



(51) International Patent Classification:

H04W 36/00 (2009.01)

(21) International Application Number:

PCT/CN2018/105261

(22) International Filing Date:

12 September 2018 (12.09.2018)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

201810903477.9 09 August 2018 (09.08.2018) CN

(71) Applicant: **HUIZHOU TCL MOBILE COMMUNICATION CO., LTD** [CN/CN]; No. 86, Hechang 7th West Road, Zhong Kai Hi-tech Development District, Hui Zhou, Guangdong 516006 (CN).

(72) Inventors: **LUO, Yaming**; No. 86, Hechang 7th West Road, Zhong Kai Hi-tech Development District, Hui Zhou, Guangdong 516006 (CN). **CHEN, Xiang**; No. 86, Hechang 7th West Road, Zhong Kai Hi-tech Development District, Hui Zhou, Guangdong 516006 (CN). **CHIU, Eddy**; No. 86, Hechang 7th West Road, Zhong Kai Hi-tech Development District, Hui Zhou, Guangdong 516006 (CN).

(74) Agent: **CHINA WISPRO INTELLECTUAL PROPERTY LLP.**; Room A806, Zhongdi Building, China University of Geosciences Base, No.8 Yuexing 3rd Road, High-Tech Industrial Estate, Nanshan District, Shenzhen, Guangdong 518057 (CN).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: HANDOVER METHOD AND APPARATUS

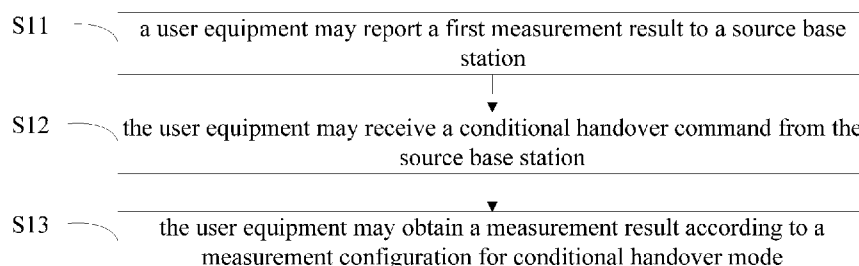


Fig. 1

(57) Abstract: The present disclosure provides a handover method. The method may include at least one of following measurement events to be triggered. The measurement events may include: an event D1, a measurement value of a neighbor cell is better than a measurement value of a best cell in a candidate target cell list; an event D2, the measurement value of the neighbor cell is better than the measurement value of the best cell in the candidate target cell list, and a measurement value of a serving cell is worse than a third threshold; an event D3, a number of the candidate cell which has a measurement value worse than a fourth threshold is greater than a fifth threshold; and an event A1, a measurement value of the serving cell is better than a sixth threshold. The present disclosure provides a communication handover apparatus and a readable storage medium.



HANDOVER METHOD AND APPARATUS

TECHNICAL FIELD

[0001] The described embodiments relate to a communication technology, and more particularly, to a handover method and an apparatus.

BACKGROUND

[0002] A handover is a fundamental and important process in mobility management. In LTE/LTE-A, the handover of a user equipment is controlled by a base station. In NR, because of the use of a high frequency carrier and a beamforming technique, a channel quality changes rapidly, which may cause a failure of handover command delivery to the user equipment from a source base station (i.e., the base station to which the user equipment is currently connected). Once the problem described above happens, a control signal between the user equipment and the base station may disappear, and the user equipment may enter a radio link failure (RLF) and perform a radio resource control (RRC) connection re-establishment, so as to bring a longer delay.

[0003] In order to solve the problem, a conditional handover is proposed (which may also be called autonomous handover). The conditional handover is a network-configured but user-equipment-controlled downlink mobility mechanism. The conditional handover allows the source base station to send a conditional handover command to the user equipment before the channel quality is unstable enough to initiate the conventional handover. The conditional handover command includes information of multiple candidate target cells and handover conditions, and then the user equipment may perform a handover process automatically when it observes that the handover condition is satisfied.

[0004] For convenience of description, a period between the time that the conditional handover command is issued, and the time that the handover is executed or the expiration of the conditional handover command if it is never executed, is defined as conditional handover lifetime. During the conditional handover lifetime, the user equipment may still perform a measurement according to a current measurement configuration, and report the measurement result to the source base station to enable the base station to adjust the conditional handover. Frequent measurement result reporting may be required, which brings about a large overhead.

SUMMARY

[0005] The present disclosure provides a handover method and an apparatus, which may solve a technical problem that a frequent measurement result reporting in conditional handover lifetime may bring a large overhead in the related art.

[0006] In order to solve the above-mentioned technical problem, a technical solution adopted by the present disclosure is to provide a handover method comprising: reporting a first measurement result by a user equipment to a source base station; receiving a conditional handover command by the user equipment from the source base station, wherein the conditional handover command comprises information of a candidate target cell list and a handover condition, and the candidate cell is selected for the user equipment by the source base station according to the first measurement result; obtaining a measurement result by the user equipment according to a measurement configuration for conditional handover mode, wherein the measurement configuration for the conditional handover mode comprises at least one of following measurement events that: an event D1, a measurement value of a neighbor cell is better than a measurement value of a best cell in a candidate target cell list, and a difference between the measurement value of the neighbor cell and the measurement value of the best cell in the candidate target cell list is greater than a first threshold; an event D2, the measurement value of the neighbor cell is better than the measurement value of the best cell in the candidate target cell list, and the difference between the measurement value of the neighbor cell and the measurement value of the best cell in the candidate target cell list is greater than a second threshold, and a measurement value of a serving cell is worse than a third threshold; an event D3, a number of the candidate cell which has a measurement value worse than a fourth threshold is greater than a fifth threshold; and an event A1, a measurement value of the serving cell is better than a sixth threshold.

[0007] In order to solve the above-mentioned technical problem, a technical solution adopted by the present disclosure is to provide a handover method comprising: receiving a first measurement result from a user equipment, by a source base station; selecting a candidate cell by the source base station according to the first measurement result for the user equipment; sending a conditional handover command comprising information of the candidate target cell list and a handover condition, by the source base station, to the user equipment, and sending a measurement configuration for conditional handover mode, by the source base station, to the user equipment, wherein the measurement configuration for the conditional handover mode comprises at least one of following measurement events that: an event D1, a measurement value of a neighbor cell is better than a measurement value of a best cell in a candidate target cell list, and a difference between the measurement value of the neighbor cell and the measurement value of the best cell in the candidate target cell list is greater than a first threshold; an event D2, the measurement value of the neighbor cell is better than the measurement value of the best cell in the candidate target cell list, and the difference between the measurement value of the neighbor cell and the measurement value of the best cell in the candidate target cell list is greater than a second threshold, and a measurement value of a serving cell is worse than a third threshold; an event D3, a number of the candidate cell which

has a measurement value worse than a fourth threshold is greater than a fifth threshold; and an event A1, a measurement value of the serving cell is better than a sixth threshold.

[0008] In order to solve the above-mentioned technical problem, a technical solution adopted by the present disclosure is to provide a communication handover apparatus comprising a processor and a communication circuit, wherein the processor is coupled to the communication circuit, and the processor is configured to execute an command to implement methods according to claims 1-19.

[0009] In order to solve the above-mentioned technical problem, a technical solution adopted by the present disclosure is to provide a readable storage medium storing commands, wherein the commands are configured to be executed to implement methods according to claims 1-19.

[0010] Advantages of the disclosure may follow. As compared with the related art, after receiving a conditional handover command, a user equipment performs a measurement and reports the measurement according to a measurement configuration for conditional handover mode; the measurement configuration for the conditional handover mode may include at least one of measurement events of an event D1, an event D2, an event D3, and an event A1. The measurement events may satisfy at least a part of the requirements of the base station to adjust the conditional handover. Compared with measurement events A2-A6 in the related art, the measurement events D1, D2 and D3 may be less likely to be triggered, so as to reduce an overhead caused by a measurement result reporting.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Fig. 1 is a flow chart of a handover method in accordance with an embodiment in the present disclosure.

[0012] Fig. 2 is a flow chart of a handover method in accordance with an embodiment in the present disclosure.

[0013] Fig. 3 is a flow chart of a handover method in accordance with an embodiment in the present disclosure.

[0014] Fig. 4 is a flow chart of a handover method in accordance with an embodiment in the present disclosure.

[0015] Fig. 5 is a flow chart of a handover method in accordance with an embodiment in the present disclosure.

[0016] Fig. 6 is a flow chart of a handover method in accordance with an embodiment in the present disclosure.

[0017] Fig. 7 is a flow chart of a handover method in accordance with an embodiment in the present disclosure.

[0018] Fig. 8 is a flow chart of a handover method in accordance with an embodiment in the

present disclosure.

[0019] Fig. 9 is a flow chart of a handover method in accordance with an embodiment in the present disclosure.

[0020] Fig. 10 is a flow chart of a handover method in accordance with an embodiment in the present disclosure.

[0021] Fig. 11 is a flow chart of a handover method in accordance with an embodiment in the present disclosure.

[0022] Fig. 12 is a structural illustration of a handover apparatus in accordance with an embodiment in the present disclosure.

[0023] Fig. 13 is a structural illustration of a handover apparatus in accordance with an embodiment in the present disclosure.

[0024] Fig. 14 is a structural illustration of a readable storage medium in accordance with an embodiment in the present disclosure.

DETAILED DESCRIPTION

[0025] The present disclosure will now be described in a detail in conjunction with drawings and embodiments. The following non-conflict embodiments may be combined with each other.

[0026] An execution body of a handover method in accordance with an embodiment in the present disclosure may be a user equipment. The user equipment may be fixed or mobile, and may be a cellular phone, a personal digital assistant (PDA), a wireless modem, a tablet computer, a notebook computer, or the like. As shown in Fig. 1, the embodiment may include as following.

[0027] S11: a user equipment may report a first measurement result to a source base station.

[0028] The first measurement result may also be referred to an early measurement result. Before the block S11, the user equipment may receive a measurement control from the source base station to indicate when to start to measure and report the first measurement result. The measurement control may be conveyed by a RRC connection reconfiguration. A measurement configuration indicated by the measurement control may be referred to a normal mode measurement configuration. A reporting of the first measurement result may be periodic or non-periodic, such as event-triggered.

