

## **METHODS AND APPARATUSES OF MRO FOR AN MCG OR SCG LTM PROCEDURE**

### **TECHNICAL FIELD**

**[0001]** The present disclosure relates to wireless communications, and more specifically to methods and apparatuses of a mobility robustness optimization (MRO) mechanism for a master cell group (MCG) L1/L2-Triggered Mobility (LTM) procedure or a secondary cell group (SCG) LTM procedure.

### **BACKGROUND**

**[0002]** A wireless communications system may include one or multiple network communication devices, such as base stations, which may support wireless communications for one or multiple user communication devices, which may be otherwise known as user equipment (UE), or other suitable terminology. The wireless communications system may support wireless communications with one or multiple user communication devices by utilizing resources of the wireless communication system (e.g. time-domain resources (e.g. symbols, slots, subframes, frames, or the like) or frequency-domain resources (e.g. subcarriers, carriers, or the like). Additionally, the wireless communications system may support wireless communications across various radio access technologies including third generation (3G) radio access technology, fourth generation (4G) radio access technology, fifth generation (5G) radio access technology, among other suitable radio access technologies beyond 5G (e.g. sixth generation (6G)).

**[0003]** LTM is a procedure in which a network equipment (e.g. gNB) receives layer 1 (L1) measurement report(s) from a UE, and the network equipment (e.g. gNB) changes UE's serving cell by a cell switch command. LTM may also be named as a layer 1/layer 2 (L1/L2) lower layer-Triggered Mobility or the like. An LTM cell switch procedure includes an LTM primary cell (PCell) switch procedure or an LTM primary secondary cell group cell (PSCell) switch procedure. An LTM PCell switch procedure from a source cell (or source PCell) to a target cell (or target PCell) may also be named as an MCG LTM procedure. An LTM PSCell switch procedure from a source PSCell to a target PSCell may also be named as an SCG LTM procedure.

## SUMMARY

**[0004]** An article "a" before an element is unrestricted and understood to refer to "at least one" of those elements or "one or more" of those elements. The terms "a," "at least one," "one or more," and "at least one of one or more" may be interchangeable. As used herein, including in the claims, "or" as used in a list of items (e.g. a list of items prefaced by a phrase such as "at least one of" or "one or more of" or "one or both of") indicates an inclusive list such that, for example, a list of at least one of A, B, or C means A or B or C or AB or AC or BC or ABC (i.e., A and B and C). Also, as used herein, the phrase "based on" shall not be construed as a reference to a closed set of conditions. For example, an example step that is described as "based on condition A" may be based on both a condition A and a condition B without departing from the scope of the present disclosure. In other words, as used herein, the phrase "based on" shall be construed in the same manner as the phrase "based at least in part on." Further, as used herein, including in the claims, a "set" may include one or more elements.

**[0005]** In a master cell group (MCG) LTM procedure or an LTM PCell switch procedure from a source cell (or source PCell) to a target cell (or target PCell) in a dual connectivity scenario, a node which generates an RRC Reconfiguration message for the MCG LTM switch procedure or the LTM PCell switch procedure, or which determines to initiate MCG LTM may be a MN or a CU of the MN.

**[0006]** In a master cell group (MCG) LTM procedure or an LTM cell switch procedure from a source cell to a target cell in a single connectivity scenario, a node which generates an RRC Reconfiguration message for the MCG LTM switch procedure or the LTM cell switch procedure, or which determines to initiate LTM may be a source node to which the source cell belongs or a CU of the source node.

**[0007]** In a secondary cell group (SCG) LTM procedure or an LTM PSCell switch procedure from a source PSCell to a target PSCell in a dual connectivity scenario, a node which generates an RRC Reconfiguration message for the SCG LTM switch procedure or the LTM PSCell switch procedure, or which determines to initiate SCG LTM may be a MN or an SN or a CU of the MN or a CU of the SN, furthermore, the SN may be a node to which the serving PSCell or source PSCell belongs (e.g. a source SN), or the SN may be a node to which the target PSCell for LTM belongs (e.g. a target SN).

**[0008]** Some implementations of the present disclosure provide a user equipment (UE). The UE includes at least one memory; and at least one processor coupled to the at least one memory and configured to cause the UE to: store first information related to access in a L1/L2-Triggered Mobility (LTM) cell switch procedure; and report the first information.

**[0009]** In some implementations of the UE described herein, the first information includes at least one of the following: information related to at least one early timing advance (TA) acquisition; information related to at least one contention-free random access (CFRA) based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated; information related to at least one CFRA based on CFRA resources in a radio resource control (RRC) reconfiguration message for the LTM cell switch procedure; information related to at least one UE based TA measurement or at least one random access channel (RACH)-less LTM based on the at least one UE based TA measurement; or information related to at least one contention based random access (CBRA).

**[0010]** In some implementations of the UE described herein, the first information is stored or reported in a random access (RA) report, and the RA report includes at least one of the following: one RA report entry used to convey information for one or more operations performed by the UE during the LTM cell switch procedure; multiple RA report entries used to convey information for the one or more operations performed by the UE during the LTM cell switch procedure; or information indicating at least one switch of the one or more operations performed by the UE during the LTM cell switch procedure.

**[0011]** In some implementations of the UE described herein, the one or more operations includes at least one of the following: at least one early timing advance (TA) acquisition; at least one contention-free random access (CFRA) based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated; at least one CFRA based on CFRA resources in a radio resource control (RRC) reconfiguration message for the LTM cell switch procedure; at least one UE based TA measurement or at least one random access channel (RACH)-less LTM based on the at least one UE based TA measurement; or at least one contention based random access (CBRA). Wherein the at least one switch of the one or more operations includes at least one of the following: switch from at least one early TA acquisition to at least one RACH-less LTM based on at least one UE based TA measurement; switch from the at least one early TA acquisition to at least one RACH based LTM; switch

from the at least one RACH-less LTM based on at least one UE based TA measurement to the at least one RACH based LTM; switch from at least one CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated to at least one CFRA based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure; or switch from at least one CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated or based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure to at least one CBRA.

**[0012]** In some implementations of the UE described herein, the first information includes at least one of the following: time duration between two PDCCH orders triggered for early TA acquisition; or one or more layer 1 (L1) measurement results.

**[0013]** In some implementations of the UE described herein, the one or more L1 measurement results includes at least one of the following: L1 measurement results before performing at least one early UL synchronization or at least one early TA acquisition; L1 measurement results before performing at least one RACH based LTM; L1 measurement results before performing at least one RACH-less based LTM; L1 measurement results when an LTM cell switch execution is initiated; or L1 measurement results upon reception of an indication from a lower layer indicating that the LTM cell switch execution is successfully completed.

**[0014]** In some implementations of the UE described herein, the at least one RACH based LTM includes at least one of the following: a CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated; a CFRA based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure; or a CBRA.

**[0015]** In some implementations of the UE described herein, the first information includes at least one of the following: a random access (RA) purpose or information indicating that a RA procedure is initiated by a PDCCH order to an LTM candidate cell; an RA purpose or information indicating that the RA procedure is initiated for the LTM cell switch procedure; information indicating whether CFRA resources are provided in a lower layer message concerning that an LTM cell switch execution is initiated; information

indicating whether the CFRA resources are provided in an RRC reconfiguration message for the LTM cell switch procedure; one or more parameters of an uplink carrier for physical random access channel (PRACH) transmission on an LTM candidate cell; subcarrier spacing of PRACH for the LTM cell switch procedure; n-TimingAdvanceOffset to be applied for uplink transmissions on the LTM candidate cell; one or more RACH parameters for performing the RA procedure on the LTM candidate cell; a total number of synchronization signal blocks (SSB)s for a RACH occasion; one or more bandwidth part (BWP) parameters; one or more SSBs per RACH occasion; or a PRACH root sequence index.

**[0016]** Some implementations of the present disclosure provide a processor for wireless communication, comprising at least one controller coupled with at least one memory and configured to cause the processor to store first information related to access in a L1/L2-Triggered Mobility (LTM) cell switch procedure; and report the first information.

**[0017]** Some implementations of the present disclosure provide a method performed by a user equipment (UE). The method comprises: storing first information related to access in a L1/L2-Triggered Mobility (LTM) cell switch procedure; and reporting the first information.

**[0018]** Some implementations of the present disclosure provide a base station (BS). The BS includes at least one memory; and at least one processor coupled to the at least one memory and configured to cause the BS to receive first information related to access in a L1/L2-Triggered Mobility (LTM) cell switch procedure.

**[0019]** In some implementations of the BS described herein, the first information includes at least one of the following: information related to at least one early timing advance (TA) acquisition; information related to at least one contention-free random access (CFRA) based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated; information related to at least one CFRA based on CFRA resources in a radio resource control (RRC) reconfiguration message for the LTM cell switch procedure; information related to at least one user equipment (UE) based TA measurement or at least one random access channel (RACH)-less LTM based on the at least one UE based TA measurement; or information related to at least one contention based random access (CBRA).

**[0020]** In some implementations of the BS described herein, the first information is stored or reported in a random access (RA) report, and the RA report includes at least one of

the following: one RA report entry used to convey information for one or more operations performed by the UE during the LTM cell switch procedure; multiple RA report entries used to convey information for the one or more operations performed by the UE during the LTM cell switch procedure; or information indicating at least one switch of the one or more operations performed by the UE during the LTM cell switch procedure.

**[0021]** In some implementations of the BS described herein, the one or more operations includes at least one of the following: at least one early timing advance (TA) acquisition; at least one contention-free random access (CFRA) based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated; at least one CFRA based on CFRA resources in a radio resource control (RRC) reconfiguration message for the LTM cell switch procedure; at least one UE based TA measurement or at least one random access channel (RACH)-less LTM based on the at least one UE based TA measurement; or at least one contention based random access (CBRA). Wherein the at least one switch of the one or more operations includes at least one of the following: switch from at least one early TA acquisition to at least one RACH-less LTM based on at least one UE based TA measurement; switch from the at least one early TA acquisition to at least one RACH based LTM; switch from the at least one RACH-less LTM based on at least one UE based TA measurement to the at least one RACH based LTM; switch from at least one CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated to at least one CFRA based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure; or switch from at least one CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated or based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure to at least one CBRA.

**[0022]** In some implementations of the BS described herein, the first information includes at least one of the following: time duration between two PDCCH orders triggered for early TA acquisition; or one or more layer 1 (L1) measurement results.

**[0023]** In some implementations of the BS described herein, the one or more layer 1 (L1) measurement results includes at least one of the following: L1 measurement results before performing at least one early UL synchronization or at least one early TA acquisition; L1 measurement results before performing at least one RACH based LTM; L1 measurement

results before performing at least one RACH-less based LTM; L1 measurement results when an LTM cell switch execution is initiated; or L1 measurement results upon reception of an indication from a lower layer indicating that the LTM cell switch execution is successfully completed.

**[0024]** In some implementations of the BS described herein, the at least one RACH based LTM includes at least one of the following: a CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated; a CFRA based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure; or a CBRA.

**[0025]** In some implementations of the BS described herein, the first information includes at least one of the following: a random access (RA) purpose or information indicating that a RA procedure is initiated by a PDCCH order to an LTM candidate cell; an RA purpose or information indicating that the RA procedure is initiated for the LTM cell switch procedure; information indicating whether CFRA resources are provided in a lower layer message concerning that an LTM cell switch execution is initiated; information indicating whether the CFRA resources are provided in an RRC reconfiguration message for the LTM cell switch procedure; one or more parameters of an uplink carrier for physical random access channel (PRACH) transmission on an LTM candidate cell; subcarrier spacing of PRACH for the LTM cell switch procedure; n-TimingAdvanceOffset to be applied for uplink transmissions on the LTM candidate cell; one or more RACH parameters for performing the RA procedure on the LTM candidate cell; a total number of synchronization signal blocks (SSB)s for a RACH occasion; one or more bandwidth part (BWP) parameters; one or more SSBs per RACH occasion; or a PRACH root sequence index.

**[0026]** In some implementations of the BS described herein, if the first information is received by a centralized unit (CU) of the BS, the processor is configured to cause the CU of the BS to transmit the first information to at least one distributed unit (DU) of the BS.

**[0027]** Some implementations of the present disclosure provide a processor for wireless communication, comprising at least one controller coupled with at least one memory and configured to cause the processor to receive first information related to access in a L1/L2-Triggered Mobility (LTM) cell switch procedure.

**[0028]** Some implementations of the present disclosure provide a method performed by base station (BS). The method comprises receiving first information related to access in a L1/L2-Triggered Mobility (LTM) cell switch procedure.

**[0029]** Some implementations of the present disclosure provide a user equipment (UE). The UE includes at least one memory; and at least one processor coupled to the at least one memory and configured to cause the UE to receive a configuration related to at least one of the following: a context of the UE associated with a L1/L2-Triggered Mobility (LTM) cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0030]** In some implementations of the UE described herein, the configuration includes at least one of the following: a first configuration generated by a base station (BS) or a centralized unit (CU) of a base station (BS) of the LTM cell switch procedure; a second configuration generated by a source distributed unit (DU) of the BS; a third configuration generated by a target DU of the BS; or at least one fourth configuration generated by at least one candidate target DU of the BS.

**[0031]** In some implementations of the UE described herein, the processor is configured to cause the UE to transmit at least one of the following: a part or a whole of the configuration; or successful LTM related information for the LTM cell switch procedure.

**[0032]** In some implementations of the UE described herein, the successful LTM related information is stored as or reported via at least one of the following reports: a successful handover report (SHR); a successful primary secondary cell (PSCell) change report (SPR); or a successful report for the LTM cell switch procedure.

**[0033]** In some implementations of the UE described herein, the part or the whole of the configuration and the successful LTM related information are transmitted in separate information elements (IE)s or UE variables or reports or messages; the part or the whole of the configuration and the successful LTM related information are transmitted in a same IE or UE variable or report or message; or the part or the whole of the configuration is transmitted within the successful LTM related information.

**[0034]** In some implementations of the UE described herein, if at least one trigger condition related to storing or reporting the successful LTM related information is satisfied, the configuration corresponding to the at least one satisfied trigger condition is transmitted.

**[0035]** In some implementations of the UE described herein, if the at least one trigger condition is associated with at least one timer T310 or T312 related threshold, the configuration includes the second configuration; or if the at least one trigger condition is associated with at least one timer T304 related threshold, the configuration includes at least one of the third configuration or the at least one fourth configuration.

**[0036]** In some implementations of the UE described herein, the processor is configured to cause the UE to: receive a fifth configuration used for the UE to store or report the successful LTM related information; and store the successful LTM related information.

**[0037]** In some implementations of the UE described herein, the processor is configured to cause the UE to release the fifth configuration upon or during: a radio resource control (RRC) reestablishment is initiated; an RRC resume is initiated; an RRC setup is initiated; a reception of an RRC release message; an LTM cell switch execution failure happens; an RLF occurs shortly after a successful LTM cell switch execution; a reception of a message to release a LTM related configuration for the LTM cell switch procedure; a reconfiguration with synchronization on a primary cell (PCell) is initiated; a reconfiguration with synchronization on a primary secondary cell group cell (PSCell) is initiated; or a successful execution of the LTM cell switch procedure.

**[0038]** In some implementations of the UE described herein, the processor is configured to cause the UE to discard the successful LTM related information upon or during: a time period after the successful LTM related information is stored at the UE but the successful LTM related information is not fetched by a base station (BS); the successful LTM related information is retrieved by the BS; a detach procedure is initiated; or another successful report for the LTM cell switch procedure is initiated.

**[0039]** In some implementations of the UE described herein, to discard the successful LTM related information, the processor is configured to cause the UE to release at least one information element (IE) or UE variable or report or message used to store the successful LTM related information.

**[0040]** Some implementations of the present disclosure provide a processor for wireless communication, comprising at least one controller coupled with at least one memory and configured to cause the processor to receive a configuration related to at least one of the following: a context of a user equipment (UE) associated with a L1/L2-Triggered Mobility (LTM) cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0041]** Some implementations of the present disclosure provide a method performed by a user equipment (UE). The method comprises receiving a configuration related to at least one of the following: a context of the UE associated with a L1/L2-Triggered Mobility (LTM) cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0042]** Some implementations of the present disclosure provide a base station (BS). The BS includes at least one memory; and at least one processor coupled to the at least one memory and configured to cause the BS to obtain a configuration related to at least one of the following: a context of the UE associated with a L1/L2-Triggered Mobility (LTM) cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0043]** In some implementations of the BS described herein, if the BS includes a centralized unit (CU), to obtain the configuration, the processor is configured to cause the BS or the CU of the BS to perform at least one of the following: generating a first configuration; receiving a second configuration generated by a source distributed unit (DU) of the BS; receiving a third configuration generated by a target DU of the BS; or receiving at least one fourth configuration generated by at least one candidate target DU of the BS.

**[0044]** In some implementations of the BS described herein, if the BS includes a centralized unit (CU), the processor is configured to cause the BS or the CU of the BS to transmit the configuration to the UE, and wherein the configuration includes at least one of

the following: the first configuration; the second configuration; the third configuration; or the at least one fourth configuration.

**[0045]** In some implementations of the BS described herein, the configuration is transmitted to the UE in at least one of the following: a radio resource control (RRC) reconfiguration message; or a lower layer message concerning that an LTM cell switch execution is initiated.

**[0046]** In some implementations of the BS described herein, the configuration is transmitted to the UE via the source DU.

**[0047]** In some implementations of the BS described herein, if the BS includes a centralized unit (CU), the processor is configured to cause the BS or the CU of the BS to receive at least one of the following: a part or a whole of the configuration; or successful LTM related information for the LTM cell switch procedure.

**[0048]** In some implementations of the BS described herein, the successful LTM related information is received via at least one of the following reports: a successful handover report (SHR); a successful primary secondary cell (PSCell) change report (SPR); or a successful report for the LTM cell switch procedure.

**[0049]** In some implementations of the BS described herein, the part or the whole of the configuration and the successful LTM related information are received in separate information elements (IE)s or UE variables or reports or messages; the part or the whole of the configuration and the successful LTM related information are received in a same IE or UE variable or report or message; or the part or the whole of the configuration is received within the successful LTM related information.

**[0050]** In some implementations of the BS described herein, if at least one trigger condition related to storing or reporting successful LTM related information is satisfied, the configuration corresponding to the at least one satisfied trigger condition is received.

**[0051]** In some implementations of the BS described herein, if the at least one trigger condition is associated with at least one timer T310 or T312 related threshold, the configuration includes the second configuration; or if the at least one trigger condition is

associated with at least one timer T304 related threshold, the configuration includes at least one of the third configuration or the at least one fourth configuration.

**[0052]** In some implementations of the BS described herein, if the BS includes a centralized unit (CU), the processor is configured to cause the BS or the CU of the BS to generate or transmit, a fifth configuration used for the UE to store or report the successful LTM related information.

**[0053]** In some implementations of the BS described herein, if the BS includes a centralized unit (CU) and a source distributed unit (DU), the processor is configured to cause the CU of the BS to transmit at least one of the following to the source DU: the first configuration; the second configuration; the third configuration; or the at least one fourth configuration.

**[0054]** In some implementations of the BS described herein, the configuration is transmitted in at least one of the following: a UE context modification request message; a downlink (DL) RRC message transfer message; a CU-DU timing advance (TA) information transfer message; or an access and mobility indication message.

**[0055]** In some implementations of the BS described herein, if the BS includes a centralized unit (CU) and a source distributed unit (DU), the processor is configured to cause the CU of the BS to transmit successful LTM related information to the source DU.

**[0056]** In some implementations of the BS described herein, if the BS includes a centralized unit (CU), the processor is configured to cause the CU of the BS to transmit at least one of the first configuration, the second configuration, the third configuration or the at least one fourth configuration to at least one of the following: a target DU of the BS; at least one candidate target DU of the BS; another target DU; or at least one another candidate target DU.

**[0057]** In some implementations of the BS described herein, the configuration is transmitted in at least one of the following: a UE context setup request message; a UE context modification request message; a CU-DU cell switch notification message; or an access and mobility indication message.

**[0058]** In some implementations of the BS described herein, if the BS includes a centralized unit (CU), the processor is configured to cause the CU of the BS to transmit successful LTM related information to at least one of the following: a target DU of the BS; or at least one candidate target DU of the BS.

