive command, and the terminal can determine the target transmission point number to be monitored according to the monitoring state and search for the configuration information according to the number information. Waste of transmission resources caused by the transmission of the configuration information each time the target transmission point directive command is sent can be avoided, whereby the transmission time of the command and the interruption time of the terminal can be shortened.

The configuration information includes at least one of the following or a combination thereof: physical cell identification, identification assigned to a terminal by a transmission point, number of ports of a cell reference signal, frequency offset of a cell reference signal, multimedia broadcast/multicast service single frequency network sub-frame configuration list, zero power channel state information reference signal configuration number, PDSCH start symbol, and non-zero power channel state information reference signal configuration number for quasi co-location. Preferably, the determining unit 206 is further configured to determine whether an identification assigned to each terminal in each candidate transmission point is the same with an identification assigned to another terminal in other candidate transmission points; the transmitting unit 204 is further configured to include the identification assigned to the terminal in the configuration information being transmitted if the result of the determining unit 202 is yes.

In the technical scheme described above, the blind detection position of a PDCCH is related to an identification of a terminal when the terminal is in a cell; if the identification of the terminal in its own service cell is the same as an identification of an existing terminal in the new transmission point, collision may occur between the blind detection location of a PDCCH from the new transmission point to the terminal and the blind detection location of a PDSCH of the existing terminal in the new transmission point. Two solutions are provided to avoid such collision: 1) a plurality of transmission points can share identification resource of the terminal, that is to say, identifications of terminals in adjacent transmission points are different; 2) the identification assigned to the terminal is included in the configuration information of each transmission point; when at different transmission points, the terminal will select a corresponding identification to acquire the blind detection location of the PDCCH.

In one example, the target transmission point directive command is Radio Resource Control ("RRC" for short) signaling, wherein the RRC signaling is included in a RRC connection reconfiguration that does not contain mobility control information, and the indicative content of the RRC signaling is the configuration information of the target transmission point.

As mentioned above, the RRC signaling is included in the RRC connection reconfiguration that does not contain mobility control information to indicate the configuration information of the new transmission point, and there is no need to indicate the configuration information of each transmission point via the RRC signaling prior to this.

In one example, the target transmission point directive command is Media Access Control ("MAC" for short) signaling that contains an indicator corresponding to each transmission point number; the indicator is used to indicate the monitoring state of the channel information of each candidate transmission point by the terminal. The service base station sets an indicator corresponding to the target transmission point number in MAC signaling to "on" state, and sets indicators corresponding to other transmission point number to "off" state, so as to indicate that the channel information of the target transmission point will be monitored.

The signaling format of the MAC signaling can be the same as activation/deactivation signaling of a secondary service cell. In the MAC signaling, there is an indicator corresponding to each transmission point. For example, if there are eight candidate transmission points, an eight-bit group will be needed for indication, wherein the indicator can use 0 or 1 to indicate "on" or "off" of the monitoring state of the transmission point. For instance, if the eight-bits group MAC layer transmission point directive command is 00000010, it means that monitoring of a transmission point with transmission point number 2 will be turned on and monitoring of other transmission points will not be enabled. Understandably, if there are four candidate transmission points, a four-bits group will be needed.

Preferably, the target transmission point directive command is Physical Downlink Control ("PDC" for short) signaling. Wherein the PDC signaling is in Downlink Control Information ("DCI" for short) format 2D of Transmission Mode 10 ("TM10" for short), and indicates the target transmission point number.
In this example, the target transmission point directive command is DCI signaling, in other words, PDC signaling, it can be the same as Physical Downlink Shared Channel ("PDSCH" for short) Re Mapping and Quasi-Co-Location Indicator ("PQI" for short) in the DCI format 2D of TM10. For example, if there are eight transmission points, three-bit DCI signaling will be needed. Similarly, if there are four transmission points, two-bit DCI signaling will be needed. Bits of the target transmission point directive command can be new bits, or can multiplex PQI signaling, or multiplex PQI signaling partially and use new bits partially.

Preferably, in this embodiment, the transmitting unit 204 is further configured to transmit closing signaling to the terminal upon detecting that the current transmission point in use needs to be closed, whereby the terminal can determine that the current transmission point in use will be closed according to the closing signaling, wherein the target transmission point directive command and the closing signaling can be transmitted to the terminal concurrently or not concurrently.

Alternatively, instead of transmitting the closing signaling separately, the transmitting unit can transmit the target transmission point directive command only; when received by the terminal, it can be determined that the current transmission point in use will be closed and the new target transmission point will be monitored soon. Preferably, the target transmission point directive command can be transmitted to the terminal by the transmitting unit 204 through the service base station or through the current transmission point in use, wherein the service base station can be a main service base station in a main service cell, or can be a secondary service base station, that is, an auxiliary service base station.

FIG. 3 is a block diagram illustrating a quick transmission point handover device according to the third embodiment of the disclosure.

As shown in FIG. 3, the quick transmission point handover device 300 according to the third embodiment can be used for a terminal, and includes a receiving unit 302 (for example, receiver), wherein the receiving unit 302 is configured to receive a target transmission point directive command transmitted from a service base station so as to determine information of a new target transmission point to be monitored or determine that the current transmission point in use will be closed according to the target transmission point directive command.