[0029] Trigger conditions of the event-triggered measurement result may be referred to a measurement event. The normal mode measurement configuration may include some or all of the measurement events A1-A6, and the measurement events A1-A6 are as shown in Table 1.

event	entry condition	leaving condition
-------	-----------------	-------------------

A1	a measurement value in a serving cell becomes better than an absolute threshold	a measurement value in a serving cell becomes worse than another absolute threshold
A2	a measurement value in a serving cell becomes worse than an absolute threshold	a measurement value in a serving cell becomes better than another absolute threshold
A3	a measurement value in a neighbor cell becomes amount of offset better than a measurement value in a special cell	a measurement value in a neighbor cell becomes amount of another offset worse than a measurement value in a special cell
A4	a measurement value in a neighbor cell becomes better than an absolute threshold	a measurement value in a neighbor cell becomes worse than another absolute threshold
A5	a measurement value in a special cell becomes worse than an absolute threshold ¹ and a measurement value in a neighbor cell becomes better than an absolute threshold ²	a measurement value in a special cell becomes better than an absolute threshold ³ or a measurement value in a neighbor cell becomes worse than an absolute threshold ⁴
A6	a measurement value in a neighbor cell becomes amount of offset better than a measurement value in a special cell	a measurement value in a neighbor cell becomes amount of another offset worse than a measurement value in a special cell

Table 1

[0030] In Table 1, the serving cell may be referred to a cell serving the user equipment currently. When the user equipment is in a dual-connection state, the special cell may be referred to a primary cell (PCell) or a primary secondary cell (PSCell). In other cases, the special cell may be the PCell. The PCell may work on a primary frequency. The user equipment may perform a initial connection establishment process or may initiate a connection re-establishment process in the PCell. When the user equipment is in the dual-connection state, the PCell may belong to a primary node. When the PSCell belongs to a secondary node, the user equipment may perform a random access to synchronize in the PSCell when a connection reconfiguration process is performed.

[0031] S12: the user equipment may receive a conditional handover command from the source base station.

[0032] The conditional handover command may be conveyed by the RRC connection

reconfiguration. The conditional handover command may include information of a candidate target cell list and a handover condition. The candidate cell may be selected for the user equipment by the source base station according to the first measurement result. The conditional handover command may include a candidate target cell list. The list may include some or all of the information of all candidate cells. The handover conditions of different candidate cells may be the same or different.

[0033] S13: the user equipment may obtain a measurement result according to a measurement configuration for conditional handover mode.

[0034] Because the conditional handover is a network-configured but user-equipment-controlled downlink mobility mechanism, a handover decision is made by the user equipment instead of a network side during the conditional handover lifetime. The source base station may adjust the conditional handover according to a measurement result, and the adjustment may include exiting the conditional handover in advance, adding a new candidate cell, removing an inappropriate candidate cell, and the like.

[0035] In this case, the source base station may not need to obtain updated measurement values of the serving/special/adjacent cell provided by the measurement results of events A1-A6 in all cases. In fact, most of the measurement results of A1-A6 do not provide useful information directly to the source base station during the conditional handover lifetime. The following description may be an analysis of whether the measurement events A1-A6 are suitable during the conditional handover lifetime. Unless otherwise mentioned specific indication, only the entry conditions of the measurement event are analyzed.

[0036] The event A1: useful, a measurement result including the event A1 may indicate that signal quality of serving cell is good enough, in which case the source base station may exit the conditional handover in advance.

[0037] The event A2: useless, the conditional handover has been initiated, and it is up to the user equipment, not the source base station, to decide whether to perform an actual handover.

[0038] The event A3: the neighbor cell triggering the event A3 may serve as a possible handover target which the user equipment handover. However, after initiating the conditional handover, the user equipment may select a handover target from configured candidate cells in a default state. When a cell which is most suitable as the handover target belongs to the configured candidate cell, the source base station may not need to know whether a new cell may be used as a candidate cell. Therefore, the event A3 is useless.

[0039] The event A4: an entry condition analysis of the event A4 may be similar to the event A3. The measurement result including the leaving condition of the event A4 may be used by the source base station to evaluate whether to remove improper candidate cells. However, measurement

objects of the event A4 may be neighbor cells (which may be defined by a cellsTriggeredList) and a number thereof may be greater than a number of the candidate cells, it may cause a lot of useless measurement results to be reported, and may bring unnecessary overhead.

[0040] The event A5: the event A5 may be similar to the event A2 and the event A3.

[0041] The event A6: the event A6 may be similar to the event A3.

[0042] In this embodiment, after receiving the conditional handover command, the user equipment may exit to use the normal mode measurement configuration and may enable the measurement configuration for measurement in the conditional handover mode (which may also be referred to a reporting configuration). The measurement configuration for the conditional handover mode may be conveyed by the conditional handover command. The measurement configuration for the conditional handover mode may include at least one of measurement events D1, D2, D3, and A1. The measurement events D1, D2, D3, and A1 and its corresponding trigger conditions may be described as following.

[0043] The event D1, a measurement value of a neighbor cell may be better than a measurement value of a best cell in the candidate target cell list, and a difference between the measurement value of the neighbor cell and the measurement value of the best cell in the candidate target cell list may be greater than a first threshold, i.e., the measurement value of the neighbor cell may be more better than the first threshold than the measurement value of the best cell in the candidate target cell list.

[0044] The event D2, the measurement value of the neighbor cell may be better than the measurement value of the best cell in the candidate target cell list, and the difference between the measurement value of the neighbor cell and the measurement value of the best cell in the candidate target cell list may be greater than a second threshold, and a measurement value of a serving cell may be worse than a third threshold, i.e., the measurement value of the neighbor cell may be more better than the second threshold than the measurement value of the best cell in the candidate target cell list, and the measurement value of the serving cell may be worse than the third threshold.

[0045] The event D3, the number of the candidate cell which has a measurement value worse than a fourth threshold may be greater than a fifth threshold.

[0046] The event A1, a measurement value of the serving cell may be better than a sixth threshold.

[0047] In the above-mentioned measurement events, the measurement value may be configured to indicate signal quality. The measurement value may include at least one of reference signal received power (RSPP), reference signal received quality (RSRQ), and a signal to interference plus noise ratio (SINR). The first threshold and the second threshold may be relative thresholds of signal quality, and the first threshold and the second threshold may be same or different. The third threshold may be an absolute threshold of the signal quality. The fourth threshold may be an absolute threshold of the signal quality. The fifth threshold may be a quantity threshold. The

sixth threshold may be an absolute threshold of the signal quality.

[0048] When the measurement result triggers at least one of the measurement events, the user equipment may generate and report a second measurement result including the measurement event which has been triggered. The source base station may adjust the conditional handover according to the second measurement result.

[0049] Triggering condition of the events D1 may include that the measurement value of the neighbor cell may be better than the measurement value of the best cell in the candidate target cell list, and the difference between the measurement value of the neighbor cell and the measurement value of the best cell in the candidate target cell list may be greater than the first threshold; triggering condition of the events D2 may include that the measurement value of the neighbor cell may be better than the measurement value of the best cell in the candidate target cell list, and the difference between the measurement value of the neighbor cell and the measurement value of the best cell in the candidate target cell list may be greater than the second threshold. Therefore, the best cell in the candidate target cell list may be a cell with the best signal quality in the candidate target cell list, i.e., the signal quality of the neighbor cell may be better than that of all candidate cells. The neighbor cell signal quality which triggers the event D1 or D2 the event may be better than a current candidate cell, and may be more suitable as a handover target and may be not a configured candidate cell. When at least one of the event D1 and the event D2 are triggered, the user equipment may report the second measurement result including the triggered at least one of the event D1 and the triggered event D2. After the source base station received the second measurement result, the source base station may add the neighbor cell which triggers at least one of the event D1 and the event D2 as a new candidate cell to ensure that the user equipment may handover to a suitable cell.

[0050] In a case that when both the event D1 and the event D2 are configured and the second threshold is greater than or equal to the first threshold, the neighbor cell which triggers the event D2 may trigger the event D1 necessarily at the same time, and the event D2 may be considered as a combination of the event D1 and another trigger condition.

[0051] The triggering of the event D3 may mean that some candidate cells may be no longer suitable as a handover target. The user equipment may report the second measurement result including the triggered event D3, and the source base station may remove the candidate cells after receiving the second measurement result, to release resource reservation for user equipment and reduce resource usage. Compared with the leaving condition of the event A4 analyzed above, the event D3 may involve fewer measurement objects and have higher accuracy, and unnecessary overhead may be reduced. In a case that the event D3 is configured, the source base station may adjust at least one of the fourth threshold and the fifth threshold according to requirements of

different application scenarios, and may evaluate a tradeoff between an overhead of the measurement result of the user equipment and an overhead of the resource reservation in network side.

[0052] The triggering of the event A1 may mean that the signal quality of the serving cell may be good, and the user equipment may report the second measurement result including the triggered event A1. After the source base received the second measurement result, the source base station may exit the conditional handover in advance.

[0053] An abstract syntax notation 1 (ASN.1) example of the event D1, the event D2, and the event D3 may be shown as following.

-- ASN1START

```

EventTriggerConfig ::=
    eventId
        eventD1
            d1-Offset
            reportOnLeave
            hysteresis
            timeToTrigger
        },
        eventD2
            d2-Threshold
            d2-Offset
            reportOnLeave
            hysteresis
            timeToTrigger
        },
        eventD3
            d3-Threshold
            d3-NroCellToTrigger
            reportOnLeave
            hysteresis
            timeToTrigger
            useWhiteCellList
        },
    },
    rsType
-- Common reporting config (at least to periodical and eventTriggered)
reportInterval
reportAmount
-- Cell reporting configuration
reportQuantityCell
maxReportCells

```

```

SEQUENCE {
    CHOICE {
        SEQUENCE {
            MeasTriggerQuantityOffset,
            BOOLEAN,
            Hysteresis,
            TimeToTrigger
        },
        SEQUENCE {
            MeasTriggerQuantity,
            MeasTriggerQuantityOffset,
            BOOLEAN,
            Hysteresis,
            TimeToTrigger
        },
        SEQUENCE {
            MeasTriggerQuantity,
            INTEGER (1..maxNroCellToTrigger)
            BOOLEAN,
            Hysteresis,
            TimeToTrigger,
            BOOLEAN
        }
    }
    ENUMERATED {ss, csi-rs}
    ReportInterval,
    ENUMERATED {FFS!},
    MeasReportQuantity,
    INTEGER (1..maxCellReport),

```

```

-- RS index reporting configuration
reportQuantityRsIndexes          MeasReportQuantity
maxNroIndexesToReport            INTEGER (1..maxNroIndexesToReport)
onlyReportBeamIds                BOOLEAN

-- If configured the UE includes the best neighbor cells per serving frequency
reportAddNeighMeas               TYPE_FFS!
}

-- ASN1STOP

```

[0054] The measurement configuration for the conditional handover mode may include measurement event without at least one of the event A2, the event A3, the event A4, the event A5, and the event A6, to reduce the overhead of the measurement result.

[0055] After the measurement result is obtained, the user equipment may evaluate whether the measurement result satisfies the trigger conditions of the measurement configuration for the conditional handover mode including the measurement event. When the measurement result satisfies the trigger condition of the at least one measurement event (i.e., the measurement result may trigger at least one of the measurement events), the user equipment may generate and report the second measurement result including the triggered measurement event. In addition, the user equipment may evaluate whether the measurement value of the candidate cell in the measurement result satisfies the handover condition; when it satisfies, the user equipment may select the candidate cell which satisfies the handover condition as the target cell and handover to the target cell. The generating and reporting of the second measurement result and the actual handover may be not necessarily performed. When the generating and reporting of the second measurement result and the actual handover are performed, there is no limit to the order of execution between the two.