**[0059]** In some implementations of the BS described herein, the configuration and the successful LTM related information are transmitted in separate information elements (IE)s or UE variables or reports or messages; the configuration and the successful LTM related information are transmitted in a same IE or UE variable or report or message; or the configuration is transmitted within the successful LTM related information.

**[0060]** In some implementations of the BS described herein, if the BS includes at least one of a centralized unit (CU) or at least one distributed unit (DU), the processor is configured to cause the CU or the at least one DU of the BS to identify the context of the UE based on the configuration.

**[0061]** Some implementations of the present disclosure provide a processor for wireless communication, comprising at least one controller coupled with at least one memory and configured to cause the processor to obtain a configuration related to at least one of the following: a context of the UE associated with a L1/L2-Triggered Mobility (LTM) cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0062]** Some implementations of the present disclosure provide a method performed by a base station (BS). The method comprises obtaining a configuration related to at least one of the following: a context of the UE associated with a L1/L2-Triggered Mobility (LTM) cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0063]** Some implementations of the present disclosure provide a distributed unit (DU) of a base station (BS). The DU includes at least one memory; and at least one processor coupled to the at least one memory and configured to cause the DU to obtain a configuration related to at least one of the following: a context of a user equipment (UE) associated with a

L1/L2-Triggered Mobility (LTM) cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0064]** In some implementations of the DU described herein, to obtain the configuration, the processor is configured to cause the DU of the BS to perform at least one of the following: receiving at least one configuration generated by a centralized unit (CU) of the BS; generating at least one configuration; or receiving, from the CU of the BS, at least one configuration generated by at least one DU of the BS, wherein the at least one DU of the BS includes at least one of: a source DU, a target DU, or a candidate target DU.

**[0065]** In some implementations of the DU described herein, the processor is configured to cause the DU of the BS to transmit the generated at least one configuration to the CU of the BS.

**[0066]** In some implementations of the DU described herein, the DU of the BS is a source distributed unit (DU) of the BS, and the processor is configured to cause the source DU to transmit the generated at least one configuration or the received at least one configuration to the UE via at least one of a radio resource control (RRC) reconfiguration message or a lower layer message concerning that an LTM cell switch execution is initiated.

**[0067]** In some implementations of the DU described herein, the processor is configured to cause the DU of the BS to receive, from the CU of the BS, successful LTM related information.

**[0068]** In some implementations of the DU described herein, the configuration and the successful LTM related information are received in separate information elements (IE)s or UE variables or reports or messages; the configuration and the successful LTM related information are received in a same IE or UE variable or report or message; or the configuration is received within the successful LTM related information.

**[0069]** In some implementations of the DU described herein, the DU of the BS is a source distributed unit (DU) of the BS, and the configuration is received from the CU of the BS via at least one of the following: a UE context modification request message; a downlink (DL) RRC message transfer message; a CU-DU timing advance (TA) information transfer message; or an access and mobility indication message.

**[0070]** In some implementations of the DU described herein, the DU of the BS is a target DU of the BS or at least one candidate target DU of the BS, and the configuration is received from the CU of the BS via at least one of the following: a UE context setup request message; a UE context modification request message; a CU-DU cell switch notification message; or an access and mobility indication message.

**[0071]** In some implementations of the DU described herein, the processor is configured to cause the DU of the BS to identify the context of the UE based on the configuration.

**[0072]** Some implementations of the present disclosure provide a processor for wireless communication, comprising at least one controller coupled with at least one memory and configured to cause the processor to obtain a configuration related to at least one of the following: a context of a user equipment (UE) associated with a L1/L2-Triggered Mobility (LTM) cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0073]** Some implementations of the present disclosure provide a method performed by a distributed unit (DU) of a base station (BS). The method comprises obtaining a configuration related to at least one of the following: a context of a user equipment (UE) associated with a L1/L2-Triggered Mobility (LTM) cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

**[0074]** Figure 1 illustrates an example of a wireless communications system in accordance with aspects of the present disclosure.

**[0075]** Figure 2 illustrates an example of a user equipment (UE) 200 in accordance with aspects of the present disclosure.

**[0076]** Figure 3 illustrates an example of a processor 300 in accordance with aspects of the present disclosure.

**[0077]** Figure 4 illustrates an example of a network equipment (NE) 400 in accordance with aspects of the present disclosure.

**[0078]** Figure 5A illustrates a schematic diagram of an intra-CU intra-DU LTM/mobility scenario in accordance with aspects of the present disclosure.

**[0079]** Figure 5B illustrates a schematic diagram of an intra-CU inter-DU LTM/mobility scenario in accordance with aspects of the present disclosure.

**[0080]** Figure 5C illustrates a schematic diagram of an inter-CU LTM/mobility scenario in accordance with aspects of the present disclosure.

**[0081]** Figure 6 illustrates a schematic diagram of an inter-DU intra-CU LTM procedure for intra-NR in accordance with aspects of the present disclosure.

**[0082]** Figure 7 illustrates a flowchart of a CFRA procedure without network response with 4-step RA type in accordance with aspects of the present disclosure.

**[0083]** Figure 8 illustrates a flowchart of a method related to an LTM cell switch procedure in accordance with aspects of the present disclosure.

#### DETAILED DESCRIPTION

**[0084]** In general, when a UE moves from one cell to another cell, at some point a serving cell change needs to be performed. In the legacy, the serving cell change is done by explicit RRC reconfiguration signalling (e.g. a handover (HO) command) to trigger the synchronization of a target cell based on L3 measurements report. It leads to longer latency, larger overhead, and longer interruption time than beam level mobility. Therefore, in 3GPP, LTM was approved to change a serving cell via L1/L2 signalling, in order to reduce the latency, overhead and interruption time.

**[0085]** "LTM candidate cell" refers to a candidate cell configured to the UE for LTM. There may be multiple LTM candidate cells prepared for the UE, where the LTM candidate cells may belong to the same or different candidate DUs.

**[0086]** "LTM candidate configuration" refers to a configuration part of an RRC Reconfiguration message associated with a candidate cell, e.g. for LTM. A candidate configuration can be a complete candidate configuration or a delta configuration relatively to a reference configuration.

**[0087]** "LTM reference configuration" refers to a configuration provided by the network to the UE that is common, within the same cell group, to a group of configured non-complete candidate configurations.

**[0088]** "L1/L2 Triggered Mobility" refers to a cell switch procedure that the network triggers via MAC CE based on L1 measurements.

**[0089]** "RACH-less LTM" refers to an LTM cell switch procedure where UE skips the random access procedure.

**[0090]** "Subsequent LTM" refers to an LTM cell switch procedures between candidate cells without RRC reconfiguration by the network in between. In some cases, subsequent LTM may be supported. Subsequent LTM means subsequent LTM cell switch procedures between LTM candidate cells where a UE does not need to be reconfigured by the network in between.

**[0091]** LTM is a cell switch procedure that the network triggers via a MAC CE based on L1 measurements. In 3GPP, LTM was approved to change a serving cell via L1/L2 signalling, in order to reduce the latency, overhead and interruption time. The potential applicable scenarios of LTM include "intra-CU intra-DU LTM," "intra-CU inter-DU LTM," and "inter-CU LTM" as shown in Figures 5A-5C as described below.

- (1) Intra-CU intra-DU LTM/mobility: a UE moves between different cells within a DU.
- (2) Intra-CU inter-DU LTM/mobility: a UE moves between different cells belonging to different DUs but within a same CU.
- (3) Inter-CU LTM/mobility: a UE moves between different cells belonging to different DUs different CUs.

**[0092]** LTM is a procedure in which a BS receives L1 measurement report(s) from a UE, and on their basis the BS changes UE's serving cell by a cell switch command signaled via a medium access control (MAC) control element (CE), e.g. LTM cell switch command MAC CE or LTM Command MAC CE. The cell switch command indicates a target cell for LTM e.g. an LTM candidate cell configuration that the BS previously prepared and provided to the UE through RRC signalling. Then the UE switches to the target cell according to the cell switch command. The LTM procedure can be used to reduce the mobility latency.

**[0093]** When configured by the network, it is possible to activate transmission configuration indication (TCI) states of one or multiple cells that are different from the current serving cell. For instance, the TCI states of the LTM candidate cells can be activated in advance before any of those cells become the serving cell. This allows the UE to be DL synchronized with those cells, thereby facilitating a faster cell switch to one of those cells when cell switch is triggered.

**[0094]** When configured by the network, it is possible to initiate UL TA acquisition (called early TA) procedure of one or multiple cells that are different from the current serving cells. If the cell has the same  $N_{TA}$  as the current serving cells or  $N_{TA}=0$ , early TA acquisition procedure is not required. The network may request the UE to perform early TA acquisition of a candidate cell before a cell switch. The early TA acquisition procedure may be triggered by a PDCCH order as specified in Figure 7 or may be realized through UE-based TA measurement as configured by RRC signaling as described below.

**[0095]** Figure 7 illustrates a flowchart of a CFRA procedure without network response with 4-step random access (RA) type in accordance with aspects of the present disclosure. As shown in Figure 7, an RA procedure towards an LTM candidate cell for an early UL TA acquisition is performed. This CFRA procedure is triggered by a PDCCH order. In particular, a BS (e.g. BS #1) to which the serving cell belongs may send a message for RA preamble assignment to a UE. The UE may send a message including a RA preamble (i.e. MSG #1) towards a candidate cell of a base station (BS) (e.g. a candidate cell of BS #2) without monitoring for a response from the candidate cell as shown in Figure 7, to support the UE's power ramping. The UE may perform MSG #1 retransmission as indicated by the network. Then, BS #2 to which the candidate cell belongs calculates the TA value and sends the calculated TA value to BS #1 to which the serving cell belongs. The serving cell may send the TA value in an LTM cell switch command MAC CE when triggering an LTM cell switch. In case of Intra-CU intra-DU LTM/mobility or Intra-CU inter-DU LTM/mobility, BS #1 and BS #2 are a same BS. In case of Inter-CU LTM/mobility, BS #1 and BS #2 are two different BSs.

**[0096]** In an early TA acquisition procedure realized through UE-based TA measurement as configured by RRC signaling, a UE may perform a TA measurement for candidate cells after being configured by RRC signaling, while the exact time the UE performs TA

measurement is up to the UE's implementation. The UE may apply the TA value measured by itself and performs RACH-less LTM upon receiving a cell switch command. The network may also send a TA value in the LTM cell switch command MAC CE without an early TA acquisition.

**[0097]** Depending on the availability of a valid TA value, the UE performs either a RACH-less LTM or RACH-based LTM cell switch. If the TA value is provided in the cell switch command, the UE applies the TA value as instructed by the network. In the case where UE-based TA measurement is configured, but no TA value is provided in the cell switch command, the UE applies the TA value by itself if available. Meanwhile, the UE performs RACH-less LTM cell switch upon receiving the cell switch command. If no valid TA value is available, the UE performs a RACH-based LTM cell switch.

**[0098]** Regardless of whether the UE is configured for UE-based TA measurement for a certain candidate cell, the UE will still follow the PDCCH order, which includes requesting a random access procedure towards the candidate cells. This also applies to the candidate cells for which the UE is capable of deriving TA values by itself. Additionally, regardless of whether the UE has already performed a random access procedure towards the candidate cells, it will still follow the UE-based measurement configuration if configured by the network.

**[0099]** For RACH-less LTM, the UE accesses the target cell using either a configured grant or a dynamic grant. The configured grant is provided in the LTM candidate configuration, and the UE selects the configured grant occasion associated with the beam indicated in the cell switch command. Upon initiation of LTM cell switch to the target cell, the UE starts to monitor PDCCH on the target cell for dynamic scheduling. Before RACH-less LTM procedure completion, the UE shall not trigger random access procedure if it does not have a valid PUCCH resource for triggered SRs.

**[0100]** In general, RACH optimization may be supported by "UE reported information made available at a next generation (NG) RAN node as specified in 3GPP standard document TS 38.331" and by "physical random access channel (PRACH) parameters exchange between NG RAN nodes" RACH information report may be named as "an RA report" or the like.

**[0101]** The contents of the RACH information report may comprise at least one of the following:

- contention detection indication per RACH attempt;
- indexes of synchronization signal blocks (SSB)s and number of RACH preambles sent on each tried SSB listed in chronological order of attempts;
- indication whether the selected SSB is above or below the configured RSRP threshold per RACH attempt; or
- 2-step RACH information as specified in clause 5.7.10.4 of 3GPP standard document TS 38.331 [12].

**[0102]** In addition, a UE operating in NR-DC may also support "SgNB RACH information report", or "SN RA report", or "RA report for SN/ SgNB".

**[0103]** One of the functions of Mobility Robustness Optimization (MRO) is to detect a sub-optimal successful handover event. The aim is to identify underlying conditions during successful ordinary handovers, successful dual active protocol stack (DAPS) handovers, or successful Conditional handovers. For analysis of successful handover, a UE may collect Successful Handover Report (SHR) based on configuration by network, if stored, and makes the SHR available to the network as specified in 3GPP standard document TS 38.331.

**[0104]** For SHR collected during intra-NR handover, if the target new radio (NR) node fetches the SHR from the UE and the trigger of SHR is timer T310 or T312, it may forward the information to the source NR node, i.e. the node handling the cell reported as source cell in this SHR, by using the ACCESS AND MOBILITY INDICATION message over Xn or by means of the Uplink RAN configuration transfer procedure and Downlink RAN configuration transfer procedure over NG. If the NG-RAN node that fetches the SHR from the UE is neither the source node nor the target node of the handover, it forwards the information to the node(s) which configured the SHR trigger causing the SHR to be generated, by using the ACCESS AND MOBILITY INDICATION message over Xn or by means of the Uplink RAN configuration transfer procedure and Downlink RAN configuration transfer procedure over NG. Upon retrieval of a SHR, the receiving node may analyse whether its mobility configuration needs adjustment.

**[0105]** In general, the objective of successful PSCell change Report (SPR) is to detect sub-optimal successful PSCell change/CPC (conditional PSCell change) or successful PSCell addition/CPA (a conditional PSCell addition). For analysis of such sub-optimal successful PSCell change/CPC and successful PSCell addition/CPA, the UE may collect SPR based on the triggers configured by the network, if received, and makes the SPR available to the network as specified in 3GPP standard document TS 38.331. For PSCell addition/CPA and PSCell change/CPC (MN or SN initiated), the target SN always decides the T304 trigger for SPR and performs root cause analysis. For SN-initiated PSCell change/CPC, the source SN decides the T310/T312 triggers for SPR and is responsible for SPR related optimizations e.g. to optimize PSCell change/CPC configuration or associated mobility thresholds or adjust T310/T312 timer values. For MN-initiated PSCell change/CPC, the MN decides the T310/T312 triggers for SPR. An MN may optimize PSCell change/CPC configuration or associated mobility thresholds or both. Source SN may optimize lower layer issues e.g. adjust T310/T312 timer values. The SPR can be fetched from the UE by the MN only while the UE is still connected to the MN, or by a node different from the MN that sent the SPR configuration to the UE if the UE is not connected to the MN anymore. In case the SPR is retrieved in a node different from the MN that sent the SPR configuration to the UE, the SPR is first forwarded to that MN, which then forwards it to the respective SN(s) which should perform the SPR optimization.

**[0106]** Currently, an MRO for LTM (e.g. including MCG LTM and SCG LTM) would be supported in 3GPP Release-19. Regarding an MRO for LTM, following issues need to be solved. In some cases, RACH for early TA acquisition or UE-based TA measurement or CFRA based on CFRA resources included in LTM cell switch command MAC CE and/or an RRC message may be performed by a UE in an LTM procedure, to assist the network to optimize RACH related configuration for LTM, an issue needs to be solved is what is enhancements of an RA report for LTM. For a case of a near failure successful LTM, a UE's context may be released when receiving a successful report for LTM at the network's side (e.g. at a source DU or a target DU), an issue needs to be solved is how to enable network identify or retrieve the UE's context. In addition, for an MRO for LTM, issues of "when to release configuration for storing or generating or reporting successful LTM cell switch related information" and "when to release the stored successful LTM cell switch related information" need to be solved.

**[0107]** Currently, details regarding an MRO for LTM (e.g. including MCG LTM and SCG LTM) have not been discussed yet. Embodiments of the present disclosure aim to resolve the abovementioned issues.

**[0108]** Some embodiments of the present application define enhancements for an RA report. In some embodiments, information related with early TA acquisition, and/or, information related with CFRA procedure based on CFRA resources in LTM cell switch command MAC CE, and/or, information related with CFRA procedure based on CFRA resources in an RRC reconfiguration message, and/or, information for RACH-less LTM based on UE based TA/UE based TA measurement, may be included in RA report. In some embodiments, one RA report entry or multiple RA report entries may be used to convey above information separately. An RA report may include an (explicit or implicit) indication (e.g. per RA attempt or per RA procedure) to indicate switches of access procedure to target cell (e.g. the access procedure may include a RACH for early TA acquisition or a RACH-less LTM based on UE based TA or a UE based TA measurement or a CFRA or a CBRA) is performed by the UE. In some embodiments, an RA report may include time duration between two PDCCH orders to a same LTM candidate cell (e.g. time duration between any two consecutive PDCCH orders to a same LTM candidate cell, or time duration between any two non-consecutive PDCCH orders to a same LTM candidate cell, or time duration between first PDCCH order and last PDCCH order to a same LTM candidate cell). In some embodiments, an RA report may include L1 measurement results during LTM procedure.

**[0109]** Some embodiments of the present disclosure study solutions for UE's context identification. For example, some embodiments refer to a UE based solution. More specifically, a CU, or a source DU, or a (candidate) target DU may generate a configuration (e.g. which may be named as "a reference" or the like) related to the UE's context. The CU may send the configuration generated by the CU to the source DU or the (candidate) target DU, or the CU may send the configuration received from the source DU to (candidate) target DU, or the CU may send the configuration received from the (candidate) target DU to the source DU. The configuration may be sent to the UE; and the UE may report the configuration along with the successful report, or the UE may include the configuration in the successful report.

**[0110]** Some other embodiments refer to a network based solution. In particular, a CU, or a source DU, or a (candidate) target DU may generate a configuration (e.g. or a reference) related to the UE's context. The CU may send the configuration generated by the CU to the source DU or the (candidate) target DU; or the CU may send the configuration received from the source DU to the (candidate) target DU; or the CU may send the configuration received from the (candidate) target DU to the source DU. The CU may send the configuration generated by the CU or the configuration generated by the source DU or the configuration generated by the (candidate) target DU to the source DU, when the CU sends the successful report to the source DU. Also, the CU may send the configuration generated by the CU or the configuration generated by the source DU or the configuration generated by the (candidate) target DU to the (candidate) target DU, when the CU sends the successful report to the (candidate) target DU.

**[0111]** For MCG LTM or SCG LTM, some embodiments of the present application define "when a UE releases a configuration for storing or generating or reporting successful report for LTM or successful LTM cell switch related information". Some embodiments of the present application define "when a UE discards the stored successful report for LTM or successful LTM cell switch related information."

**[0112]** In the present disclosure, a configuration (e.g. or a reference) related to UE context may be called as "Configuration Information" or "Mobility Information" or "LTM Information" or "Mobility Information for LTM" or "LTM related Mobility Information" or other name, and it can be encoded as an OCTET STRING.

**[0113]** In the present disclosure, the successful LTM cell switch related information may also be named as "successful LTM related information", "information related with successful LTM cell switch", "a successful report for LTM", "a successful report for LTM cell switch", "a successful LTM report", "a successful LTM cell switch report", or the like. For one instance, for MCG LTM, the successful LTM cell switch related information may be included in a SHR or other named report or a new introduced report, and the successful report may be a SHR or other named report or a new introduced report. For another instance, for SCG LTM, the successful LTM related information may be included in a SPR or other named report or a new introduced report, and the successful report may be a SPR or other named report or a new introduced report.

**[0114]** In the present disclosure, at least one early TA acquisition can also be called as at least one early UL synchronization, or at least one PDCCH order triggered at least one RA, or at least one PDCCH order triggered at least one early TA acquisition.

**[0115]** More details of the embodiments of the present disclosure will be illustrated in the following text in combination with the appended drawings.