In the above-mentioned technical scheme, upon detecting that the current transmission point in use needs to be closed, the service base station will transmit the information of the target transmission point to be monitored to the terminal via the target transmission point directive command. The terminal will be informed through the target transmission point directive command that the current transmission point in use will be closed and the new target transmission point will be monitored; and then the terminal will monitor the new target transmission point. Compared with the technical scheme of the related art, in which the subscriber is switched out or the communication thereof is interrupted when the transmission point will be closed, with the aid of the technical scheme of the present disclosure, communication interrupt time due to closing of the current transmission point can be reduced, thus improving user experience and the overall resource utilization and system throughput of the system.

As shown in FIG. 3, the quick transmission point handover device 300 further includes a monitoring unit 304, configured to monitor channel information of the new target transmission point according to the information of the new target transmission point, wherein the channel information includes at least PDCCH information and PDSCH information.

Preferably, the receiving unit 302 is further configured to receive measurement parameters transmitted from the service base station. The device 300 further includes a measurement report acquiring unit 306 and a transmitting unit 308. Wherein the measurement report acquiring unit 306 is configured to acquire a measurement report of a plurality of adjacent small cell transmission points which is in the same carrier frequency with the current transmission point in use and with signal strength that meets a preset condition according to the measurement parameters; and the transmitting unit 308 is configured to transmit the measurement report to the service base station.

In the technical scheme described above, correspondingly, the service base station configures and transmits the measurement parameters to the terminal. The measurement parameters are used to trigger the measurement report when the signal strength of the current transmission point in use and the signal strength of other transmission points which are in the same carrier frequency both meet the preset condition. For example, if a difference between the signal strength of the adjacent small cell transmission point and the signal strength of the current transmission point in use is within a certain range, the measurement report will be triggered.

Preferably, the receiving unit 302 is further configured to receive configuration information and number information of each candidate transmission point transmitted by the service base station, and store the configuration information and the number information of each candidate transmission point in association with each other.

In an example, the target transmission point directive command includes target transmission point number, and the monitoring unit 304 is further configured to: receive the target transmission point number transmitted by the service base station; determine the configuration information of the target transmission point according to the target transmission point number and the stored association relationship between the configuration information and number information; and then monitor the channel information of the target transmission point according to the configuration information of the target transmission point.
In the technical scheme described above, by numbering each candidate transmission point in the candidate
transmission point set according to a preset numbering rule and transmitting the number information and the configuration
information of each transmission point to the terminal respectively, these information can be stored in association with
each other in the terminal. Thus, thereafter, only the target transmission point number has to be transmitted via the
target transmission point directive command, and the terminal can search for the configuration information according to
the number information. Waste of transmission resources caused by the transmission of the configuration information
each time the target transmission point directive command is sent can be avoided, whereby the transmission time of the
command and the interruption time of the terminal can be shorten.

Specifically, if the number information and the configuration information has been stored in the terminal, upon
receiving the number information and the configuration information of a candidate transmission point, the information
received can be used to update the information previously stored. Wherein the candidate transmission point set includes
at least two transmission points, one is the current transmission point in use, and the other one is the adjacent small
cell transmission point.

In an example, the target transmission point directive command includes monitoring state of each candidate
transmission point number. The monitoring unit 304 is configured to: receive the monitoring state corresponding to each
candidate transmission point number; determine the target transmission point number of a target transmission point to
be monitored according to the monitoring state received; determine the configuration information of the target transmission
point according to the target transmission point number and the stored association relationship between the number
information and the configuration information of each candidate transmission point; and monitor the channel information
of the target transmission point according to the configuration information of the target transmission point.

In this example, by numbering each candidate transmission point in the candidate transmission point set ac-
cording to the preset numbering rule and transmitting the number information and the configuration information of each
transmission point to the terminal respectively by the service base station, the configuration information and the number
information of each transmission point can be stored in association with each other in the terminal. Thus, only the
monitoring state of the target transmission point number has to be transmitted via the target transmission point directive
command thereafter, and the terminal can determine the target transmission point number to be monitored according to
the monitoring state and search for the configuration information according to the number determined. Waste of
transmission resources caused by the transmission of the configuration information each time the target transmission
point directive command is sent can be avoided, whereby the transmission time of the command and the interruption
time of the terminal can be shorten.

Preferably, the configuration information includes at least one of the following or a combination thereof: physical
cell identification, identification assigned to a terminal by a transmission point, number of ports of a cell reference signal,
frequency offset of a cell reference signal, multimedia broadcast/multicast service single frequency network sub-frame
configuration list, zero power channel state information reference signal configuration number, PDSCH start symbol,
and non- zero power channel state information reference signal configuration number for quasi co-location.

Preferably, as shown in FIG. 3, the device 300 further includes a determining unit 310, configured to determine
whether an identification assigned to the terminal by the transmission point is included in the configuration information
of each candidate transmission point; the monitoring unit 304 is further configured to use the identification assigned to
the terminal by the transmission point to monitor the channel information of the target transmission point if the identification
is included in the configuration information, or use a current identification of the terminal to monitor the channel information
of the target transmission point.

In the technical scheme described above, the blind detection position of a PDCCH is related to an identification
of a terminal when the terminal is in a cell; if the identification of the terminal in its own service cell is the same as an
identification of an existing terminal in the new transmission point, collision may occur between the blind detection
location of a PDCCH from the new transmission point to the terminal and the blind detection location of a PDCCH of the
existing terminal in the new transmission point. Two solutions are provided to avoid such collision: 1) a plurality of
transmission points can share identification resource of the terminal, that is to say, identifications of terminals in adjacent
transmission points are different; 2) the identification assigned to the terminal is included in the configuration information
of each transmission point; when at different transmission points, the terminal will select a corresponding identification
to acquire the blind detection location of the PDCCH.

