

METHOD AND APPARATUS FOR L2 RESET INDICATION AND UE- MEASURED TA INDICATION IN LTM SCENARIO

TECHNICAL FIELD

[0001] The present disclosure relates to wireless communications, and more specifically to network units, methods, apparatuses, and computer readable medium for lower layer triggered mobility management.

BACKGROUND

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

[0003] Layer 1/layer 2 (L1/L2) triggered mobility (LTM) is a procedure in which a network equipment (e.g. gNB) receives a 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 an L1/L2 lower layer-triggered mobility or the like.

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] Some embodiments of the present disclosure provide a first BS. The first BS may include at least one memory; and at least one processor coupled with the at least one memory and configured to cause the first BS to: transmit a request message to a second BS, wherein the request message includes an identity of a first candidate cell and requests an indication of whether user equipment (UE)-measured timing advance (TA) is able to be used or an indication of whether cell switch without layer 2 (L2) reset is performed when switching towards the first candidate cell from a second candidate cell; and receive, from the second BS, a response message in response to the request message.

[0006] In some embodiments of the present disclosure, the at least one processor is further configured to cause the first BS to receive an LTM configuration for the second candidate cell from the second BS before the transmission of the request message. In some embodiments of the present disclosure, the request message further includes an identity of the second candidate cell.

[0007] In some embodiments of the present disclosure, the request message requests the second BS to indicate one or more of the following: whether a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell

and the second candidate cell; and whether the UE performs an L2 reset or not when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell.

[0008] In some embodiments of the present disclosure, the response message indicates one or more of the following: whether a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; at least one cell pair, each cell pair including a first cell and a second cell belonging to the second BS, wherein the UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from the first cell to the second cell; whether the UE performs an L2 reset or not when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; and at least one cell pair, each cell pair including a third cell and a fourth cell belonging to the second BS, wherein the UE performs no L2 reset when the UE switches from the third cell to the fourth cell.

[0009] In some embodiments of the present disclosure, the at least one processor is further configured to cause the first BS to transmit a configuration to the UE based on the response message, and wherein the configuration indicates one or more of: a UE-measured TA ID for the first candidate cell and a no-reset ID for the first candidate cell.

[0010] In some embodiments of the present disclosure, the at least one processor is configured to cause the first BS to: transmit, to a UE, a command to perform an LTM cell switch or a handover to switch the UE from the first BS to a third BS; and transmit, to the third BS, LTM configurations for all candidate cells configured for the UE, wherein the LTM configurations includes at least a UE-measured TA ID for the first candidate cell and a no-reset ID for the first candidate cell.

[0011] In some embodiments of the present disclosure, the at least one processor is further configured to cause the first BS to: receive, from the third BS, an indication indicating the completion of the LTM cell switch or the completion of the handover, wherein the LTM configurations is transmitted in response to the reception of the indication; or receive, from the third BS, a release message in response to the LTM cell switch or the handover, wherein the LTM configurations is transmitted in response to

the reception of the release message.

[0012] In some embodiments of the present disclosure, the at least one processor is configured to cause the first BS to: receive, from a third BS, an indication indicating the completion of a handover of a UE from the first BS to the third BS or a release message in response to the handover of the UE; and transmit, to the third BS, an LTM configurations for all candidate cells configured for the UE in response to the reception of the indication or the release message.

[0013] In some embodiments of the present disclosure, the handover is related to a conditional handover (CHO), a conditional primary secondary cell change (CPC) or a subsequent CPC (S-CPC).

[0014] In some embodiments of the present disclosure, the first BS is a master node (MN) of the UE and the second BS is a candidate MN for LTM. In some embodiments of the present disclosure, the UE operates in a multi-connectivity mode, the first BS is an MN of the UE and the second BS is a candidate secondary node (SN) for LTM. In some embodiments of the present disclosure, the first BS is an MN of the UE. In some embodiments of the present disclosure, the UE operates in a multi-connectivity mode, the first BS is a source SN of the UE.

[0015] Some embodiments of the present disclosure provide a second BS. The second BS may include at least one memory; and at least one processor coupled with the at least one memory and configured to cause the second BS to: receive a request message from a first BS, wherein the request message includes an identity of a first candidate cell and requests an indication of whether UE-measured TA is able to be used or an indication of whether cell switch without L2 reset is performed when switching towards the first candidate cell from a second candidate cell; and transmit, to the first BS, a response message in response to the request message.

[0016] In some embodiments of the present disclosure, the at least one processor is further configured to cause the second BS to transmit an LTM configuration for the second candidate cell to the first BS before the reception of the request message. In some embodiments of the present disclosure, the request message further includes an identity of the second candidate cell.

[0017] In some embodiments of the present disclosure, the request message requests the second BS to indicate one or more of the following: whether a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; and whether the UE performs an L2 reset or not when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell.

[0018] In some embodiments of the present disclosure, the response message indicates one or more of the following: whether a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; at least one cell pair, each cell pair including a first cell and a second cell belonging to the second BS, wherein the UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from the first cell to the second cell; whether the UE performs an L2 reset or not when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; and at least one cell pair, each cell pair including a third cell and a fourth cell belonging to the second BS, wherein the UE performs no L2 reset when the UE switches from the third cell to the fourth cell.

[0019] In some embodiments of the present disclosure, the at least one processor is configured to cause the second BS to: perform an LTM cell switch procedure or a handover procedure with a UE to switch the UE from the first BS to the second BS; and receive, from the first BS, LTM configurations for all candidate cells configured for the UE, wherein the LTM configurations includes at least a UE-measured TA ID for the first candidate cell and a no-reset ID for the first candidate cell.

[0020] In some embodiments of the present disclosure, the at least one processor is further configured to cause the second BS to: transmit, to the first BS, an indication indicating the completion of the LTM cell switch procedure or the completion of the handover procedure, wherein the LTM configurations is received in response to the transmission of the indication; or transmit, to the first BS, a release message in response to the LTM cell switch procedure or the handover procedure, wherein the LTM

configurations is received in response to the transmission of the release message.

[0021] In some embodiments of the present disclosure, the handover procedure is related to a L3 handover, a CHO, a CPC or an S-CPC.

[0022] In some embodiments of the present disclosure, the first BS is an MN of the UE and the second BS is a candidate MN for LTM. In some embodiments of the present disclosure, the UE operates in a multi-connectivity mode, the first BS is an MN of the UE and the second BS is a candidate SN for LTM. In some embodiments of the present disclosure, the first BS and the second BS are respectively a source MN and a target MN of the LTM cell switch procedure or the handover procedure. In some embodiments of the present disclosure, the UE operates in a multi-connectivity mode, the first BS and the second BS are respectively a source SN and a target SN of the LTM cell switch procedure or the handover procedure.

[0023] Some embodiments of the present disclosure provide a method for wireless communication, including: transmitting a request message to a second BS, wherein the request message includes an identity of a first candidate cell and requests an indication of whether UE-measured TA is able to be used or an indication of whether cell switch without L2 reset is performed when switching towards the first candidate cell from a second candidate cell; and receiving, from the second BS, a response message in response to the request message.

[0024] Some embodiments of the present disclosure provide a method for wireless communication, including: receiving a request message from a first BS, wherein the request message includes an identity of a first candidate cell and requests an indication of whether UE-measured TA is able to be used or an indication of whether cell switch without L2 reset is performed when switching towards the first candidate cell from a second candidate cell; and transmitting, to the first BS, a response message in response to the request message.

[0025] Some embodiments of the present disclosure provide an apparatus. According to some embodiments of the present disclosure, the apparatus may include: at least one non-transitory computer-readable medium having stored thereon computer-executable instructions; at least one receiving circuitry; at least one transmitting

circuitry; and at least one processor coupled to the at least one non-transitory computer-readable medium, the at least one receiving circuitry and the at least one transmitting circuitry, wherein the at least one non-transitory computer-readable medium and the computer executable instructions may be configured to, with the at least one processor, cause the apparatus to perform a method according to some embodiments of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] In order to describe the manner in which the advantages and features of the disclosure can be obtained, a description of the disclosure is rendered by reference to specific embodiments thereof, which are illustrated in the appended drawings. These drawings depict only exemplary embodiments of the disclosure and are not therefore to be considered limiting of its scope.

[0027] FIG. 1 illustrates a schematic diagram of a wireless communication system in accordance with some embodiments of the present disclosure;

[0028] FIGs. 2-5 illustrate flowcharts of methods for wireless communication in accordance with some embodiments of the present disclosure;

[0029] FIGs. 6 and 7 illustrate flowcharts of methods for wireless communication performed by a network equipment (NE) in accordance with some embodiments of the present disclosure;

[0030] FIG. 8 illustrates an example of a processor in accordance with some embodiments of the present disclosure; and

[0031] FIG. 9 illustrates an example of an NE in accordance with some embodiments of the present disclosure.

DETAILED DESCRIPTION

[0032] The detailed description of the appended drawings is intended as a description

of the preferred embodiments of the present disclosure and is not intended to represent the only form in which the present disclosure may be practiced. It should be understood that the same or equivalent functions may be accomplished by different embodiments that are intended to be encompassed within the spirit and scope of the present disclosure.

[0033] Reference will now be made in detail to some embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings. To facilitate understanding, embodiments are provided under a specific network architecture(s) and new service scenarios, such as the 3rd generation partnership project (3GPP) 5G NR or 6G, 3GPP LTE, and so on. It is contemplated that along with the developments of network architectures and new service scenarios, all embodiments in the present disclosure are also applicable to similar technical problems; and moreover, the terminologies recited in the present disclosure may change, which should not affect the principles of the present disclosure.

[0034] In a communication system, an NE (e.g., a BS) may trigger an LTM cell switch procedure to indicate a UE to switch from its current serving cell to a target cell. Solutions are desired to facilitate the LTM procedure. For example, solutions are desired to facilitate the LTM configuration for a candidate cell at a serving BS (e.g., a source MN or a source SN) in the inter-BS LTM scenario. For example, solutions are desired to handling LTM configurations for candidate cells configured for a UE after the UE switches to a target cell.

[0035] The present disclosure provides solutions to solve the above issues. For example, embodiments are provided to facilitate the LTM configuration for a candidate cell at a serving BS in the inter-BS LTM scenario. For example, embodiments are provided to handle the LTM configurations for candidate cells configured for a UE after the UE switches to a target cell.