**[0116]** Figure 1 illustrates an example of a wireless communications system 100 in accordance with aspects of the present disclosure. The wireless communications system 100 may include one or more NE 102, one or more UE 104, and a core network (CN) 106. The wireless communications system 100 may support various radio access technologies. In some implementations, the wireless communications system 100 may be a 4G network, such as an LTE network or an LTE-Advanced (LTE-A) network. In some other implementations, the wireless communications system 100 may be a NR network, such as a 5G network, a 5G-Advanced (5G-A) network, or a 5G ultrawideband (5G-UWB) network. In other implementations, the wireless communications system 100 may be a combination of a 4G network and a 5G network, or other suitable radio access technology including Institute of Electrical and Electronics Engineers (IEEE) 802.11 (Wi-Fi), IEEE 802.16 (WiMAX), IEEE 802.20. The wireless communications system 100 may support radio access technologies beyond 5G, for example, 6G. Additionally, the wireless communications system 100 may support technologies, such as time division multiple access (TDMA), frequency division multiple access (FDMA), or code division multiple access (CDMA), etc.

**[0117]** The one or more NE 102 may be dispersed throughout a geographic region to form the wireless communications system 100. One or more of the NE 102 described herein may be or include or may be referred to as a network node, a base station, a network element, a network function, a network entity, a radio access network (RAN), a NodeB, an eNodeB (eNB), a next-generation NodeB (gNB), or other suitable terminology. An NE 102 and a UE 104 may communicate via a communication link, which may be a wireless or wired connection. For example, an NE 102 and a UE 104 may perform wireless communication (e.g. receive signaling, transmit signaling) over a Uu interface.

**[0118]** An NE 102 may provide a geographic coverage area for which the NE 102 may support services for one or more UEs 104 within the geographic coverage area. For example,

an NE 102 and a UE 104 may support wireless communication of signals related to services (e.g. voice, video, packet data, messaging, broadcast, etc.) according to one or multiple radio access technologies. In some implementations, an NE 102 may be moveable, for example, a satellite associated with a non-terrestrial network (NTN). In some implementations, different geographic coverage areas 112 associated with the same or different radio access technologies may overlap, but the different geographic coverage areas may be associated with different NE 102.

**[0119]** The one or more UE 104 may be dispersed throughout a geographic region of the wireless communications system 100. A UE 104 may include or may be referred to as a remote unit, a mobile device, a wireless device, a remote device, a subscriber device, a transmitter device, a receiver device, or some other suitable terminology. In some implementations, the UE 104 may be referred to as a unit, a station, a terminal, or a client, among other examples. Additionally, or alternatively, the UE 104 may be referred to as an Internet-of-Things (IoT) device, an Internet-of-Everything (IoE) device, or machine-type communication (MTC) device, among other examples.

**[0120]** A UE 104 may be able to support wireless communication directly with other UEs 104 over a communication link. For example, a UE 104 may support wireless communication directly with another UE 104 over a device-to-device (D2D) communication link. In some implementations, such as vehicle-to-vehicle (V2V) deployments, vehicle-to-everything (V2X) deployments, or cellular-V2X deployments, the communication link 114 may be referred to as a sidelink. For example, a UE 104 may support wireless communication directly with another UE 104 over a PC5 interface.

**[0121]** An NE 102 may support communications with the CN 106, or with another NE 102, or both. For example, an NE 102 may interface with other NE 102 or the CN 106 through one or more backhaul links (e.g. S1, N2, or network interface). In some implementations, the NE 102 may communicate with each other directly. In some other implementations, the NE 102 may communicate with each other or indirectly (e.g. via the CN 106). In some implementations, one or more NE 102 may include subcomponents, such as an access network entity, which may be an example of an access node controller (ANC). An ANC may communicate with the one or more UEs 104 through one or more other access network

transmission entities, which may be referred to as a radio heads, smart radio heads, or transmission-reception points (TRPs).

**[0122]** The CN 106 may support user authentication, access authorization, tracking, connectivity, and other access, routing, or mobility functions. The CN 106 may be an evolved packet core (EPC), or a 5G core (5GC), which may include a control plane entity that manages access and mobility (e.g. a mobility management entity (MME), an access and mobility management functions (AMF)) and a user plane entity that routes packets or interconnects to external networks (e.g. a serving gateway (S-GW), a Packet Data Network (PDN) gateway (P-GW), or a user plane function (UPF)). In some implementations, the control plane entity may manage non-access stratum (NAS) functions, such as mobility, authentication, and bearer management (e.g. data bearers, signal bearers, etc.) for the one or more UEs 104 served by the one or more NE 102 associated with the CN 106.

**[0123]** The CN 106 may communicate with a packet data network over one or more backhaul links (e.g. via an S1, N2, or another network interface). The packet data network may include an application server. In some implementations, one or more UEs 104 may communicate with the application server. A UE 104 may establish a session (e.g. a protocol data unit (PDU) session, or the like) with the CN 106 via an NE 102. The CN 106 may route traffic (e.g. control information, data, and the like) between the UE 104 and the application server using the established session (e.g. the established PDU session). The PDU session may be an example of a logical connection between the UE 104 and the CN 106 (e.g. one or more network functions of the CN 106).

**[0124]** In the wireless communications system 100, the NEs 102 and the UEs 104 may use resources of the wireless communications system 100 (e.g. time resources (e.g. symbols, slots, subframes, frames, or the like) or frequency resources (e.g. subcarriers, carriers)) to perform various operations (e.g. wireless communications). In some implementations, the NEs 102 and the UEs 104 may support different resource structures. For example, the NEs 102 and the UEs 104 may support different frame structures. In some implementations, such as in 4G, the NEs 102 and the UEs 104 may support a single frame structure. In some other implementations, such as in 5G and among other suitable radio access technologies, the NEs 102 and the UEs 104 may support various frame structures (i.e., multiple frame structures).

The NEs 102 and the UEs 104 may support various frame structures based on one or more numerologies.

**[0125]** One or more numerologies may be supported in the wireless communications system 100, and a numerology may include a subcarrier spacing and a cyclic prefix. A first numerology (e.g.  $\mu=0$ ) may be associated with a first subcarrier spacing (e.g. 15 kHz) and a normal cyclic prefix. In some implementations, the first numerology (e.g.  $\mu=0$ ) associated with the first subcarrier spacing (e.g. 15 kHz) may utilize one slot per subframe. A second numerology (e.g.  $\mu=1$ ) may be associated with a second subcarrier spacing (e.g. 30 kHz) and a normal cyclic prefix. A third numerology (e.g.  $\mu=2$ ) may be associated with a third subcarrier spacing (e.g. 60 kHz) and a normal cyclic prefix or an extended cyclic prefix. A fourth numerology (e.g.  $\mu=3$ ) may be associated with a fourth subcarrier spacing (e.g. 120 kHz) and a normal cyclic prefix. A fifth numerology (e.g.  $\mu=4$ ) may be associated with a fifth subcarrier spacing (e.g. 240 kHz) and a normal cyclic prefix.

**[0126]** A time interval of a resource (e.g. a communication resource) may be organized according to frames (also referred to as radio frames). Each frame may have a duration, for example, a 10 millisecond (ms) duration. In some implementations, each frame may include multiple subframes. For example, each frame may include 10 subframes, and each subframe may have a duration, for example, a 1 ms duration. In some implementations, each frame may have the same duration. In some implementations, each subframe of a frame may have the same duration.

**[0127]** Additionally or alternatively, a time interval of a resource (e.g. a communication resource) may be organized according to slots. For example, a subframe may include a number (e.g. quantity) of slots. The number of slots in each subframe may also depend on the one or more numerologies supported in the wireless communications system 100. For instance, the first, second, third, fourth, and fifth numerologies (i.e.,  $\mu=0$ ,  $\mu=1$ ,  $\mu=2$ ,  $\mu=3$ ,  $\mu=4$ ) associated with respective subcarrier spacings of 15 kHz, 30 kHz, 60 kHz, 120 kHz, and 240 kHz may utilize a single slot per subframe, two slots per subframe, four slots per subframe, eight slots per subframe, and 16 slots per subframe, respectively. Each slot may include a number (e.g. quantity) of symbols (e.g. OFDM symbols). In some implementations, the number (e.g. quantity) of slots for a subframe may depend on a numerology. For a normal cyclic prefix, a slot may include 14 symbols. For an extended cyclic prefix (e.g. applicable

for 60 kHz subcarrier spacing), a slot may include 12 symbols. The relationship between the number of symbols per slot, the number of slots per subframe, and the number of slots per frame for a normal cyclic prefix and an extended cyclic prefix may depend on a numerology. It should be understood that reference to a first numerology (e.g.  $\mu=0$ ) associated with a first subcarrier spacing (e.g. 15 kHz) may be used interchangeably between subframes and slots.

**[0128]** In the wireless communications system 100, an electromagnetic (EM) spectrum may be split, based on frequency or wavelength, into various classes, frequency bands, frequency channels, etc. By way of example, the wireless communications system 100 may support one or multiple operating frequency bands, such as frequency range designations FR1 (410 MHz – 7.125 GHz), FR2 (24.25 GHz – 52.6 GHz), FR3 (7.125 GHz – 24.25 GHz), FR4 (52.6 GHz – 114.25 GHz), FR4a or FR4-1 (52.6 GHz – 71 GHz), and FR5 (114.25 GHz – 300 GHz). In some implementations, the NEs 102 and the UEs 104 may perform wireless communications over one or more of the operating frequency bands. In some implementations, FR1 may be used by the NEs 102 and the UEs 104, among other equipment or devices for cellular communications traffic (e.g. control information, data). In some implementations, FR2 may be used by the NEs 102 and the UEs 104, among other equipment or devices for short-range, high data rate capabilities.

**[0129]** FR1 may be associated with one or multiple numerologies (e.g. at least three numerologies). For example, FR1 may be associated with a first numerology (e.g.  $\mu=0$ ), which includes 15 kHz subcarrier spacing; a second numerology (e.g.  $\mu=1$ ), which includes 30 kHz subcarrier spacing; and a third numerology (e.g.  $\mu=2$ ), which includes 60 kHz subcarrier spacing. FR2 may be associated with one or multiple numerologies (e.g. at least 2 numerologies). For example, FR2 may be associated with a third numerology (e.g.  $\mu=2$ ), which includes 60 kHz subcarrier spacing; and a fourth numerology (e.g.  $\mu=3$ ), which includes 120 kHz subcarrier spacing.

**[0130]** Figure 2 illustrates an example of a UE 200 in accordance with aspects of the present disclosure. The UE 200 may include a processor 202, a memory 204, a controller 206, and a transceiver 208. The processor 202, the memory 204, the controller 206, or the transceiver 208, or various combinations thereof or various components thereof may be examples of means for performing various aspects of the present disclosure as described

herein. These components may be coupled (e.g. operatively, communicatively, functionally, electronically, electrically) via one or more interfaces.

**[0131]** The processor 202, the memory 204, the controller 206, or the transceiver 208, or various combinations or components thereof may be implemented in hardware (e.g. circuitry). The hardware may include a processor, a digital signal processor (DSP), an application-specific integrated circuit (ASIC), or other programmable logic device, or any combination thereof configured as or otherwise supporting a means for performing the functions described in the present disclosure.

**[0132]** The processor 202 may include an intelligent hardware device (e.g. a general-purpose processor, a DSP, a CPU, an ASIC, an FPGA, or any combination thereof). In some implementations, the processor 202 may be configured to operate the memory 204. In some other implementations, the memory 204 may be integrated into the processor 202. The processor 202 may be configured to execute computer-readable instructions stored in the memory 204 to cause the UE 200 to perform various functions of the present disclosure.

**[0133]** The memory 204 may include volatile or non-volatile memory. The memory 204 may store computer-readable, computer-executable code including instructions when executed by the processor 202 cause the UE 200 to perform various functions described herein. The code may be stored in a non-transitory computer-readable medium such the memory 204 or another type of memory. Computer-readable media includes both non-transitory computer storage media and communication media including any medium that facilitates transfer of a computer program from one place to another. A non-transitory storage medium may be any available medium that may be accessed by a general-purpose or special-purpose computer.

**[0134]** In some implementations, the processor 202 and the memory 204 coupled with the processor 202 may be configured to cause the UE 200 to perform one or more of the functions described herein (e.g. executing, by the processor 202, instructions stored in the memory 204). For example, the processor 202 may support wireless communication at the UE 200 in accordance with examples as disclosed with respect to Figure 7.

**[0135]** For example, the processor 202 may support wireless communication at the UE 200, and the UE 200 may be configured to support means for storing information related to access in an LTM cell switch procedure and means for reporting the stored information.

**[0136]** For example, the processor 202 may support wireless communication at the UE 200, and the UE 200 may be configured to support means for receiving a configuration related to at least one of the following: a context of the UE associated with an LTM cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0137]** The controller 206 may manage input and output signals for the UE 200. The controller 206 may also manage peripherals not integrated into the UE 200. In some implementations, the controller 206 may utilize an operating system such as iOS®, ANDROID®, WINDOWS®, or other operating systems. In some implementations, the controller 206 may be implemented as part of the processor 202.

**[0138]** In some implementations, the UE 200 may include at least one transceiver 208. In some other implementations, the UE 200 may have more than one transceiver 208. The transceiver 208 may represent a wireless transceiver. The transceiver 208 may include one or more receiver chains 210, one or more transmitter chains 212, or a combination thereof. The means for receiving abovementioned in the processor 202 or the means for transmitting in the processor 202 may be implemented via at least one transceiver 208.

**[0139]** A receiver chain 210 may be configured to receive signals (e.g. control information, data, packets) over a wireless medium. For example, the receiver chain 210 may include one or more antennas for receive the signal over the air or wireless medium. The receiver chain 210 may include at least one amplifier (e.g. a low-noise amplifier (LNA)) configured to amplify the received signal. The receiver chain 210 may include at least one demodulator configured to demodulate the receive signal and obtain the transmitted data by reversing the modulation technique applied during transmission of the signal. The receiver chain 210 may include at least one decoder for decoding the processing the demodulated signal to receive the transmitted data.

**[0140]** A transmitter chain 212 may be configured to generate and transmit signals (e.g. control information, data, packets). The transmitter chain 212 may include at least one modulator for modulating data onto a carrier signal, preparing the signal for transmission over a wireless medium. The at least one modulator may be configured to support one or more techniques such as amplitude modulation (AM), frequency modulation (FM), or digital modulation schemes like phase-shift keying (PSK) or quadrature amplitude modulation (QAM). The transmitter chain 212 may also include at least one power amplifier configured to amplify the modulated signal to an appropriate power level suitable for transmission over the wireless medium. The transmitter chain 212 may also include one or more antennas for transmitting the amplified signal into the air or wireless medium.

**[0141]** Figure 3 illustrates an example of a processor 300 in accordance with aspects of the present disclosure. The processor 300 may be an example of a processor configured to perform various operations in accordance with examples as described herein. The processor 300 may include a controller 302 configured to perform various operations in accordance with examples as described herein. The processor 300 may optionally include at least one memory 304, which may be, for example, an L1/L2/L3 cache. Additionally, or alternatively, the processor 300 may optionally include one or more arithmetic-logic units (ALUs) 306. One or more of these components may be in electronic communication or otherwise coupled (e.g. operatively, communicatively, functionally, electronically, electrically) via one or more interfaces (e.g. buses).

**[0142]** The processor 300 may be a processor chipset and include a protocol stack (e.g. a software stack) executed by the processor chipset to perform various operations (e.g. receiving, obtaining, retrieving, transmitting, outputting, forwarding, storing, determining, identifying, accessing, writing, reading) in accordance with examples as described herein. The processor chipset may include one or more cores, one or more caches (e.g. memory local to or included in the processor chipset (e.g. the processor 300) or other memory (e.g. random access memory (RAM), read-only memory (ROM), dynamic RAM (DRAM), synchronous dynamic RAM (SDRAM), static RAM (SRAM), ferroelectric RAM (FeRAM), magnetic RAM (MRAM), resistive RAM (RRAM), flash memory, phase change memory (PCM), and others).

**[0143]** The controller 302 may be configured to manage and coordinate various operations (e.g. signaling, receiving, obtaining, retrieving, transmitting, outputting, forwarding, storing, determining, identifying, accessing, writing, reading) of the processor 300 to cause the processor 300 to support various operations in accordance with examples as described herein. For example, the controller 302 may operate as a control unit of the processor 300, generating control signals that manage the operation of various components of the processor 300. These control signals include enabling or disabling functional units, selecting data paths, initiating memory access, and coordinating timing of operations.

**[0144]** The controller 302 may be configured to fetch (e.g. obtain, retrieve, receive) instructions from the memory 304 and determine subsequent instruction(s) to be executed to cause the processor 300 to support various operations in accordance with examples as described herein. The controller 302 may be configured to track memory address of instructions associated with the memory 304. The controller 302 may be configured to decode instructions to determine the operation to be performed and the operands involved. For example, the controller 302 may be configured to interpret the instruction and determine control signals to be output to other components of the processor 300 to cause the processor 300 to support various operations in accordance with examples as described herein. Additionally, or alternatively, the controller 302 may be configured to manage flow of data within the processor 300. The controller 302 may be configured to control transfer of data between registers, arithmetic logic units (ALUs), and other functional units of the processor 300.

**[0145]** The memory 304 may include one or more caches (e.g. memory local to or included in the processor 300 or other memory, such RAM, ROM, DRAM, SDRAM, SRAM, MRAM, flash memory, etc. In some implementations, the memory 304 may reside within or on a processor chipset (e.g. local to the processor 300). In some other implementations, the memory 304 may reside external to the processor chipset (e.g. remote to the processor 300).

**[0146]** The memory 304 may store computer-readable, computer-executable code including instructions that, when executed by the processor 300, cause the processor 300 to perform various functions described herein. The code may be stored in a non-transitory computer-readable medium such as system memory or another type of memory. The controller 302 and/or the processor 300 may be configured to execute computer-readable

instructions stored in the memory 304 to cause the processor 300 to perform various functions. For example, the processor 300 and/or the controller 302 may be coupled with or to the memory 304, the processor 300, the controller 302, and the memory 304 may be configured to perform various functions described herein. In some examples, the processor 300 may include multiple processors and the memory 304 may include multiple memories. One or more of the multiple processors may be coupled with one or more of the multiple memories, which may, individually or collectively, be configured to perform various functions herein.

**[0147]** The one or more ALUs 306 may be configured to support various operations in accordance with examples as described herein. In some implementations, the one or more ALUs 306 may reside within or on a processor chipset (e.g. the processor 300). In some other implementations, the one or more ALUs 306 may reside external to the processor chipset (e.g. the processor 300). One or more ALUs 306 may perform one or more computations such as addition, subtraction, multiplication, and division on data. For example, one or more ALUs 306 may receive input operands and an operation code, which determines an operation to be executed. One or more ALUs 306 be configured with a variety of logical and arithmetic circuits, including adders, subtractors, shifters, and logic gates, to process and manipulate the data according to the operation. Additionally, or alternatively, the one or more ALUs 306 may support logical operations such as AND, OR, exclusive-OR (XOR), not-OR (NOR), and not-AND (NAND), enabling the one or more ALUs 306 to handle conditional operations, comparisons, and bitwise operations.

**[0148]** The processor 300 may support wireless communication in accordance with examples as disclosed herein.

**[0149]** In some implementations, the processor 300 may be configured to support means for performing operations of a UE. The processor 300 may be configured to or operable to support means for storing information related to access in an LTM cell switch procedure and means for reporting the stored information.

**[0150]** In some implementations, the processor 300 may be configured to support means for performing operations of a BS or a CU of a BS. The processor 300 may be configured to or operable to support means for receiving information related to access in an LTM cell switch procedure.

**[0151]** In some implementations, the processor 300 may be configured to support means for performing operations of a UE. The processor 300 may be configured to or operable to support means for receiving a configuration related to at least one of the following: a context of the UE associated with an LTM cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0152]** In some implementations, the processor 300 may be configured to support means for performing operations of a BS or a CU of a BS. The processor 300 may be configured to or operable to support means for obtaining a configuration related to at least one of the following: a context of the UE associated with an LTM cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0153]** In some implementations, the processor 300 may be configured to support means for performing operations of a DU of a BS. The processor 300 may be configured to or operable to support means for obtaining a configuration related to at least one of the following: a context of a UE associated with an LTM cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0154]** It should be appreciated by persons skilled in the art that the components in exemplary processor 300 may be changed, for example, some of the components in exemplary processor 300 may be omitted or modified or new component(s) may be added to exemplary processor 300, without departing from the spirit and scope of the disclosure. For example, in some embodiments, the processor 300 may not include the ALUs 306.