FIG. 4 is a block diagram illustrating a service base station according to an embodiment of the disclosure.
As shown in FIG. 4, a service base station 400 according to the fourth embodiment includes the quick trans-
mission point handover device 200 for a service base station as described above. The service base station 400 has the
same technical effect as the quick transmission point handover device 200, and will not be elaborated further here.

FIG. 5 is a block diagram illustrating a terminal according to an embodiment of the disclosure.
As shown in FIG. 5, a terminal 500 according to the fifth embodiment includes the quick transmission point
handover device 300 for a terminal as described above. The terminal 500 has the same technical effect as the quick
transmission point handover device 300, and will not be elaborated further here.
A specific process is provided below in order to better understand the technical schemes of the disclosure.

FIG. 6 is a detailed flowchart of the quick transmission point handover method according to the embodiment of the disclosure. As shown in FIG. 6, the quick transmission point handover method can be achieved through step 602-step 618 as follows:

5 [0144] Step 602, a terminal adding a transmission point that can be on/off as a serving cell.

10 [0145] Step 604, a service base station setting a measurement configuration for selecting candidate transmission points consisting a candidate transmission point set. As to terminals whose serving cell has a transmission point that can be on/off, the service base station will set measurement parameters for them. The measurement configuration is used to trigger a measurement report when a difference between the signal strength quality of the transmission point that can be on/off and the signal strength quality of an adjacent cell with the same frequency as the transmission point is within an offset. For example, User #1 has a small cell ("small cell #1" for short) as a transmission point on carrier frequency 3 ("F3" for short). If small cell #1 can be on/off, the service base station will transmit the measurement configuration to the terminal, and the measurement object configured is small cell #1. The measurement report trigger condition is: the sum of the signal strength quality of the adjacent small cell and an offset is higher than the signal strength quality of small cell #1.

15 [0146] Step 606, the terminal transmitting a measurement report to the service base station according to the measurement configuration.

Step 608, the service base station selecting and numbering transmission points within the candidate transmission point set. The service base station will select small cells with relatively higher signal strength as the transmission points consisting the candidate transmission point set on the carrier frequency for User #1 according to the measurement report. Small cell #1 must be in the candidate transmission point set. There can be one or a plurality of transmission points within the candidate transmission point set.

20 [0148] The service base station will number small cells within the candidate transmission point set according to the following rules:

25 [0149] 1) if there is only one small cell within the candidate transmission point set on this carrier frequency, the transmission point number is 0, that is to say, the number of small cell #1 is 0.

30 [0150] 2) if there is a plurality of small cells within the candidate transmission point set on this carrier frequency, the service base station can numbering the small cells randomly, in ascending or descending order based on the signal strength, or, according to the sequence of the ID of small cells.

[0151] Maximum number is determined according to the number of the transmission points within the candidate transmission point set. For example, if there are two transmission points, the maximum number will be 1; similarly, if there are eight transmission points, the maximum number will be 7.

[0152] Step 610, the service base station transmitting the number and configuration information of transmission points within the candidate transmission point set to the terminal. After numbering, the service base station will send the information of the transmission points to User #1 via RRC signaling. As described above, the information includes number information and configuration information, wherein the configuration information still includes:

1) Physical cell ID. If small cells on F3 have the same physical cell ID, the physical cell ID will be Transmission point ID ("TP ID" for short).

2) Cell Radio Network Temporary Identification ("C-RNTI" for short) assigned to the terminal by the transmission point.

3) number of ports of Cell-specific reference signal ("CRS-PortsCount" for short).

4) CRS frequency shift ("CRS-FreqShift" for short), this information will not be included if the physical cell ID has been transmitted already.


7) PDSCH start symbol ("PDSCH-Start" for short).


[0153] It should be noted that, the numbering information can be included in the configuration either, therefore, the present disclosure is not limited thereto.

[0154] The following Table 1 illustrates a mapping relationship between the number and configuration information of transmission points. Suppose there are eight transmission points within the transmission point set, and the maximum number is 7. If there are less than eight transmission points within the transmission point set, the mapping relationship will be a sub-set of Table 1; if there are more than eight transmission points within the transmission point set, Table 1 will be expanded correspondingly.
Step 612, the service base station determining whether the current transmission point in use is to be closed, and if yes, proceed to step 614.

Step 614, when small cell #1, which is transmitting data to the terminal, is to be closed, the service base station transmitting closing signaling to the terminal to inform the terminal that the transmission point will be closed. The closing signaling can be RRC signaling or DCI signaling, or can be achieved through DRX configuration, or can be indicated implicitly through reference signal.

Step 616, at the same time of transmitting the closing signaling, the service base station transmitting a transmission point directive command to the terminal to inform the terminal about information of a new transmission point to be monitored.

Specifically, the transmission point directive command can be RRC signaling, MAC signaling, or DCI signaling.

1) the transmission point directive command is RRC signaling. The RRC signaling is included in a RRC connection reconfiguration that does not contain mobility control information, and is used to indicate configuration information of the new transmission point. In this situation, there is no need to indicate the configuration information of each transmission point via the RRC signaling prior to this.

2) the transmission point directive command is MAC signaling. The signaling format of the MAC signaling can be the same as activation/deactivation signaling of a secondary service cell. For example, if there are eight candidate transmission points, an eight-bit group will be needed for indication; as shown in FIG. 7, Ci is used to indicate a transmission point with number i within the candidate transmission point set. If Ci is 1, the transmission point with number i will be monitored. For example, the eight-bit group MAC layer transmission point directive command is 00000010, the small cell with number 2 will be monitored.