[0036] FIG. 1 illustrates a schematic diagram of wireless communication system 100 in accordance with some embodiments of the present disclosure.

[0037] The wireless communication system 100 may include one or more NEs 102 (e.g., one or more BSs), one or more UEs 104, and a core network (CN) 106. The

wireless communication system 100 may support various radio access technologies. In some implementations, the wireless communication 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 communication system 100 may be a NR network, such as a 5G network, a 5G-Advanced (5G-A) network, or a 5G ultra-wideband (5G-UWB) network. In other implementations, the wireless communication 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), and IEEE 802.20. The wireless communication system 100 may support radio access technologies beyond 5G, for example, 6G. Additionally, the wireless communication system 100 may support technologies, such as time division multiple access (TDMA), frequency division multiple access (FDMA), or code division multiple access (CDMA), etc.

[0038] The one or more NEs 102 may be dispersed throughout a geographic region to form the wireless communication system 100. One or more of the NEs 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. In some embodiments of the present disclosure, an NE 102 may include a centralized unit (CU) and one or more distributed units (DUs). An F1 interface may be established between the DU of NE 102 and the CU of NE 102.

[0039] 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.

[0040] 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 a different NE 102.

[0041] The one or more UEs 104 may be dispersed throughout a geographic region of the wireless communication 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.

[0042] 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.

[0043] A relaying function based on a sidelink may be supported in the wireless communication system 100. For example, a UE 104 supporting sidelink communication may function as a relay node to extend the coverage of an NE 102 (e.g., a BS). An out-of-coverage or in-coverage UE may communicate with a BS via a relay node (e.g., a relay UE). In some implementations, a UE, which functions as a relay between another UE and a BS, may be referred to as a UE-to-network (U2N) relay.

[0044] An NE 102 may support communication with the CN 106, or with another NE 102, or both. For example, an NE 102 may interface with another NE 102 or the CN 106 through one or more backhaul links (e.g., S1, N2, N3, or another 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 NEs 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 radio heads, smart radio heads, or transmission-reception points (TRPs).

[0045] 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 NEs 102 associated with the CN 106.

[0046] The CN 106 may communicate with a packet data network over one or more backhaul links (e.g., via an S1, N2, N3, 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).

[0047] In the wireless communication system 100, the NEs 102 and the UEs 104 may use resources of the wireless communication 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 communication). 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.

[0048] One or more numerologies may be supported in the wireless communication 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.

[0049] 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.

[0050] 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 communication 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., orthogonal frequency-division multiplexing (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.

[0051] In the wireless communication 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 communication 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 communication 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 communication 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.

[0052] 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.

[0053] A UE 104 may include computing devices, such as desktop computers, laptop computers, personal digital assistants (PDAs), tablet computers, smart televisions (e.g., televisions connected to the Internet), set-top boxes, game consoles, security systems (including security cameras), vehicle on-board computers, network devices (e.g., routers, switches, and modems), or the like. According to some embodiments of the present disclosure, a UE 104 may include a portable wireless communication device, a smart phone, a cellular telephone, a flip phone, a device having a subscriber identity module, a personal computer, a selective call receiver, or any other device that is capable of sending and receiving communication signals on a wireless network. In some embodiments of the present disclosure, a UE 104 includes wearable devices, such as smart watches, fitness bands, optical head-mounted displays, or the like. Moreover, a UE 104 may be referred to as a subscriber unit, a mobile, a mobile station, a user, a terminal, a mobile terminal, a wireless terminal, a fixed terminal, a subscriber station, a user terminal, or a device, or described using other terminology used in the art. A UE 104 may communicate with an NE 102 (e.g., a BS) via uplink (UL) communication signals. An NE 102 may communicate with a UE 104 via downlink (DL) communication signals.

[0054] In some embodiments of the present disclosure, an NE 102 and a UE 104 may communicate over licensed spectrums, whereas in some other embodiments, an NE 102 and a UE 104 may communicate over unlicensed spectrums. The present disclosure is not intended to be limited to the implementation of any particular wireless communication system architecture or protocol.

[0055] In some embodiments of the present disclosure, an NE (e.g., a BS) may trigger an LTM cell switch procedure to indicate a UE to switch from its serving cell to a target cell. For example, based on an L1 measurement report from a UE, the BS may determine to change the UE's serving cell by a cell switch command. The cell switch command may indicate an LTM candidate cell configuration that the BS previously prepared and provided to the UE. Then, the UE may switch to the target cell according to the cell switch command. The LTM procedure can be used to reduce mobility

latency.

[0056] Embodiments of the present disclosure propose technical solutions for facilitating the LTM procedure in a communication network. LTM procedure may include an inter-BS (also referred to as inter-CU) or intra-BS (also referred to as intra-CU) LTM. Embodiments of the present disclosure propose technical solutions for facilitating inter-BS LTM.

[0057] For example, solutions are provided to configure UE-measured TA ID and no reset ID for a candidate cell at a serving BS side (e.g., a source MN or a source SN) in the inter-BS LTM scenario (e.g., in inter-BS master cell group (MCG) LTM or inter-BS secondary cell group (SCG) LTM). For example, in inter-BS LTM, a source BS (or source CU) cannot determine whether two candidate cells from the same target BS (or target CU) should be configured with the same or different UE-measured TA IDs or no-reset IDs because, for example, the source BS does not know whether the two candidate cells belong to the same distributed unit (DU) or not. It is proposed that the target BS (target CU) decides whether the same or different UE-measured TA IDs or no-reset IDs should be configured for the two candidate cells.

[0058] For example, solutions are provided to transfer LTM configurations (e.g., UE-measured TA IDs and no reset IDs) for candidate cells configured for a UE after the UE switches to a target cell. For example, generally, source BS (or source CU) is responsible for the allocation of LTM configurations (e.g., UE-measured TA IDs and no reset IDs) for candidate cells. In some embodiments, after a UE switch its serving cell to a target cell, the UE may continue keeping these configurations for subsequent use (e.g., conditional primary secondary cell addition or change (CPAC)). The new serving cell (or the target BS) may need to know these configuration allocated by the previous BS. Therefore, configurations transfer may be needed.

[0059] For example, solutions for transferring LTM configurations (e.g., UE-measured TA IDs and no reset IDs) for candidate cells (e.g., primary cells (PCells)) and/or the serving cell (e.g., serving PCell) to a target BS after inter-BS MCG LTM, L3 handover or CHO are provided. For example, solutions for transferring LTM configurations (e.g., UE-measured TA IDs and no reset IDs) for candidate cells (e.g., primary secondary cells (PSCells)) and/or the serving cell (e.g., serving PSCell) to a

target BS after inter-BS SCG LTM, inter-SN CPC or S-CPC are provided. By employing the above solutions, the target BS (e.g., the target CU and target DU) can know the LTM configurations (e.g., UE-measured TA IDs and no reset IDs) allocated by the previous BS.

[0060] More details on the embodiments of the present disclosure will be illustrated in the following text in combination with the appended drawings.

[0061] FIG. 2 illustrates a flow chart of exemplary method 200 for wireless communications in accordance with some embodiments of the present disclosure. Details described in all of the foregoing embodiments of the present disclosure are applicable for the embodiments shown in FIG. 2. For example, UE 204 may function as UE 104 in FIG. 1 and BS 202 and BS 206 may function as NE 102 shown in FIG. 1. In some embodiments, each of BS 202 and BS 206 may include a CU and at least one DU.

[0062] Referring to FIG. 2, at 211, UE 204 may connect to (or access) BS 202. For example, UE 204 may access a cell of BS 202, which can be referred to as the "serving cell" of UE 204. At 213, UE 204 may send a measurement report to BS 202. In some examples, UE 204 may access the network via single connectivity (e.g., via MCG only) and BS 202 is associated with the MCG of UE 204. In some examples, UE 204 may access the network via multi-connectivity (e.g., via dual connectivity (DC), that is MCG and SCG). For example, in addition to BS 202 which is associated with the MCG of UE 204, UE 204 may connect to another BS (denoted as BS #A1) which is associated with the SCG of UE 204. BS 202 and BS #A1 may also be referred to as an MN and an SN of UE 204, respectively. UE 204 may also send a measurement report to BS #A1.

[0063] In some embodiments, UE 204 may be configured with MCG LTM (regardless of whether the UE operates in a single connectivity mode or multi-connectivity mode). In some embodiments, in the case that UE 204 operates in the multi-connectivity mode (e.g., DC mode), UE 204 may be configured with SCG LTM.

[0064] In some embodiments, BS 202 may determine to initiate an LTM configuration preparation procedure for UE 204 for SCG LTM. BS 202 may transmit a request

message to a candidate BS (or target BS), which can also be referred to candidate SN (or target SN). The candidate SN (or target SN) may transmit a response message to BS 202 (source MN). The response message may include configuration for a candidate cell(s). The LTM configuration preparation may be based on the response message.

[0065] In some embodiments, at 215, BS 202 may determine to initiate an LTM configuration preparation procedure for UE 204 for MCG LTM. For example, at 217, BS 202 may transmit a request message to BS 206. BS 202 may also be referred to as source MN and BS 206 may also be referred to as candidate MN or target MN. The request message may be used to request assistant information from BS 206 for determining LTM configurations of candidate cells to be configured for UE 204.

[0066] In some embodiments, the request message may include an identity of a candidate cell (denoted as cell #A1). The request message may request information related to UE-measured TA or no-reset between cell #A1 and another candidate cell (denoted as cell #A2). For example, the request message may request an indication of whether UE-measured TA is able to be used or an indication of whether cell switch without L2 reset is performed when switching towards cell #A1 from cell #A2. Both cell #A1 and cell #A2 may belong to BS 206. In the context of the present disclosure, "UE-measured TA" can also be referred to as "UE-based TA measurement."

[0067] In some embodiments, the request message may further include an identity of cell #A2. In some embodiments, an LTM configuration for cell #A2 may have been provided by BS 206 to BS 202 before the transmission of the request message (e.g., before operation 217). LTM configuration for a certain cell may include, for example, a UE-measured TA ID and a no-reset ID for this cell.