[0056] By an embodiment, after receiving a conditional handover command, a user equipment performs a measurement and reports the measurement according to a measurement configuration for conditional handover mode; the measurement configuration for the conditional handover mode may include at least one of measurement events of an event D1, an event D2, an event D3, and an event A1. The measurement events may satisfy at least a part of the requirements of the base station to adjust the conditional handover. Compared with A2-A6 measurement events in the related art, the measurement events D1, D2 and D3 may be less likely to be triggered, so as to reduce a overhead caused by a measurement result reporting.

[0057] As shown in Fig. 2, Fig. 2 is a flow chart of a handover method in accordance with an embodiment base on the above-mentioned embodiment in the present disclosure. Measurement

events may include at least one of the event D1 and the event D2, and the at least one of the event D1 and the event D2 may be triggered. The embodiment may be a further extension of the handover method of the above-mentioned embodiment in the present disclosure, and same parts may be not described repeatedly herein. The embodiment may include as following.

[0058] S101: a user equipment may report a first measurement result to a source base station.

[0059] S102: the user equipment may receive a conditional handover command from the source base station.

[0060] S103: the user equipment may obtain a measurement result by a measurement configuration for conditional handover mode.

[0061] The measurement configuration for the conditional handover mode may include at least one of the event D1 and the event D2.

[0062] S104: when the measurement result triggers at least one of the event D1 and the event D2, the user equipment may generate and report a second measurement result including the at least one of the event D1 and the event D2 which has been triggered.

[0063] The second measurement result may include information of the neighbor cell which triggers the at least one of the event D1 and the event D2.

[0064] S105: the user equipment may receive an updated conditional handover command from the source base station.

[0065] The source base station may add the neighbor cell which triggers the at least one of the event D1 and the event D2 as a new candidate cell to the candidate target cell list, and may update the conditional handover command. The updated conditional handover command may include information of the neighbor cell which triggers the at least one of the event D1 and the event D2.

[0066] As shown in Fig. 3, Fig. 3 is a flow chart of a handover method in accordance with an embodiment based on the above-mentioned embodiment in the present disclosure. Measurement events may include the event D3, and the event D3 may be triggered. The embodiment may be a further extension of the handover method of the above-mentioned embodiment in the present disclosure, and same parts may be not described repeatedly herein. The embodiment may include as following.

[0067] S111: a user equipment may report a first measurement result to a source base station.

[0068] S112: the user equipment may receive a conditional handover command from the source base station.

[0069] S113: the user equipment may obtain a measurement result by according to a measurement configuration for conditional handover mode.

[0070] The measurement configuration for the conditional handover mode may include the event D3.

[0071] S114: when the measurement result triggers the event D3, the user equipment may generate and report a second measurement result including the event D3 which has been triggered.

[0072] The second measurement result may include information of the neighbor cell which triggers the event D3.

[0073] S115: the user equipment may receive an updated conditional handover command from the source base station.

[0074] The source base station may remove the candidate cell which triggers the event D3 in the candidate target cell list, and may update the conditional handover command. The updated conditional handover command may include information of an updated candidate cell with information of the candidate cell which triggers the event D3.

[0075] As shown in Fig. 4, Fig. 4 is a flow chart of a handover method in accordance with an embodiment based on the above-mentioned embodiment in the present disclosure. Measurement events may include the event A1, and the event A1 may be triggered. The embodiment may be a further extension of the handover method of the above-mentioned embodiment in the present disclosure, and some parts may be not described repeatedly herein. The embodiment may include as following.

[0076] S121: a user equipment may report a first measurement result to a source base station.

[0077] S122: the user equipment may receive a conditional handover command from the source base station.

[0078] S123: the user equipment may obtain a measurement result by according to a measurement configuration for conditional handover mode.

[0079] The measurement configuration for the conditional handover mode may include the event A1.

[0080] S124: when the measurement result triggers the event A1, the user equipment may generate and report a second measurement result including the event A1 which has been triggered.

[0081] After receiving the second measurement result, the source base station may decide to exit a conditional handover in advance.

[0082] S125: the user equipment may receive a command to exit the handover method from the source base station.

[0083] An execution body of a handover method in accordance with an embodiment in the present disclosure may be a base station. The base station may be referred to a source base station, i.e., the base station to which a user equipment is currently connected. The base station may connect to a core network and may perform a wireless communication with the user equipment to provide a communication coverage for a corresponding geographic area. The base station may be a macro base station, a micro base station, a pico base station, or a femtocell. In some embodiments, a base

station may also be referred to a radio base station, an access point, a node B, an evolved node B (eNodeB, eNB), a gNB, or other suitable terminology. As shown in Fig. 5, the embodiment may include as following.

[0084] S21: a source base station may receive a first measurement result from a user equipment.

[0085] Before the above-mentioned block, the source base station may be a send measurement control to the user equipment to indicate when to start to measure and report the first measurement result. The measurement control may be conveyed by a RRC connection reconfiguration. A measurement configuration indicated by the measurement control may be referred to a normal mode measurement configuration. A reporting of the first measurement result may be periodic or non-periodic, such as event-triggered. The normal mode measurement configuration may include some or all of the measurement events A1-A6, and the measurement events A1-A6 are described in the above-mentioned embodiment.

[0086] S22: the source base station may select a candidate cell according to the first measurement result for the user equipment.

[0087] The first measurement result may include signal quality of the neighbor cell. The source base station may select several of the neighbor cells as candidate cells according to the signal quality in the first measurement result. In addition to the first measurement result, the source base station may also refer to factors such as the current location of the user equipment, the direction of motion, the load of the candidate cell, and the like in the above-mentioned block, to select the candidate cell.

[0088] S23: the source base station may send a conditional handover command and a measurement configuration for conditional handover mode.

[0089] The conditional handover command may be conveyed by the RRC connection reconfiguration. The conditional handover command may include information of a candidate target cell list and a handover condition. The conditional handover command may include a candidate target cell list. The list may include some or all of the information of all candidate cells. The handover conditions of different candidate cells may be the same or different. The user equipment that received the conditional handover command may initiate a conditional handover.

[0090] It should be noted that, the sending of the measurement configuration for the conditional handover mode may be performed simultaneously with the sending of the conditional handover command. For example, the measurement configuration for the conditional handover mode may be conveyed by the conditional handover command, i.e., the measurement configuration for the conditional handover mode may be included in the conditional handover command. Regardless of whether the measurement configuration for the conditional handover mode is sent earlier or simultaneously with the conditional handover command, the measurement configuration for the

conditional handover mode may not be conveyed by the conditional handover command. The sending of the measurement configuration for the conditional handover mode and an order of execution between the block S21 and the block S22 may be merely illustrative, it is not be limited.

[0091] The measurement configuration for the conditional handover mode may include at least one of measurement events D1, D2, D3, and A1. The measurement events are described in the above-mentioned embodiment, same parts may be not described repeatedly herein.

[0092] The measurement configuration for the conditional handover mode may include measurement events without at least one of the event A2, the event A3, the event A4, the event A5, and the event A6, to reduce the overhead of the measurement result.

[0093] Optionally, the source base station may receive a second measurement result from the user equipment, and the second measurement result may include triggered measurement events.

[0094] By an embodiment, after receiving a conditional handover command, a user equipment performs a measurement and reports the measurement according to a measurement configuration for conditional handover mode; the measurement configuration for the conditional handover mode may include at least one of measurement events of an event D1, an event D2, an event D3, and an event A1. The measurement events may satisfy at least a part of the requirements of the base station to adjust the conditional handover. Compared with A2-A6 measurement events in the related art, the measurement events D1, D2 and D3 may be less likely to be triggered, so as to reduce a overhead caused by a measurement result reporting.

[0095] As shown in Fig. 6, Fig. 6 is a flow chart of a handover method in accordance with an embodiment base on the above-mentioned embodiment in the present disclosure. Measurement events may include at least one of the event D1 and the event D2, and the at least one of the event D1 and the event D2 may be triggered. The embodiment may be a further extension of the handover method of the above-mentioned embodiment in the present disclosure, and same parts may be not described repeatedly herein. The embodiment may include as following.

[0096] S201: a source base station may receive a first measurement result from a user equipment.

[0097] S202: the source base station may select a candidate cell according to the first measurement result for the user equipment.

[0098] S203: the source base station may send a conditional handover command and a measurement configuration for conditional handover mode.

[0099] The measurement configuration for the conditional handover mode may include at least one of the event D1 and the event D2.

[00100] S204: the source base station may receive a second measurement result including at least one of the event D1 and the event D2 from the user equipment.

[00101] The second measurement result may include information of the neighbor cell which

triggers the event D1 and/or the event D2.

[00102] S205: the source base station and a base station corresponding to a candidate target cell which triggers the at least one of the event D1 and the event D2 may complete a handover preparation.

[00103] The source base station may send a handover request command to the base station corresponding to the candidate target cell. The handover request command may include information of the user equipment. The base station corresponding to the candidate target cell may perform an admission control to evaluate whether there is enough resource to receive the user equipment. When there is enough resource, a preparation handover confirmation message may be sent to the source base station and the resource may be reserved for the user equipment, and the preparation handover confirmation message is used to indicate that the admission control is successful.

[00104] S206: the source base station may send an updated conditional handover command to the user equipment.

[00105] The source base station may add the neighbor cell which triggers the at least one of the event D1 and the event D2 as a new candidate cell to the candidate target cell list, and may update the conditional handover command. The updated conditional handover command may include information of the neighbor cell which triggers the at least one of the event D1 and the event D2.

[00106] As shown in Fig. 7, Fig. 7 is a flow chart of a handover method in accordance with an embodiment based on the above-mentioned embodiment in the present disclosure. Measurement events may include the event D3, and the event D3 may be triggered. The embodiment may be a further extension of the handover method of the above-mentioned embodiment in the present disclosure, and same parts may be not described repeatedly herein. The embodiment may include as following.

[00107] S211: a source base station may receive a first measurement result from a user equipment.

[00108] S212: the source base station may select a candidate cell according to the first measurement result for the user equipment.

[00109] S213: the source base station may send a conditional handover command and a measurement configuration for conditional handover mode.

[00110] The measurement configuration for the conditional handover mode may include the event D3.

[00111] S214: the source base station may receive a second measurement result including the event D3 from the user equipment.

[00112] The second measurement result may include information of the neighbor cell which triggers the event D3.

[00113] S215: the source base station may notify a base station corresponding to a candidate target cell to release resource reservation for the user equipment.

[00114] The candidate cell which triggers the event D3 may be no longer suitable as a possible handover target of the user equipment, so it is not necessary to continue to reserve a resource for the user equipment.

[00115] S216: the source base station may send an updated conditional handover command to the user equipment.

[00116] The source base station may remove the candidate cell which triggers the event D3 from the candidate target cell list, and may update the conditional handover command. The updated conditional handover command may include information of an updated candidate cell with information of the candidate cell which triggers the event D3.