If there are four candidate transmission points, as shown in FIG. 8, an four-bit group will be needed for indication.

3) the transmission point directive command is DCI signaling. DCI signaling can be the same as a Physical Downlink Shared Channel ("PDSCH" for short) Re Mapping and Quasi-Co-Location Indicator ("PQI" for short) in DCI format 2D of Transmission Mode 10 ("TM10" for short). For example, if there are eight transmission points, three-bit signaling will be needed. Similarly, if there are four transmission points, two-bit signaling will be needed. Bits of the target transmission point directive command can be new bits, or can multiplex PQI signaling, or multiplex PQI signaling partially and use new bits partially.

The mapping relationship among the number, configuration information, and the DCI transmission point directive command is illustrated in Table 2 (three-bit) and Table 3 (two-bit).

### Table 1: Mapping relationship between number and configuration information of transmission points

<table>
<thead>
<tr>
<th>Number</th>
<th>Description (Configuration information)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Information set 0 configured by higher layer</td>
</tr>
<tr>
<td>1</td>
<td>Information set 1 configured by higher layer</td>
</tr>
<tr>
<td>2</td>
<td>Information set 2 configured by higher layer</td>
</tr>
<tr>
<td>3</td>
<td>Information set 3 configured by higher layer</td>
</tr>
<tr>
<td>4</td>
<td>Information set 4 configured by higher layer</td>
</tr>
<tr>
<td>5</td>
<td>Information set 5 configured by higher layer</td>
</tr>
<tr>
<td>6</td>
<td>Information set 6 configured by higher layer</td>
</tr>
<tr>
<td>7</td>
<td>Information set 7 configured by higher layer</td>
</tr>
</tbody>
</table>

### Table 2: transmission point directive command of three-bit

<table>
<thead>
<tr>
<th>Transmission point directive command bit</th>
<th>Transmission point Number</th>
<th>Description (Configuration information)</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>0</td>
<td>Information set 0 configured by higher layer</td>
</tr>
<tr>
<td>001</td>
<td>1</td>
<td>Information set 1 configured by higher layer</td>
</tr>
</tbody>
</table>
Wherein the transmission point directive command and the closing signaling of small cell #1 can be transmitted concurrently or not concurrently.

FIG. 9 illustrates an example in which the transmission point directive command and the closing signaling of small cell #1 are transmitted concurrently, for example, at t1 as shown in FIG. 9, specifically, small cell #1 will be closed, and small cell #2 is the new transmission point. The transmission point directive command and the closing signaling can be transmitted via the same or different signaling.

In contrast to FIG. 9, FIG. 10 illustrates an example in which the transmission point directive command and the closing signaling of small cell #1 are transmitted not concurrently, for example, as shown in FIG. 10, the closing signaling is transmitted at t2, and the transmission point directive command is transmitted at t3; wherein the transmission point directive command can be transmitted from a primary cell (for example, a primary cell within a secondary service base station) or a small cell to be closed.

Step 618, when receiving the closing signaling and the transmission point directive command, the terminal (or user) can obtain the configuration information of the new transmission point based on the information of the transmission point directive command and the mapping relationship of Table 1, and prepare to monitor the PDCCH and the PDSCH of the new transmission point. The blind detection position of the PDCCH is related to an identification (C-RNTI) of a terminal when the terminal in a cell; if the C-RNTI of the terminal in its own service cell is the same as the C-RNTI of an existing terminal in the new transmission point, collision may occur between the blind detection location of the PDCCH from the new transmission point to the terminal and the blind detection location of the PDCCH of the existing terminal in the new transmission point. Two solutions are provided to avoid such collision: 1) a plurality of transmission points can share C-RNTI resource of the user, that is to say, C-RNTIs of terminals in adjacent transmission points are different; 2) the C-RNTI assigned to the terminal is included in the configuration information of each transmission point, when at different transmission points, the terminal will select a corresponding C-RNTI to acquire the blind detection location of the PDCCH.

Following is the difference between the method of the present disclosure and a Coordinated multi-point Transmission ("CoMP" for short) method.

1) in CoMP, only the transmission point of the PDSCH is changed; in the method described above, in addition to

<table>
<thead>
<tr>
<th>Transmission point directive command bit</th>
<th>Transmission point Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>010</td>
<td>2</td>
<td>Information set 2 configured by higher layer</td>
</tr>
<tr>
<td>011</td>
<td>3</td>
<td>Information set 3 configured by higher layer</td>
</tr>
<tr>
<td>100</td>
<td>4</td>
<td>Information set 4 configured by higher layer</td>
</tr>
<tr>
<td>101</td>
<td>5</td>
<td>Information set 5 configured by higher layer</td>
</tr>
<tr>
<td>110</td>
<td>6</td>
<td>Information set 6 configured by higher layer</td>
</tr>
<tr>
<td>111</td>
<td>7</td>
<td>Information set 7 configured by higher layer</td>
</tr>
</tbody>
</table>

Table 3: transmission point directive command of two-bit

<table>
<thead>
<tr>
<th>Transmission point directive command bit</th>
<th>Transmission point Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>0</td>
<td>Information set 0 configured by higher layer</td>
</tr>
<tr>
<td>01</td>
<td>1</td>
<td>Information set 1 configured by higher layer</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>Information set 2 configured by higher layer</td>
</tr>
<tr>
<td>11</td>
<td>3</td>
<td>Information set 3 configured by higher layer</td>
</tr>
</tbody>
</table>

[0160] Wherein the transmission point directive command and the closing signaling of small cell #1 can be transmitted concurrently or not concurrently.