**[0155]** Figure 4 illustrates an example of a NE 400 in accordance with aspects of the present disclosure. The NE 400 may include a processor 402, a memory 404, a controller 406, and a transceiver 408. The processor 402, the memory 404, the controller 406, or the transceiver 408, or various combinations thereof or various components thereof may be examples of means for performing various aspects of the present disclosure as described herein. These components may be coupled (e.g. operatively, communicatively, functionally, electronically, electrically) via one or more interfaces.

**[0156]** The processor 402, the memory 404, the controller 406, or the transceiver 408, or various combinations or components thereof may be implemented in hardware (e.g. circuitry). The hardware may include a processor, a digital signal processor (DSP), an application-specific integrated circuit (ASIC), or other programmable logic device, or any combination thereof configured as or otherwise supporting a means for performing the functions described in the present disclosure.

**[0157]** The processor 402 may include an intelligent hardware device (e.g. a general-purpose processor, a DSP, a CPU, an ASIC, an FPGA, or any combination thereof). In some implementations, the processor 402 may be configured to operate the memory 404. In some other implementations, the memory 404 may be integrated into the processor 402. The processor 402 may be configured to execute computer-readable instructions stored in the memory 404 to cause the NE 400 to perform various functions of the present disclosure.

**[0158]** The memory 404 may include volatile or non-volatile memory. The memory 404 may store computer-readable, computer-executable code including instructions when executed by the processor 402 cause the NE 400 to perform various functions described herein. The code may be stored in a non-transitory computer-readable medium such the memory 404 or another type of memory. Computer-readable media includes both non-transitory computer storage media and communication media including any medium that facilitates transfer of a computer program from one place to another. A non-transitory storage medium may be any available medium that may be accessed by a general-purpose or special-purpose computer.

**[0159]** In some implementations, the processor 402 and the memory 404 coupled with the processor 402 may be configured to cause the NE 400 to perform one or more of the functions described herein (e.g. executing, by the processor 402, instructions stored in the memory 404). For example, the processor 402 may support wireless communication at the NE 400 in accordance with examples as disclosed herein.

**[0160]** In some implementations, the NE 400 may be a BS or a CU of a BS, and the NE 400 may be configured to support means for receiving information related to access in an LTM cell switch procedure.

**[0161]** In some implementations, the NE 400 may be a BS or a CU of a BS, and the NE 400 may be configured to support means for obtaining a configuration related to at least one of the following: a context of the UE associated with an LTM cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0162]** In some implementations, the NE 400 may be a DU of a BS, and the NE 400 may be configured to support means for obtaining a configuration related to at least one of the following: a context of a UE associated with an LTM cell switch procedure; a set of parameters used by the UE during the LTM cell switch procedure; or a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0163]** The controller 406 may manage input and output signals for the NE 400. The controller 406 may also manage peripherals not integrated into the NE 400. In some implementations, the controller 406 may utilize an operating system such as iOS®, ANDROID®, WINDOWS®, or other operating systems. In some implementations, the controller 406 may be implemented as part of the processor 402.

**[0164]** In some implementations, the NE 400 may include at least one transceiver 408. In some other implementations, the NE 400 may have more than one transceiver 408. The transceiver 408 may represent a wireless transceiver. The transceiver 408 may include one or more receiver chains 410, one or more transmitter chains 412, or a combination thereof. The means for receiving or the means for transmitting abovementioned in the processor 402 may be implemented via at least one transceiver 408.

**[0165]** A receiver chain 410 may be configured to receive signals (e.g. control information, data, packets) over a wireless medium. For example, the receiver chain 410 may include one or more antennas for receive the signal over the air or wireless medium. The receiver chain 410 may include at least one amplifier (e.g. a low-noise amplifier (LNA)) configured to amplify the received signal. The receiver chain 410 may include at least one demodulator configured to demodulate the receive signal and obtain the transmitted data by reversing the modulation technique applied during transmission of the signal. The receiver chain 410 may include at least one decoder for decoding the processing the demodulated signal to receive the transmitted data.

**[0166]** A transmitter chain 412 may be configured to generate and transmit signals (e.g. control information, data, packets). The transmitter chain 412 may include at least one modulator for modulating data onto a carrier signal, preparing the signal for transmission over a wireless medium. The at least one modulator may be configured to support one or more techniques such as amplitude modulation (AM), frequency modulation (FM), or digital modulation schemes like phase-shift keying (PSK) or quadrature amplitude modulation (QAM). The transmitter chain 412 may also include at least one power amplifier configured to amplify the modulated signal to an appropriate power level suitable for transmission over the wireless medium. The transmitter chain 412 may also include one or more antennas for transmitting the amplified signal into the air or wireless medium.

**[0167]** It should be appreciated by persons skilled in the art that the components in exemplary NE 400 may be changed, for example, some of the components in exemplary NE 400 may be omitted or modified or new component(s) may be added to exemplary NE 400, without departing from the spirit and scope of the disclosure. For example, in some embodiments, the NE 400 may not include the controller 406.

**[0168]** Figure 5A illustrates a schematic diagram of an intra-CU intra-DU LTM/mobility scenario in accordance with aspects of the present disclosure. The wireless communication system in Figure 5A includes a DU, a UE (e.g. UE 101A), and some access nodes (e.g. access node 102A and access node 103A). The access node 102A and access node 103A are controlled by the DU, and provides services for UEs within cell #1 and cell #2 respectively. Even though there are only one UE and two access nodes in Figure 5A, persons skilled in the art will recognize that any number of UEs and access nodes may be included in the wireless communication system.

**[0169]** In Figure 5A, UE 101A is moving from cell #1 to cell #2, and may perform an LTM cell switch procedure from cell #1 to access to cell #2, which is an LTM cell switch procedure performed between different cells within a DU. This scenario may be referred to as intra-CU intra-DU LTM/mobility. In short, this scenario may be called as intra-DU LTM/mobility.

**[0170]** Figure 5B illustrates a schematic diagram of an intra-CU inter-DU LTM/mobility scenario in accordance with aspects of the present disclosure. The wireless communication

system in Figure 5B includes a CU, a UE (e.g. UE 101B), and some DUs (e.g. DU #1 and DU #2). DU #1 and DU #2 are controlled by the CU, and provides services for UEs within cell #A and cell #B respectively. Even though there are only one UE and two DUs in Figure 5B, persons skilled in the art will recognize that any number of UEs and DUs may be included in the wireless communication system.

**[0171]** In Figure 5B, UE 101B is moving from cell #A to cell #B, and may perform an LTM cell switch procedure from cell #A to access to cell #B, which is an LTM cell switch procedure performed between different cells belonging to different DUs but within the same CU. This scenario may be referred to as intra-CU inter-DU LTM/mobility. In short, this scenario may be called as inter-DU LTM/mobility.

**[0172]** Figure 5C illustrates a schematic diagram of an inter-CU LTM/mobility scenario in accordance with aspects of the present disclosure. The wireless communication system in Figure 5C includes some CUs (e.g. CU #1 and CU #2), a UE (e.g. UE 101C), and some DUs (e.g. DU #A and DU #B). DU #A is controlled by CU #1 and provides services for UEs within cell #X. DU #B is controlled by CU #2 and provides services for UEs within cell #Y. Even though there are only one UE, two DUs, and two CUs in Figure 5C, persons skilled in the art will recognize that any number of UEs, DUs, and CUs may be included in the wireless communication system.

**[0173]** In Figure 5C, UE 101C is moving from cell #X to cell #Y, and may perform an LTM cell switch procedure from cell #X to access to cell #Y, which is an LTM cell switch procedure performed between different cells belonging to different DUs within different CUs. This scenario may be referred to as inter-CU LTM/mobility.

**[0174]** Figure 6 illustrates a schematic diagram of an inter-DU intra-CU LTM procedure for intra-NR in accordance with aspects of the present disclosure. An inter-DU intra-CU LTM procedure is used for the case when a UE moves from one DU to another DU within the same CU during NR operation for LTM.

**[0175]** In the embodiments of Figure 6, a wireless communication system includes a UE, a source DU (which may also be referred to a serving DU, the source DU serves the UE before an LTM cell switch execution is triggered), a target DU, one or more candidate DUs (which may also be referred to as "(candidate) target DU(s)," "candidate target DU(s)" or

"candidate DU(s)" in Figure 6), and a CU. The source DU and the target DU or the one or more candidate DUs are within the CU. In SCG LTM, the source DU and the target DU or the one or more candidate DUs are within the SN, the CU is a CU of the SN. The UE is moving from the source DU to the target DU or one of the one or more candidate DUs. The source DU may manage (or control) the serving cell of the UE, and one or more source cells. The serving cell and the one or more source cells are considered as in the source DU. Each candidate DU of the candidate DU(s) may manage one or more LTM candidate cells, and the one or more LTM candidate cells are considered as in each candidate DU. One of the one or more candidate DUs manages the LTM candidate cell to which the UE may be switched. In some embodiments, the LTM candidate cell to which the UE may be switched to may be referred to as the "LTM candidate target cell." When one LTM candidate cell is selected as a target cell for LTM by the network or is indicated in the LTM cell switch MAC CE, the LTM candidate cell can be called as an LTM target cell. Then, the candidate DU which manages or controls the LTM candidate cell can be called as a target DU, i.e. the LTM target cell is managed by the target DU, and the LTM candidate cell is managed by the candidate target DU. In MCG LTM, above "cell" can also be called as PCell; and in SCG LTM, above "cell" can also be called as PSCell.

**[0176]** In operation 601, the UE sends a measurement report to the source DU containing measurements of neighboring cells. The source DU sends an UL RRC message transfer message conveying the received measurement report message to the CU.

**[0177]** In operation 602, the CU determines to initiate LTM configuration.

**[0178]** In operation 603, the CU sends a UE's context setup request message to the candidate DU, containing one target candidate cell ID. The CU indicates the source DU ID, and requests PRACH resources from the Candidate DU.

**[0179]** In operation 604, if the candidate DU accepts the request of LTM configuration, it responds with a UE's context setup response message including the generated lower layer RRC configuration (e.g. transmission configuration indication (TCI) state configuration and RACH configuration) and the RS configuration for the accepted LTM candidate cell.

**[0180]** In operation 605, the CU sends a UE's context modification request message to the source DU including the collected RS configuration, TCI state configuration and RACH configuration for the accepted LTM candidate cell(s) in other DUs.

**[0181]** In operation 606, the source DU responds with a UE's context modification response message which may include the RS configuration of the source cell, prepared LTM candidate cells and the generated CSI resource configuration.

**[0182]** In operation 607, the CU sends a UE's context modification request message to the candidate DU(s) containing the cell ID(s) of the prepared LTM candidate cell(s) and associated RS configuration for each LTM candidate cell in other candidate DU(s). In some cases, the source cell may be configured as one LTM candidate cell.

**[0183]** In operation 608, the candidate DU responds with a UE's context modification response message including the generated CSI resource configuration.

**[0184]** In operation 609, the CU sends a DL RRC message transfer message to the source DU, which includes the generated RRC reconfiguration message with the LTM configuration.

**[0185]** In operation 610, the source DU forwards the received RRC reconfiguration message to the UE.

**[0186]** In operation 611, the UE responds to the source DU with an RRC reconfiguration complete message.

**[0187]** In operation 612, the source DU forwards the RRC reconfiguration complete message to the CU via an UL RRC message transfer message.

**[0188]** In operation 613 (optional), early synchronization may be performed.

**[0189]** In operations 614 and 615 (optional), the candidate DU sends the TA value, the associated CFRA resource information, the candidate cell ID and the source DU ID to the source DU via the DU-CU TA INFORMATION TRANSFER and CU-DU TA INFORMATION TRANSFER messages, for which the source DU ID is omitted in the CU-DU TA INFORMATION TRANSFER message.

**[0190]** In operation 616, the UE sends an L1 measurement report to the source DU.

**[0191]** In operation 617, the source DU decides to execute LTM cell switch to an LTM candidate target cell.

**[0192]** In operation 618, the source DU sends a cell switch command to the UE.

**[0193]** In operation 619, the source DU sends the DU-CU cell switch notification message to the CU to indicate the initiation of the LTM command to the UE including the target cell ID and the selected beam information.

**[0194]** In operation 620, the CU sends the target cell ID and the TCI state ID to the target DU in the CU-DU cell switch notification message.

**[0195]** In operation 621, the target DU detects the access of the UE.

**[0196]** In operation 622, the target DU sends the access success message to the CU with the target cell ID.

**[0197]** In operation 623, the UE sends an RRC reconfiguration complete message to the target DU.

**[0198]** In operation 624, the target DU forwards the RRC reconfiguration complete message to the CU via an UL RRC message transfer message.

**[0199]** In operation 625 (optional), the CU may send a UE's context release command message to the source DU to release the resources of prepared cells.

**[0200]** In operation 626 (optional), the source DU responds with a UE's context release complete message.

**[0201]** Some embodiments of the present disclosure refer to an intra-DU intra-CU LTM procedure for intra-NR, wherein the serving or source cell and one or more LTM candidate cells are considered as in the same DU. A wireless communication system of the intra-DU LTM procedure includes a UE, a DU (which may also be referred to a source or serving DU, or a target DU, or a candidate DU), and a CU. The source DU is managed or controlled by the CU. That is to say, different from the source DU and the target DU or the candidate DU(s) in Figure 6, the intra-DU LTM procedure only refers to one DU, i.e. the source DU and the target DU or the candidate DU(s) are the same DU. In an intra-DU LTM procedure, the messages transferred between the DU and the CU are similar as the messages transferred

between the source DU or the target DU or the one or more candidate DUs and the CU in an inter-DU LTM procedure as described in the embodiments of Figure 6.

**[0202]** Figure 8 illustrates a flowchart of a method related to an LTM cell switch procedure in accordance with aspects of the present disclosure. The operations of the method may be implemented by a UE as described herein. In some implementations, the UE may execute a set of instructions to control the function elements of the UE to perform the described functions. In some implementations, aspects of operations 802 and 804 may be performed by UE 200, UE 101A, UE 101B, or UE 101C, as described with reference to Figures 2 and 5A-5C. Each of operations 802 and 804 may be performed in accordance with examples as described herein. A specific example is described in Embodiment 1 as follows.

**[0203]** At operation 802, the method may include storing, by a UE, information (denoted as "information #1") related to access in an LTM cell switch procedure. At operation 804, the method may include reporting information #1. Information #1 may also be named as "a RACH information report related to an LTM cell switch procedure" or the like. For example, information #1 may include at least one of the following:

- (1) information related to at least one early TA acquisition (or information related to at least one early uplink (UL) synchronization, or information related to at least one PDCCH order triggered at least one RA, or information related to at least one PDCCH order triggered at least one early TA acquisition);
- (2) information related to at least one CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated or triggered;
- (3) information related to at least one CFRA based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure;
- (4) information related to at least one UE based TA measurement or at least one RACH-less LTM based on the at least one UE based TA measurement; or
- (5) information related to at least one CBRA.

**[0204]** In some embodiments of the present disclosure, information #1 is stored or reported in a random access (RA) report. The RA report may include at least one of the following:

- (1) one RA report entry or one entry used to convey information for one or more operations performed by the UE during the LTM cell switch procedure;
- (2) multiple RA report entries or multiple entries used to separately convey information for one or more operations performed by the UE during the LTM cell switch procedure; or
- (3) information (e.g. at least one explicit or implicit indication) indicating at least one switch of one or more operations which is performed by the UE during the LTM cell switch procedure (one of the at least one switch is denoted as "switch #1" for simplicity).

**[0205]** In some embodiments, the one or more operations includes at least one of the following:

- (1) at least one early TA acquisition or at least one early UL synchronization, or at least one PDCCH order triggered at least one RA, or at least one PDCCH order triggered at least one early TA acquisition;
- (2) at least one CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated or triggered (e.g. an LTM Cell Switch Command MAC CE);
- (3) at least one CFRA based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure;
- (4) at least one UE based TA measurement or at least one RACH-less LTM based on the at least one UE based TA measurement; or
- (5) at least one CBRA.

**[0206]** In some embodiments, switch #1 includes at least one of the following:

- (1) switch from at least one early TA acquisition to at least one RACH-less LTM based on at least one UE based TA measurement (the least one early TA acquisition can also be called as at least one early UL synchronization, or at least one PDCCH order triggered at least one RA, or at least one PDCCH order triggered at least one early TA acquisition. the at least one RACH-less LTM based on at least one UE based TA measurement can also be called as at least one UE-based TA measurement, or at least one RACH-less LTM based on UE based TA);

- (2) switch from the at least one early TA acquisition to at least one RACH based LTM (one RACH based LTM may be at least one of: a CFRA based on CFRA resources in LTM cell switch command MAC CE, a CFRA based on CFRA resources in an RRC Reconfiguration message, or a CBRA);
- (3) switch from the at least one RACH-less LTM based on at least one UE based TA measurement to the at least one RACH based LTM;
- (4) switch from at least one CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated or triggered to at least one CFRA based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure; or
- (5) switch from at least one CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated or based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure to at least one CBRA (e.g. switch from at least one CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated to at least one CBRA, or switch from at least one CFRA based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure to at least one CBRA, or switch from at least one CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated and based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure to at least one CBRA).

**[0207]** In some embodiments of the present disclosure, information #1 includes at least one of the following:

- (1) time duration between two PDCCH orders (e.g. any two consecutive or any two non-consecutive PDCCH orders, or time duration between first PDCCH order and last PDCCH order) triggered for early TA acquisition, e.g. time duration between two PDCCH orders (e.g. any two consecutive or any two non-consecutive PDCCH orders, or time duration between first PDCCH order and last PDCCH order) to a same LTM candidate cell for early TA acquisition, or time duration between two PDCCH orders (e.g. any two consecutive or any two non-consecutive PDCCH orders, or time duration

between first PDCCH order and last PDCCH order) to different LTM candidate cells for early TA acquisition; or

(2) one or more layer 1 (L1) measurement results. For instance, the L1 measurement results includes at least one of the following:

- a) L1 measurement results before performing at least one early UL synchronization or at least one early TA acquisition;
- b) L1 measurement results before performing at least one RACH based LTM (e.g. the RACH based LTM includes at least one of the following: a CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated or triggered; a CFRA based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure; or a CBRA);
- c) L1 measurement results before performing at least one RACH-less based LTM (e.g. the RACH-less based LTM includes at least one of the following: an early UL synchronization or an early TA acquisition or PDCCH order triggered RA or PDCCH order triggered early TA acquisition, or UE based TA measurement or UE-based TA measurement or a RACH-less LTM based on UE based TA);
- d) L1 measurement results when an LTM cell switch execution is initiated or triggered; or
- e) L1 measurement results when the LTM cell switch execution is successfully completed or upon reception of an indication from a lower layer indicating that the LTM cell switch execution is successfully completed.

**[0208]** In some embodiments of the present disclosure, information #1 includes at least one of the following:

- (1) a RA purpose or information indicating that a RA procedure is initiated or triggered by a PDCCH order;
- (2) an RA purpose or information indicating that the RA procedure is initiated for the LTM cell switch procedure;

- (3) information indicating whether CFRA resources are provided in a lower layer message concerning that an LTM cell switch execution is initiated or triggered;
- (4) information indicating whether the CFRA resources are provided in an RRC reconfiguration message for the LTM cell switch procedure;
- (5) one or more parameters of an uplink carrier for physical random access channel (PRACH) transmission on an LTM candidate cell, e.g. frequencyInfoUL;
- (6) subcarrier spacing of PRACH for the LTM cell switch procedure, e.g. ltm-prach-SubcarrierSpacing;
- (7) n-TimingAdvanceOffset to be applied for uplink transmissions on the LTM candidate cell, e.g. n-TimingAdvanceOffset; N\_TA-Offset;
- (8) one or more RACH parameters for performing the RA procedure on the LTM candidate cell, e.g. rach-ConfigGeneric;
- (9) a total number of synchronization signal blocks (SSB)s for a RACH occasion, e.g. number of SSBs for RACH occasion;
- (10) one or more bandwidth part (BWP) parameters, e.g. bwp-GenericParameters;
- (11) one or more SSBs per RACH occasion, e.g. ssb-PerRACH-Occasion; or
- (12) a PRACH root sequence index, e.g. prach-RootSequenceIndex.

**[0209]** It should be noted that the method described in Figure 8 describes possible implementations, and that the operations and the steps may be rearranged or otherwise eliminated or modified and that other implementations are possible, without departing from the spirit and scope of the disclosure.