[0068] For example, BS 202 (i.e., source MN) may have prepared one or more candidate cells (e.g., cell #A2) for MCG LTM purpose. The one or more candidate cells can be referred to as prepared candidate cells. The LTM configuration for the one or more candidate cells (e.g., cell #A2) may have been configured to UE 204. UE-measured TA ID for cell #A2 may be configured as a specific value (e.g., m2). In some examples, UE 204 may have been configured with an LTM configuration for another candidate cell (e.g., cell #A3) by BS 202. UE-measured TA ID for cell #A3

may be configured as a specific value (e.g., m3). In the case that m2 is not equal to m3, UE measured TA cannot be used in the cell switch between cell #A2 and cell #A3. That is, UE 204 cannot obtain TA by performing a UE-based TA measurement when UE 204 switches (e.g., LTM cell switch) from one of cell #A2 and cell #A3 to the other of cell #A2 and cell #A3. In the case that m2 is equal to m3, UE measured TA can be used in the cell switch between cell #A2 and cell #A3.

[0069] Similarly, no-reset ID for cell #A2 may be configured as a specific value (e.g., n2). No-reset ID for cell #A3 may be configured as a specific value (e.g., n3). Whether UE 204 needs to perform an L2 reset or not when UE 204 switches from one of cell #A2 and cell #A3 to the other of cell #A2 and cell #A3 depends on n2 and n3. That is, in the case that n2 is equal to n3, UE 204 performs no L2 reset; otherwise, UE 204 performs an L2 reset.

[0070] It should be noted that BS 206 (target MN or candidate MN) may not know the LTM configuration for cell #A2 or cell #A3 since it is configured by BS 202 (source MN).

[0071] In some embodiments, the request message may be a handover request message. BS 202 may transmit the request message to BS 206 via the Xn interface.

[0072] As mentioned above, the request message may request BS 206 to assist in preparing the configuration for cell #A1.

[0073] For example, in some embodiments, the request message may request BS 206 to provide an association of UE-measured TA among candidate cells (e.g., cell #A1 and cell #A2). In some embodiments, the request message may request whether UE-measured TA can be used between candidate cells (e.g., cell #A1 and cell #A2). These candidate cells (e.g., cell #A1 and cell #A2) belong to the same BS (e.g., BS 206). In some embodiments, the request message may indicate the identities of these candidate cells. In some embodiments, the request message may indicate an identity of one candidate cell (e.g., cell #A1) and the remaining candidate cells are prepared candidate cells that BS 206 has provided relevant information to BS 202. If UE-measured TA can be used in a cell switch from cell #A1 to cell #A2 or from cell #A2 to cell #A1, there is an association for UE-measured TA between cell #A1 and cell #A2. "UE-

measured TA can be used" means that the TA can be obtained by performing a UE-based TA measurement. For example, the request message may request BS 206 to indicate whether a UE (e.g., UE 204) is able to obtain TA by performing a UE-based TA measurement when the UE (e.g., UE 204) switches from one of cell #A1 and cell #A2 to the other of cell #A1 and cell #A2.

[0074] For example, in some embodiments, the request message may request BS 206 to provide an association of no-L2 reset among candidate cells (e.g., cell #A1 and cell #A2). In some embodiments, the request message may request whether no-L2 reset is required for a cell switch between candidate cells (e.g., cell #A1 and cell #A2). These candidate cells (e.g., cell #A1 and cell #A2) belong to the same BS (e.g., BS 206). In some embodiments, the request message may indicate the identities of these candidate cells. In some embodiments, the request message may indicate an identity of one candidate cell (e.g., cell #A1) and the remaining candidate cells are prepared candidate cells. If no-L2 reset is required for a cell switch from cell #A1 to cell #A2 or from cell #A2 to cell #A1, there is an association for no-L2 reset between cell #A1 and cell #A2. For example, the request message may request BS 206 to indicate whether a UE (e.g., UE 204) performs an L2 reset or not when the UE (e.g., UE 204) switches from one of cell #A1 and cell #A2 to the other of cell #A1 and cell #A2.

[0075] At 219, BS 206 may transmit, to BS 202, a response message in response to the request message. The response message may include assistance information for preparing the LTM configuration (e.g., UE-measured TA ID and no-reset ID) for cell #A1.

[0076] For example, in some embodiments, the response message may indicate whether there is an association of UE-measured TA among candidate cells (e.g., cell #A1 and cell #A2). In some embodiments, the response message may indicate whether UE-measured TA can be used between candidate cells (e.g., cell #A1 and cell #A2). The candidate cells may be indicated by the request message; or one candidate cell may be indicated by the request message and the remaining may be prepared candidate cells. For example, the response message may indicate whether a UE (e.g., UE 204) is able to obtain TA by performing a UE-based TA measurement when the UE (e.g., UE 204) switches from one of cell #A1 and cell #A2 to the other of cell #A1 and

cell #A2. For example, the response message may indicate at least one cell pair. Each cell pair may include two cells belonging to BS 206, and there is an association of UE-measured TA among the two cells in the cell pair. That is, a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches between the two cells.

[0077] For example, in some embodiments, the response message may indicate whether there is an association of no-L2 reset among candidate cells (e.g., cell #A1 and cell #A2). In some embodiments, the request message may indicate whether no-L2 reset is required for a cell switch between candidate cells (e.g., cell #A1 and cell #A2). The candidate cells may be indicated by the request message; or one candidate cell may be indicated by the request message and the remaining may be prepared candidate cells. For example, the response message may indicate whether a UE (e.g., UE 204) performs an L2 reset or not when the UE (e.g., UE 204) switches from one of cell #A1 and cell #A2 to the other of cell #A1 and cell #A2. For example, the response message may indicate at least one cell pair. Each cell pair may include two cells belonging to BS 206, and there is an association of no-L2 reset among the two cells in the cell pair. That is, performs no L2 reset when the UE switches between the two cells.

[0078] In some examples, if there is an association of UE-measured TA among two candidate cells (e.g., cell #A1 and cell #A2), the same value or index may be set by BS 206 in the response message for the two candidate cells. Otherwise, if a UE measured TA cannot be used in the cell switch between two candidate cells (e.g., cell #A1 and cell #A2), different values or indexes may be set in the response message for the two candidate cells. For example, in the response message, value k may be set to cell #A1 and a different value, for example, k-1 may be set to cell #A2.

[0079] Similarly, if there is an association of no-L2 reset among two candidate cells (e.g., cell #A1 and cell #A2), the same value or index may be set in the response message for the two candidate cells; otherwise, different values or indexes may be set in the response message.

[0080] Based on the response message, BS 202 may transmit a configuration to UE 204 at 221. The configuration may include an LTM candidate cell configuration of one or more candidate cells (e.g., cell #A1). For example, the configuration may

indicate a UE-measured TA ID for cell #A1, a no-reset ID for cell #A1 or both. For example, if the response message indicates that UE measured TA can be used in the cell switch between cell #A1 and cell #A2, the UE-measured TA ID of cell #A1 is set as the same value for cell #A2. For example, if the UE measured TA ID for cell #A2 is 5, the UE measured TA ID for cell #A1 is also set to 5. The no-reset ID for cell #A1 can be similarly set based on the response message.

[0081] In some embodiments, the configuration may be transmitted in a radio resource control (RRC) reconfiguration message. For example, BS 202 may generate an RRC reconfiguration message based on the configuration from BS 206 (e.g., information included in the response message) and transmit it to UE 204 via the DU (source DU) of BS 202. The RRC reconfiguration message includes an LTM candidate cell configuration of one or more candidate cells (e.g., cell #A1). For example, the RRC reconfiguration message may include a UE-measured TA ID (e.g., "lrm-UE-MeasuredTA-ID" as specified in 3GPP standards) for cell #A1. For example, the RRC reconfiguration message may include a no-reset ID (e.g., "lrm-NoResetID" as specified in 3GPP standards) for cell #A1. The UE-measured TA ID (e.g., "lrm-UE-MeasuredTA-ID") can be used to determine whether the UE should perform UE-based TA measurements towards an LTM candidate cell. The no-reset ID (e.g., "lrm-NoResetID") can be used by a UE to determine whether an L2 reset should be performed when an LTM cell switch procedure is triggered towards an LTM candidate cell. For example, the RRC reconfiguration message may include both the UE-measured TA ID and no-reset ID for cell #A1.

[0082] It should be appreciated by persons skilled in the art that the sequence of the operations in exemplary method 200 may be changed and some of the operations in exemplary method 200 may be eliminated or modified, without departing from the spirit and scope of the disclosure.

[0083] FIG. 3 illustrates a flow chart of exemplary method 300 for wireless communications in accordance with some embodiments of the present disclosure. Details described in all of the foregoing embodiments of the present disclosure are applicable for the embodiments shown in FIG. 3. For example, UE 304 may function as UE 104 in FIG. 1 and BS 302 and BS 306 may function as NE 102 shown in FIG. 1.

In some embodiments, each of BS 302 and BS 306 may include a CU and at least one DU.

[0084] Referring to FIG. 3, at 311, UE 304 may connect to (or access) BS 302. For example, UE 304 may access a cell of BS 302, which can be referred to as the "serving cell" of UE 304. At 313, UE 304 may send a measurement report to BS 302. In some examples, UE 304 may access the network via single connectivity (e.g., via MCG only) and BS 302 is associated with the MCG of UE 304. In some examples, UE 304 may access the network via multi-connectivity (e.g., via MCG and SCG). For example, in addition to BS 302 which is associated with the MCG of UE 304, UE 304 may connect to another BS (denoted as BS #B1) which is associated with the SCG of UE 304. BS 302 and BS #B1 may also be referred to as an MN and an SN of UE 304, respectively. UE 304 may also send a measurement report to BS #B1.

[0085] In some embodiments, UE 304 may be configured with MCG LTM (regardless of whether the UE operates in a single connectivity mode or multi-connectivity mode). In some embodiments, in the case that UE 304 operates in the multi-connectivity mode (e.g., DC mode), UE 304 may be configured with SCG LTM.

[0086] In some embodiments, BS 302 may determine to initiate an LTM configuration preparation procedure for UE 304 for MCG LTM. BS 302 may transmit a request message to a candidate BS (or target BS), which can also be referred to candidate MN (or target MN). The candidate MN (or target MN) may transmit a response message to BS 302 (source MN). The response message may include configuration for a candidate cell(s). The LTM configuration preparation may be based on the response message.