[0161] FIG. 9 illustrates an example in which the transmission point directive command and the closing signaling of small cell #1 are transmitted concurrently, for example, at t1 as shown in FIG. 9, specifically, small cell #1 will be closed, and small cell #2 is the new transmission point. The transmission point directive command and the closing signaling can be transmitted via the same or different signaling.

[0162] In contrast to FIG. 9, FIG. 10 illustrates an example in which the transmission point directive command and the closing signaling of small cell #1 are transmitted not concurrently, for example, as shown in FIG. 10, the closing signaling is transmitted at t2, and the transmission point directive command is transmitted at t3; wherein the transmission point directive command can be transmitted from a primary cell (for example, a primary cell within a secondary service base station) or a small cell to be closed.

[0163] Step 618, when receiving the closing signaling and the transmission point directive command, the terminal (or user) can obtain the configuration information of the new transmission point based on the information of the transmission point directive command and the mapping relationship of Table 1, and prepare to monitor the PDCCH and the PDSCH of the new transmission point. The blind detection position of the PDCCH is related to an identification (C-RNTI) of a terminal when the terminal in a cell; if the C-RNTI of the terminal in its own service cell is the same as the C-RNTI of an existing terminal in the new transmission point, collision may occur between the blind detection location of the PDCCH from the new transmission point to the terminal and the blind detection location of the PDCCH of the existing terminal in the new transmission point. Two solutions are provided to avoid such collision: 1) a plurality of transmission points can share C-RNTI resource of the user, that is to say, C-RNTIs of terminals in adjacent transmission points are different; 2) the C-RNTI assigned to the terminal is included in the configuration information of each transmission point, when at different transmission points, the terminal will select a corresponding C-RNTI to acquire the blind detection location of the PDCCH.

[0164] Following is the difference between the method of the present disclosure and a Coordinated multi-point Transmission ("CoMP" for short) method.

1) in CoMP, only the transmission point of the PDSCH is changed; in the method described above, in addition to
the transmission point of the PDSCH, the transmission point of the PDCCH is changed either; to this end, a transmission point directive command is needed to inform the user about the information of the PDCCH of the cell to be monitored.

2) In CoMP, the transmission point of each transmission time interval ("TTI" for short) can be changed, therefore, information of the transmission point needs to be indicated via QPI for each TTI. Wherein the transmission point directive command is a semi-static signaling, that is to say, new small cell number and other information of the new small cell will be informed only when the current small cell is to closed and the new small cell is to be turned on. Therefore, signaling cost of the transmission point directive command of the present disclosure is much smaller than CoMP. For example, if duration time of on/off switching is 100ms, in CoMP, signaling indication will be performed for 100 times, in contradistinction, in the present disclosure, signaling indication only needs to be performed once.

3) In CoMP, since the transmission point of each TTI can be different, CSI of the transmission point needs to be measured and feedback; in the technical scheme of the disclosure, there is no need to feed back CSI of a plurality of transmission points when handover between transmission points. For example, only CSI of the current transmission point will be measured and feed back before the transmission point directive command is received; and start to measure and feedback CSI of the new transmission point after the transmission point directive command is received.

The technical scheme of the disclosure has been described with reference to the accompanying drawings. By preparing candidate transmission points for the terminal and informing the terminal about the configuration information thereof, transmitting a transmission point directive command to the terminal when the current transmission point in use is to be closed to inform the terminal about the information of the new transmission point to be monitored, the terminal can acquire the configuration information of the new transmission point according to the transmission point directive command and prepare to monitor the PDCCH and the PDSCH of the new transmission point. Compared with the technical scheme of the related art, in which the subscriber is switched out or the communication thereof is interrupted when the transmission point will be closed, with the aid of the technical scheme of the present disclosure, communication interrupt time due to closing of the current transmission point can be reduced, thus improving user experience and the overall resource utilization and system throughput of the system.

According to another embodiment of the disclosure, it is provided a program product stored in a non-volatile machine readable medium for quick transmission point handover. The program product including program code, when executed on a computer system, adapted to perform any of the quick transmission point handover method according to embodiments described above.

According to another embodiment of the disclosure, it is provided a non-volatile machine readable medium storing a program product for quick transmission point handover. The program product including program code, when executed on a computer system, adapted to perform any of the quick transmission point handover method according to embodiments described above.

According to another embodiment of the disclosure, it is provided a computer readable program, when executed on a computer system, adapted to perform any of the quick transmission point handover method according the embodiments described above.

According to a further aspect of the disclosure, it is provided a storage medium storing computer readable program. The computer readable program, when executed on a computer system, adapted to perform any of the quick transmission point handover method according the embodiments described above.

The foregoing descriptions are merely preferred embodiments of the present disclosure, rather than limiting the present disclosure. Various modifications and alterations may be made to the present disclosure for those skilled in the art. Any modification, equivalent substitution, improvement or the like made within the spirit and principle of the present disclosure shall fall into the protection scope of the present disclosure.

Claims

1. A quick transmission point handover method, comprising:
   - detecting whether a current transmission point in use needs to be closed by a service base station; and
   - transmitting a target transmission point directive command to a terminal if it is detected that the current transmission point in use needs to be closed, so as to inform the terminal about information of a new target transmission point to be monitored and/or to inform the terminal that the current transmission point in use will be closed.

2. The method of claim 1, wherein the method further comprises:
   - monitoring channel information of the new target transmission point according to the information of the new
target transmission point, wherein the channel information includes at least physical downlink control channel information and physical downlink shared channel information.