[00117] An order of execution between the present block and the block S215 may be merely illustrative, and the execution may be executed simultaneously or may change the order.

[00118] As shown in Fig. 8, Fig. 8 is a flow chart of a handover method in accordance with an embodiment based on the above-mentioned embodiment in the present disclosure. Measurement events may include the event A1, and the event A1 may be triggered. The embodiment may be a further extension of the handover method of the above-mentioned embodiment in the present disclosure, and same parts may be not described repeatedly herein. The embodiment may include as following.

[00119] S221: a source base station may receive a first measurement result from a user equipment.

[00120] S222: the source base station may select a candidate cell according to the first measurement result for the user equipment.

[00121] S223: the source base station may send a conditional handover command and a measurement configuration for conditional handover mode.

[00122] The measurement configuration for the conditional handover mode may include the event A1.

[00123] S224: the source base station may receive a second measurement result including the event A1 from the user equipment.

[00124] After receiving the second measurement result, the source base station may decide to exit a conditional handover in advance.

[00125] S225: the source base station may notify the base station corresponding to a candidate target cell to release resource reservation for the user equipment.

[00126] Because the conditional handover is exited, the candidate cell may not need to continue to reserve a resource for the user equipment.

[00127] S226: the source base station may send a command to exit the handover method to the user

equipment.

[00128] An order of execution between the present block and the block S225 may be merely illustrative, and the execution may be executed simultaneously or may change the order.

[00129] A reporting process of the second measurement result including different measurement events may be exemplified below with reference to the figures, and same parts in the above-mentioned embodiment may be not described repeatedly herein.

[00130] As shown in Fig. 9, Fig. 9 is a flow chart of a handover method in accordance with an embodiment in the present disclosure. A second measurement result may include the event D1. The embodiment in Fig. 9 may include as following.

[00131] S301: a source base station may send a measurement control to a user equipment.

[00132] S302: the source base station may receive a first measurement result from the user equipment.

[00133] S303: the source base station may select a candidate cell A, a candidate cell B, and a candidate cell C for the user equipment.

[00134] A base station in the candidate cell A may belong to a gNB A; a base station in the candidate cell B may belong to a gNB B; and a base station of the candidate cell C may belong to a gNB C.

[00135] S304: the source base station and the gNB A may complete a handover preparation.

[00136] S305: the source base station and the gNB B may complete a handover preparation.

[00137] S306: the source base station and the gNB C may complete a handover preparation.

[00138] An order of execution between the block S304, the block S305, and the block S306 may be merely illustrative.

[00139] S307: the source base station may send a conditional handover command to the user equipment.

[00140] The conditional handover command may include information of the candidate cell A, information of the candidate cell B, and information of the candidate cell C, and the conditional handover command may include a handover condition and a measurement configuration for the conditional handover mode. The measurement configuration for the conditional handover mode may include the event D1.

[00141] S308: the user equipment may obtain a measurement result according to the measurement configuration for the conditional handover mode.

[00142] The measurement result may include a measurement value of a neighbor cell D. A base station in the neighbor cell D may belong to a gNB D.

[00143] S309: the user equipment may evaluate whether the event D1 is triggered.

[00144] When the measurement value of the neighbor cell D satisfies a trigger condition of the

event D1, the event D1 may be triggered.

[00145] S310: the user equipment may report the second measurement result including the event D1 to the source base station.

[00146] The second measurement result may include the measurement value of the neighbor cell D.

[00147] S311: the source base station and the gNB D may complete a handover preparation.

[00148] S312: the source base station may send a updated conditional handover command to the user equipment.

[00149] The neighbor cell D may be added to the candidate target cell list. The updated conditional handover command may include information of the candidate cell D.

[00150] As shown in Fig. 10, Fig. 10 is a flow chart of a handover method in accordance with an embodiment in the present disclosure. A second measurement result may include the event D3. The embodiment in Fig. 10 may include as following.

[00151] S321: a source base station may send a measurement control to a user equipment.

[00152] S322: the source base station may receive a first measurement result from the user equipment.

[00153] S323: the source base station may select a candidate cell A, a candidate cell B, and a candidate cell C for the user equipment.

[00154] A base station in the candidate cell A may belong to a gNB A; a base station in the candidate cell B may belong to a gNB B; and a base station of the candidate cell C may belong to a gNB C.

[00155] S324: the source base station and the gNB A may complete a handover preparation.

[00156] S325: the source base station and the gNB B may complete a handover preparation.

[00157] S326: the source base station and the gNB C may complete a handover preparation.

[00158] An order of execution between the block S324, the block S325, and the block S326 may be merely illustrative.

[00159] S327: the source base station may send a conditional handover command to the user equipment.

[00160] The conditional handover command may include information of the candidate cell A, information of the candidate cell B, and information of the candidate cell C, and the conditional handover command may include a handover condition and a measurement configuration for the conditional handover mode. The measurement configuration for the conditional handover mode may include the event D3.

[00161] S328: the user equipment may obtain a measurement result according to the measurement configuration for the conditional handover mode.

[00162] The measurement result may include a measurement value of a neighbor cell A, a

measurement value of a neighbor cell B, and a measurement value of a neighbor cell C.

[00163] S329: the user equipment may evaluate whether the event D3 is triggered.

[00164] When the measurement value of the neighbor cell C satisfies a trigger condition of the event D3, the event D3 may be triggered.

[00165] S330: the user equipment may report the second measurement result including the event D3 to the source base station.

[00166] The second measurement result may include the measurement value of the neighbor cell C.

[00167] S331: the source base station may notify the gNB C to release resource reservation for the user equipment.

[00168] S332: the source base station may send a updated conditional handover command to the user equipment.

[00169] The updated conditional handover command may include information without the candidate cell D.

[00170] As shown in Fig. 11, Fig. 11 is a flow chart of a handover method in accordance with an embodiment in the present disclosure. A second measurement result may include the event A1. The embodiment in Fig. 11 may include as following.

[00171] S341: a source base station may send a measurement control to a user equipment and a measurement configuration for conditional handover mode.

[00172] The measurement configuration for the conditional handover mode may include the event A1.

[00173] S342: the source base station may receive a first measurement result from the user equipment.

[00174] S343: the source base station may select a candidate cell A, a candidate cell B, and a candidate cell C for the user equipment.

[00175] A base station in the candidate cell A may belong to a gNB A; a base station in the candidate cell B may belong to a gNB B; and a base station of the candidate cell C may belong to a gNB C.

[00176] S324: the source base station and the gNB A may complete a handover preparation.

[00177] S325: the source base station and the gNB B may complete a handover preparation.

[00178] S326: the source base station and the gNB C may complete a handover preparation.

[00179] An order of execution between the block S344, the block S345, and the block S346 may be merely illustrative.

[00180] S327: the source base station may send a conditional handover command to the user equipment.

[00181] The conditional handover command may include information of the candidate cell A,

information of the candidate cell B, and information of the candidate cell C, and the conditional handover command may include a handover condition.

[00182] S348: the user equipment may obtain a measurement result according to the measurement configuration for the conditional handover mode.

[00183] When the user equipment may obtain the measurement result according to the measurement configuration for the conditional handover mode, the events A2-A6 have expired except the event A1.

[00184] The measurement result may include a measurement value of a serving cell.

[00185] S349: the user equipment may evaluate whether the event A1 is triggered.

[00186] When the measurement value of the serving cell satisfies a trigger condition of the event A1, the event A1 may be triggered.

[00187] S350: the user equipment may report the second measurement result including the event A1 to the source base station.

[00188] The second measurement result may include the measurement value of the serving cell.

[00189] S351: the source base station may notify the gNB A, the gNB B, and the gNB C to release resource reservation for the user equipment.

[00190] S352: the source base may send a command to exit the handover method to the user equipment.

[00191] As shown in Fig. 12, Fig. 12 is a structural illustration of a communication handover apparatus in accordance with an embodiment in the present disclosure. The communication handover apparatus may include a processor 110 and a communication circuit 120. The processor 110 may be connected to the communication circuit 120.

[00192] The communication circuit 120 may be configured to send and receive user data, and may be an interface for the communication handover apparatus to communicate with other communication apparatuses.

[00193] The processor 110 may control operations of the communication handover apparatus, and the processor 110 may also be referred to a central processing unit (CPU). The processor 110 may be an integrated circuit chip with signal processing capabilities. The processor 110 may also be a general purpose processor, a digital signal processor (DSP), an application specific integrated circuit (ASIC), an field programmable gate array (FPGA), or other programmable logic devices, a discrete gate or a transistor logic device, and a discrete hardware component. The general purpose processor may be a microprocessor, or the general purpose processor may be any conventional processor or the like.

[00194] The processor 110 may be configured to execute commands to implement any one of the above-mentioned handover methods provided in Fig. 1 to Fig. 4 of the present disclosure and its

non-conflicting combination.

[00195] The communication handover apparatus in an embodiment may be a user equipment, or may be an independent component that may be integrated in a user equipment, such as a baseband chip.

[00196] As shown in Fig. 13, Fig. 13 is a structural illustration of a communication handover apparatus in accordance with an embodiment in the present disclosure. The communication handover apparatus may include a processor 210 and a communication circuit 220. The processor 210 may be connected to the communication circuit 220.

[00197] The communication circuit 220 may be configured to send and receive user data, and may be an interface for the communication handover apparatus to communicate with other communication apparatuses.

[00198] The processor 210 may control operations of the communication handover apparatus, and the processor 210 may also be referred to a central processing unit (CPU). The processor 210 may be an integrated circuit chip with signal processing capabilities. The processor 210 may also be a general purpose processor, a digital signal processor (DSP), an application specific integrated circuit (ASIC), an field programmable gate array (FPGA), or other programmable logic devices, a discrete gate or a transistor logic device, and a discrete hardware component. The general purpose processor may be a microprocessor, or the general purpose processor may be any conventional processor or the like.

[00199] The processor 210 may be configured to execute commands to implement any one of the above-mentioned handover methods provided in Fig. 5 to Fig. 8 of the present disclosure and its non-conflicting combination.

[00200] The communication handover apparatus in an embodiment may be a base station, or may be an independent component that may be integrated in a base station, such as a baseband board.

[00201] As shown in Fig. 14, Fig. 14 is a structural illustration of a readable storage medium in accordance with an embodiment in the present disclosure. The readable storage medium may include a memory 310, and the memory 310 may store commands. The commands may be executed to implement any one of the above-mentioned handover methods provided in Fig. 1 to Fig. 8 of the present disclosure and its non-conflicting combination.

[00202] The memory 310 may include a read-only memory (ROM), a random access memory (RAM), a flash memory, a hard disk, an compact disk, and the like.

[00203] In several embodiments provided by the present disclosure, it should be understood that the disclosed methods and apparatus may be implemented in other ways. For example, the apparatus described above are merely schematic. For example, the division of the modules or units is only a logical function division, and an actual implementation may have another division manner, e.g.,

multiple units or components may be combined or may be integrated into another system, or some features can be ignored or not be performed. In addition, the illustrated or discussed mutual coupling or the direct coupling or the communication connection may be indirect coupling or may be a communication connection via some interfaces, devices or units, and may be electrical, mechanical or other forms.