**[0210]** In accordance with some aspects of the present disclosure, operations of a method related to an LTM cell switch procedure may be implemented by a network node, e.g. a BS or a CU of a BS as described herein. The BS or the CU is of the LTM procedure, or is a node which generates the RRC reconfiguration message including LTM related configuration for the LTM cell switch procedure or a node which sends the RRC reconfiguration message for the LTM cell switch procedure to a UE. In some implementations, the BS or the CU may execute a set of instructions to control the function elements of the BS or the CU to perform

the described functions. In some implementations, aspects of the operations of the BS or the CU may be performed by NE 400 as described with reference to Figure 4. Each of operations may be performed in accordance with examples as described herein. A specific example is described in Embodiment 1 as follows.

**[0211]** Specifically, the method may include receiving, by a BS or a CU of a BS, information related to access in an LTM cell switch procedure (e.g. information #1 as described in the embodiments of Figure 8). In some embodiments, the BS or the CU of the BS may transmit the received information to at least one DU of the BS. The information may also be named as "a RACH information report related to an LTM cell switch procedure" or the like.

**[0212]** In some embodiments, the information received by the BS or the CU or the at least one DU may include the same elements (e.g. information related to at least one early TA acquisition) as those of information #1 in the embodiments of Figure 8.

**[0213]** Moreover, the same as information #1 in the embodiments of Figure 8, the information may be stored or reported in an RA report. The RA report may include:

- (1) one RA report entry or one entry used to convey information for one or more operations (e.g. similar to the one or more operations as described in the embodiments of Figure 8) performed by a UE during the LTM cell switch procedure;
- (2) multiple RA report entries or multiple entries used to separately convey information for the one or more operations performed by the UE during the LTM cell switch procedure; and/or
- (3) information (e.g. at least one explicit or implicit indication) indicating at least one switch (e.g. one of the at least one switch is similar as "switch #1" as described in the embodiments of Figure 8) of the one or more operations performed by the UE during the LTM cell switch procedure.

**[0214]** The following text describes specific Embodiment 1 of the flowcharts as shown and illustrated above. Embodiment 1 provides enhancements of an RA report for MCG LTM or SCG LTM. The RA report enhanced in following Embodiments 1-1, 1-2 and 1-3 can be applied for MCG LTM or SCG LTM.

**[0215]** Embodiment 1 (enhancements of an RA report for LTM) (for MCG LTM or SCG LTM)

**[0216]** Embodiment 1, in an MCG LTM or SCG LTM procedure, depending on the availability of a valid TA value, a UE may perform either a RACH-less LTM or RACH-based LTM cell switch.

**[0217]** In some cases, a UE performs at least one RACH-less LTM cell switch (the RACH-less LTM cell switch includes at least one of the following: an early UL synchronization or an early TA acquisition or PDCCH order triggered RA or PDCCH order triggered early TA acquisition, or UE based TA measurement or UE-based TA measurement or a RACH-less LTM based on UE based TA) upon receiving a cell switch command (e.g. LTM Cell Switch Command MAC CE):

- (1) In some implementations, if a TA value is provided in the cell switch command, the UE may apply the TA value as instructed by the network. For this case, before the cell switch command, at least one RA procedure or at least one early TA acquisition procedure or at least one early UL synchronization may be triggered by at least one PDCCH order to an LTM candidate cell, or the UE performs at least one RACH for early UL synchronization or at least one RACH for early TA acquisition.
- (2) In some other implementations, if a UE-based TA measurement is configured, but no TA value is provided in the cell switch command, the UE may apply a TA value by itself if available.

**[0218]** In some cases, if no valid TA value is available, a UE performs at least one RACH-based LTM cell switch (the RACH-based LTM cell switch includes at least one of the following: a CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated or triggered; a CFRA based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure; or a CBRA) upon receiving a cell switch command (e.g. LTM Cell Switch Command MAC CE). For example:

- (1) In some implementations, the UE performs at least one CFRA to a target cell, if one or more contention-free RA resources are provided in an LTM cell switch command MAC CE.

- (2) In some further implementations, the UE performs at least one CFRA to a target cell, if no contention-free RA resource is provided in an LTM cell switch command MAC CE, but one or more contention-free RA resources are provided in an RRC reconfiguration message for the LTM procedure.
- (3) In some additional implementations, the UE performs at least one CFRA to a target cell based on contention-free RA resources provided in an LTM cell switch command MAC CE, if contention-free RA resources are provided in the LTM cell switch command MAC CE, and the UE performs at least one CFRA to a target cell based on contention-free RA resources provided in an RRC reconfiguration message for the LTM procedure, if contention-free RA resources are provided in the RRC reconfiguration message.
- (4) In some other implementations, the UE performs a CBRA to a target cell, if no contention-free RA resource is provided.

**[0219]** Embodiment 1-1 (for MCG LTM or SCG LTM)

**[0220]** In an LTM procedure, a UE may perform at least one of following operations:

- (1) at least one RACH for early UL synchronization or at least one RACH for early TA acquisition, or at least one RA triggered by at least one PDCCH order, or at least one early TA acquisition procedure triggered by at least one PDCCH order, if configured by the network;
- (2) at least one UE-based TA measurement, or at least one RACH-less LTM based on UE based TA;
- (3) at least one CFRA based on CFRA resources in an LTM cell switch command MAC CE;
- (4) at least one CFRA based on CFRA resources in an RRC reconfiguration message; or
- (5) at least one CBRA based LTM.

**[0221]** In general, in Embodiment 1-1, the network needs to optimize RACH related configuration for LTM, e.g. to optimize RA resources for an early TA acquisition or a RACH-less LTM, or CFRA resource related information included in an LTM cell switch command MAC CE or an RRC reconfiguration message. For example, for a PDCCH order triggered RA for an early TA acquisition, a candidate target DU needs to optimize CFRA resources

configured for the early TA acquisition, e.g. for the case that a TA value is not available (e.g. a UE does not get a TA value from network in an RRC reconfiguration message or a TA value is not valid anymore). In some embodiments, to assist the network to optimize the RACH related configuration for LTM, an RA report needs to be enhanced to include LTM related information. In some implementations, the LTM related information or the RA report includes at least one of the following:

- (1) Information related with at least one early UL synchronization or early TA acquisition or at least one PDCCH order triggered at least one RA or at least one early TA acquisition procedure, and/or
- (2) information related with one or more CFRA procedures based on CFRA resources in an LTM cell switch command MAC CE, and/or
- (3) information related with one or more CFRA procedures based on CFRA resources in an RRC reconfiguration message, and/or
- (4) information related with at least one UE based TA measurement or at least one RACH-less LTM based on UE based TA, and/or
- (5) information related with at least one CBRA.

**[0222]** In some other embodiments of Embodiment 1-1, the abovementioned LTM related information may also be included in a radio link failure (RLF) report, an SCG failure information message, and/or a successful report. For instance, for MCG LTM, the successful report may be a SHR or a new introduced report. For SCG LTM, the successful report may be a SPR or a new introduced report.

**[0223]** Regarding an RA report enhanced to include LTM related information, different LTM related information may be included in the RA report according to the following different embodiments, i.e. Embodiments 1-1-1, 1-1-2, 1-1-3, 1-1-4, 1-1-5 and 1-1-6.

**[0224]** Embodiment 1-1-1

**[0225]** If a procedure switching from at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early

UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization) to at least one RACH-less LTM based on UE based TA (or to at least one UE based TA measurement) occurs, the RA report may be of at least one of following formats:

- (1) In the RA report, one entry or one RA report entry is used to convey both of information for at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization) and information for at least one RACH-less LTM based on UE based TA (or at least one UE based TA measurement).
- (2) In the RA report, two entries or two RA report entries are used to separately convey the information for the at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization) and the information for at least one RACH-less LTM based on UE based TA (or at least one UE based TA measurement).
- (3) The RA report includes at least one (explicit or implicit) indication (e.g. per RA attempt or per RA procedure) that enables the network to know that switch from at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization) to at least one RACH-less LTM based on UE based TA (or to at least one UE based TA measurement) is performed by the UE.
  - In an implementation, the RA report includes an indication to indicate an access type switching point, for example, an indication concerning that switching from a

RACH for early TA acquisition to a UE based TA measurement is performed by the UE.

**[0226]** Embodiment 1-1-2

**[0227]** If a procedure switching from at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization) to at least one RACH based LTM (e.g. the RACH based LTM includes at least one of: a CFRA based on CFRA resources in LTM cell switch command MAC CE, a CFRA based on CFRA resources in an RRC reconfiguration message, or a CBRA) occurs, the RA report may be of at least one of following formats:

- (1) In the RA report, one entry or one RA report entry is used to convey information for at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization) and information for at least one RACH based LTM (e.g. the at least one RACH based LTM includes at least one of: a CFRA based on CFRA resources in an LTM cell switch command MAC CE, a CFRA based on CFRA resources in an RRC reconfiguration message, or a CBRA).
- (2) In the RA report, multiple entries or multiple RA report entries are used to separately convey the information for the at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization) and the information for at least one RACH based LTM (e.g. the at least one RACH based LTM includes at least one of: a CFRA based on CFRA resources in LTM cell switch

command MAC CE, a CFRA based on CFRA resources in an RRC reconfiguration message, or a CBRA.

- For one example, two RA report entries are used to separately convey the information for the at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization) and the information for at least one CFRA based on CFRA resources in LTM cell switch command MAC CE.
- For another example, three RA report entries are used to separately convey the information for the at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization), the information for at least one CFRA based on CFRA resources in an LTM cell switch command MAC CE, and the information for at least one CFRA based on CFRA resources in an RRC reconfiguration message.

(3) The RA report includes at least one (explicit or implicit) indication (e.g. per RA attempt or per RA procedure) that enables the network to know that switching from at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization) to at least one RACH based LTM (e.g. the at least one RACH based LTM includes at least one of: a CFRA based on CFRA resources in LTM cell switch command MAC CE, a CFRA based on CFRA resources in an RRC reconfiguration message, or a CBRA) is performed by the UE.

- In an implementation, the RA report includes an indication to indicate access type switching point, for example, an indication concerning that switching from a RACH for early TA acquisition to at least one RACH based LTM (e.g. the at least one RACH based LTM includes at least one of: a CFRA based on CFRA resources in LTM cell switch command MAC CE, a CFRA based on CFRA resources in an RRC reconfiguration message, or a CBRA) is performed by the UE.

**[0228]** Embodiment 1-1-3

**[0229]** If a procedure switching from at least one RACH-less LTM based on UE based TA (or at least one UE based TA measurement) to at least one RACH based LTM (e.g. the at least one RACH based LTM includes at least one of: a CFRA based on CFRA resources in LTM cell switch command MAC CE, a CFRA based on CFRA resources in an RRC reconfiguration message, or a CBRA) occurs, the RA report may be of at least one of following formats:

- (1) In the RA report, one entry or one RA report entry is used to convey both of information for the at least one RACH-less LTM based on UE based TA (or at least one UE based TA measurement) and information for the at least one RACH based LTM (e.g. the RACH based LTM includes at least one of: a CFRA based on CFRA resources in LTM cell switch command MAC CE, a CFRA based on CFRA resources in an RRC reconfiguration message, or a CBRA), or two RA report entries are used to separately convey the information for the at least one RACH-less LTM based on UE based TA (or at least one UE based TA measurement) and the information for the at least one RACH based LTM.
- (2) The RA report includes at least one (explicit or implicit) indication (e.g. per RA attempt or per RA procedure) that enables the network to know that switch from at least one RACH-less LTM based on UE based TA/UE based TA measurement to at least one RACH based LTM (e.g. the at least one RACH based LTM includes at least one of: a CFRA based on CFRA resources in LTM cell switch command MAC CE, a CFRA based on CFRA resources in an RRC reconfiguration message, or a CBRA) is performed by the UE.

- In an implementation, the RA report includes an indication to indicate access type switching point, for example, an indication concerning that switching from a RACH-less LTM based on UE based TA (or a UE based TA measurement) to at least one RACH based LTM (e.g. the at least one RACH based LTM includes at least one of: a CFRA based on CFRA resources in LTM cell switch command MAC CE, a CFRA based on CFRA resources in an RRC reconfiguration message, or a CBRA) is performed by the UE.

**[0230]** Embodiment 1-1-4

**[0231]** If a procedure switching from at least one CFRA based on CFRA resources in an LTM cell switch command MAC CE to at least one CFRA based on CFRA resources in an RRC reconfiguration message for LTM occurs, the RA report may be of at least one of following formats:

- (1) In the RA report, one entry or one RA report entry is used to convey both of information for the at least one CFRA based on CFRA resources in an LTM cell switch command MAC CE and information for the at least one CFRA based on CFRA resources in an RRC reconfiguration message for LTM, or two RA report entries are used to separately convey the information for the at least one CFRA based on CFRA resources in an LTM cell switch command MAC CE and the information for the at least one CFRA based on CFRA resources in an RRC reconfiguration message for LTM.
- (2) The RA report includes at least one (explicit or implicit) indication (e.g. per RA attempt or per RA procedure) that enables the network to know that switching from a CFRA based on CFRA resources in an LTM cell switch command MAC CE to a CFRA based on CFRA resources in an RRC reconfiguration message for LTM is performed by the UE.
  - In an implementation, the RA report includes an indication to indicate access type switching point (for example, an indication concerning that switching from a CFRA based on CFRA resources in an LTM cell switch command MAC CE to a CFRA based on CFRA resources in an RRC reconfiguration message for LTM is performed by the UE).

**[0232]** Embodiment 1-1-5

**[0233]** If a procedure switching from at least one CFRA (e.g. at least one CFRA based on CFRA resources in an LTM cell switch command MAC CE and/or at least one CFRA based on CFRA resources in an RRC reconfiguration message) to at least one CBRA occurs, the RA report may be of at least one of following formats:

- (1) In the RA report, one entry or one RA report entry is used to convey both of information for the at least one CFRA (e.g. at least one CFRA based on CFRA resources in an LTM cell switch command MAC CE and/or at least one CFRA based on CFRA resources in an RRC reconfiguration message) and information for the at least one CBRA.
- (2) In the RA report, multiple entries or multiple RA report entries are used to separately convey the information for the at least one CFRA (e.g. at least one CFRA based on CFRA resources in an LTM cell switch command MAC CE and/or at least one CFRA based on CFRA resources in an RRC reconfiguration message) and the information for the at least one CBRA.
  - For an example, two entries or two RA report entries are used to separately convey the information for the at least one CFRA based on CFRA resources in an LTM cell switch command MAC CE and the information for the at least one CBRA.
  - For another example, three entries or three RA report entries are used to separately convey the information for the at least one CFRA based on CFRA resources in an LTM cell switch command MAC CE, the information for the at least one CFRA based on CFRA resources in an RRC reconfiguration message, and the information for the at least one CBRA.
- (3) The RA report includes at least one (explicit or implicit) indication (e.g. per RA attempt or per RA procedure) that enables the network to know that switching from at least one CFRA (e.g. at least one CFRA based on CFRA resources in an LTM cell switch command MAC CE and/or at least one CFRA based on CFRA resources in an RRC reconfiguration message) to at least one CBRA is performed by the UE.
  - In an implementation, the RA report includes an indication to indicate access type switching point, for example, an indication concerning switching from a CFRA (e.g. a CFRA based on CFRA resources in an LTM cell switch command MAC CE and/or

a CFRA based on CFRA resources in an RRC reconfiguration message) to a CBRA is performed by the UE.

**[0234]** Embodiment 1-1-6

**[0235]** If a procedure switching from at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization) to at least one RACH-less LTM based on UE based TA (or at least one a UE based TA measurement) and then switching to at least one RACH based LTM (e.g. the RACH based LTM includes at least one of: a CFRA based on CFRA resources in LTM cell switch command MAC CE, a CFRA based on CFRA resources in an RRC reconfiguration message, or a CBRA) occurs, the RA report may be of at least one of following formats:

- (1) In the RA report, one entry or one RA report entry is used to convey all of information for the at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization), information for the at least one RACH-less LTM based on UE based TA, and information for the at least one RACH based LTM.
- (2) In the RA report, multiple entries or multiple RA report entries are used to separately convey the information for the at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization), the information for the at least one RACH-less LTM based on UE based TA, and the information for the at least one RACH based LTM.

- For an example, three entries or three RA report entries are used to separately convey the information for the at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization), the information for the at least one RACH-less LTM based on UE based TA, and the information for the at least one RACH based LTM (e.g. the RACH based LTM includes at least one of: a CFRA based on CFRA resources in LTM cell switch command MAC CE, a CFRA based on CFRA resources in an RRC reconfiguration message, or a CBRA).
- For another example, four entries or four RA report entries are used to separately convey the information for the at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization), the information for the at least one RACH-less LTM based on UE based TA, the information for at least one CFRA based on CFRA resources in LTM cell switch command MAC CE, and the information for at least one CFRA based on CFRA resources in an RRC reconfiguration message.
- For another example, four entries or four RA report entries are used to separately convey the information for the at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization), the information for the at least one RACH-less LTM based on UE based TA, the information for at least one CFRA based on CFRA resources in LTM cell switch command MAC CE, and the information for the at least one CBRA.

- For another example, five entries or five RA report entries are used to separately convey the information for the at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization), the information for the at least one RACH-less LTM based on UE based TA, the information for at least one CFRA based on CFRA resources in LTM cell switch command MAC CE, the information for at least one CFRA based on CFRA resources in an RRC reconfiguration message, and the information for the at least one CBRA.
- (3) The RA report includes at least one (explicit or implicit) indication (e.g. per RA attempt or per RA procedure) that enables the network to know that switching from at least one RA or at least one early TA acquisition procedure triggered by at least one PDCCH order (or from at least one RACH for at least one early UL synchronization or from at least one early TA acquisition or from at least one early UL synchronization or at least one early TA acquisition or PDCCH order triggered early TA acquisition or PDCCH order triggered early UL synchronization) to at least one RACH-less LTM based on UE based TA and then switching to at least one RACH based LTM occurs is performed by the UE.
- In an implementation, the RA report includes an indication to indicate access type switching point, for example, an indication concerning switching from an early TA acquisition procedure to a RACH-less LTM based on UE based TA and then switching to a RACH based LTM (e.g. the RACH based LTM includes at least one of: a CFRA based on CFRA resources in LTM cell switch command MAC CE, a CFRA based on CFRA resources in an RRC reconfiguration message, or a CBRA) is performed by the UE.

**[0236]** In some embodiments of the present disclosure, after a BS (e.g. gNB) receives the information related to access in a LTM cell switch procedure or the RA report as described above in Embodiment 1-1, especially, in any of Embodiments 1-1-1 to 1-1-6, in case of the BS comprises of a CU and at least one DU, a CU of the BS may transmit the received

information related to access in a LTM cell switch procedure or the received RA report to at least one DU of the BS.

**[0237]** Embodiment 1-2 (for MCG LTM or SCG LTM)

**[0238]** For early TA acquisition triggered by PDCCH order, in some embodiments, it is possible that multiple PDCCH orders for early TA acquisition may be sent to a UE, e.g. multiple PDCCH orders to a same LTM candidate cell may be sent to a UE, for the case that TA is not valid anymore or TA is not given in an LTM cell switch command MAC CE or TA is not available in the network. In order to enable the network to optimize CFRA resources for early TA acquisition, the UE may store and report time duration between two PDCCH orders for early TA acquisition, e.g. time duration between two PDCCH orders to a same LTM candidate cell (for instance, time duration between any two consecutive PDCCH orders to a same LTM candidate cell, or time duration between any two non-consecutive PDCCH orders to a same LTM candidate cell, or time duration between a first PDCCH order and the last PDCCH order to a same LTM candidate cell in the RA report.

**[0239]** In Embodiment 1-2, for MCG LTM, for instance, the UE may receive PDCCH order #1 to LTM candidate cell #a, PDCCH order #2 to LTM candidate cell #a and PDCCH order #3 to LTM candidate cell #a. The UE may store and report time duration between PDCCH order #1 and PDCCH order #2, and/or time duration between PDCCH order #2 and PDCCH order #3, and/or time duration between PDCCH order #1 and PDCCH order #3, in the RA report.

**[0240]** In Embodiment 1-2, for SCG LTM, for instance, the UE may receive PDCCH order #1 to LTM candidate PSCell #1, PDCCH order #2 to LTM candidate PSCell #2 and PDCCH order #3 to LTM candidate PSCell #3. The UE may store and report time duration between PDCCH order #1 and PDCCH order #2, and/or time duration between PDCCH order #2 and PDCCH order #3, and/or time duration between PDCCH order #1 and PDCCH order #3, in the RA report.