[0087] In some embodiments, at 315 (denoted in a dotted arrow as an option), BS 302 (MN) may determine to initiate an LTM configuration preparation procedure for UE 304 for SCG LTM. For example, at 317, BS 302 may transmit a request message to BS 306. BS 302 may also be referred to as source MN and BS 306 may also be referred to as candidate SN or target SN. The request message may be used to request assistant information from BS 306 for determining LTM configurations of candidate cells to be configured for UE 304. In some embodiments, the request message may include an identity of a candidate cell (denoted as cell #B1). The request message

may request information related to UE-measured TA or no-reset between cell #B1 and another candidate cell (denoted as cell #B2). For example, the request message may request an indication of whether UE-measured TA is able to be used or an indication of whether cell switch without L2 reset is performed when switching towards cell #B1 from cell #B2. Both cell #B1 and cell #B2 may belong to BS 306.

[0088] In some embodiments, the LTM configuration preparation procedure for UE 304 for SCG LTM may be initiated by an SN (e.g., BS #B1), instead of an MN (e.g., BS 302). For example, BS #B1 (source SN) may transmit a message (e.g., SN change required message) to BS 302 (source MN). The SN change required message may indicate an identity of a candidate cell (e.g., cell #B2) belonging to a candidate or target SN (e.g., BS 306). In response to receiving the SN change required message, BS 302 may transmit the request message to BS 306 at 317.

[0089] In some embodiments, the request message may further include an identity of cell #B2. In some embodiments, an LTM configuration for cell #B2 may have been provided by BS 306 to BS 302 or BS #B1 before the transmission of the request message (e.g., before operation 317). LTM configuration for a certain cell may include, for example, a UE-measured TA ID and a no-reset ID for this cell.

[0090] For example, BS 302 or BS #B1 (i.e., source MN or source SN) may have prepared one or more candidate cells (e.g., cell #B2) for SCG LTM purpose. The one or more candidate cells can be referred to as prepared candidate cells. The LTM configuration for the one or more candidate cells (e.g., cell #B2) may have been configured to UE 304. UE-measured TA ID for cell #B2 may be configured as a specific value (e.g., m_2). In some examples, UE 304 may have been configured with an LTM configuration for another candidate cell (e.g., cell #B3) by BS 302 or BS #B1. UE-measured TA ID for cell #B3 may be configured as a specific value (e.g., m_3). In the case that m_2 is not equal to m_3 , UE measured TA cannot be used in the cell switch between cell #B2 and cell #B3. That is, UE 304 cannot obtain TA by performing a UE-based TA measurement when UE 304 switches (e.g., LTM cell switch) from one of cell #B2 and cell #B3 to the other of cell #B2 and cell #B3. In the case that m_2 is equal to m_3 , UE measured TA can be used in the cell switch between cell #B2 and cell #B3.

[0091] Similarly, no-reset ID for cell #B2 may be configured as a specific value (e.g., n2'). No-reset ID for cell #B3 may be configured as a specific value (e.g., n3'). Whether UE 304 needs to perform an L2 reset or not when UE 304 switches from one of cell #B2 and cell #B3 to the other of cell #B2 and cell #B3 depends on n2' and n3'. That is, in the case that n2 is equal to n3, UE 304 performs no L2 reset; otherwise, UE 304 performs an L2 reset.

[0092] It should be noted that BS 306 (target SN or candidate SN) may not know the LTM configuration for cell #B2 or cell #B3 since it is configured by BS 302 (source MN) or BS #B1 (source SN).

[0093] In some embodiments, the request message may be an SN addition request. BS 302 may transmit the request message to BS 306 via the Xn interface.

[0094] As mentioned above, the request message may request BS 306 (candidate or target SN) to assist in preparing the configuration for cell #B1.

[0095] For example, in some embodiments, the request message may request BS 306 to provide an association of UE-measured TA among candidate cells (e.g., cell #B1 and cell #B2). In some embodiments, the request message may request whether UE-measured TA can be used between candidate cells (e.g., cell #B1 and cell #B2). These candidate cells (e.g., cell #B1 and cell #B2) belong to the same BS (e.g., BS 306). In some embodiments, the request message may indicate the identities of these candidate cells. In some embodiments, the request message may indicate an identity of one candidate cell (e.g., cell #B1) and the remaining candidate cells are prepared candidate cells that BS 306 has provided relevant information. If UE-measured TA can be used in a cell switch from cell #B1 to cell #B2 or from cell #B2 to cell #B1, there is an association for UE-measured TA between cell #B1 and cell #B2. For example, the request message may request BS 306 to indicate whether a UE (e.g., UE 304) is able to obtain TA by performing a UE-based TA measurement when the UE (e.g., UE 304) switches from one of cell #B1 and cell #B2 to the other of cell #B1 and cell #B2.

[0096] For example, in some embodiments, the request message may request BS 306 to provide an association of no-L2 reset among candidate cells (e.g., cell #B1 and cell #B2). In some embodiments, the request message may request whether no-L2 reset is

required for a cell switch between candidate cells (e.g., cell #B1 and cell #B2). These candidate cells (e.g., cell #B1 and cell #B2) belong to the same BS (e.g., BS 306). In some embodiments, the request message may indicate the identities of these candidate cells. In some embodiments, the request message may indicate an identity of one candidate cell (e.g., cell #B1) and the remaining candidate cells are prepared candidate cells. If no-L2 reset is required for a cell switch from cell #B1 to cell #B2 or from cell #B2 to cell #B1, there is an association for no-L2 reset between cell #B1 and cell #B2. For example, the request message may request BS 306 to indicate whether a UE (e.g., UE 304) performs an L2 reset or not when the UE (e.g., UE 304) switches from one of cell #B1 and cell #B2 to the other of cell #B1 and cell #B2.

[0097] At 319, BS 306 may transmit, to BS 302, a response message in response to the request message. The response message may include assistance information for preparing the LTM configuration (e.g., UE-measured TA ID and no-reset ID) for cell #B1.

[0098] For example, in some embodiments, the response message may indicate whether there is an association of UE-measured TA among candidate cells (e.g., cell #B1 and cell #B2). In some embodiments, the response message may indicate whether UE-measured TA can be used between candidate cells (e.g., cell #B1 and cell #B2). The candidate cells may be indicated by the request message; or one candidate cell may be indicated by the request message and the remaining may be prepared candidate cells. For example, the response message may indicate whether a UE (e.g., UE 304) is able to obtain TA by performing a UE-based TA measurement when the UE (e.g., UE 304) switches from one of cell #B1 and cell #B2 to the other of cell #B1 and cell #B2. For example, the response message may indicate at least one cell pair. Each cell pair may include two cells belonging to BS 306, and there is an association of UE-measured TA among the two cells in the cell pair. That is, a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches between the two cells.

[0099] For example, in some embodiments, the response message may indicate whether there is an association of no-L2 reset among candidate cells (e.g., cell #B1 and cell #B2). In some embodiments, the request message may indicate whether no-L2

reset is required for a cell switch between candidate cells (e.g., cell #B1 and cell #B2). The candidate cells may be indicated by the request message; or one candidate cell may be indicated by the request message and the remaining may be prepared candidate cells. For example, the response message may indicate whether a UE (e.g., UE 304) performs an L2 reset or not when the UE (e.g., UE 304) switches from one of cell #B1 and cell #B2 to the other of cell #B1 and cell #B2. For example, the response message may indicate at least one cell pair. Each cell pair may include two cells belonging to BS 306, and there is an association of no-L2 reset among the two cells in the cell pair. That is, performs no L2 reset when the UE switches between the two cells.

[00100] In some examples, if there is an association of UE-measured TA among two candidate cells (e.g., cell #B1 and cell #B2), the same value or index may be set by BS 306 in the response message for the two candidate cells. Otherwise, if a UE measured TA cannot be used in the cell switch between two candidate cells (e.g., cell #B1 and cell #B2), different values or indexes may be set in the response message for the two candidate cells. For example, in the response message, value k' may be set to cell #B1 and a different value, for example, $k'+1$ may be set to cell #B2.

[00101] Similarly, if there is an association of no-L2 reset among two candidate cells (e.g., cell #B1 and cell #B2), the same value or index may be set in the response message for the two candidate cells; otherwise, different values or indexes may be set in the response message.

[00102] Based on the response message, BS 302 may transmit a configuration to UE 304 at 321. The configuration may include an LTM candidate cell configuration of one or more candidate cells (e.g., cell #B1). For example, the configuration may indicate a UE-measured TA ID for cell #B1, a no-reset ID for cell #B1 or both. For example, if the response message indicates that UE measured TA can be used in the cell switch between cell #B1 and cell #B2, the UE-measured TA ID of cell #B1 is set as the same value for cell #B2. For example, if the UE measured TA ID for cell #B2 is 5, the UE measured TA ID for cell #B1 is also set to 5. The no-reset ID for cell #B1 can be similarly set based on the response message.

[00103] In some embodiments, the configuration may be transmitted in an RRC reconfiguration message. For example, BS 302 may generate an RRC reconfiguration

message based on the configuration from BS 306 (e.g., information included in the response message) and transmit it to UE 304 via the DU (source DU) of BS 302. The RRC reconfiguration message includes an LTM candidate cell configuration of one or more candidate cells (e.g., cell #B1). For example, the RRC reconfiguration message may include a UE-measured TA ID (e.g., "*ltm-UE-MeasuredTA-ID*" as specified in 3GPP standards) for cell #B1. For example, the RRC reconfiguration message may include a no-reset ID (e.g., "*ltm-NoResetID*" as specified in 3GPP standards) for cell #B1. For example, the RRC reconfiguration message may include both the UE-measured TA ID and no-reset ID for cell #B1.

[00104] It should be appreciated by persons skilled in the art that the sequence of the operations in exemplary method 300 may be changed and some of the operations in exemplary method 300 may be eliminated or modified, without departing from the spirit and scope of the disclosure.

[00105] FIG. 4 illustrates a flow chart of exemplary method 400 for wireless communications in accordance with some embodiments of the present disclosure. Details described in all of the foregoing embodiments of the present disclosure are applicable for the embodiments shown in FIG. 4. For example, UE 404 may function as UE 104 in FIG. 1 and BS 402, BS 406 and BS 408 may function as NE 102 shown in FIG. 1. In some embodiments, each of BS 402, BS 406 and BS 408 may include a CU and at least one DU.