[00204] The units described as separate parts may or may not be physically separated, and the parts displayed as units may or may not be physical units, i.e., which may be located in one place, or may be distributed on multiple network units. Some or all of the units may be selected to achieve the purpose of the solution of the present embodiment according to actual needs.

[00205] In addition, each functional unit in each embodiment of the present disclosure may be integrated in one processing unit, or each unit may exist alone physically, or two or more units may be integrated in one unit. The above-mentioned integrated unit can be implemented either in hardware or in software.

[00206] If the integrated unit is implemented in the form of a software functional unit and sold or used as a stand-alone product, it may be stored in a computer-readable storage medium. Based on such understanding, a part of the technical solution of the present disclosure that contributes to the related art or all the part of the technical solution can be embodied in the form of a software product. The computer software product is stored in a storage medium and may include commands for enabling a computer device (which may be a personal computer, a server, or a network device, etc.) or a processor to perform all or part of blocks of the method according to various embodiments of the present disclosure. The above-mentioned storage medium may include various media that can store program codes, such as a flash disk, a removable hard disk, a read-only memory (ROM), a random access memory (RAM), a magnetic disk, or a CD.

[00207] It is understood that the descriptions above are only embodiments of the present disclosure. It is not intended to limit the scope of the present disclosure. Any equivalent transformation in structure and/or in scheme referring to the command and the accompanying drawings of the present disclosure, and direct or indirect application in other related technical field, are included within the scope of the present disclosure.

Claims

1. A handover method comprising:

reporting a first measurement result by a user equipment to a source base station;

receiving a conditional handover command by the user equipment from the source base station, wherein the conditional handover command comprises information of a candidate target cell list and a handover condition, and a candidate cell is selected for the user equipment by the source base station according to the first measurement result;

obtaining a measurement result by the user equipment according to a measurement configuration for conditional handover mode, wherein the measurement configuration for the conditional handover mode comprises at least one of following measurement events that:

an event D1, a measurement value of a neighbor cell is better than a measurement value of a best cell in the candidate target cell list, and a difference between the measurement value of the neighbor cell and the measurement value of the best cell in the candidate target cell list is greater than a first threshold;

an event D2, the measurement value of the neighbor cell is better than the measurement value of the best cell in the candidate target cell list, and the difference between the measurement value of the neighbor cell and the measurement value of the best cell in the candidate target cell list is greater than a second threshold, and a measurement value of a serving cell is worse than a third threshold;

an event D3, a number of the candidate cell which has a measurement value worse than a fourth threshold is greater than a fifth threshold; and

an event A1, a measurement value of the serving cell is better than a sixth threshold.

2. The method according to claim 1, when the measurement result triggers at least one of the measurement events, generating and reporting a second measurement result comprising the measurement event which has been triggered, by the user equipment.

3. The method according to claim 2, wherein the second measurement result comprises at least one of the event D1 and the event D2;

after generating and reporting the second measurement result comprising the measurement event which has been triggered, by the user equipment, the method further comprises:

receiving an updated conditional handover command by the user equipment from the source base station, wherein the updated conditional handover command comprises information of the neighbor cell which triggers at least one of the event D1 and the event D2.

4. The method according to claim 2, wherein the second measurement result comprises the event D3;

after generating and reporting the second measurement result comprising the measurement event which has been triggered, by the user equipment, the method further comprises:

receiving an updated conditional handover command by the user equipment from the source base station, wherein the updated conditional handover command comprises information of an updated candidate target cell list without information of the candidate cell which triggers the event D3.

5. The method according to claim 2, wherein the second measurement result comprises the event A1;

after generating and reporting the second measurement result comprising the measurement event which has been triggered, by the user equipment, the method further comprises:

receiving a command to exit the handover method by the user equipment from the source base station.

6. The method according to any one of claims 1-4, further comprising:

evaluating by the user equipment, whether the measurement value of the candidate cell satisfies the handover condition;

when the measurement value of the candidate cell satisfies the handover condition, selecting the candidate cell that satisfies the handover condition as a target cell by the user equipment, and to handover to the target cell.

7. The method according to any one of claims 1-5, wherein the measurement configuration for the conditional handover mode comprises measurement events without at least one of an event A2, an event A3, an event A4, an event A5, and an event A6.

8. The method according to any one of claims 1-5, wherein the measurement configuration for the conditional handover mode is conveyed by the conditional handover command.

9. The method according to any one of claims 1-5, before the obtaining the measurement result by the user equipment according to the measurement configuration for the conditional handover mode, further comprising:

receiving the measurement configuration for the conditional handover mode by the user equipment from the base station.

10. The method according to any one of claims 1-5, wherein the measurement value comprises at least one of reference signal received power, reference signal received quality, and a signal to interference plus noise ratio.

.

11. A handover method comprising:

receiving a first measurement result from a user equipment, by a source base station;

selecting a candidate cell by the source base station according to the first measurement result for the user equipment;

sending a conditional handover command comprising information of a candidate target cell list and a handover condition, by the source base station, to the user equipment, and sending a measurement configuration for conditional handover mode, by the source base station, to the user equipment, wherein the measurement configuration for the conditional handover mode comprises at least one of following measurement events that:

an event D1, a measurement value of a neighbor cell is better than a measurement value of a best cell in a candidate target cell list, and a difference between the measurement value of the neighbor cell and the measurement value of the best cell in the candidate target cell list is greater than a first threshold;

an event D2, the measurement value of the neighbor cell is better than the measurement value of the best cell in the candidate target cell list, and the difference between the measurement value of the neighbor cell and the measurement value of the best cell in the candidate target cell list is greater than a second threshold, and a measurement value of a serving cell is worse than a third threshold;

an event D3, a number of the candidate cell which has a measurement value worse than a fourth threshold is greater than a fifth threshold; and

an event A1, a measurement value of the serving cell is better than a sixth threshold.

12. The method according to claim 11, further comprising: receiving a second measurement result by the source base station from the user equipment, wherein the second measurement result comprises the measurement event which has been triggered.

13. The method according to claim 12, wherein the second measurement result comprises at least one of the event D1 and the event D2;

after receiving the second measurement result by the source base station from the user equipment, the method further comprises:

completing a handover preparation, by the source base station and a base station corresponding to a candidate target cell which triggers at least one of the event D1 and the event D2;

sending an updated conditional handover command by the source base station to the user equipment, wherein the updated conditional handover command comprises information of the neighbor cell which triggers at least one of the event D1 and the event D2.

14. The method according to claim 12, wherein the second measurement result comprises the event D3;

after receiving the second measurement result by the source base station from the user equipment, the method further comprises:

notifying a base station corresponding to the candidate target cell which triggers the event D3, by the source base station, to release resource reservation for the user equipment; and sending an updated conditional handover command to the user equipment, wherein the updated conditional handover command comprises information of an updated candidate cell without information of the candidate cell which triggers the event D3.

15. The method according to claim 12, wherein the second measurement result comprises the event A1;

after receiving the second measurement result by the source base station from the user equipment, the method further comprises:

notifying a base station corresponding to the candidate target cell by the source base station, to release resource reservation for the user equipment, and sending a command to exit the handover method to the user equipment.

16. The method according to any one of claims 11-15, wherein the measurement configuration for conditional handover mode comprises measurement events without at least one of an event A2, an event A3, an event A4, an event A5, and an event A6.

17. The method according to any one of claims 11-15, wherein the measurement configuration for the conditional handover mode is conveyed by the conditional handover command.

18. The method according to any one of claims 11-15, wherein the measurement configuration for the conditional handover mode is not conveyed by the conditional handover command.

19. The method according to any one of claims 11-15, wherein the measurement value comprises at

least one of reference signal received power, reference signal received quality, and a signal to interference plus noise ratio.

20. A communication handover apparatus comprising a processor and a communication circuit, wherein the processor is coupled to the communication circuit, and the processor is configured to execute an command to implement methods according to claims 1-19.

21. A readable storage medium storing commands, wherein the commands are configured to be executed to implement methods according to claims 1-19.