3. The method of claim 2, wherein before detecting whether the current transmission point in use needs to be closed, the method further comprises:

determining whether on/off status change can be performed on the current transmission point in use by the service base station;
acquiring a measurement report from the terminal by the service base station if it is determined that the on/off status change can be performed on the current transmission point in use;
selecting at least one candidate transmission point from a plurality of adjacent small cell transmission points in the measurement report by the service base station, the at least one candidate transmission point forms a candidate transmission point set with the current transmission point in use;
acquiring configuration information of each candidate transmission point in the candidate transmission point set and numbering each candidate transmission point according to a preset numbering rule by the service base station;
transmitting the configuration information and number information of each candidate transmission point to the terminal; and
storing the configuration information and the number information of each candidate transmission point in association with each other by the terminal.

4. The method of claim 3, wherein the process of acquiring the measurement report from the terminal comprises:

transmitting measurement parameters to the terminal by the service base station;
acquiring the measurement report of a plurality of adjacent small cell transmission points which is in the same carrier frequency with the current transmission point in use and with signal strength that meets a preset condition; and
transmitting the measurement report to the service base station by the terminal.

5. The method of claim 3, wherein the target transmission point indicative command comprises a target transmission point number, and the method further comprises:

receiving the target transmission point number by the terminal;
determining the configuration information of the target transmission point according to the target transmission point number and a stored association relationship between the configuration information and the number information of each candidate transmission point by the terminal; and
monitoring the channel information of the target transmission point according to the configuration information of the target transmission point by the terminal.

6. The method of claim 3, wherein the target transmission point indicative command comprises the monitoring state corresponding to each candidate transmission point number, and the method further comprises:

receiving the monitoring state corresponding to each candidate transmission point number by the terminal; and
determining the target transmission point number of the target transmission point to be monitored according to the monitoring state received by the terminal;
determining the configuration information of the target transmission point according to the target transmission point number and a stored association relationship between the configuration information and the number information of each candidate transmission point by the terminal; and
monitoring the channel information of the target transmission point according to the configuration information of the target transmission point by the terminal.

7. The method of claim 3, wherein the configuration information includes at least one of the following or a combination thereof: physical cell identification, identification assigned to a terminal by a transmission point, number of ports of a cell reference signal, frequency offset of a cell reference signal, multimedia broadcast/multicast service single frequency network sub-frame configuration list, zero power channel state information reference signal configuration number, physical downlink shared channel start symbol, and non-zero power channel state information reference signal configuration number for quasi co-location.
8. The method of claim 7, wherein the method further comprises:

determining whether an identification assigned to each terminal in each candidate transmission point is the same with an identification assigned to another terminal in other candidate transmission points by the service base station; and

if yes, including the identification assigned to the terminal in the configuration information being transmitted by the service base station, otherwise, the identification assigned to the terminal will not be included in the configuration information being transmitted.

9. The method of claim 8, wherein the method further comprises:

determining whether the identification assigned by the transmission point is included in the configuration information of the candidate transmission point by the terminal; and

if yes, using the identification assigned by the transmission point to monitor the target transmission point by the terminal; otherwise, using a current identification of the terminal to monitor the target transmission point by the terminal.

10. The method of claim 1, wherein the target transmission point indicative command is Radio Resource Control signaling which is included in a Radio Resource Control connection reconfiguration that does not contain mobility control information, and the indicative content of the Radio Resource Control signaling is the configuration information of the target transmission point.

11. The method of claim 1, wherein the target transmission point indicative command is Media Access Control signaling which contains an indicator corresponding to each transmission point number; the indicator is used to indicate the monitoring state of channel information of each candidate transmission point by the terminal; wherein an indicator corresponding to a target transmission point number in the Media Access Control signaling is set to "on" state, and indicators corresponding to other transmission point number are set to "off" state by the service base station, so as to indicate that the channel information of the target transmission point will be monitored.

12. The method of claim 1, wherein the target transmission point directive command is Physical Downlink Control signaling which is in downlink control information format 2D of Transmission Mode 10 and indicates a target transmission point number.

13. The method of claim 1, wherein the method further comprises:

transmitting closing signaling to the terminal upon detecting that the current transmission point in use is to be closed by the service base station, whereby the terminal can determine that the current transmission point in use will be closed according to the closing signaling; wherein the target transmission point directive command and the closing signaling can be transmitted to the terminal concurrently or not concurrently.

14. The method of any of claims 1-13, wherein the target transmission point directive command is transmitted to the terminal by the service base station or the current transmission point in use.

15. A quick transmission point handover device for a service base station, wherein the device comprises:

a detecting unit, configured to detect whether a current transmission point in use needs to be closed; and

a transmitting unit, configured to transmit a target transmission point directive command to a terminal if it is detected that the current transmission point in use needs to be closed by the detecting unit, so as to inform the terminal about information of a new target transmission point to be monitored and/or to inform the terminal that the current transmission point in use will be closed.

16. The device of claim 15, wherein the device further comprises:

a determining unit, configured to determine whether on/off status change can be performed on the current transmission point in use;

an acquiring unit, configured to acquire a measurement report from the terminal if the on/off status change can be performed on the current transmission point in use;

a selecting unit, configured to select at least one candidate transmission point from a plurality of adjacent small
sell transmission points in the measurement report, the at least one candidate transmission point forms a
candidate transmission point set with the current transmission point in use; and
a numbering unit, configured to acquire configuration information of each candidate transmission point in the
candidate transmission point set, and number each candidate transmission point according to a preset numbering
rule;
the transmitting unit is further configured to transmit the configuration information and number information of
each candidate transmission point to the terminal, whereby the configuration information and the number informa-
tion of each candidate transmission point will be stored in association with each other in the terminal.