[00106] Referring to FIG. 4, at 411, UE 404 may connect to (or access) BS 402. For example, UE 404 may access a cell of BS 402, which can be referred to as the "serving cell" of UE 404. UE 404 may send a measurement report to BS 402. In some examples, UE 404 may access the network via single connectivity (e.g., via MCG only) and BS 402 is associated with the MCG of UE 404. In some examples, UE 404 may access the network via multi-connectivity (e.g., via MCG and SCG). For example, in addition to BS 402 which is associated with the MCG of UE 404, UE 404 may connect to another BS (denoted as BS #C1) which is associated with the SCG of UE 404. BS 402 and BS #C1 may also be referred to as an MN and an SN of UE 404, respectively. UE 404 may also send a measurement report to BS #C1.

[00107] In some embodiments, UE 404 may be configured with MCG LTM (regardless

of whether the UE operates in a single connectivity mode or multi-connectivity mode). In some embodiments, in the case that UE 404 operates in the multi-connectivity mode (e.g., DC mode), UE 404 may be configured with SCG LTM.

[00108] In some embodiments, an LTM configuration preparation procedure for UE 404 for SCG LTM may be initiated by BS 402 or BS #C1. BS 402 may transmit a request message to a candidate BS (or target BS), which can also be referred to as candidate SN (or target SN). The candidate SN (or target SN) may transmit a response message to BS 402 (source MN). The response message may include configuration for a candidate cell(s). The LTM configuration preparation may be based on the response message.

[00109] In some embodiments, at 413, BS 402 may determine to initiate an LTM configuration preparation procedure for UE 404 for MCG LTM. For example, at 415, BS 402 may transmit a request message to BS 406. BS 402 may also be referred to as source MN and BS 406 may also be referred to as candidate MN or target MN. The request message may be used to request assistant information from BS 406 for determining LTM configurations of candidate cells to be configured for UE 404. At 417, BS 406 may transmit a response message to BS 402. The response message may include configuration for a candidate cell(s). The LTM configuration preparation may be based on the response message.

[00110] Based on the response message, BS 402 may transmit a configuration to UE 404 at 419. The configuration may include an LTM candidate cell configuration of one or more candidate cells. For example, the configuration may indicate a UE-measured TA ID for cell #C1, a no-reset ID for cell #C1 or both. For example, BS 402 may generate an RRC reconfiguration message based on the configuration from BS 406 (e.g., information included in the response message) and transmit it to UE 404 via the DU (source DU) of BS 402. The RRC reconfiguration message includes the LTM candidate cell configuration of one or more candidate cells (e.g., cell #C1).

[00111] UE 404 may receive an RRC configuration message associated with one or more candidate cells for LTM configuration. For example, UE 404 may receive configurations for a plurality of candidate cells (e.g., cell #C1, cell #C2 and cell #C3) which may belong to the same or different BSs. For example, the respective RRC

configuration messages may include corresponding UE-measured TA IDs (e.g., "*ltm-UE-MeasuredTA-ID*" as specified in 3GPP standards) for the plurality of candidate cells. The respective RRC configuration messages may include corresponding no-reset ID (e.g., "*ltm-NoResetID*" as specified in 3GPP standards) for the plurality of candidate cells.

[00112] If UE measured TA can be used in a cell switch from one candidate cell of the plurality of candidate cells to another candidate cell of the plurality of candidate cells (e.g., from cell #C1 to cell #C2), the UE-measured TA IDs of the two candidate cells are set as the same value. For example, if the UE measured TA ID for cell #C1 is 5, the UE measured TA ID for cell #C2 should also be set to 5. The no-reset IDs for candidate cells can be similarly set.

[00113] In some embodiments, the serving cell of UE 404 may also configure UE 404 with LTM configuration for the serving cell. For example, the serving cell of UE 404 may configure a UE-measured TA ID for the serving cell, a no-reset ID for the serving cell or both to UE 404.

[00114] In some embodiments, an MCG LTM procedure may be triggered. For example, operation block 420 may be performed. At 421, BS 402 (source MN) may transmit an LTM cell switch command to UE 404. In some embodiments, the LTM cell switch command may indicate a candidate cell (denoted as cell #C4) belonging to BS 408. BS 408 may be the same or different from BS 406. Cell #C4 may also be referred to as target cell and BS 408 may also be referred to as target BS or target MN. The LTM cell switch command may be transmitted by the DU (source DU) of BS 402 to UE 404. In some embodiments, in response to transmitting the LTM cell switch command, the source DU may, at 423, transmit a cell switch notification message to the CU (source CU) of BS 402. In response to receiving the LTM cell switch command, UE 404 may perform an LTM cell switch procedure to switch from its current serving cell (i.e., a cell of BS 402 currently serving UE 404, referred to as cell #C0 for clarity) to cell #C4.

[00115] In some embodiments, at 425, BS 402 (source MN) may transmit LTM configurations for all candidate cells (e.g., cell #C1 to cell #C4) configured for UE 404 to BS 408 (target MN). In some embodiments, BS 402 may also transmit the LTM

configuration for cell #C0 (i.e., serving PCell) to BS 408. In some embodiments, an LTM configuration for a certain cell may include a UE-measured TA ID for this cell, a no-reset ID for this cell or both. In some embodiments, "all candidate cells configured for UE 404" may refer to all candidate cells configured for MCG LTM, for example, all candidate PCells.

[00116] In some embodiments, BS 402 (source MN) may receive from BS 408 (target MN) an indication indicating the completion of the LTM cell switch. In some embodiments, BS 402 (source MN) may receive from BS 408 (target MN) a release message in response to the LTM cell switch. Operation 425 may be performed in response to the reception of the indication or the release message.

[00117] In some embodiments, an L3 handover may be triggered. For example, operation block 430 may be performed. At 431, BS 402 (source MN) may transmit a handover command to handover UE 404 from cell #C0 to a target cell (denoted as cell #C5). Cell #C5 may belong to BS 408, which may be referred to as target BS or target MN. BS 408 may be the same or different from BS 406. In response to receiving the handover command, UE 404 may perform a handover procedure to switch from its current serving cell (cell #C0) to cell #C5.

[00118] In some embodiments, at 433, BS 402 (source MN) may transmit LTM configurations for all candidate cells (e.g., cell #C1 to cell #C5) configured for UE 404 to BS 408 (target MN). In some embodiments, BS 402 may also transmit the LTM configuration for cell #C0 to BS 408. In some embodiments, an LTM configuration for a certain cell may include a UE-measured TA ID for this cell, a no-reset ID for this cell or both. In some embodiments, "all candidate cells configured for UE 404" may refer to all candidate cells configured for MCG LTM, for example, all candidate PCells.

[00119] In some embodiments, BS 402 (source MN) may receive from BS 408 (target MN) an indication indicating the completion of the handover. In some embodiments, BS 402 (source MN) may receive from BS 408 (target MN) a release message in response to the handover. Operation 433 may be performed in response to the reception of the indication or the release message.

[00120] In some embodiments, a CHO may be triggered. For example, operation

block 450 may be performed. At 451, UE 404 may determine that a condition for switching to a cell (denoted as cell #C6) is met and may then perform a CHO from cell #C0 to cell #C6. Cell #C6 may belong to BS 408, which may be referred to as target BS or target MN. BS 408 may be the same or different from BS 406.

[00121] In some embodiments, at 453, BS 402 (source MN) may transmit LTM configurations for all candidate cells (e.g., cell #C1 to cell #C6) configured for UE 404 to BS 408 (target MN). In some embodiments, BS 402 may also transmit the LTM configuration for cell #C0 to BS 408. In some embodiments, an LTM configuration for a certain cell may include a UE-measured TA ID for this cell, a no-reset ID for this cell or both. In some embodiments, "all candidate cells configured for UE 404" may refer to all candidate cells configured for MCG LTM, for example, all candidate PCells.

[00122] In some embodiments, BS 402 (source MN) may receive from BS 408 (target MN) an indication indicating the completion of the handover (e.g., the CHO). In some embodiments, BS 402 (source MN) may receive from BS 408 (target MN) a release message in response to the handover. Operation 453 may be performed in response to the reception of the indication or the release message.

[00123] It should be appreciated by persons skilled in the art that the sequence of the operations in exemplary method 400 may be changed and some of the operations in exemplary method 400 may be eliminated or modified, without departing from the spirit and scope of the disclosure.

[00124] FIG. 5 illustrates a flow chart of exemplary method 500 for wireless communications in accordance with some embodiments of the present disclosure. Details described in all of the foregoing embodiments of the present disclosure are applicable for the embodiments shown in FIG. 5. For example, UE 504 may function as UE 104 in FIG. 1 and BS 502, BS 506 and BS 508 may function as NE 102 shown in FIG. 1. In some embodiments, each of BS 502, BS 506 and BS 508 may include a CU and at least one DU.

[00125] Referring to FIG. 5, UE 504 may access the network via multi-connectivity (e.g., via MCG and SCG). For example, UE 504 may connect to (or access) a BS (denoted as BS #D1), which is associated with the MCG of UE 504. UE 504 may

send a measurement report to BS #D1. At 511, UE 504 may also connect to (or access) BS 502, which is associated with the SCG of UE 504. For example, UE 504 may access a cell of BS 502, which can be referred to as the "serving cell" of UE 504. UE 504 may send a measurement report to BS 502. BS #D1 may also be referred to as an MN or a serving MN of UE 504. BS 502 may also be referred to as an SN or a serving SN of UE 504.

[00126] In some embodiments, at 513, BS 502 may determine to initiate an LTM configuration preparation procedure for UE 504 for SCG LTM. For example, BS 502 may (source SN) may transmit a message (e.g., SN change required message) to BS #D1 (source MN). The SN change required message may indicate an identity of at least one candidate cell (e.g., cell #D1) belonging to a candidate or target SN (e.g., BS 506). In response to receiving the SN change required message, BS #D1 may transmit a request message to BS 506. The request message may be used to request assistance information from BS 506 for determining an LTM configuration of cell #D1. BS 506 may transmit, to BS #D1, a response message in response to the request message. The response message may include assistance information for preparing the LTM configuration (e.g., UE-measured TA ID and no-reset ID) for cell # D1.