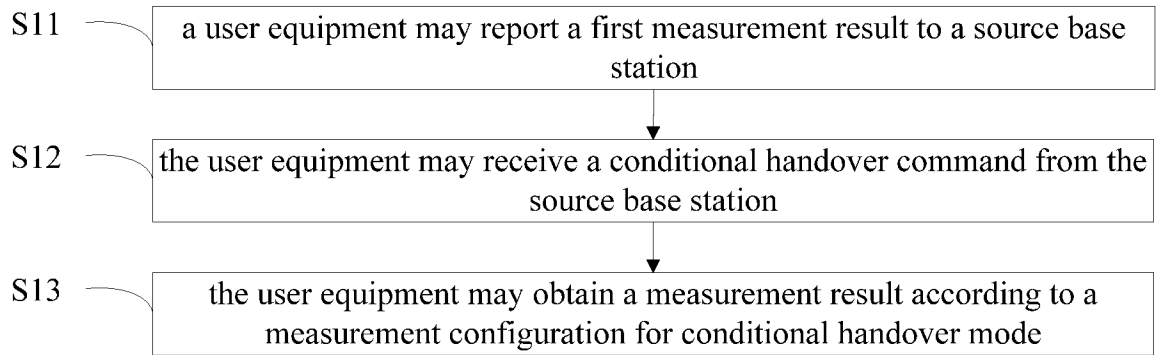


Fig. 1

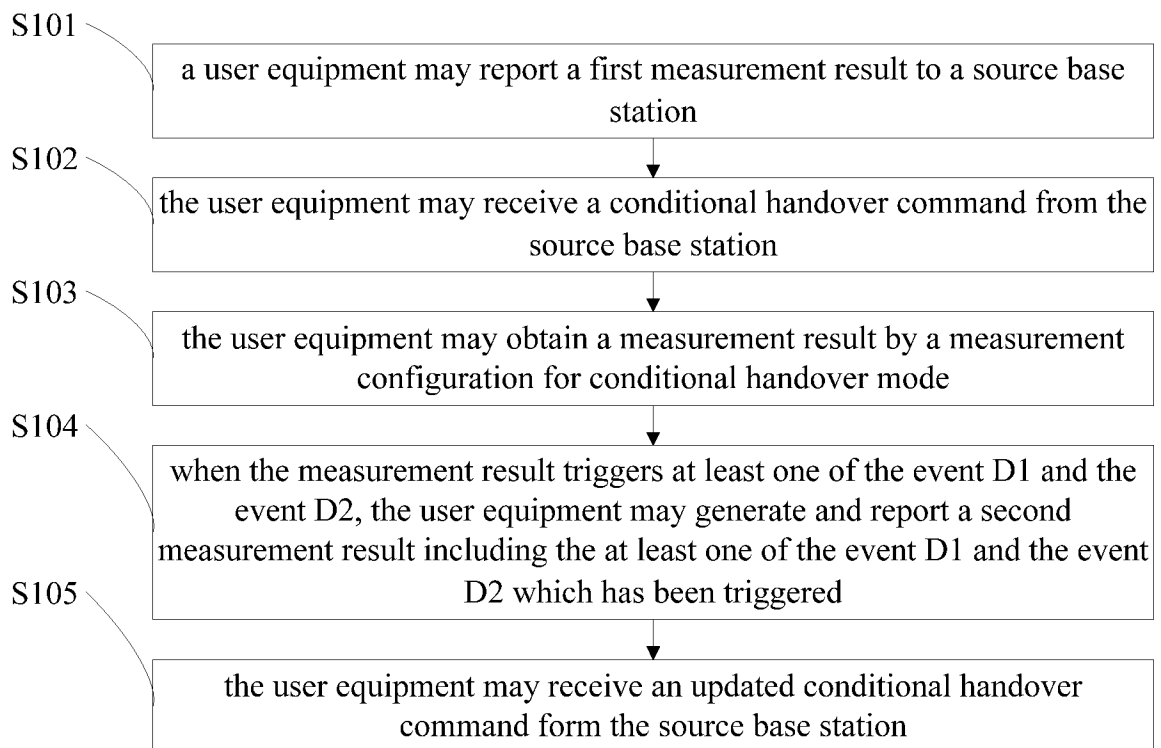


Fig. 2

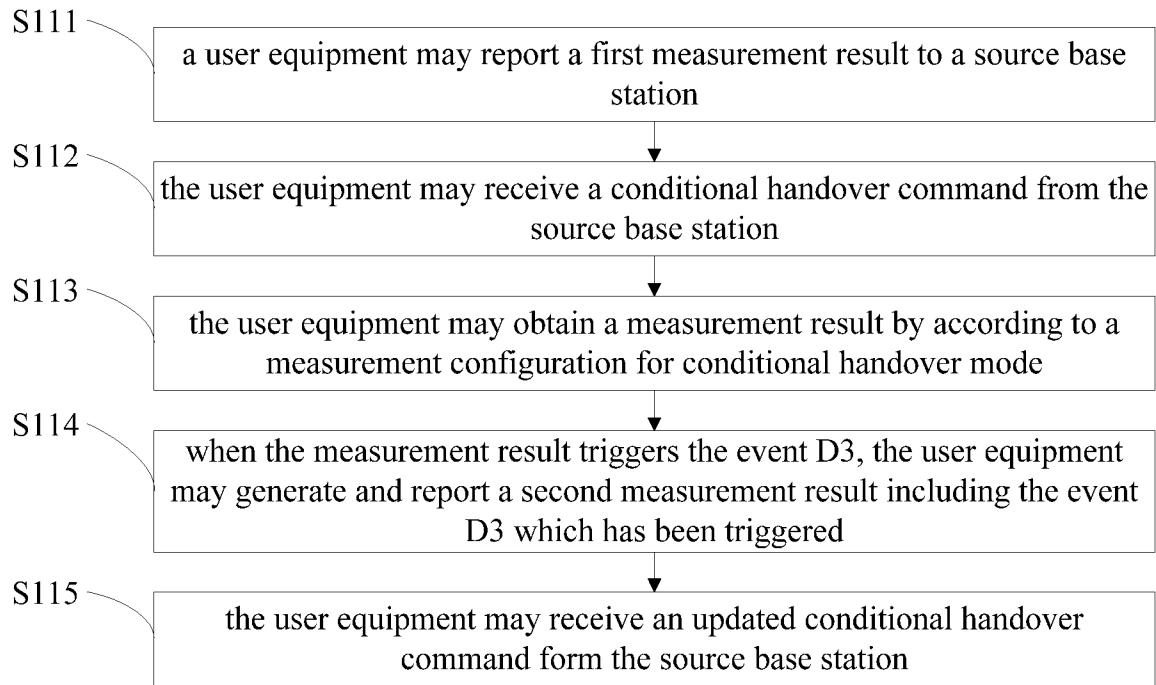


Fig. 3

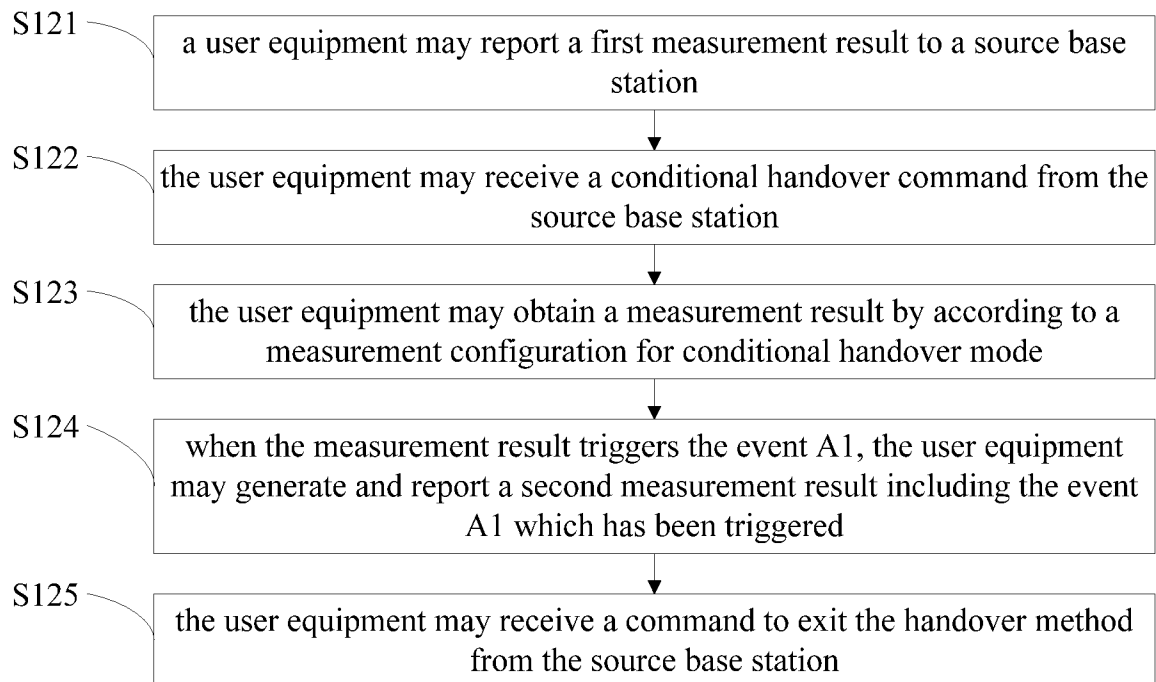


Fig. 4

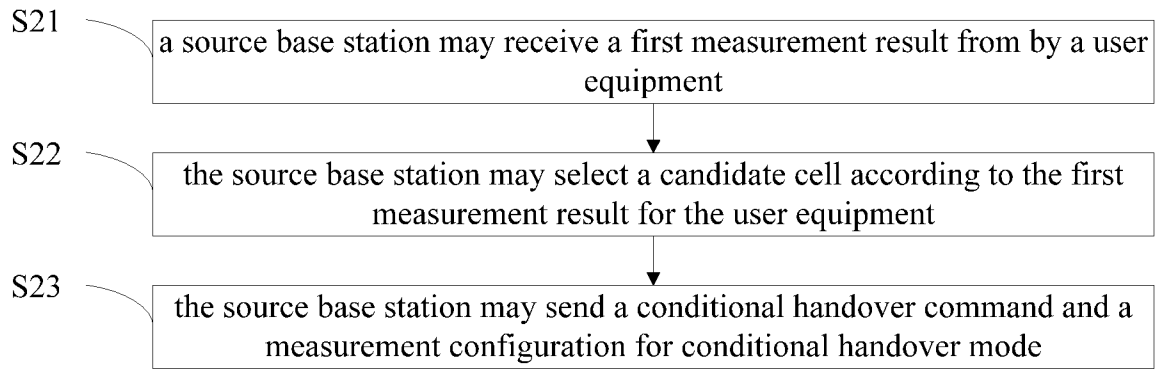


Fig. 5

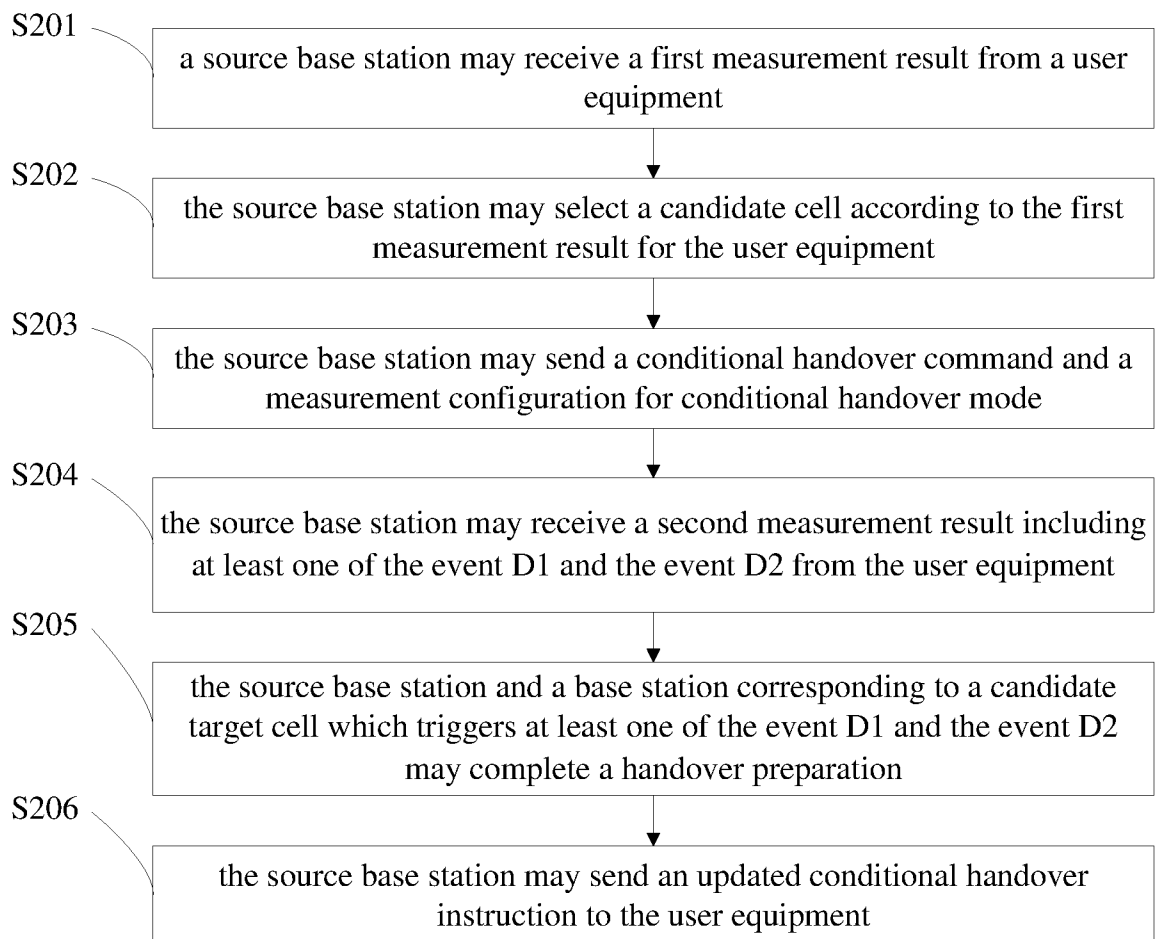


Fig. 6

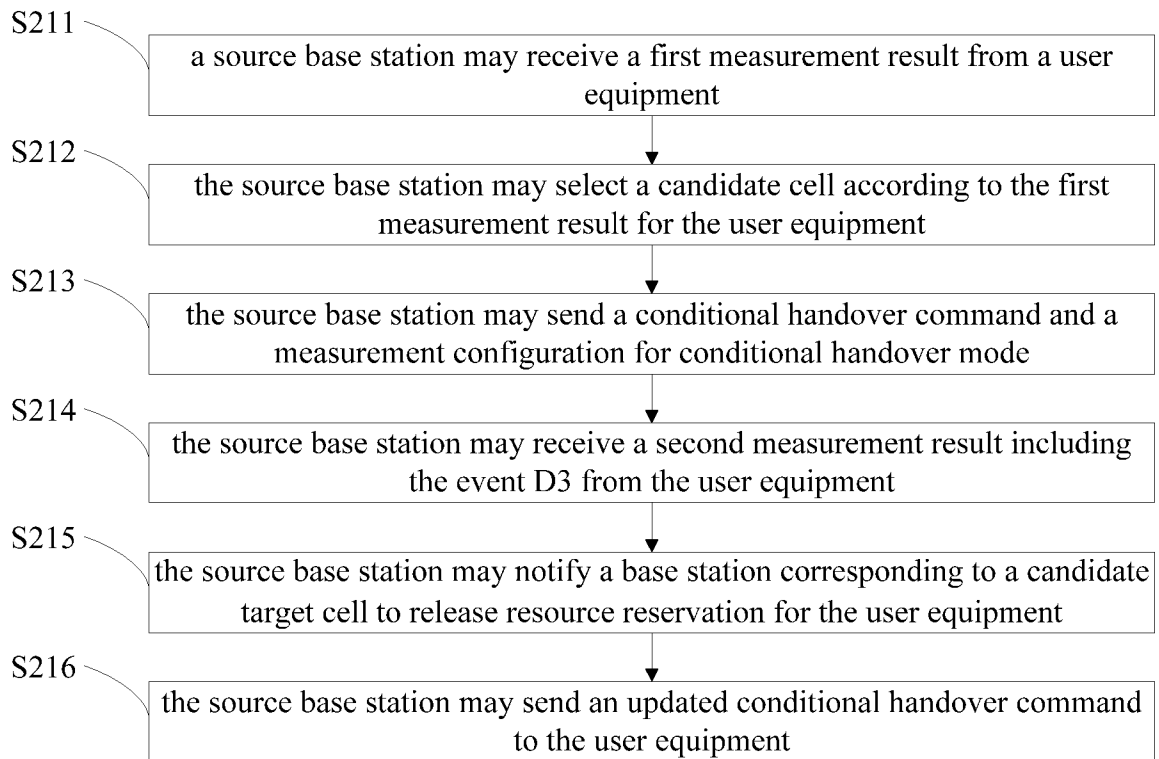


Fig. 7

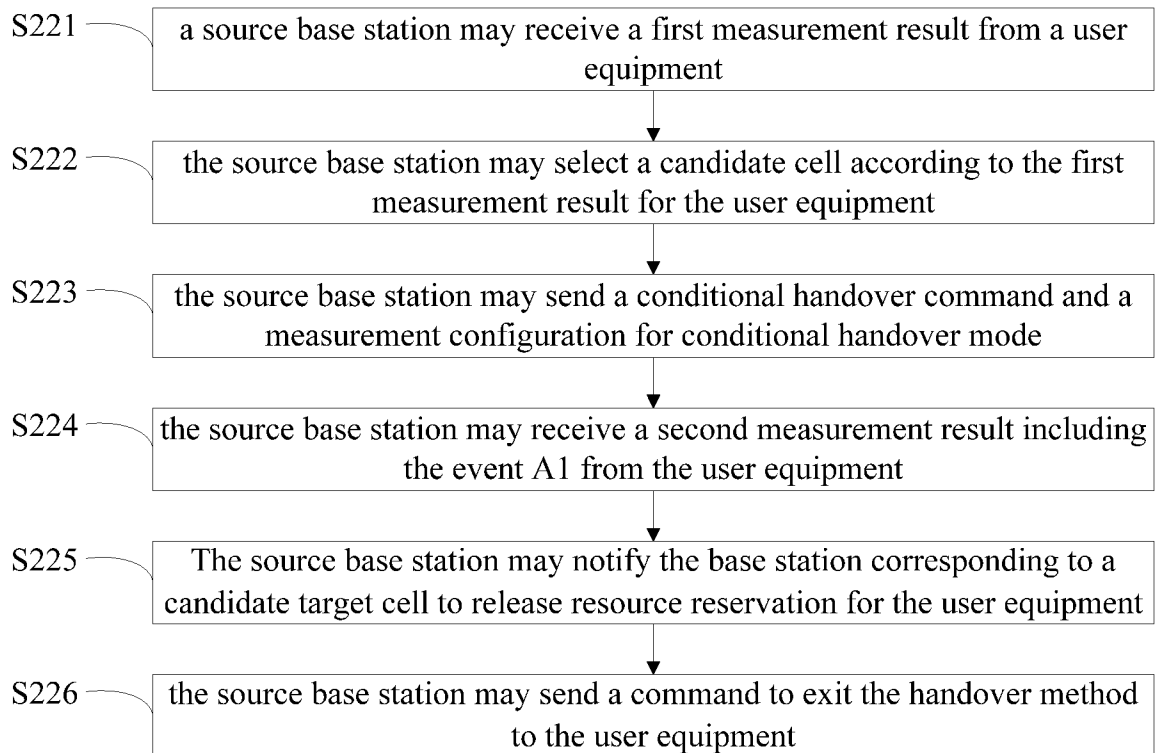


Fig. 8

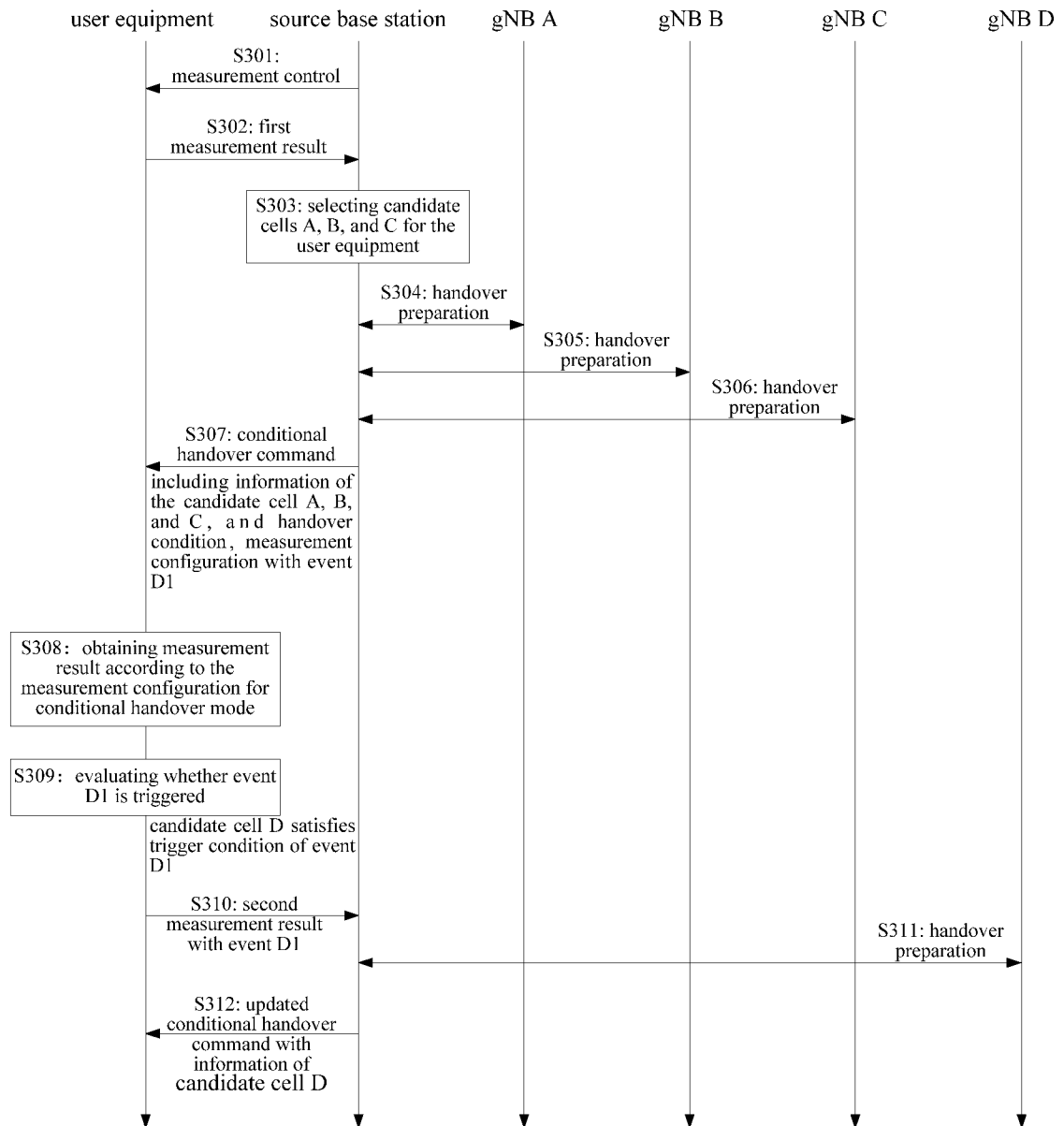


Fig. 9

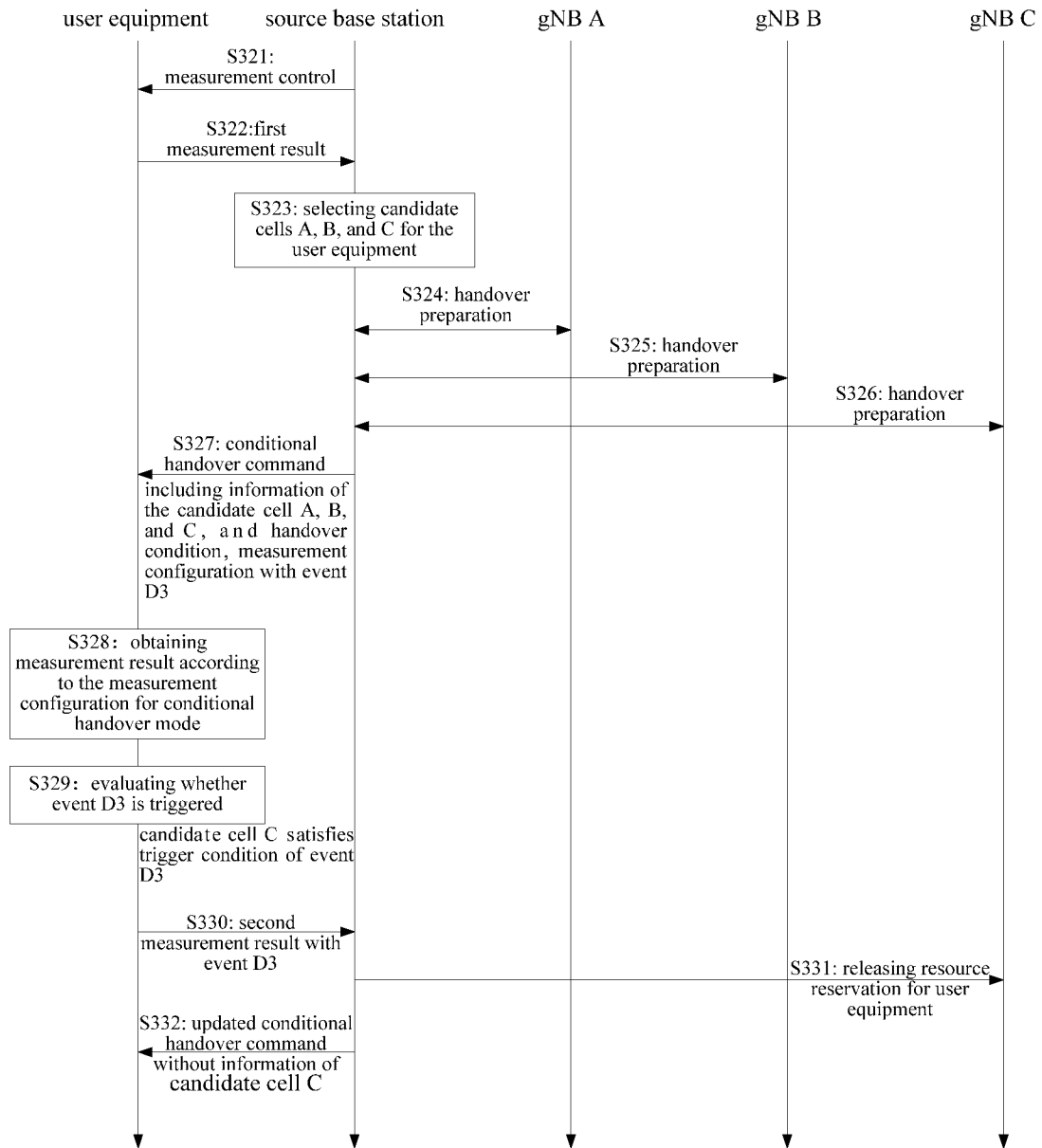


Fig. 10

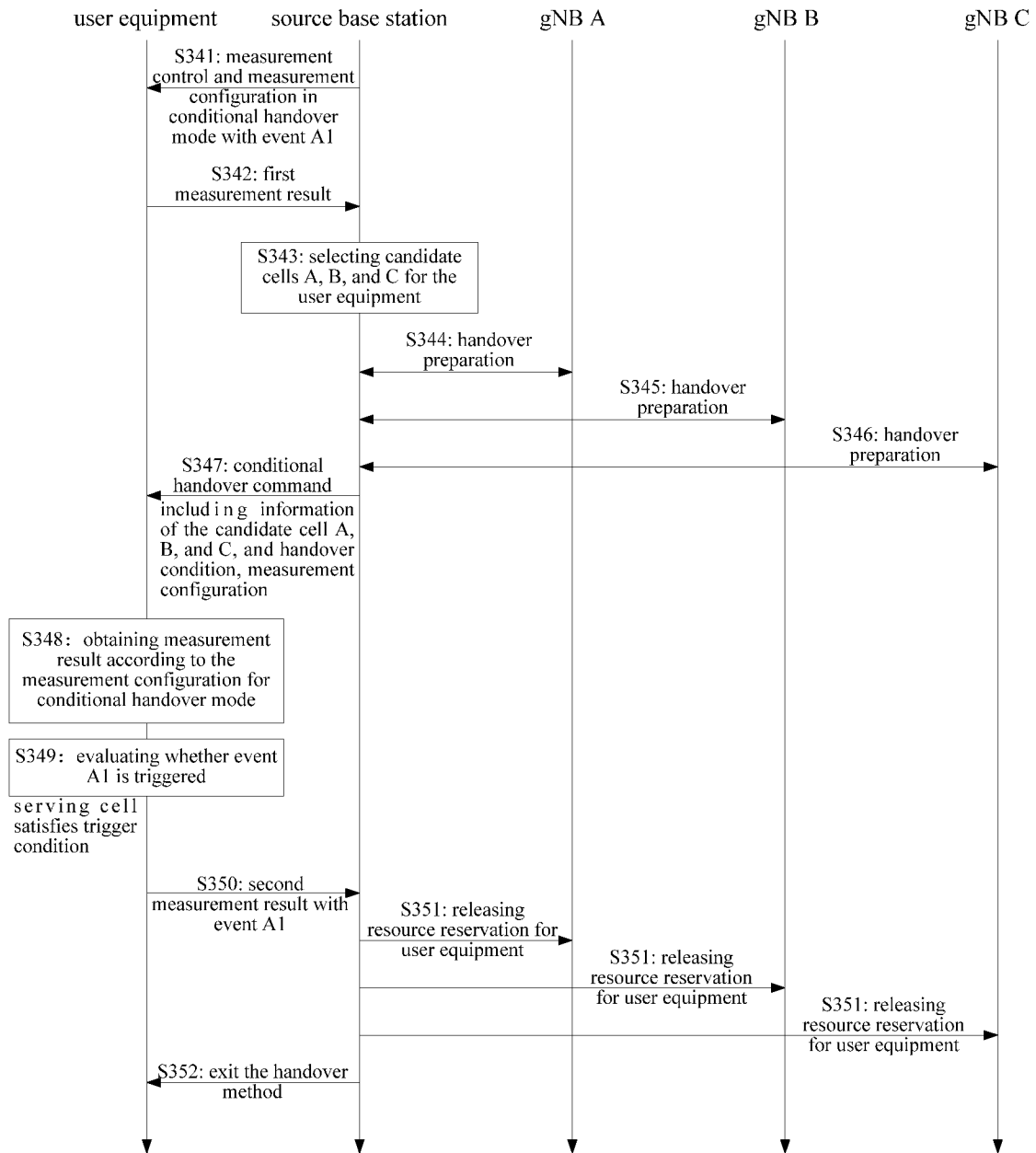


Fig. 11

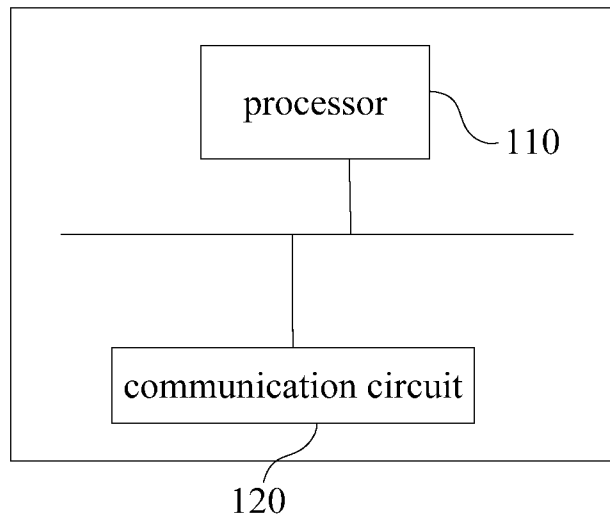


Fig. 12

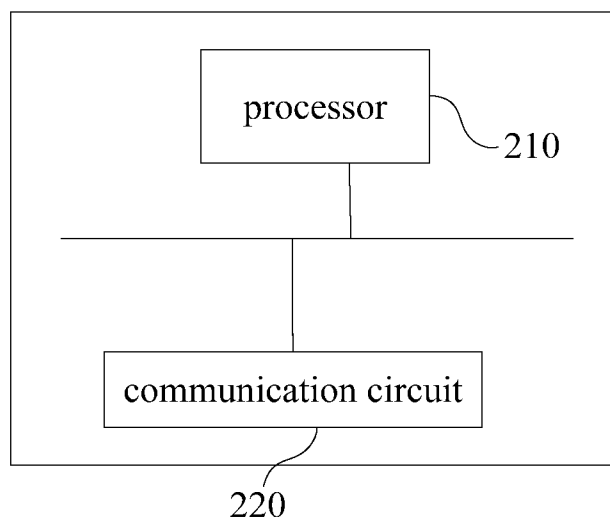


Fig. 13

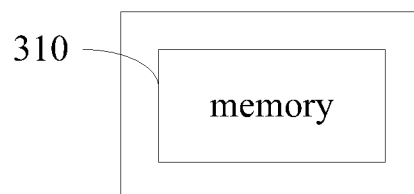


Fig. 14

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2018/105261

A. CLASSIFICATION OF SUBJECT MATTER

H04W 36/00(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)