**[0241]** Embodiment 1-3 (for MCG LTM or SCG LTM)

**[0242]** To optimize RA resources for an LTM procedure, a UE may store and/or report one or more measurement results during the LTM procedure in the RA report. For example, the UE may store and/or report, in the RA report (per RACH procedure granularity or RACH

attempt granularity), at least one of the following elements: (1) L1 or L3 measurement results (of a source cell, or at least one LTM candidate cell, or a target cell, or one or more neighbour cells); and/or (2) measured reference signal received power (RSRP) of a downlink (DL) path loss reference. These elements may be obtained before performing an early UL synchronization or an early TA acquisition with LTM candidate cell(s), or before performing a RACH procedure with a target cell (e.g. after receiving an LTM cell switch command MAC CE, before the UE performs CFRA based on CFRA resources in an LTM cell switch command MAC CE, or before the UE performs CFRA based on CFRA resources in an RRC reconfiguration message for LTM, or before the UE performs CBRA), or before performing a RACH-less procedure with a target cell.

**[0243]** In Embodiment 1-3, L1 or L3 measurement results of a source cell, a target cell, at least one LTM candidate cell, or one or more neighbour cells when an LTM cell switch execution is initiated or triggered (or when reconfiguration with sync for LTM cell switch is initiated or triggered, or when reception of the LTM cell switch command MAC CE, or when receiving a trigger for an LTM cell switch from a lower layer, or when an indication from a lower layer concerning that the LTM cell switch execution is triggered is received), or when the LTM cell switch execution is successful, or upon an indication from lower layer that the LTM cell switch execution has been successfully completed, may also be stored and/or reported in the RA report.

**[0244]** Additionally, in Embodiment 1-3, for optimization of early UL synchronization or early TA acquisition or RACH resources for an LTM procedure, at least following information related with the early UL synchronization or early TA acquisition, or RA resources related information for PDCCH order triggered early TA acquisition procedure, may be stored and/or reported in the RA report:

- (1) a new RA purpose or an indication to indicate that the Random Access Procedure was triggered by a PDCCH order to an LTM candidate cell;
- (2) a new RA purpose or an indication to indicate that the Random Access procedure was initiated for LTM cell switch;
- (3) a new RA purpose or an indication to indicate that the RA procedure was initiated for early TA acquisition or early UL synchronization;

- (4) an indication to indicate if the contention-free Random Access Resources were provided in a lower layer message concerning that an LTM cell switch execution is initiated or triggered, e.g. an LTM cell switch command MAC CE;
- (5) an indication to indicate if the contention-free Random Access Resources were provided in an RRC reconfiguration message for LTM;
- (6) frequencyInfoUL, parameters of an uplink carrier for PRACH transmission on an LTM candidate cell;
- (7) ltm-prach-SubcarrierSpacing, subcarrier spacing of PRACH for LTM;
- (8) n-TimingAdvanceOffset, N\_TA-Offset to be applied for all uplink transmissions on an LTM candidate cell;
- (9) rach-ConfigGeneric, RACH parameters for performing a random access procedure on an LTM candidate cell;
- (10) ssb-PerRACH-Occasion, number of SSBs for RACH occasion;
- (11) bwp-GenericParameters;
- (12) ssb-PerRACH-Occasion; or
- (13) prach-RootSequenceIndex.

**[0245]** In some other embodiments of Embodiment 1-3, the abovementioned information may be stored and/or reported by the UE in an RLF report, or an SCG failure information message, or a successful report. For instance, for MCG LTM, the successful report may be a SHR or a new introduced report. For SCG LTM, the successful report may be a SPR or a new introduced report.

**[0246]** In accordance with some aspects of the present disclosure, operations of another method related to an LTM cell switch procedure may be implemented by a UE as described herein. In some implementations, the UE may execute a set of instructions to control the function elements of the UE to perform the described functions. In some implementations, aspects of operations of the UE may be performed by UE 200, UE 101A, UE 101B, or UE 101C, as described with reference to Figures 2 and 5A-5C. Specific examples are described in Embodiments 2, 3 and 4 as follows.

**[0247]** Specifically, the method may include receiving, by a UE, a configuration (denoted as "configuration #A") related to at least one of the following:

- (1) a context of the UE associated with an LTM cell switch procedure;
- (2) a set of parameters (or configurations) used by the UE during the LTM cell switch procedure; or
- (3) a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0248]** For example, configuration #A may include at least one of the following:

- (1) a configuration (denoted as "configuration #1") generated by a BS of the LTM cell switch procedure, or generated by a CU of the BS of the LTM cell switch procedure;
- (2) a configuration (denoted as "configuration #2") generated by a source DU of the BS;
- (3) a configuration (denoted as "configuration #3") generated by a target DU of the BS; or
- (4) at least one configuration (denoted as "configuration #4") generated by at least one candidate target DU of the BS.

**[0249]** In some cases, configuration #A or the elements included in configuration #A may also be named as "a reference" or "Configuration Information" or "Mobility Information" or "LTM Information" or "Mobility Information for LTM" or "LTM related Mobility Information" or the like.

**[0250]** In some embodiments, the UE may transmit at least one of the following: (1) a part or a whole of configuration #A; or (2) successful LTM related information for the LTM cell switch procedure (e.g. information related to successful LTM or a successful report for LTM). In some examples, the part or the whole of configuration #A and the successful LTM related information may be transmitted by the UE in separate IEs or UE variables or reports or messages or may be transmitted in a same IE or UE variable or report or message. In some other examples, the part or the whole of configuration #A may be transmitted within the successful LTM related information (or within the information related to successful LTM or within the successful report for LTM).

**[0251]** In an embodiment, the successful LTM related information (or information related to successful LTM) is stored as or reported by the UE via at least one of the following reports:

- (1) a SHR;
- (2) a SPR; or
- (3) a successful report for the LTM cell switch procedure.

**[0252]** In some embodiments, if at least one trigger condition related to storing or reporting the successful LTM related information (or information related to successful LTM) is satisfied, configuration #A corresponding to the at least one satisfied trigger condition is transmitted by the UE. In an example, if the at least one trigger condition is associated with at least one timer T310 or T312 related threshold, the configuration includes configuration #2 (generated by the source DU of the BS). In another example, if the at least one trigger condition is associated with at least one timer T304 related threshold, configuration #A includes configuration #3 (generated by the target DU) and/or configuration #4 (generated by the at least one candidate target DU). A specific example is described in Embodiment 2-1 as follows.

**[0253]** In some embodiments, the UE may receive a configuration (denoted as "configuration #5") used for the UE to store or report the successful LTM related information or information related to successful LTM or the successful report for LTM. Then, the UE may store the successful LTM related information or information related to successful LTM or the successful report for LTM.

**[0254]** In some embodiments, the UE may release or clear configuration #5 upon or during:

- (1) an RRC reestablishment is initiated;
- (2) an RRC resume is initiated;
- (3) an RRC setup is initiated;
- (4) a reception of an RRC release message;
- (5) an LTM cell switch execution failure happens, e.g. supervision timer T304 expiry;

- (6) an RLF occurs shortly after a successful LTM cell switch execution;
- (7) a reception of a message to release an LTM related configuration for the LTM cell switch procedure, e.g. an RRC message that indicates the UE to release LTM or stop LTM;
- (8) a reconfiguration with synchronization on a PCell is initiated, e.g. a normal handover or a conditional handover (CHO) or a DAPS handover (HO) is initiated;
- (9) a reconfiguration with synchronization on a PSCell is initiated, e.g. a normal PSCell change or a conditional PSCell change (CPC) is initiated; or
- (10) a successful execution of the LTM cell switch procedure.

**[0255]** In some embodiments, the UE may discard the successful LTM related information or the information related to successful LTM or the successful report for LTM upon or during:

- (1) a time period (e.g. 48 hours) after the successful LTM related information is stored or generated at the UE but the successful LTM related information or the information related to successful LTM or the successful report for LTM is not fetched by network (e.g. a BS);
- (2) the successful LTM related information or the information related to successful LTM or the successful report for LTM is retrieved by the network;
- (3) a detach procedure is initiated; or
- (4) another successful report for the LTM cell switch procedure is initiated.

**[0256]** In an embodiment, to discard the successful LTM related information or the information related to successful LTM or the successful report for LTM, the UE may release at least one IE or UE variable or report or message, which is used to store or generate the successful LTM related information or the information related to successful LTM or the successful report for LTM. Specific examples are described in Embodiments 3 and 4 as follows.

**[0257]** In accordance with some aspects of the present disclosure, operations of another method related to an LTM cell switch procedure may be implemented by a network node, e.g. a BS or a CU of a BS as described herein. The BS or the CU is of the LTM procedure, or is a node which generates an RRC reconfiguration message including LTM related

configuration for the LTM cell switch procedure or a node which sends the RRC reconfiguration message for the LTM cell switch procedure to a UE. In some implementations, the BS or the CU may execute a set of instructions to control the function elements of the BS or the CU to perform the described functions. In some implementations, aspects of the operations of the BS or the CU may be performed by NE 400 as described with reference to Figure 4. Each of operations may be performed in accordance with examples as described herein. Specific examples are described in Embodiment 2 as follows.

**[0258]** Specifically, the method may include obtaining, by a BS or a CU of a BS, a configuration (which may also be named as "a reference" or "Configuration Information" or "Mobility Information" or "LTM Information" or "Mobility Information for LTM" or "LTM related Mobility Information" or the like) related to at least one of the following:

- (1) a context of a UE associated with an LTM cell switch procedure;
- (2) a set of parameters (or configurations) used by the UE during the LTM cell switch procedure; or
- (3) a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0259]** In some embodiments, to obtain the configuration, the BS or the CU of the BS may perform at least one of the following:

- (1) generating a configuration (e.g. configuration #1 as described above);
- (2) receiving a configuration (e.g. configuration #2 as described above) generated by a source DU of the BS, e.g. from the source DU;
- (3) receiving a configuration (e.g. configuration #3 as described above) generated by a target DU of the BS, e.g. from the target DU; or
- (4) receiving at least one configuration (e.g. configuration #4 as described above) generated by at least one candidate target DU of the BS, e.g. from the at least one candidate target DU.

**[0260]** In some embodiments, the BS or the CU of the BS may identify the context of the UE based on the obtained configuration.

**[0261]** In some embodiments, the configuration obtained by the BS or the CU may be transmitted by the BS or the CU to the UE, i.e. configuration #A as described above. For example, the BS or the CU may transmit, to the UE (e.g. via a source DU), the configuration including at least one of the following: configuration #1; configuration #2; configuration #3; or configuration #4. For instance, the configuration may be transmitted to the UE (e.g. via a source DU) in (1) an RRC reconfiguration message and/or (2) a lower layer message concerning that an LTM cell switch execution is initiated or triggered (e.g. an LTM Cell Switch Command MAC CE).

**[0262]** In some embodiments, the BS or the CU of the BS may receive, from the UE or another receiving node: (1) a part or a whole of the configuration (e.g. configuration #A as described above); and/or (2) successful LTM related information for the LTM cell switch procedure (e.g. information related to successful LTM or a successful report for LTM). In an embodiment, the successful LTM related information or the information related to successful LTM may be stored as or reported via at least one of the following reports: a SHR; a SPR; or a successful report for the LTM cell switch procedure. The successful report for LTM may be: a SHR for the LTM cell switch procedure; a SPR for the LTM cell switch procedure; or a successful report for the LTM cell switch procedure.

**[0263]** In some examples, the part or the whole of the configuration (e.g. the part or the whole of the configuration #A as described above) and the successful LTM related information (or the information related to successful LTM or the successful report for LTM) may be received by the BS or the CU in separate IEs or UE variables or reports or messages, or may be received in a same IE or UE variable or report or message. In some other examples, the part or the whole of the configuration may be received by the BS or the CU within the successful LTM related information (or the information related to successful LTM or the successful report for LTM).

**[0264]** In some embodiments, if at least one trigger condition related to storing or reporting successful LTM related information (or the information related to successful LTM or the successful report for LTM) is satisfied, the configuration corresponding to the at least one satisfied trigger condition is received by the BS or the CU. In some examples, if the at least one trigger condition is associated with at least one timer T310 or T312 related threshold, the configuration includes configuration #2 generated by the source DU. In some other

examples, if the at least one trigger condition is associated with at least one timer T304 related threshold, the configuration includes configuration #3 (generated by the target DU) and/or configuration #4 (generated by the at least one candidate target DU). A specific example is described in Embodiment 2-1 as follows.

**[0265]** In some embodiments, the BS or the CU of the BS may generate or transmit, a configuration (e.g. configuration #5 as described above) used for the UE to store or report the successful LTM related information (or the information related to successful LTM or the successful report for LTM).

**[0266]** In some embodiments, the CU of the BS may transmit configuration #1, configuration #2, configuration #3, and/or configuration #4 to the source DU, e.g. in at least one of the following messages:

- (1) a UE's context modification request message;
- (2) a DL RRC message transfer message;
- (3) a CU-DU TA information transfer message;
- (4) an access and mobility indication message or another existing F1 message; or
- (5) a new introduced F1 message.

**[0267]** In an embodiment, the CU of the BS may further transmit successful LTM related information (e.g. information related to successful LTM or a successful report for LTM) to the source DU.

**[0268]** In some embodiments, the CU of the BS may transmit configuration #1, configuration #2, configuration #3, and/or configuration #4 to at least one of the following DUs:

- (1) the target DU which generates configuration #3;
- (2) the at least one candidate target DU which generates configuration #4;
- (3) another target DU; or
- (4) at least one another candidate target DU.

**[0269]** For example, configuration #1, configuration #2, configuration #3, and/or configuration #4 may be transmitted by the CU of the BS in at least one of the following:

- (1) a UE's context setup request message;
- (2) a UE's context modification request message;
- (3) a CU-DU cell switch notification message;
- (4) an access and mobility indication message or another existing F1 message;
- (5) a new introduced F1 message.

**[0270]** In some embodiments, the CU of the BS may transmit successful LTM related information (e.g. information related to successful LTM or a successful report for LTM) to at least one of the following:

- (1) the target DU, which generates configuration #3; or
- (2) the at least one candidate target DU, which generates configuration #4.

**[0271]** In some embodiments, the part or the whole of the configuration (e.g. the part or the whole of the configuration #A as described above) and the successful LTM related information (or the information related to successful LTM or the successful report for LTM) may be transmitted by the CU of the BS in separate IEs or UE variables or reports or messages, or may be transmitted in a same IE or UE variable or report or message. In some embodiments, the configuration may be transmitted by the CU of the BS within the successful LTM related information (or the information related to successful LTM or the successful report for LTM).

**[0272]** In accordance with some aspects of the present disclosure, operations of another method related to an LTM cell switch procedure may be implemented by a network node, e.g. a DU of a BS as described herein. The DU may be a source DU, a target DU, or a candidate target DU. In some implementations, the DU may execute a set of instructions to control the function elements of the DU to perform the described functions. In some implementations, aspects of the operations of the DU may be performed by NE 400 as described with reference to Figure 4. Each of operations may be performed in accordance

with examples as described herein. Specific examples are described in Embodiment 2 as follows.

**[0273]** Specifically, the method may include obtaining, by a DU of a BS (denoted as DU #1; the DU #1 may be a source DU, a target DU, or a candidate target DU), a configuration (which may also be named as "a reference" or "Configuration Information" or "Mobility Information" or "LTM Information" or "Mobility Information for LTM" or "LTM related Mobility Information" or the like) related to at least one of the following:

- (1) a context of a UE associated with an LTM cell switch procedure;
- (2) a set of parameters (or configurations) used by the UE during the LTM cell switch procedure; or
- (3) a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

**[0274]** In some embodiments, to obtain the configuration, DU #1 may perform at least one of the following:

- (1) receiving at least one configuration generated by a CU of the BS;
- (2) generating at least one configuration; or
- (3) receiving, from the CU of the BS, at least one configuration generated by at least one DU of the BS. The at least one DU includes at least one of: a source DU, a target DU, or a candidate target DU. That is, DU #1 may receive, via the CU of the BS, at least one configuration generated by another DU, which may be a source DU, a target DU, or a candidate target DU.

**[0275]** In some cases, after generating the at least one configuration, DU #1 may transmit the generated configuration to the CU of the BS.

**[0276]** In some embodiments, if DU #1 is a source DU, it may transmit the generated configuration or the received configuration to the UE, via an RRC reconfiguration message and/or a lower layer message (e.g. a MAC CE) concerning that an LTM cell switch execution is initiated or triggered.

**[0277]** In some embodiments, if DU #1 is a source DU, it may receive the configuration from the CU of the BS via at least one of the following:

- (1) a UE's context modification request message;
- (2) a DL RRC message transfer message;
- (3) a CU-DU TA information transfer message;
- (4) an access and mobility indication message or another existing F1 message; or
- (5) a new introduced F1 message.

**[0278]** In some embodiments, if DU #1 is a target DU or at least one candidate target DU, it may receive the configuration from the CU of the BS via at least one of the following:

- (1) a UE's context setup request message;
- (2) a UE's context modification request message;
- (3) a CU-DU cell switch notification message;
- (4) an access and mobility indication message or another existing F1 message; or
- (5) a new introduced F1 message.

**[0279]** In some embodiments, DU #1 may receive, from the CU of the BS, successful LTM related information (or information related to successful LTM or a successful report for LTM). In some examples, the part or whole of the configuration (e.g. the part or whole of the configuration #A as described above) and the successful LTM related information (or information related to successful LTM or the successful report for LTM) may be received by DU #1 in separate IEs or UE variables or reports or messages, or received in a same IE or UE variable or report or message. In some other examples, the part or whole of the configuration (e.g. the part or whole of the configuration #A as described above) may be received by DU #1 within the successful LTM related information (or within the information related to successful LTM or within the successful report for LTM).

**[0280]** In some embodiments, DU #1 may identify the context of the UE based on the obtained configuration.

**[0281]** The following text describes specific embodiments of the flowcharts as shown and illustrated above, i.e., Embodiments 2 and 3 for an MCG LTM procedure or an SCG LTM procedure.

**[0282]** Embodiment 2 (UE's context identification) (for MCG LTM or SCG LTM)

**[0283]** Embodiment 2-A (for MCG LTM)

**[0284]** In Embodiment 2-A, a receiving network may receive a successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM from a UE. There may be following cases, i.e. Case #1 and Case #2.

**[0285]** Case #1: If the receiving network (e.g. node #1 or CU #1) is a new serving node of the UE, the receiving network may forward the received successful report (e.g. a SHR or other named report or a new introduced report) for LTM or successful LTM cell switch related information or information related with successful LTM to node #2 or CU #2 which generates or configures the RRC reconfiguration message for the LTM procedure for the UE, e.g. via an ACCESS AND MOBILITY INDICATION message or other XnAP message (over XnAP), or via a UL or DL RAN configuration transfer message or other NGAP message (over NGAP). Then, CU #2 may transfer the received successful report for LTM or successful LTM related information or information related with successful LTM to one or more relevant DUs (e.g. via an ACCESS AND MOBILITY INDICATION message or other F1AP message (over F1AP). The one or more relevant DUs may be a source DU which sends the LTM Cell Switch Command MAC CE to the UE. Or, the one or more relevant DUs may be a target DU to which the target cell belongs. CU #2 or the one or more relevant DUs may analyse whether or how the LTM related configuration needs adjustments and/or perform the corresponding adjustments for MRO. Such adjustments may result in changes of configuration for LTM, e.g. including one or more LTM candidate cells, or one or more RACH resources for accessing to a target cell, or one or more RACH configurations for an early TA acquisition.

**[0286]** Case #2: If the receiving network (e.g. CU #2) generates or configures an RRC reconfiguration message for an LTM procedure for a UE, CU #2 may transfer the received successful report (e.g. a SHR or other named report or a new introduced report) for LTM or

successful LTM cell switch related information or information related with successful LTM to one or more relevant DUs (e.g. via an ACCESS AND MOBILITY INDICATION message or other F1AP message (over F1AP). The relevant DUs may be a source DU which sends an LTM Cell Switch Command MAC CE to the UE. Or, the relevant DUs may be a target DU to which the target cell belongs. CU #2 or the one or more relevant DUs may analyse whether or how LTM related configuration needs adjustments and/or perform the corresponding adjustments for MRO. Such adjustments may result in changes of configuration for LTM, e.g. including one or more LTM candidate cells, or one or more RACH resources for accessing to target cell, or one or more RACH configurations for an early TA acquisition.