[00127] In some embodiments, based on the response message, BS #D1 (source MN) may transmit a configuration to UE 504 (not shown in FIG. 5). The configuration may include an LTM candidate cell configuration of one or more candidate cells. For example, the configuration may indicate a UE-measured TA ID for cell #D1, a no-reset ID for cell #D1 or both. For example, BS #D1 may generate an RRC reconfiguration message based on the configuration from BS 506 (e.g., information included in the response message) and transmit it to UE 504 via the DU (source DU) of BS #D1. The RRC reconfiguration message includes the LTM candidate cell configuration of one or more candidate cells (e.g., cell #D1).

[00128] In some embodiments, BS 502 (source SN) may transmit the LTM candidate cell configuration of one or more candidate cells (e.g., cell #D1) to UE 504. For example, in the case that an SN initiates the SCG LTM, the SN may configure LTM configuration of one or more candidate cells to a UE. In some embodiments, the configuration may be transmitted via BS #D1 (MN).

[00129] UE 504 may receive an RRC configuration message associated with one or more candidate cells for LTM configuration. For example, UE 504 may receive configurations for a plurality of candidate cells (e.g., cell #D1, cell #D2 and cell #D3) which may belong to the same or different BSs. For example, the respective RRC configuration messages may include corresponding UE-measured TA IDs (e.g., "*ltm-UE-MeasuredTA-ID*" as specified in 3GPP standards) for the plurality of candidate cells. The respective RRC configuration messages may include corresponding no-reset ID (e.g., "*ltm-NoResetID*" as specified in 3GPP standards) for the plurality of candidate cells.

[00130] If UE measured TA can be used in a cell switch from one candidate cell of the plurality of candidate cells to another candidate cell of the plurality of candidate cells (e.g., from cell #D1 to cell #D2), the UE-measured TA IDs of the two candidate cells are set as the same value. For example, if the UE measured TA ID for cell #D1 is 5, the UE measured TA ID for cell #D2 should also be set to 5. The no-reset IDs for candidate cells can be similarly set.

[00131] In some embodiments, the serving cell of UE 504 may also configure UE 504 with LTM configuration for the serving cell. For example, the serving cell of UE 504 may configure a UE-measured TA ID for the serving cell, a no-reset ID for the serving cell or both to UE 504.

[00132] In some embodiments, an SCG LTM procedure may be triggered. For example, operation block 520 may be performed. At 521, BS 502 (source SN) may transmit an LTM cell switch command to UE 504. In some embodiments, the LTM cell switch command may indicate a candidate cell (denoted as cell #D4) belonging to BS 508. BS 508 may be the same or different from BS 506. Cell #D4 may also be referred to as target cell and BS 508 may also be referred to as target BS or target SN. The LTM cell switch command may be transmitted by the DU (source SN-DU) of BS 502 to UE 504. In some embodiments, in response to transmitting the LTM cell switch command, the source SN-DU may, at 523, transmit a cell switch notification message to the CU (source SN-CU) of BS 502. In response to receiving the LTM cell switch command, UE 504 may perform an LTM cell switch procedure to switch from its current serving cell (i.e., a cell of BS 502 currently serving UE 504, referred to as cell

#D0 for clarity) to cell #D4.

[00133] In some embodiments, at 525, BS 502 (source SN) may transmit LTM configurations for all candidate cells (e.g., cell #D1 to cell #D4) configured for UE 504 to BS 508 (target SN). In some embodiments, BS 502 may also transmit the LTM configuration for cell #D0 (i.e., serving PSCell) to BS 508. The above configurations may be transmitted via BS #D1 (MN). In some embodiments, an LTM configuration for a certain cell may include a UE-measured TA ID for this cell, a no-reset ID for this cell or both. In some embodiments, "all candidate cells configured for UE 504" may refer to all candidate cells configured for SCG LTM, for example, all candidate PSCell.

[00134] In some embodiments, BS 502 (source SN) may receive from BS 508 (target SN) an indication indicating the completion of the LTM cell switch. In some embodiments, BS 502 (source SN) may receive from BS 508 (target SN) a release message in response to the LTM cell switch. Operation 525 may be performed in response to the reception of the indication or the release message. In some embodiments, the indication or the release message may be received via BS #D1 (MN).

[00135] In some embodiments, a CPC or S-CPC may be triggered. For example, operation block 550 may be performed. At 551, UE 504 may determine that a condition for switching to a cell (denoted as cell #D6) is met and may then perform a CPC from cell #D0 to cell #D6. Cell #D6 may belong to BS 508, which may be referred to as target BS or target MN. BS 508 may be the same or different from BS 506.

[00136] In some embodiments, at 553, BS 502 (source SN) may transmit LTM configurations for all candidate cells (e.g., cell #D1 to cell #D4 and cell #D6) configured for UE 504 to BS 508 (target SN). In some embodiments, BS 502 may also transmit the LTM configuration for cell #D0 to BS 508. In some embodiments, an LTM configuration for a certain cell may include a UE-measured TA ID for this cell, a no-reset ID for this cell or both. The above configurations may be transmitted via BS #D1 (MN). In some embodiments, "all candidate cells configured for UE 504" may refer to all candidate cells configured for SCG LTM, for example, all candidate PSCell.

[00137] In some embodiments, BS 502 (source SN) may receive from BS 508 (target SN) an indication indicating the completion of the cell change (e.g., the CPC or S-CPC). In some embodiments, BS 502 (source SN) may receive from BS 508 (target SN) a release message in response to the cell change (e.g., the CPC or S-CPC). Operation 553 may be performed in response to the reception of the indication or the release message. In some embodiments, the indication or the release message may be received via BS #D1 (MN).

[00138] It should be appreciated by persons skilled in the art that the sequence of the operations in exemplary method 500 may be changed and some of the operations in exemplary method 500 may be eliminated or modified, without departing from the spirit and scope of the disclosure.

[00139] FIG. 6 illustrates a flowchart of method 600 for wireless communication in accordance with some embodiments of the present disclosure. Details described in all of the foregoing embodiments of the present disclosure are applicable for the embodiments shown in FIG. 6. In some examples, method 600 may be performed by a network node, for example, a BS or an NE. In some embodiments, the network node may execute a set of instructions to control the functional elements of the network node to perform the described functions or operations. For the sake of simplicity, the operations in method 600 are described as follows with respect to a BS.

[00140] At 611, a BS (denoted as "first BS" for clarity) may transmit a request message to another BS (denoted as "second BS" for clarity), wherein the request message may include an identity of a first candidate cell and may request an indication of whether UE-measured TA is able to be used or an indication of whether cell switch without L2 reset is performed when switching towards the first candidate cell from a second candidate cell. At 613, the first BS may receive, from the second BS, a response message in response to the request message.

[00141] In some embodiments of the present disclosure, the first BS may receive an LTM configuration for the second candidate cell from the second BS before the transmission of the request message. In some embodiments of the present disclosure, the request message may further include an identity of the second candidate cell.

[00142] In some embodiments of the present disclosure, the request message may request the second BS to indicate one or more of the following: whether a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; and whether the UE performs an L2 reset or not when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell.

[00143] In some embodiments of the present disclosure, the response message may indicate one or more of the following: whether a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; at least one cell pair, each cell pair including a first cell and a second cell belonging to the second BS, wherein the UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from the first cell to the second cell; whether the UE performs an L2 reset or not when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; and at least one cell pair, each cell pair including a third cell and a fourth cell belonging to the second BS, wherein the UE performs no L2 reset when the UE switches from the third cell to the fourth cell.

[00144] In some embodiments of the present disclosure, the first BS may transmit a configuration to the UE based on the response message, and wherein the configuration indicates one or more of: a UE-measured TA ID for the first candidate cell and a no-reset ID for the first candidate cell.

[00145] In some embodiments of the present disclosure, the first BS may: transmit, to a UE, a command to perform an LTM cell switch or a handover to switch the UE from the first BS to another BS (denoted as "third BS"); and transmit, to the third BS, LTM configurations for all candidate cells configured for the UE, wherein the LTM configurations includes at least a UE-measured TA ID for the first candidate cell and a no-reset ID for the first candidate cell. The third BS may be the same or different from the second BS.

[00146] In some embodiments of the present disclosure, the first BS may receive, from

the third BS, an indication indicating the completion of the LTM cell switch or the completion of the handover, wherein the LTM configurations is transmitted in response to the reception of the indication. In some embodiments of the present disclosure, the first BS may receive, from the third BS, a release message in response to the LTM cell switch or the handover, wherein the LTM configurations is transmitted in response to the reception of the release message.

[00147] In some embodiments of the present disclosure, the first BS may: receive, from another BS (denoted as "third BS"), an indication indicating the completion of a handover of a UE from the first BS to the third BS or a release message in response to the handover of the UE; and transmit, to the third BS, an LTM configurations for all candidate cells configured for the UE in response to the reception of the indication or the release message. The third BS may be the same or different from the second BS.

[00148] In some embodiments of the present disclosure, the handover may be related to a CHO, a CPC or an S-CPC.

[00149] In some embodiments of the present disclosure, the first BS may be an MN of the UE and the second BS may be a candidate MN for LTM. In some embodiments of the present disclosure, the UE may operate in a multi-connectivity mode, the first BS may be an MN of the UE and the second BS may be a candidate SN for LTM. In some embodiments of the present disclosure, the first BS may be an MN of the UE. In some embodiments of the present disclosure, the UE may operate in a multi-connectivity mode, the first BS may be a source SN of the UE.

[00150] It should be appreciated by persons skilled in the art that the sequence of the operations in exemplary method 600 may be changed and some of the operations in exemplary method 600 may be eliminated or modified, without departing from the spirit and scope of the disclosure.

[00151] FIG. 7 illustrates a flowchart of method 700 for wireless communication in accordance with some embodiments of the present disclosure. Details described in all of the foregoing embodiments of the present disclosure are applicable for the embodiments shown in FIG. 7. In some examples, method 700 may be performed by a network node, for example, a BS or an NE. In some embodiments, the network node

may execute a set of instructions to control the functional elements of the network node to perform the described functions or operations. For the sake of simplicity, the operations in method 700 are described as follows with respect to a BS.