H04Q; H04W

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)

CNPAT,CNKI,WPI,EPDOC,3GPP: base station, basestation, BS, cell?, ??NB, node B, handover, hand over, handoff, hand off, switch, event, neighbor, candidat+, differ+, threshold

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2013131553 A1 (HUAWEI TECHNOLOGIES CO., LTD.) 12 September 2013 (2013-09-12) description, page 6 paragraph 3 – page 7 paragraph 2	1-21
A	CN 104581849 A (CHONGQING UNIVERSITY OF POSTS AND TELECOMMUNICATIONS) 29 April 2015 (2015-04-29) the whole document	1-21
A	CN 107333293 A (GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.) 07 November 2017 (2017-11-07) the whole document	1-21
A	HUAWEI et al. "Measurement and Mobility Considering Beamforming" 3GPP TSG-RAN2 Meeting #97 R2-1701130, 17 February 2017 (2017-02-17), the whole document	1-21

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* 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

01 April 2019

Date of mailing of the international search report

28 April 2019

Name and mailing address of the ISA/CN

National Intellectual Property Administration, PRC
6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing
100088
China

Authorized officer

ZHANG,Feng

Facsimile No. (86-10)62019451

Telephone No. 86-(10)-53961628

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2018/105261

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
WO	2013131553	A1	12 September 2013	CN	104137609	A	05 November 2014
				KR	20140128456	A	05 November 2014
				JP	2015509685	A	30 March 2015
				US	2014378144	A1	25 December 2014
CN	104581849	A	29 April 2015	None			
CN	107333293	A	07 November 2017	WO	2019019903	A1	31 January 2019