17. The device of claim 16, wherein the acquiring unit is configured to transmit measurement parameters to the terminal
if the on/off status change can be performed on the current transmission point in use; whereby the terminal can
acquire the measurement report of a plurality of adjacent small sell transmission points which is in the same carrier
frequency with the current transmission point in use and with signal strength that meets a preset condition according
to the measurement parameters, and transmit the measurement report to the service base station.

18. The device of claim 16, wherein the target transmission point directive command includes a target transmission
point number, and the transmitting unit is configured to transmit the target transmission point number to the terminal;
whereby the terminal can determine the configuration information of the target transmission point according to the
target transmission point number and a stored association relationship between the configuration information and
the number information of each transmission point, and monitor channel information of the target transmission point
according to the configuration information of the target transmission point.

19. The device of claim 16, wherein the target transmission point directive command includes the monitoring state
corresponding to each candidate transmission point number, the transmitting unit is configured to transmit the
monitoring state corresponding to each candidate transmission point number to the terminal, whereby the terminal
can determine the target transmission point number of the target transmission point to be monitored according to
the monitoring state received, determine the configuration information of the target transmission point according to the
target transmission point number and the stored association relationship between the configuration information and
the number information of each candidate transmission point, and monitor the channel information of the target
transmission point according to the configuration information of the target transmission point.

20. The device of claim 16, wherein the configuration information includes at least one of the following or a combination
thereof: physical cell identification, identification assigned to a terminal by a transmission point, number of ports of
a cell reference signal, frequency offset of a cell reference signal, multimedia broadcast/multicast service single
frequency network sub-frame configuration list, zero power channel state information reference signal configuration
number, physical downlink shared channel start symbol, and non- zero power channel state information reference
signal configuration number for quasi co-location.

21. The device of claim 20, wherein the determining unit is further configured to determine whether an identification
assigned to each terminal in each candidate transmission point is the same with an identification assigned to another
terminal in other candidate transmission points; the transmitting unit is further configured to include the identification
assigned to the terminal in the configuration information being transmitted if the result of the determining unit is yes.

22. The device of claim 15, wherein the target transmission point directive command is Radio Resource Control signaling
which is included in a Radio Resource Control connection reconfiguration that does not contain mobility control
information; the indicative content of the Radio Resource Control signaling is the configuration information of the
target transmission point.

23. The device of claim 15, wherein the target transmission point directive command is Media Access Control signaling
which contains an indicator corresponding to each transmission point number; the indicator is used to indicate the
monitoring state of channel information of each candidate transmission point by the terminal.

24. The device of claim 15, wherein the target transmission point directive command is Physical Downlink Control
signaling which is in downlink control information format 2D of Transmission Mode 10 and indicates a target trans-
mission point number.

25. The device of claim 15, wherein the transmitting unit is further configured to transmit closing signaling to the terminal
upon detecting that the current transmission point in use is to be closed by the detecting unit, whereby the terminal
can determine that the current transmission point in use will be closed according to the closing signaling; the target
transmission point directive command and the closing signaling can be transmitted to the terminal concurrently or
not concurrently.

26. The device of any of claims 15-25, wherein the target transmission point directive command is transmitted to the
terminal by the transmitting unit via the service base station or the current transmission point in use.

27. A quick transmission point handover device for a terminal, wherein the device comprises:

- a receiving unit, configured to receive a target transmission point directive command transmitted from a service
  base station so as to determine information of a new target transmission point to be monitored or determine
  that the current transmission point in use will be closed according to the target transmission point directive
  command.

28. The device of claim 27, wherein the device further comprises:

- a monitoring unit, configured to monitor channel information of the new target transmission point according to
  the information of the new target transmission point, wherein the channel information includes at least physical
downlink control channel information and physical downlink shared channel information.

29. The device of claim 28, wherein the receiving unit is further configured to receive measurement parameters trans-
mitted from the service base station; and the device further comprises:

- a measurement report acquiring unit, configured to acquire a measurement report of a plurality of adjacent small
  sell transmission points which is in the same carrier frequency with the current transmission point in use and
  with signal strength that meets a preset condition according to the measurement parameters; and
  a transmitting unit, configured to transmit the measurement report to the service base station.

30. The device of claim 29, wherein the receiving unit is further configured to receive configuration information and
number information of each candidate transmission point transmitted by the service base station and store the
configuration information and the number information of each candidate transmission point in association with each
other.

31. The device of claim 30, wherein the target transmission point directive command includes target transmission point
number, the monitoring unit is further configured to:

- receive the target transmission point number transmitted by the service base station;
- determine the configuration information of the target transmission point according to the target transmission
  point number and the stored association relationship between the configuration information and the number
  information; and
- monitor the channel information of the target transmission point according to the configuration information of
  the target transmission point.

32. The device of claim 30, wherein the target transmission point directive command includes monitoring state of each
candidate transmission point number, the monitoring unit is configured to:

- receive the monitoring state corresponding to each candidate transmission point number and determine the
target transmission point number of the target transmission point to be monitored according to the monitoring
state received;
- determine the configuration information of the target transmission point according to the target transmission
  point number and the stored association relationship between the configuration information and the number
  information of each candidate transmission point; and
- monitor the channel information of the target transmission point according to the configuration information of
  the target transmission point.