[00152] At 711, a BS (denoted as "second BS" for clarity) may receive a request message from another BS (denoted as "first BS" for clarity), wherein the request message may include an identity of a first candidate cell and may request an indication of whether UE-measured TA is able to be used or an indication of whether cell switch without L2 reset is performed when switching towards the first candidate cell from a second candidate cell. At 713, the second BS may transmit, to the first BS, a response message in response to the request message.

[00153] In some embodiments of the present disclosure, the second BS may transmit an LTM configuration for the second candidate cell to the first BS before the reception of the request message. In some embodiments of the present disclosure, the request message may further include an identity of the second candidate cell.

[00154] In some embodiments of the present disclosure, the request message may request the second BS to indicate one or more of the following: whether a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; and whether the UE performs an L2 reset or not when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell.

[00155] In some embodiments of the present disclosure, the response message may indicate one or more of the following: whether a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; at least one cell pair, each cell pair including a first cell and a second cell belonging to the second BS, wherein the UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from the first cell to the second cell; whether the UE performs an L2 reset or not when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; and at least one cell pair, each cell pair including a third cell

and a fourth cell belonging to the second BS, wherein the UE performs no L2 reset when the UE switches from the third cell to the fourth cell.

[00156] In some embodiments of the present disclosure, the second BS may: perform an LTM cell switch procedure or a handover procedure with a UE to switch the UE from the first BS to the second BS; and receive, from the first BS, LTM configurations for all candidate cells configured for the UE, wherein the LTM configurations includes at least a UE-measured TA ID for the first candidate cell and a no-reset ID for the first candidate cell.

[00157] In some embodiments of the present disclosure, the second BS may transmit, to the first BS, an indication indicating the completion of the LTM cell switch procedure or the completion of the handover procedure, wherein the LTM configurations is received in response to the transmission of the indication. In some embodiments of the present disclosure, the second BS may transmit, to the first BS, a release message in response to the LTM cell switch procedure or the handover procedure, wherein the LTM configurations is received in response to the transmission of the release message.

[00158] In some embodiments of the present disclosure, the handover procedure may be related to a L3 handover, a CHO, a CPC or an S-CPC.

[00159] In some embodiments of the present disclosure, the first BS may be an MN of the UE and the second BS may be a candidate MN for LTM. In some embodiments of the present disclosure, the UE may operate in a multi-connectivity mode, the first BS may be an MN of the UE and the second BS may be a candidate SN for LTM. In some embodiments of the present disclosure, the first BS and the second BS are respectively a source MN and a target MN of the LTM cell switch procedure or the handover procedure. In some embodiments of the present disclosure, the UE may operate in a multi-connectivity mode, the first BS and the second BS are respectively a source SN and a target SN of the LTM cell switch procedure or the handover procedure.

[00160] It should be appreciated by persons skilled in the art that the sequence of the operations in exemplary method 700 may be changed and some of the operations in exemplary method 700 may be eliminated or modified, without departing from the spirit and scope of the disclosure.

[00161] FIG. 8 illustrates an example of a processor 800 in accordance with aspects of the present disclosure. The processor 800 may be an example of a processor configured to perform various operations in accordance with examples as described herein. The processor 800 may include a controller 802 configured to perform various operations in accordance with examples as described herein. The processor 800 may optionally include at least one memory 804, which may be, for example, an L1/L2/L3 cache. Additionally, or alternatively, the processor 800 may optionally include one or more arithmetic-logic units (ALUs) 806. 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).

[00162] The processor 800 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 800) 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).

[00163] The controller 802 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 800 to cause the processor 800 to support various operations in accordance with examples as described herein. For example, the controller 802 may operate as a control unit of the processor 800, generating control signals that manage the operation of various components of the processor 800. These control signals include enabling or disabling functional units, selecting data paths, initiating memory access, and coordinating timing of operations.

[00164] The controller 802 may be configured to fetch (e.g., obtain, retrieve, receive) instructions from the memory 804 and determine a subsequent instruction(s) to be

executed to cause the processor 800 to support various operations in accordance with examples as described herein. The controller 802 may be configured to track memory address of instructions associated with the memory 804. The controller 802 may be configured to decode instructions to determine the operation to be performed and the operands involved. For example, the controller 802 may be configured to interpret the instruction and determine control signals to be output to other components of the processor 800 to cause the processor 800 to support various operations in accordance with examples as described herein. Additionally, or alternatively, the controller 802 may be configured to manage flow of data within the processor 800. The controller 802 may be configured to control transfer of data between registers, ALUs, and other functional units of the processor 800.

[00165] The memory 804 may include one or more caches (e.g., memory local to or included in the processor 800 or other memory, such RAM, ROM, DRAM, SDRAM, SRAM, MRAM, flash memory, etc. In some implementations, the memory 804 may reside within or on a processor chipset (e.g., local to the processor 800). In some other implementations, the memory 804 may reside external to the processor chipset (e.g., remote to the processor 800).

[00166] The memory 804 may store computer-readable, computer-executable code including instructions that, when executed by the processor 800, cause the processor 800 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 802 and/or the processor 800 may be configured to execute computer-readable instructions stored in the memory 804 to cause the processor 800 to perform various functions. For example, the processor 800 and/or the controller 802 may be coupled with or to the memory 804, the processor 800, the controller 802, and the memory 804 may be configured to perform various functions described herein. In some examples, the processor 800 may include multiple processors and the memory 804 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.

[00167] The one or more ALUs 806 may be configured to support various operations

in accordance with examples as described herein. In some implementations, the one or more ALUs 806 may reside within or on a processor chipset (e.g., the processor 800). In some other implementations, the one or more ALUs 806 may reside external to the processor chipset (e.g., the processor 800). One or more ALUs 806 may perform one or more computations such as addition, subtraction, multiplication, and division on data. For example, one or more ALUs 806 may receive input operands and an operation code, which determines an operation to be executed. One or more ALUs 806 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 806 may support logical operations such as AND, OR, exclusive-OR (XOR), not-OR (NOR), and not-AND (NAND), enabling the one or more ALUs 806 to handle conditional operations, comparisons, and bitwise operations.

[00168] The processor 800 may support wireless communication in accordance with examples as disclosed herein.

[00169] For example, the processor 800 may be configured to support means for performing the operations as described with respect to FIG. 6. For example, the processor 800 may be configured to or operable to support: a means for transmitting a request message to a second BS, wherein the request message includes an identity of a first candidate cell and requests an indication of whether UE-measured TA is able to be used or an indication of whether cell switch without L2 reset is performed when switching towards the first candidate cell from a second candidate cell; and a means for receiving, from the second BS, a response message in response to the request message.

[00170] For example, the processor 800 may be configured to support means for performing the operations as described with respect to FIG. 7. For example, the processor 800 may be configured to or operable to support: a means for receiving a request message from a first BS, wherein the request message includes an identity of a first candidate cell and requests an indication of whether UE-measured TA is able to be used or an indication of whether cell switch without L2 reset is performed when switching towards the first candidate cell from a second candidate cell; and a means for transmitting, to the first BS, a response message in response to the request message.

[00171] It should be appreciated by persons skilled in the art that the components in exemplary processor 800 may be changed, for example, some of the components in exemplary processor 800 may be omitted or modified or a new component(s) may be added to exemplary processor 800, without departing from the spirit and scope of the disclosure. For example, in some embodiments, the processor 800 may not include the ALUs 806.

[00172] FIG. 9 illustrates an example of an NE 900 in accordance with aspects of the present disclosure. The NE 900 may include a processor 902, a memory 904, a controller 906, and a transceiver 908. The processor 902, the memory 904, the controller 906, or the transceiver 908, 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.

[00173] The processor 902, the memory 904, the controller 906, or the transceiver 908, or various combinations or components thereof may be implemented in hardware (e.g., circuitry). The hardware may include a processor, a DSP, an 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.

[00174] The processor 902 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 902 may be configured to operate the memory 904. In some other implementations, the memory 904 may be integrated into the processor 902. The processor 902 may be configured to execute computer-readable instructions stored in the memory 904 to cause the NE 900 to perform various functions of the present disclosure.

[00175] The memory 904 may include volatile or non-volatile memory. The memory 904 may store computer-readable, computer-executable code including instructions when executed by the processor 902 cause the NE 900 to perform various functions described herein. The code may be stored in a non-transitory computer-readable medium such as the memory 904 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.

[00176] In some implementations, the processor 902 and the memory 904 coupled with the processor 902 may be configured to cause the NE 900 to perform one or more of the functions described herein (e.g., executing, by the processor 902, instructions stored in the memory 904). For example, the processor 902 may support wireless communication at the NE 900 in accordance with examples as disclosed herein.

[00177] For example, the NE 900 may be configured to support means for performing the operations as described with respect to FIG. 6. For example, the NE 900 may be configured to or operable to support: a means for transmitting a request message to a second BS, wherein the request message includes an identity of a first candidate cell and requests an indication of whether UE-measured TA is able to be used or an indication of whether cell switch without L2 reset is performed when switching towards the first candidate cell from a second candidate cell; and a means for receiving, from the second BS, a response message in response to the request message.

[00178] For example, the NE 900 may be configured to support means for performing the operations as described with respect to FIG. 7. For example, the NE 900 may be configured to or operable to support: a means for receiving a request message from a first BS, wherein the request message includes an identity of a first candidate cell and requests an indication of whether UE-measured TA is able to be used or an indication of whether cell switch without L2 reset is performed when switching towards the first candidate cell from a second candidate cell; and a means for transmitting, to the first BS, a response message in response to the request message.

[00179] The controller 906 may manage input and output signals for the NE 900. The controller 906 may also manage peripherals not integrated into the NE 900. In some implementations, the controller 906 may utilize an operating system such as iOS®, ANDROID®, WINDOWS®, or other operating systems. In some implementations, the controller 906 may be implemented as part of the processor 902.

[00180] In some implementations, the NE 900 may include at least one transceiver 908. In some other implementations, the NE 900 may have more than one transceiver 908. The transceiver 908 may represent a wireless transceiver. The transceiver 908 may include one or more receiver chains 910, one or more transmitter chains 912, or a combination thereof.