**[0287]** In Embodiment 2-A, when a source DU or a target DU receives successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM from a CU (e.g. which served a UE at the last initialization of the LTM procedure or which generates or configures an RRC reconfiguration message for the LTM procedure for the UE, or which is the latest serving node that receives the successful report for LTM or successful LTM cell switch related information or information related with successful LTM from the UE), the UE's context may be released. For example, the UE's context includes information related to the UE, e.g. UE related configuration of mobility strategies or MRO. If the UE's context is released, the source DU or the target DU cannot identify the successful report for LTM or successful LTM cell switch related information or information related with successful LTM for MRO. For example, the source DU or the target DU cannot analysis and/or optimization, e.g. cannot analyze whether or how LTM related configuration needs adjustments and/or perform the corresponding adjustments for MRO. Such adjustments may result in changes of configuration for LTM, e.g. including one or more LTM candidate cells, or RACH resources for accessing to target cell or target PSCell, or RACH configuration for early TA acquisition). Thus, for MRO analysis and optimization for MCG LTM, the UE's context identification or retrieval is needed at the source DU or the target DU.

**[0288]** Embodiment 2-B (for SCG LTM)

**[0289]** In Embodiment 2-B, a receiving network may receive a successful report for LTM (e.g. for SCG LTM, the successful report may be a SPR or a new introduced report) or

successful LTM cell switch related information or information related with successful LTM from a UE. There may be following cases, i.e. Case #3, Case #4 and Case #5.

**[0290]** Case #3: If the receiving network (e.g. node #1 or CU #1) is a new serving node of the UE, the receiving network may forward the received successful report (e.g. a SPR or other named report or a new introduced report) for LTM or successful LTM cell switch related information or information related with successful LTM to a MN. Then, the MN may send the successful report (e.g. the SPR or other named report or a new introduced report) for LTM or successful LTM cell switch related information or information related with successful LTM to a SN or a CU of the SN (e.g. the SN is one which generates or configures an RRC reconfiguration message for the LTM procedure for the UE), e.g. via an ACCESS AND MOBILITY INDICATION message or other message. Then, the SN or the CU of the SN may transfer the received successful report (e.g. the SPR or other named report or a new introduced report) for LTM or successful LTM cell switch related information or information related with successful LTM to one or more relevant DUs of the SN (e.g. via an ACCESS AND MOBILITY INDICATION message or other F1AP message). The one or more relevant DUs may be a source DU of the SN which sends an LTM Cell Switch Command MAC CE to the UE. Or, the one or more relevant DUs may be a target DU of the SN to which the target cell belongs. The SN or the CU of the SN or the one or more relevant DUs of the SN may analyse whether or how LTM related configuration needs adjustments and/or perform the corresponding adjustments for MRO. Such adjustments may result in changes of configuration for LTM, e.g. including one or more LTM candidate cells, or one or more RACH resources for accessing to target cell, or one or more RACH configurations for an early TA acquisition.

**[0291]** Case #4: If the receiving network is a SN or a CU of the SN (e.g. SN is one which generates or configures an RRC reconfiguration message for an LTM procedure for the UE), the CU of the SN may transfer the received successful report (e.g. a SPR or other named report or a new introduced report) for LTM or successful LTM cell switch related information or information related with successful LTM to one or more relevant DUs of the SN (e.g. via an ACCESS AND MOBILITY INDICATION message or other F1AP message). The one or more relevant DUs may be a source DU of the SN which sends the LTM Cell Switch Command MAC CE to the UE. Or, the one or more relevant DUs may be a target DU of the

SN to which the target cell belongs. The CU of the SN or the one or more relevant DUs of the SN may analyse whether or how LTM related configuration needs adjustments and/or perform the corresponding adjustments for MRO. Such adjustments may result in changes of configuration for LTM, e.g. including one or more LTM candidate cells, or one or more RACH resources for accessing to target cell, or one or more RACH configurations for an early TA acquisition.

**[0292]** Case #5: If the receiving network is a MN, the MN may send the received successful report (e.g. a SPR or other named report or a new introduced report) for LTM or successful LTM cell switch related information or information related with successful LTM to the SN or the CU of the SN (e.g. the SN is one which generates or configures an RRC reconfiguration message for the LTM procedure for the UE), e.g. via an ACCESS AND MOBILITY INDICATION message or other message. Then, the SN or the CU of the SN may transfer the received successful report (e.g. the SPR or other named report or a new introduced report) for LTM or successful LTM cell switch related information or information related with successful LTM to one or more relevant DUs of the SN (e.g. via an ACCESS AND MOBILITY INDICATION message or other F1AP message). The one or more relevant DUs may be a source DU of the SN which sends an LTM Cell Switch Command MAC CE to the UE. Or, the one or more relevant DUs may be a target DU of the SN to which the target cell belongs. The SN or the CU of the SN or the one or more relevant DUs of the SN may analyse whether or how LTM related configuration needs adjustments and/or perform the corresponding adjustments for MRO. Such adjustments may result in changes of configuration for LTM, e.g. including one or more LTM candidate cells, or one or more RACH resources for accessing to target cell, or one or more RACH configurations for an early TA acquisition.

**[0293]** In Embodiment 2-B, when a source DU or a target DU receives successful report for LTM (e.g. for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM from a CU (e.g. for SCG LTM, the CU may be SN's CU, source DU may be SN's source DU, target DU may be SN's target DU), the UE's context may be released. For example, the UE's context includes information related to a UE, for example, UE related configuration of mobility strategies or MRO. If the UE's context is released, the source DU

or the target DU cannot identify the successful report for LTM or successful LTM cell switch related information or information related with successful LTM for MRO. For example, the source DU or the target DU cannot analysis and/or optimization, e.g. cannot analyze whether or how LTM related configuration needs adjustment and/or perform corresponding adjustments for MRO. Such adjustments may result in changes of configuration for LTM, e.g. including one or more LTM candidate cells, or one or more RACH resources for accessing to target cell or target PSCell, or one or more RACH configurations for an early TA acquisition. Thus, for MRO analysis and optimization for SCG LTM, the UE's context identification or retrieval is needed at the source DU or the target DU.

**[0294]** Embodiment 2 provides the following two solutions about how to enable a source DU or a target DU to identify or retrieve a UE's context, i.e. UE based solutions (Embodiment 2-1) and network based solutions (Embodiment 2-2).

**[0295]** Embodiment 2-1 (UE based solutions) (for MCG LTM or SCG LTM)

**[0296]** Embodiment 2-1 provides UE based solutions for UE's context retrieval or identification. There may be following four solutions in different embodiments, i.e. Solution #1, Solution #2, Solution #3, and Solution #4. In Embodiment 2-1, a reference may be called as "Configuration Information" or "Mobility Information" or "LTM Information" or "Mobility Information for LTM" or "LTM related Mobility Information" or other name, and it can be encoded as an OCTET STRING.

**[0297]** Solution #1

**[0298]** In Solution #1, a source DU may generate a reference related to a UE's context, or a configuration or a set of parameters used by one UE or a group of UEs involved in LTM procedure (e.g. via the source DU's implementation). The source DU may send the generated reference to a CU, e.g. via a UE Context Modification Response message or a UL RRC Message Transfer message or a DU-CU Cell Switch Notification message. The CU may be the one which served the UE at the last initialization of LTM procedure or which generates or configures an RRC reconfiguration message for the LTM procedure for the UE. For SCG LTM, the CU may be a SN's CU, and the source DU may be a source DU of the SN. After receiving the reference from the source DU, the CU may store the reference.

**[0299]** In Solution #1, a target DU or a candidate target DU may generate a reference related to the UE's context, or a configuration or a set of parameters used by one UE or a group of UEs involved in LTM procedure (e.g. via a target DU's implementation or a candidate target DU's implementation). The target DU or candidate target DU may send the generated reference to a CU, e.g. via a UE Context Setup Response message or a UE Context Modification Response message or a DU-CU TA Information Transfer message or an Access Success message or a UL RRC Message Transfer message. The CU may be the one which served the UE at the last initialization of LTM procedure or which generates or configures an RRC reconfiguration message for the LTM procedure for the UE. For SCG LTM, the CU may be a SN's CU, and a target DU or a candidate target DU may be a target DU or a candidate target DU of the SN. After receiving the reference from the target DU or the candidate target DU, the CU may store the reference.

**[0300]** In Solution #1, the CU may send the reference received from the source DU and/or the target DU or the candidate target DU to the UE. In one example, the CU may send the received reference to the UE in an RRC reconfiguration for the LTM procedure or in any other RRC reconfiguration. For instance, the CU may send the reference received from the source DU and/or the target DU or the candidate target DU to the source DU via the DL RRC Message Transfer message. Then, the source DU may send the reference to the UE via an RRC Reconfiguration message. In another example, the CU may send the reference received from the source DU and/or the target DU or the candidate target DU to the UE via the source DU by a lower layer message concerning that the LTM cell switch execution is triggered (e.g. by an LTM Cell Switch Command MAC CE) (i.e. the CU sends the reference received from the source DU and/or the target DU or the candidate target DU to the source DU, e.g. via the DL RRC Message Transfer message). Then, the source DU may send the reference to the UE via an LTM Cell Switch Command MAC CE.

**[0301]** In Solution #1, the UE may store the reference after receiving the reference. Then, there may be following alternative manners, i.e. Alt #1 and Alt #2.

**[0302]** Alt #1: For one instance, the UE may report reference generated by source DU and reference generated by the target DU or the candidate target DU along with the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or

successful LTM cell switch related information or information related with successful LTM. For another instance, the UE may include the reference generated by the source DU and the reference generated by the target DU or the candidate target DU in the information related to successful LTM or the successful report for LTM.

**[0303]** In case of an LTM cell switch execution failure or an RLF after a successful LTM cell switch execution failure, for one instance, the UE may report a reference generated by the source DU and/or a reference generated by the target DU or the candidate target DU along with the failure report for LTM (e.g. for MCG LTM, the failure report may be an RLF report or a new introduced report; for SCG LTM, the failure report may be an SCG failure information or a new introduced report) or LTM cell switch related failure information or information related with failure in LTM. For another instance, the UE may include the reference generated by the source DU and the reference generated by the target DU or the candidate target DU in the LTM cell switch related failure information or information related with failure in LTM or the failure report for LTM.

**[0304]** Alt #2: the UE may report the corresponding reference along with the information related to successful LTM or the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM, e.g. based on a trigger condition of the successful report. Or, the UE may include the corresponding reference in the information related to successful LTM or the successful report for LTM. For example, if the successful report is triggered due to that at least one timer T310 or T312 related threshold is fulfilled, the UE may report the reference generated by the source DU along with the successful report, or the UE may report the reference generated by the source DU within the successful report. If the successful report is triggered due to that at least one timer T304 related threshold is fulfilled, the UE may report the reference generated by the target DU along with the successful report, or the UE may report the reference generated by the target DU within the successful report.

**[0305]** In Solution #1, based on the reference, the CU, the source DU or the target DU or the candidate target DU can identify the UE's context. If the UE reports the reference generated by the source DU and the reference generated by the target DU or the candidate

target DU along with the successful report for LTM, when the successful report is transferred between the CU and relevant DU(s), the reference generated by the source DU and the reference generated by the target DU or the candidate target DU may also be transferred at the same time.

**[0306]** Solution #2

**[0307]** In Solution #2, a CU may be the one which served the UE at the last initialization of LTM procedure or which generates or configures an RRC reconfiguration message for the LTM procedure for a UE. For SCG LTM, the CU may be a SN's CU.

**[0308]** In Solution #2, a CU may generate a reference related to the UE's context, or a configuration or a set of parameters used by one UE or a group of UEs involved in LTM procedure (e.g. via the CU's implementation). Then, the CU may store the generated reference.

**[0309]** Then, the CU may send the generated reference to the source DU, e.g. via a UE Context Modification Request message or a DL RRC Message Transfer message or a CU-DU TA Information Transfer message. After receiving the reference, the source DU may store the reference (for SCG LTM, the source DU may be a SN's source DU).

**[0310]** The CU may send the generated reference to a target DU or a candidate target DU, e.g. via a UE Context Setup Request message or a UE Context Modification Request message or a CU-DU Cell Switch Notification message. After receiving the reference, the target DU or the candidate target DU may store the reference (for SCG LTM, target DU or the candidate target DU may be a SN's target DU or a SN's candidate target DU);

**[0311]** The CU may send the generated reference to the UE. In one example, the CU may send the reference to the UE in an RRC reconfiguration for the LTM procedure or in any other RRC reconfiguration. For example, the CU may send the generated reference to the source DU via the DL RRC Message Transfer message. Then, the source DU may send the reference to the UE via an RRC reconfiguration message. In another example, the CU may send the generated reference to the UE via a source DU by a lower layer message concerning that the LTM cell switch execution is triggered (e.g. by an LTM Cell Switch Command MAC CE). For example, the CU sends the reference to the source DU, e.g. via

the DL RRC Message Transfer message. Then, the source DU sends the reference to the UE via an LTM Cell Switch Command MAC CE.

**[0312]** In Solution #2, the UE may store the reference after receiving the reference. Then, in one example, the UE may report the received reference along with the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM. In another example, the UE may report the received reference within the successful report for LTM or within the successful LTM cell switch related information or within the information related with successful LTM.

**[0313]** In case of an LTM cell switch execution failure or an RLF after a successful LTM cell switch execution failure, for one instance, the UE may report the received reference along with the failure report for LTM (e.g. for MCG LTM, the failure report may be an RLF report or a new introduced report; for SCG LTM, the failure report may be an SCG failure information or a new introduced report) or LTM cell switch related failure information or information related with failure in LTM. For another instance, the UE may include the received reference in the LTM cell switch related failure information or information related with failure in LTM or the failure report for LTM.

**[0314]** In Solution #2, based on the reference, the CU, the source DU or the target DU or the candidate target DU can identify the UE's context. If the UE reports the reference generated by the CU along with the successful report for LTM, when the successful report is transferred between the CU and relevant DU(s), the reference generated by the CU may also be transferred at the same time.

**[0315]** Solution #3

**[0316]** In Solution #3, a source DU may generate a reference related to the UE's context, or a configuration or a set of parameters used by one UE or a group of UEs involved in LTM procedure (e.g. via the source DU's implementation). The source DU may store the generated reference. The source DU may send the reference to the UE, for example, the source DU may send the reference to the UE via an RRC Reconfiguration message, or in another example, the source DU may send the reference to the UE via a lower layer message

concerning that the LTM cell switch execution is triggered (e.g. by an LTM Cell Switch Command MAC CE). The source DU may send the generated reference to a CU, e.g. via a UE Context Modification Response message or a UL RRC Message Transfer message or a DU-CU Cell Switch Notification message. The CU may be the one which served the UE at the last initialization of LTM procedure or which generates or configures the RRC reconfiguration message for the LTM procedure for the UE. For SCG LTM, the CU may be a SN's CU, and the source DU may be a SN's source DU. After receiving the reference from the source DU, the CU may store the reference.

**[0317]** Then, the CU may send the reference received from the source DU to a target DU or a candidate target DU, e.g. via a UE Context Modification Request message or a CU-DU Cell Switch Notification message. After receiving the reference from the CU, the target DU or the candidate target DU may store the reference. For SCG LTM, the target DU or the candidate target DU may be a SN's target DU or a SN's candidate target DU.

**[0318]** The CU may send the reference to the UE. In one example, the CU may send the reference received from the source DU to the UE in an RRC reconfiguration for the LTM procedure or in any other RRC reconfiguration. For example, the CU may send the reference received from the source DU to the source DU via the DL RRC Message Transfer message. Then, the source DU may send the reference to the UE via an RRC Reconfiguration message. In another example, the CU may send the reference received from the source DU to the UE via the source DU by a lower layer message concerning that the LTM cell switch execution is triggered (e.g. by an LTM Cell Switch Command MAC CE). For example, the CU sends the reference received from the source DU to the source DU, e.g. via the DL RRC Message Transfer message. Then, the source DU may send the reference to the UE via an LTM Cell Switch Command MAC CE.

**[0319]** The UE may store the reference after receiving the reference. For example, the UE may report the received reference along with the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM. Or, the UE may include the reference generated by the source DU in the information related to successful LTM or the successful report for LTM.

**[0320]** In case of LTM cell switch execution failure or an RLF after successful LTM cell switch execution failure, for one instance, the UE may report the received reference (e.g. a reference generated by source DU) along with the failure report for LTM (e.g. for MCG LTM, the failure report may be a RLF report or a new introduced report; for SCG LTM, the failure report may be an SCG failure information or a new introduced report) or LTM cell switch related failure information or information related with failure in LTM. For another instance, the UE may include the received reference (e.g. a reference generated by source DU) in the LTM cell switch related failure information or information related with failure in LTM or the failure report for LTM.

**[0321]** In Solution #3, based on the reference, the CU, the source DU or the target DU or the candidate target DU can identify the UE's context.

**[0322]** Solution #4

**[0323]** In Solution #4, a target DU or a candidate target DU may generate a reference related to the UE's context, or a configuration or a set of parameters used by one UE or a group of UEs involved in LTM procedure (e.g. via the target DU or the candidate target DU's implementation). The target DU or the candidate target DU may store the generated reference. Then, the target DU or the candidate target DU may send the generated reference to a CU, e.g. via a UE Context Setup Response message or a UE Context Modification Response message or a DU-CU TA Information Transfer message or Access Success message or UL RRC Message Transfer message. The CU may be the one which served the UE at the last initialization of LTM procedure or which generates or configures the RRC reconfiguration message for the LTM procedure for the UE. For SCG LTM, the target DU or the candidate target DU may be a SN's target DU or candidate target DU. After receiving the reference from the target DU or the candidate target DU, the CU may store the reference.

**[0324]** Then, the CU may send the reference received from the target DU or the candidate target DU to source DU, e.g. via a UE Context Modification Request message or a DL RRC Message Transfer message or CU-DU TA Information Transfer message. After receiving the reference from the CU, the source DU may store the reference (for SCG LTM, the source DU may be a SN's source DU).

**[0325]** The CU may send the reference to the UE. In one example, the CU may send the reference received from the target DU or the candidate target DU to the UE in an RRC reconfiguration for the LTM procedure or in any other RRC reconfiguration. For example, the CU may send the reference received from the target DU or the candidate target DU to the source DU via the DL RRC Message Transfer message. Then, the source DU may send the reference to the UE via an RRC Reconfiguration message. In another example, the CU may send the reference received from the target DU or the candidate target DU to the UE via the source DU by a lower layer message concerning that the LTM cell switch execution is triggered (e.g. by an LTM Cell Switch Command MAC CE). For example, the CU sends the reference received from the target DU or the candidate target DU to the source DU, e.g. via the DL RRC Message Transfer message. Then, the source DU sends the reference to the UE via an LTM Cell Switch Command MAC CE.

**[0326]** The UE may store the reference after receiving the reference. For example, the UE may report the received reference along with the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM. Or, the UE may include the received reference in the information related to successful LTM or the successful report for LTM.

**[0327]** In case of an LTM cell switch execution failure or an RLF after a successful LTM cell switch execution failure, for one instance, the UE may report the received reference (e.g. a reference generated by a target DU or a candidate target DU) along with the failure report for LTM (e.g. for MCG LTM, the failure report may be an RLF report or a new introduced report; for SCG LTM, the failure report may be an SCG failure information or a new introduced report) or LTM cell switch related failure information or information related with failure in LTM. For another instance, the UE may include the received reference (e.g. a reference generated by a target DU or a candidate target DU) in the LTM cell switch related failure information or information related with failure in LTM or the failure report for LTM.

**[0328]** In Solution #4, based on the reference, the CU, the source DU or the target DU or the candidate target DU can identify the UE'S context.

**[0329]** Embodiment 2-2 (network based solutions) (for MCG LTM or SCG LTM)

**[0330]** Embodiment 2-2 provides network based solutions for UE's context retrieval or identification. There may be following four solutions in different embodiments, i.e. Solution #A, Solution #B, Solution #C, and Solution #D.

**[0331]** Solution #A

**[0332]** In Solution #A, a source DU may generate a reference related to the UE's context, or a configuration or a set of parameters used by one UE or a group of UEs involved in LTM procedure (e.g. via the source DU's implementation). Then, the source DU may send the generated reference to a CU, e.g. via UE Context Modification Response message or UL RRC Message Transfer message or DU-CU Cell Switch Notification message. The CU may be the one which served the UE at the last initialization of LTM procedure or which generates or configures an RRC reconfiguration message for the LTM procedure for the UE. For SCG LTM, the CU may be a SN's CU, and the source DU may be a SN's source DU. After receiving the reference from the source DU, the CU may store the reference.