33. The device of claim 30, wherein the configuration information includes at least one of the following or a combination
thereof: physical cell identification, identification assigned to a terminal by a transmission point, number of ports of
a cell reference signal, frequency offset of a cell reference signal, multimedia broadcast/multicast service single
frequency network sub-frame configuration list, zero power channel state information reference signal configuration number, physical downlink shared channel start symbol, and non-zero power channel state information reference signal configuration number for quasi co-location.

34. The device of claim 33, wherein the device further comprises:

- a determining unit, configured to determine whether an identification assigned to the terminal by the transmission point is included in the configuration information of each candidate transmission point;
- the monitoring unit is further configured to use the identification assigned to the terminal by the transmission point to monitor the channel information of the target transmission point if the identification is included in the configuration information; otherwise, use a current identification of the terminal to monitor the channel information of the target transmission point.

35. A service base station, comprising the quick transmission point handover device of any of claims 15-27.

36. A terminal, comprising the quick transmission point handover device of any of claims 28-34.
Fig. 1

- Detecting unit 202
- Transmitting unit 204
- Determining unit 206
- Acquiring unit 208
- Selecting unit 210
- Numbering unit 212
- Quick transmission point handover device 200

Fig. 2
Fig. 3

Fig. 4

Fig. 5
Start

602

a terminal adding a transmission point that can be on/off as a serving cell

604

a service base station setting a measurement configuration for selecting candidate transmission points consisting a candidate transmission point set

606

the terminal transmitting a measurement report to the service base station according to the measurement configuration

608

the service base station selecting and numbering transmission points within the candidate transmission point set

610

the service base station transmitting the number and configuration information of transmission points within the candidate transmission point set to the terminal

612

the service base station determining whether the current transmission point in use is to be closed

Y

614

the service base station transmitting closing signaling to the terminal

616

the service base station transmitting a transmission point directive command to the terminal

618

the terminal monitoring the new transmission point

End

Fig. 6
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

H04W 36/08 (2009.01) i; H04W 36/30 (2009.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04W; H04Q; H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNKI, CNPAT, EPDOC, WPE: handover, hand off, power off, shut up, switch+, report, intercept+, listen+, monitor+, terminal, base station, BS, access point, cell, sender, indication, instruct+, information, notify

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>CN 102438286 A (HUAWEI TECHNOLOGIES CO LTD) 02 May 2012 (02.05.2012) description, paragraphs [0039]-[0081], [0107], [0108] and figures 1-4</td>
<td>27-36, 1, 10, 12-17, 20-22, 24-27, 35</td>
</tr>
<tr>
<td>X</td>
<td>CN 101998468 A (BEIJING SAMSUNG TELECOM TECHNOLOGY RESEARCH CO LTD) 30 March 2011 (30.03.2011) description, paragraphs [0025]-[0073], and figures 2 and 3</td>
<td>1-36</td>
</tr>
<tr>
<td>Y</td>
<td>CN 102438286 A (HUAWEI TECHNOLOGIES CO LTD) 02 May 2012 (02.05.2012) description, paragraphs [0039]-[0081], [0107], [0108] and figures 1-4</td>
<td>1-36</td>
</tr>
<tr>
<td>Y</td>
<td>CN 101998468 A (BEIJING SAMSUNG TELECOM TECHNOLOGY RESEARCH CO LTD) 30 March 2011 (30.03.2011) description, paragraphs [0025]-[0073], and figures 2 and 3</td>
<td>1-36</td>
</tr>
<tr>
<td>A</td>
<td>CN 103167577 A (HUAWEI TECHNOLOGIES CO LTD) 19 June 2013 (19.06.2013) the whole document</td>
<td>1-36</td>
</tr>
</tbody>
</table>

* Special categories of cited documents:
  “A” document defining the general state of the art which is not considered to be of particular relevance
  “E” earlier application or patent but published on or after the international filing date
  “L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
  “O” document referring to an oral disclosure, use, exhibition or other means
  “P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search 31 March 2015

Date of mailing of the international search report 06 May 2015

Name and mailing address of the ISA
State Intellectual Property Office of the P. R. China
No. 6, Xiucheng Road, Jimingqiao
Haidian District, Beijing 100088, China
Facsimile No. (86-10) 62019451

Authorized officer WEL, Ling
Telephone No. (86-10) 61648264

Form PCT/ISA/210 (second sheet) (July 2009)
<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>US 2012002643 A1 (LG ELECTRONICS INC.) 05 January 2012 (05.01.2012) the whole document</td>
<td>1-36</td>
</tr>
</tbody>
</table>

Form PCT/ISA/210 (continuation of second sheet) (July 2009)
<table>
<thead>
<tr>
<th>Patent Documents referred in the Report</th>
<th>Publication Date</th>
<th>Patent Family</th>
<th>Publication Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN 102438286 A</td>
<td>02 May 2012</td>
<td>US 2014135014 A1</td>
<td>15 May 2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WO 2013071829 A1</td>
<td>23 May 2013</td>
</tr>
<tr>
<td>CN 101998468 A</td>
<td>30 March 2011</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>CN 103167577 A</td>
<td>19 June 2013</td>
<td>WO 2013086939 A1</td>
<td>20 June 2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN 102415155 A</td>
<td>11 April 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 2015003416 A1</td>
<td>01 January 2015</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WO 2010104365 A2</td>
<td>16 September 2010</td>
</tr>
</tbody>
</table>

Form PCT/ISA/210 (patent family annex) (July 2009)