[00181] A receiver chain 910 may be configured to receive signals (e.g., control information, data, or packets) over a wireless medium. For example, the receiver chain 910 may include one or more antennas for receive the signal over the air or wireless medium. The receiver chain 910 may include at least one amplifier (e.g., an LNA) configured to amplify the received signal. The receiver chain 910 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 910 may include at least one decoder for decoding the processing the demodulated signal to receive the transmitted data.

[00182] A transmitter chain 912 may be configured to generate and transmit signals (e.g., control information, data, or packets). The transmitter chain 912 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 AM, FM, or digital modulation schemes like PSK or QAM. The transmitter chain 912 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 912 may also include one or more antennas for transmitting the amplified signal into the air or wireless medium.

[00183] It should be appreciated by persons skilled in the art that the components in exemplary NE 900 may be changed, for example, some of the components in exemplary NE 900 may be omitted or modified or a new component(s) may be added to exemplary NE 900, without departing from the spirit and scope of the disclosure. For example, in some embodiments, the NE 900 may not include the controller 906.

[00184] Those having ordinary skill in the art would understand that the operations or steps of the methods described in connection with the aspects disclosed herein may be

embodied directly in hardware, in a software module executed by a processor, or in a combination of the two. A software module may reside in RAM memory, flash memory, ROM memory, EPROM memory, EEPROM memory, registers, a hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art. Additionally, in some aspects, the operations or steps of the methods may reside as one or any combination or set of codes and/or instructions on a non-transitory computer-readable medium, which may be incorporated into a computer program product.

[00185] While this disclosure has been described with specific embodiments thereof, it is evident that many alternatives, modifications, and variations may be apparent to those skilled in the art. The disclosure is not limited to the examples and designs described herein but is to be accorded with the broadest scope consistent with the principles and novel features disclosed herein. For example, various components of the embodiments may be interchanged, added, or substituted in other embodiments. Also, all of the elements of each figure are not necessary for the operation of the disclosed embodiments. For example, one of ordinary skill in the art of the disclosed embodiments would be enabled to make and use the teachings of the disclosure by simply employing the elements of the independent claims. Accordingly, embodiments of the disclosure as set forth herein are intended to be illustrative, not limiting. Various changes may be made without departing from the spirit and scope of the disclosure.

[00186] In this document, this document, the terms "handover," "path switch" and "cell switch" may be used interchangeably. The terms "path switch" and "path change" may be used interchangeably. The terms "cell switch" and "cell change" may be used interchangeably. The terms "includes," "including," or any other variation thereof, are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that includes a list of elements does not include only those elements but may include other elements not expressly listed or inherent to such process, method, article, or apparatus. An element preceded by "a," "an," or the like does not, without more constraints, preclude the existence of additional identical elements in the process, method, article, or apparatus that includes the element. Also, the term "another" is defined as at least a second or more. The term "having" or the like, as used herein, is defined as "including." Expressions such as "A and/or B" or "at least one of A and B"

may include any and all combinations of words enumerated along with the expression. For instance, the expression "A and/or B" or "at least one of A and B" may include A, B, or both A and B. The wording "the first," "the second" or the like is only used to clearly illustrate the embodiments of the present disclosure, but is not used to limit the substance of the present disclosure.

WHAT IS CLAIMED:

1. A first base station (BS), comprising:
 - at least one memory; and
 - at least one processor coupled with the at least one memory and configured to cause the first BS to:
 - transmit a request message to a second BS, wherein the request message includes an identity of a first candidate cell and requests an indication of whether user equipment (UE)-measured timing advance (TA) is able to be used or an indication of whether cell switch without layer 2 (L2) reset is performed when switching towards the first candidate cell from a second candidate cell; and
 - receive, from the second BS, a response message in response to the request message.
2. The first BS of Claim 1, wherein the at least one processor is further configured to cause the first BS to receive an L1/L2 triggered mobility (LTM) configuration for the second candidate cell from the second BS before the transmission of the request message; or wherein the request message further includes an identity of the second candidate cell.
3. The first BS of Claim 1, wherein the request message requests the second BS to indicate one or more of the following:
 - whether a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; and
 - whether the UE performs an L2 reset or not when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell.

4. The first BS of Claim 1, wherein the response message indicates one or more of the following:

whether a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell;

at least one cell pair, each cell pair comprising a first cell and a second cell belonging to the second BS, wherein the UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from the first cell to the second cell;

whether the UE performs an L2 reset or not when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; and

at least one cell pair, each cell pair comprising a third cell and a fourth cell belonging to the second BS, wherein the UE performs no L2 reset when the UE switches from the third cell to the fourth cell.

5. The first BS of Claim 4, wherein the at least one processor is further configured to cause the first BS to transmit a configuration to the UE based on the response message, and wherein the configuration indicates one or more of: a UE-measured TA ID for the first candidate cell and a no-reset ID for the first candidate cell.

6. The first BS of Claim 1, wherein the at least one processor is configured to cause the first BS to:

transmit, to a UE, a command to perform an L1/L2 triggered mobility (LTM) cell switch or a handover to switch the UE from the first BS to a third BS; and

transmit, to the third BS, LTM configurations for all candidate cells configured for the UE, wherein the LTM configurations includes at least a UE-measured TA ID for the first candidate cell and a no-reset ID for the first candidate cell.

7. The first BS of Claim 6, wherein the at least one processor is further configured to cause the first BS to:

receive, from the third BS, an indication indicating the completion of the LTM cell switch or the completion of the handover, wherein the LTM configurations is transmitted in response to the reception of the indication; or

receive, from the third BS, a release message in response to the LTM cell switch or the handover, wherein the LTM configurations is transmitted in response to the reception of the release message.

8. The first BS of Claim 1, wherein the at least one processor is configured to cause the first BS to:

receive, from a third BS, an indication indicating the completion of a handover of a UE from the first BS to the third BS or a release message in response to the handover of the UE; and

transmit, to the third BS, an L1/L2 triggered mobility (LTM) configurations for all candidate cells configured for the UE in response to the reception of the indication or the release message.

9. The first BS of Claim 8, wherein the handover is related to a conditional handover (CHO), a conditional primary secondary cell change (CPC) or a subsequent CPC (S-CPC).

10. The first BS of Claim 1, wherein the first BS is a master node (MN) of the UE and the second BS is a candidate MN for L1/L2 triggered mobility (LTM);

wherein the UE operates in a multi-connectivity mode, the first BS is an MN of the UE and the second BS is a candidate secondary node (SN) for LTM;

wherein the first BS is an MN of the UE; or

wherein the UE operates in a multi-connectivity mode, the first BS is a source SN of the UE.

11. A second base station (BS), comprising:

at least one memory; and

at least one processor coupled with the at least one memory and configured to cause the second BS to:

receive a request message from a first BS, wherein the request message includes an identity of a first candidate cell and requests an indication of whether user equipment (UE)-measured timing advance (TA) is able to be used or an indication of whether cell switch without layer 2 (L2) reset is performed when switching towards the first candidate cell from a second candidate cell; and

transmit, to the first BS, a response message in response to the request message.

12. The second BS of Claim 11, wherein the at least one processor is further configured to cause the second BS to transmit an L1/L2 triggered mobility (LTM) configuration for the second candidate cell to the first BS before the reception of the request message; or wherein the request message further includes an identity of the second candidate cell.

13. The second BS of Claim 11, wherein the request message requests the second BS to indicate one or more of the following:

whether a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; and

whether the UE performs an L2 reset or not when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell.

14. The second BS of Claim 11, wherein the response message indicates one or more of the following:

whether a UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell;

at least one cell pair, each cell pair comprising a first cell and a second cell belonging to the second BS, wherein the UE is able to obtain TA by performing a UE-based TA measurement when the UE switches from the first cell to the second cell;

whether the UE performs an L2 reset or not when the UE switches from one of the first candidate cell and the second candidate cell to the other of the first candidate cell and the second candidate cell; and

at least one cell pair, each cell pair comprising a third cell and a fourth cell belonging to the second BS, wherein the UE performs no L2 reset when the UE switches from the third cell to the fourth cell.

15. The second BS of Claim 11, wherein the at least one processor is configured to cause the second BS to:

perform an L1/L2 triggered mobility (LTM) cell switch procedure or a handover procedure with a UE to switch the UE from the first BS to the second BS; and

receive, from the first BS, LTM configurations for all candidate cells configured for the UE, wherein the LTM configurations includes at least a UE-measured TA ID for the first candidate cell and a no-reset ID for the first candidate cell.

16. The second BS of Claim 15, wherein the at least one processor is further configured to cause the second BS to:

transmit, to the first BS, an indication indicating the completion of the LTM cell switch procedure or the completion of the handover procedure, wherein the LTM configurations is received in response to the transmission of the indication; or

transmit, to the first BS, a release message in response to the LTM cell switch procedure or the handover procedure, wherein the LTM configurations is received in response to the transmission of the release message.

17. The second BS of Claim 15 or 16, wherein the handover procedure is related to a L3 handover, a conditional handover (CHO), a conditional primary secondary cell change (CPC) or a subsequent CPC (S-CPC).

18. The second BS of Claim 11, wherein the first BS is a master node (MN) of the UE and the second BS is a candidate MN for L1/L2 triggered mobility (LTM);

wherein the UE operates in a multi-connectivity mode, the first BS is an MN of the UE and the second BS is a candidate secondary node (SN) for LTM;

wherein the first BS and the second BS are respectively a source MN and a target MN of the LTM cell switch procedure or the handover procedure; or

wherein the UE operates in a multi-connectivity mode, the first BS and the second BS are respectively a source SN and a target SN of the LTM cell switch procedure or the handover procedure.

19. A method for wireless communication, comprising:

transmitting a request message to a second base station (BS), wherein the request message includes an identity of a first candidate cell and requests an indication of whether user equipment (UE)-measured timing advance (TA) is able to be used or an indication of whether cell switch without layer 2 (L2) reset is performed when switching towards the first candidate cell from a second candidate cell; and

receiving, from the second BS, a response message in response to the request message.

20. A method for wireless communication, comprising:

receiving a request message from a first base station (BS), wherein the request message includes an identity of a first candidate cell and requests an indication of whether user equipment (UE)-measured timing advance (TA) is able to be used or an indication of whether cell switch without layer 2 (L2) reset is performed when switching towards the first candidate cell from a second candidate cell; and

transmitting, to the first BS, a response message in response to the request message.