**[0333]** A target DU or a candidate target DU may generate a reference related to the UE's context, or a configuration or a set of parameters used by one UE or a group of UEs involved in LTM procedure (e.g. via the target DU's implementation or the candidate target DU's implementation). Then, the target DU or the candidate target DU may send the generated reference to a CU, e.g. via a UE Context Setup Response message or a UE Context Modification Response message or a DU-CU TA Information Transfer message or Access Success message or UL RRC Message Transfer message. The CU is the one which served the UE at the last initialization of LTM procedure or which generates or configures the RRC reconfiguration message for the LTM procedure for the UE. For SCG LTM, the CU may be a SN's CU, and the target DU or the candidate target DU may be a SN's target DU or a SN's candidate target DU. After receiving the reference from the target DU or the candidate target DU, the CU may store the reference.

**[0334]** The CU may send the reference received from the source DU back to the source DU, when the CU sends the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or

information related with successful LTM to the source DU, e.g. via a new introduced F1 message or an existing F1 message (e.g. Access and Mobility Indication message or other).

**[0335]** The CU may send the reference received from the target DU or the candidate target DU back to the target DU or the candidate target DU, when the CU sends the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM to the target DU or the candidate target DU, e.g. via a new introduced F1 message or an existing F1 message (e.g. Access and Mobility Indication message or other).

**[0336]** In Solution #A, based on the reference, the CU, the source DU or the target DU or the candidate target DU can identify the UE's context.

**[0337]** Solution #B

**[0338]** In Solution #B, a CU may generate a reference related to the UE's context, or a configuration or a set of parameters used by one UE or a group of UEs involved in LTM procedure (e.g. via the CU's implementation). The CU may be the one which served the UE at the last initialization of LTM procedure or which generates or configures the RRC reconfiguration message for the LTM procedure for the UE. For SCG LTM, the CU may be a SN's CU. After generating the reference, the CU may store the reference.

**[0339]** The CU may send the generated reference to a source DU, e.g. via a UE Context Modification Request message or a DL RRC Message Transfer message or CU-DU TA Information Transfer message. After receiving the reference from the CU, the source DU may store the reference. For SCG LTM, the source DU may be a SN's source DU.

**[0340]** The CU may send the generated reference to a target DU or a candidate target DU, e.g. via a UE Context Setup Request message or a UE Context Modification Request message or a CU-DU Cell Switch Notification message. After receiving the reference from the CU, the target DU or the candidate target DU may store the reference. For SCG LTM, the target DU or the candidate target DU may be a SN's target DU or a SN's candidate target DU.

**[0341]** The CU may send the generated reference to the source DU, when the CU sends the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a

new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM to the source DU, e.g. via a new introduced F1 message or an existing F1 message (e.g. Access and Mobility Indication message or other).

**[0342]** The CU may send the generated reference to the target DU or the candidate target DU, when the CU sends the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM to the target DU or the candidate target DU, e.g. via a new introduced F1 message or an existing F1 message (e.g. Access and Mobility Indication message or other).

**[0343]** In Solution #B, based on the reference, the CU, the source DU or the target DU or the candidate target DU can identify the UE's context.

**[0344]** Solution #C

**[0345]** In Solution #C, a source DU may generate a reference related to the UE's context, or a configuration or a set of parameters used by one UE or a group of UEs involved in LTM procedure (e.g. via the source DU's implementation). The source DU may store the generated reference. Then, the source DU may send the generated reference to a CU, e.g. via UE Context Modification Response message or UL RRC Message Transfer message or DU-CU Cell Switch Notification message. The CU may be the one which served the UE at the last initialization of LTM procedure or which generates or configures the RRC reconfiguration message for the LTM procedure for the UE. For SCG LTM, the CU may be a SN's CU, and the source DU may be a SN's source DU. After receiving the reference from the source DU, the CU may store the reference.

**[0346]** Then, the CU may send the reference received from the source DU to a target DU or a candidate target DU, e.g. via a UE Context Modification Request message or a CU-DU Cell Switch Notification message. After receiving the reference, the target DU or the candidate target DU may store the reference. For SCG LTM, the target DU or the candidate target DU may be a SN's target DU or a SN's candidate target DU.

**[0347]** The CU may send the reference to the source DU, when the CU sends the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM to the source DU, e.g. via a new introduced F1 message or an existing F1 message (e.g. Access and Mobility Indication message or other).

**[0348]** The CU may send the reference to the target DU or the candidate target DU, when the CU sends the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM to the target DU or the candidate target DU, e.g. via a new introduced F1 message or an existing F1 message (e.g. Access and Mobility Indication message or other).

**[0349]** In Solution #C, based on the reference, the CU, the source DU or the target DU or the candidate target DU can identify the UE's context.

**[0350]** Solution #D

**[0351]** In Solution #D, a target DU or a candidate target DU may generate a reference related to the UE's context, or a configuration or a set of parameters used by one UE or a group of UEs involved in LTM procedure (e.g. via the target DU's implementation or the candidate target DU's implementation). The target DU or the candidate target DU may store the generated reference. Then, the target DU or the candidate target DU may send the generated reference to a CU, e.g. via a UE Context Setup Response message or a UE Context Modification Response message or a DU-CU TA Information Transfer message or Access Success message or UL RRC Message Transfer message. The CU may be the one which served the UE at the last initialization of LTM procedure or which generates or configures the RRC reconfiguration message for the LTM procedure for the UE. For SCG LTM, the target DU or the candidate target DU may be a SN's target DU or a SN's candidate target DU. After receiving the reference from the target DU or the candidate target DU, the CU may store the reference.

**[0352]** The CU may send the reference received from the target DU or the candidate target DU to a source DU, e.g. via a UE Context Modification Request message or a DL RRC Message Transfer message or CU-DU TA Information Transfer message. After receiving the reference, the source DU may store the reference. For SCG LTM, the source DU may be a SN's source DU.

**[0353]** The CU may send the reference received from the target DU or the candidate target DU to the source DU, when the CU sends the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM to the source DU, e.g. via a new introduced F1 message or an existing F1 message (e.g. Access and Mobility Indication message or other).

**[0354]** The CU may send the reference received from the target DU or the candidate target DU back to the target DU or the candidate target DU, when the CU sends the successful report for LTM (e.g. for MCG LTM, the successful report may be a SHR or a new introduced report; for SCG LTM, the successful report may be a SPR or a new introduced report) or successful LTM cell switch related information or information related with successful LTM to the target DU or the candidate target DU, e.g. via a new introduced F1 message or an existing F1 message (e.g. Access and Mobility Indication message or other).

**[0355]** In Solution #D, based on the reference, the CU, the source DU or the target DU or the candidate target DU can identify the UE's context.

**[0356]** Embodiments 3 and 4 define when a UE releases a configuration for storing or generating or reporting successful LTM cell switch related information or information related to successful LTM or successful report for LTM, or when a UE discards the stored successful LTM cell switch related information or the information related to successful LTM or the successful report for LTM.

**[0357]** Embodiment 3 (a UE's release behavior) (for MCG LTM)

**[0358]** In Embodiment 3, for MCG LTM, trigger condition(s) for a UE to log or store or generate or report a successful report (e.g. the successful report may be a SHR or other named report or a new introduced report) for LTM, or log or store or generate successful LTM cell

switch related information or information related with successful LTM, are configured to the UE. When at least one configured trigger condition is fulfilled, and/or an LTM cell switch execution towards target cell is successful, the UE logs or stores or generates the successful report (e.g. the successful report may be a SHR or other named report or a new introduced report) for LTM, or successful LTM cell switch related information or information related with successful LTM.

**[0359]** Embodiment 3-1

**[0360]** Embodiment 3-1 provides solutions about when to release configuration for storing or generating or reporting a successful report for LTM or successful LTM cell switch related information or information related with successful LTM, for example, for MCG LTM, when to release LTM related SHR configuration.

**[0361]** In Embodiment 3-1, for MCG LTM, the UE may release or clear the configuration for storing or generating or reporting successful report for LTM or successful LTM cell switch related information or information related with successful LTM, e.g. the UE may release or clear LTM related SHR configuration, upon or during:

- (1) an RRC re-establishment is initiated;
- (2) an RRC resume is initiated;
- (3) an RRC setup is initiated;
- (4) a reception of RRC Release message;
- (5) an LTM cell switch execution failure happens, or LTM PCell switch failure happens (i.e., supervision timer T304 expiry), or a RLF occurs shortly after a successful MCG LTM execution or a successful LTM PCell switch;
- (6) a reception of a message to release LTM related configuration (e.g. an RRC message that indicates the UE to release MCG LTM or stop MCG LTM);
- (7) when reconfiguration with sync on PCell is initiated (e.g. normal handover or CHO or DAPS HO is initiated); or
- (8) at a successful LTM cell switch execution, i.e. at a successful MCG LTM execution, or at a successful LTM PCell switch.

**[0362]** Embodiment 3-2

**[0363]** Embodiment 3-2 provides solutions about when to release the successful report or the information related to successful LTM, e.g. for MCG LTM, the successful report may be a SHR or other named report or a new introduced report.

**[0364]** In Embodiment 3-2, for MCG LTM, a UE may discard the successful report (e.g. a SHR or other named report or a new introduced report) for LTM, or release the UE generated variable for successful LTM cell switch related information or information related with successful MCG LTM:

- (1) 48 hours after the successful report for MCG LTM or successful LTM cell switch related information or information related with successful MCG LTM is generated or stored at a UE if not fetched by network;
- (2) upon the successful report for MCG LTM is retrieved by network;
- (3) when detach procedure is initiated; or
- (4) when a new successful report for MCG LTM is initiated.

**[0365]** Embodiment 4 (UE release behavior) (for SCG LTM)

**[0366]** In Embodiment 4, for SCG LTM, trigger condition(s) for a UE to log or store or generate or report successful report (e.g. the successful report may be a SPR or other named report or a new introduced report) for LTM, or log or store or generate successful LTM cell switch related information or information related with successful LTM, are configured to the UE. When at least one configured trigger condition is fulfilled, and/or an LTM cell switch execution towards target PSCell is successful, the UE logs or stores or generates successful report (e.g. the successful report may be a SPR or other named report or a new introduced report) for LTM, or successful LTM cell switch related information or information related with successful LTM.

**[0367]** Embodiment 4-1

**[0368]** Embodiment 4-1 provides solutions about when to release configuration for storing or generating or reporting a successful report for LTM or successful LTM cell switch

related information or information related with successful LTM, e.g. for SCG LTM, when to release LTM related SPR configuration.

**[0369]** In Embodiment 4-1, for SCG LTM, the UE may release or clear the configuration for storing or generating or reporting successful report for LTM or successful LTM cell switch related information or information related with successful LTM, e.g. the UE may release or clear LTM related SPR configuration, upon or during:

- (1) an RRC re-establishment is initiated;
- (2) an RRC resume is initiated;
- (3) an RRC setup is initiated;
- (4) a reception of RRC Release message;
- (5) an LTM cell switch execution failure happens, or LTM PSCell switch failure happens (i.e., supervision timer T304 expiry), or SCG failure occurs shortly after a successful SCG LTM execution or a successful LTM PSCell switch;
- (6) a reception of a message to release LTM related configuration (e.g. an RRC message that indicates the UE to release SCG LTM or stop SCG LTM);
- (7) when reconfiguration with sync on PCell is initiated (e.g. normal handover or CHO or DAPS HO or MCG LTM is initiated), or when reconfiguration with sync on PSCell is initiated (e.g. normal PSCell change or CPC is initiated); or
- (8) at a successful LTM cell switch execution, i.e. at a successful SCG LTM execution, or at a successful LTM PSCell switch.

**[0370]** Embodiment 4-2

**[0371]** Embodiment 4-2 provides solutions about when to release the successful report (e.g. for MCG LTM, the successful report may be a SHR or other named report or a new introduced report; for SCG LTM, the successful report may be a SPR or other named report or a new introduced report) for LTM.

**[0372]** In Embodiment 4-2, for SCG LTM, the UE may discard the successful report (e.g. SPR or other named report or a new introduced report) for LTM, or release the UE generated

variable for successful LTM cell switch related information or information related with successful SCG LTM:

- (1) 48 hours after the successful report for SCG LTM or successful LTM cell switch related information or information related with successful SCG LTM is generated or stored at a UE if not fetched by network;
- (2) upon the successful report for SCG LTM is retrieved by network;
- (3) when detach procedure is initiated; or
- (4) when a new successful report for SCG LTM is initiated.

**[0373]** The description herein is provided to enable a person having ordinary skill in the art to make or use the disclosure. Various modifications to the disclosure will be apparent to a person having ordinary skill in the art, and the generic principles defined herein may be applied to other variations without departing from the scope of the disclosure. Thus, the disclosure is not limited to the examples and designs described herein but is to be accorded the broadest scope consistent with the principles and novel features disclosed herein.

What is claimed:

1. A user equipment (UE), comprising:
  - at least one memory; and
  - at least one processor coupled to the at least one memory and configured to cause the UE to:
    - store first information related to access in a L1/L2-Triggered Mobility (LTM) cell switch procedure; and
    - report the first information.
2. The UE of Claim 1, wherein the first information includes at least one of the following:
  - information related to at least one early timing advance (TA) acquisition;
  - information related to at least one contention-free random access (CFRA) based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated;
  - information related to at least one CFRA based on CFRA resources in a radio resource control (RRC) reconfiguration message for the LTM cell switch procedure;
  - information related to at least one UE based TA measurement or at least one random access channel (RACH)-less LTM based on the at least one UE based TA measurement;or
  - information related to at least one contention based random access (CBRA).
3. The UE of Claim 1, wherein the first information is stored or reported in a random access (RA) report, and the RA report includes at least one of the following:
  - one RA report entry used to convey information for one or more operations performed by the UE during the LTM cell switch procedure;
  - multiple RA report entries used to convey information for the one or more operations performed by the UE during the LTM cell switch procedure; or
  - information indicating at least one switch of the one or more operations performed by the UE during the LTM cell switch procedure.
4. The UE of Claim 3, wherein the one or more operations includes at least one of the following:
  - at least one early timing advance (TA) acquisition;

at least one contention-free random access (CFRA) based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated;

at least one CFRA based on CFRA resources in a radio resource control (RRC) reconfiguration message for the LTM cell switch procedure;

at least one UE based TA measurement or at least one random access channel (RACH)-less LTM based on the at least one UE based TA measurement; or

at least one contention based random access (CBRA); and

wherein the at least one switch of the one or more operations includes at least one of the following:

switch from at least one early TA acquisition to at least one RACH-less LTM based on at least one UE based TA measurement;

switch from the at least one early TA acquisition to at least one RACH based LTM;

switch from the at least one RACH-less LTM based on at least one UE based TA measurement to the at least one RACH based LTM;

switch from at least one CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated to at least one CFRA based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure; or

switch from at least one CFRA based on CFRA resources in a lower layer message concerning that an LTM cell switch execution is initiated or based on CFRA resources in an RRC reconfiguration message for the LTM cell switch procedure to at least one CBRA.

5. The UE of Claim 1, wherein the first information includes at least one of the following:
  - time duration between two PDCCH orders triggered for early TA acquisition; or
  - one or more layer 1 (L1) measurement results.
6. The UE of Claim 1, wherein the first information includes at least one of the following:
  - a random access (RA) purpose or information indicating that a RA procedure is initiated by a PDCCH order to an LTM candidate cell;
  - an RA purpose or information indicating that the RA procedure is initiated for the LTM cell switch procedure;

information indicating whether CFRA resources are provided in a lower layer message concerning that an LTM cell switch execution is initiated;

information indicating whether the CFRA resources are provided in an RRC reconfiguration message for the LTM cell switch procedure;

one or more parameters of an uplink carrier for physical random access channel (PRACH) transmission on an LTM candidate cell;

subcarrier spacing of PRACH for the LTM cell switch procedure;

n-TimingAdvanceOffset to be applied for uplink transmissions on the LTM candidate cell;

one or more RACH parameters for performing the RA procedure on the LTM candidate cell;

a total number of synchronization signal blocks (SSB)s for a RACH occasion;

one or more bandwidth part (BWP) parameters;

one or more SSBs per RACH occasion; or

a PRACH root sequence index.

7. A user equipment (UE), comprising:

at least one memory; and

at least one processor coupled to the at least one memory and configured to cause the UE to receive a configuration related to at least one of the following:

a context of the UE associated with a L1/L2-Triggered Mobility (LTM) cell switch procedure;

a set of parameters used by the UE during the LTM cell switch procedure; or

a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

8. The UE of Claim 7, wherein the configuration includes at least one of the following:

a first configuration generated by a base station (BS) or a centralized unit (CU) of the BS of the LTM cell switch procedure;

a second configuration generated by a source distributed unit (DU) of the BS;

a third configuration generated by a target DU of the BS; or

at least one fourth configuration generated by at least one candidate target DU of the BS.

9. The UE of Claim 7 or Claim 8, wherein the processor is configured to cause the UE to transmit at least one of the following:
- a part or a whole of the configuration; or
  - successful LTM related information for the LTM cell switch procedure.
10. The UE of Claim 9, wherein:
- the part or the whole of the configuration and the successful LTM related information are transmitted in separate information elements (IE)s or UE variables or reports or messages;
  - the part or the whole of the configuration and the successful LTM related information are transmitted in a same IE or UE variable or report or message; or
  - the part or the whole of the configuration is transmitted within the successful LTM related information.
11. The UE of Claim 9, wherein:
- if at least one trigger condition related to storing or reporting the successful LTM related information is satisfied, the configuration corresponding to the at least one satisfied trigger condition is transmitted.
12. A base station (BS), comprising:
- at least one memory; and
  - at least one processor coupled to the at least one memory and configured to cause the BS to obtain a configuration related to at least one of the following:
    - a context of the UE associated with a L1/L2-Triggered Mobility (LTM) cell switch procedure;
    - a set of parameters used by the UE during the LTM cell switch procedure; or
    - a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.
13. The BS of Claim 12, if the BS includes a centralized unit (CU), to obtain the configuration, the processor is configured to cause the BS or the CU of the BS to perform at least one of the following:
- generating a first configuration;

receiving a second configuration generated by a source distributed unit (DU) of the BS;

receiving a third configuration generated by a target DU of the BS; or

receiving at least one fourth configuration generated by at least one candidate target DU of the BS.

14. The BS of Claim 13, wherein the processor is configured to cause the BS or the CU of the BS to transmit the configuration to the UE, and wherein the configuration includes at least one of the following:

the first configuration;

the second configuration;

the third configuration; or

the at least one fourth configuration.

15. The BS of Claim 13, wherein the processor is configured to cause the CU of the BS to transmit at least one of the following to the source DU:

the first configuration;

the second configuration;

the third configuration; or

the at least one fourth configuration.

16. The BS of Claim 13, wherein the processor is configured to cause the CU of the BS to transmit at least one of the first configuration, the second configuration, the third configuration or the at least one fourth configuration to at least one of the following:

the target DU;

the at least one candidate target DU;

another target DU; or

at least one another candidate target DU.

17. A distributed unit (DU) of a base station (BS), comprising:

at least one memory; and

at least one processor coupled to the at least one memory and configured to cause the DU of the BS to obtain a configuration related to at least one of the following:

a context of a user equipment (UE) associated with a L1/L2-Triggered Mobility (LTM) cell switch procedure;

a set of parameters used by the UE during the LTM cell switch procedure; or

a set of parameters used by a group of UEs including the UE during the LTM cell switch procedure.

18. The DU of the BS of Claim 17, to obtain the configuration, the processor is configured to cause the DU of the BS to perform at least one of the following:
  - receiving at least one configuration generated by a centralized unit (CU) of the BS;
  - generating at least one configuration; or
  - receiving, from the CU of the BS, at least one configuration generated by at least one DU of the BS, wherein the at least one DU of the BS includes at least one of: a source DU, a target DU, or a candidate target DU.
19. The DU of the BS of Claim 17, wherein the processor is configured to cause the DU of the BS to transmit the generated at least one configuration to the CU of the BS.
20. The DU of the BS of any of Claims 17-19, wherein the processor is configured to cause the DU of the BS to receive, from the CU of the BS, successful LTM related information.