

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

TECHNICAL FIELD

[0001] Embodiments of the present disclosure generally relate to wireless communication technology, and more particularly to handling an L2 reset indication and a user equipment (UE)-measured timing advance (TA) indication in an L1/L2 Triggered Mobility (LTM) scenario.

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] In a wireless communication system, a base station (BS) and a UE may communicate via downlink channels and uplink channels. In some scenarios, a BS may trigger an LTM procedure to indicate the UE to switch from its current serving cell to a target cell.

[0004] There is a need for handling an L2 reset (e.g., no L2 reset) indication and a UE-measured TA indication in an LTM scenario.

SUMMARY

[0005] 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.

[0006] Some embodiments of the present disclosure provide a first network node. The first network node may include at least one memory; and at least one processor coupled with the at least one memory and configured to cause the first network node to: transmit, to a second network node, a request message, wherein the request message includes an ID of a first candidate cell and an indication requesting information related to UE-measured TA or no-reset for the first candidate cell; receive, from the second network node, a response message in response to the request message; and transmit, to a UE, a third network node or both, a configuration based on the response message.

[0007] In some embodiments of the present disclosure, the information related to UE-measured TA for the first candidate cell may indicate whether the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement when an LTM cell switch procedure is executed from a second cell to the first candidate cell.

[0008] In some embodiments of the present disclosure, the response message may indicate a cell list including: at least one cell based on which the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement; or at least one cell belonging to the second network node and satisfying a time alignment error (TAE) requirement.

[0009] In some embodiments of the present disclosure, the information related to no reset for the first candidate cell may indicate whether the UE performs an L2 reset or not when the UE switches from a second cell to the first candidate cell.

[0010] In some embodiments of the present disclosure, the response message may indicate a cell list including: at least one cell, when the UE switches from the at least one cell to the first candidate cell, the UE does not perform an L2 reset; or at least one cell belonging to the second network node.

[0011] In some embodiments of the present disclosure, the second cell may include a serving cell of the UE or a candidate cell for which an LTM configuration has been provided by the second network node to the first network node.

[0012] In some embodiments of the present disclosure, the cell list may include the second cell.

[0013] In some embodiments of the present disclosure, the configuration may indicate one of the following: one or more UE-measured TA IDs for the first candidate cell and a UE-measured TA ID for a serving cell of the UE; a list of candidate cells, wherein the UE is able to obtain TA for each candidate cell in the list of candidate cells by performing a UE-based TA measurement when an LTM cell switch procedure is executed from the serving cell to a corresponding candidate cell in the list of candidate cells; an association between the first candidate cell and a second candidate cell, wherein the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement when an LTM cell switch procedure is executed from the second candidate cell to the first candidate cell; an association between the serving cell of the UE and at least one candidate cell, wherein the serving cell and the at least one candidate cell belong to a same network node and satisfy a TAE requirement.

[0014] In some embodiments of the present disclosure, the first network node is associated with a master cell group (MCG) of the UE or a secondary cell group (SCG) of the UE.

[0015] Some embodiments of the present disclosure provide a second network node. The second network node may include at least one memory; and at least one processor

coupled with the at least one memory and configured to cause the second network node to: receive, from a first network node, a request message, wherein the request message may include an ID of a first candidate cell and an indication requesting information related to UE-measured TA or no-reset for the first candidate cell; and transmit, to the first network node, a response message in response to the request message.

[0016] In some embodiments of the present disclosure, the information related to UE-measured TA for the first candidate cell may indicate whether a UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement when an LTM cell switch procedure is executed from a second cell to the first candidate cell.

[0017] In some embodiments of the present disclosure, the response message may indicate a cell list including: at least one cell based on which the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement; or at least one cell belonging to the second network node and satisfying a TAE requirement.

[0018] In some embodiments of the present disclosure, the information related to no reset for the first candidate cell may indicate whether a UE performs an L2 reset or not when the UE switches from a second cell to the first candidate cell.

[0019] In some embodiments of the present disclosure, the response message may indicate a cell list including: at least one cell, when the UE switches from the at least one cell to the first candidate cell, the UE does not perform an L2 reset; or at least one cell belonging to the second network node.

[0020] In some embodiments of the present disclosure, the second cell may include a serving cell of the UE or a cell for which an LTM configuration has been provided by the second network node to the first network node.

[0021] In some embodiments of the present disclosure, the cell list may include the second cell.

[0022] Some embodiments of the present disclosure provide a third network node. The third network node may include at least one memory; and at least one processor coupled with the at least one memory and configured to cause the third network node

to: receive a configuration from a first network node, wherein the configuration may include information related to UE-measured TA for a first candidate cell; and determine whether to trigger a UE to perform early TA acquisition with respect to the first candidate cell based on the received configuration.

[0023] In some embodiments of the present disclosure, the configuration may indicate one of the following: one or more UE-measured TA IDs for the first candidate cell and a UE-measured TA ID for a serving cell of the UE; a list of candidate cells, wherein the UE is able to obtain TA for each candidate cell in the list of candidate cells by performing a UE-based TA measurement when an LTM cell switch procedure is executed from the serving cell to a corresponding candidate cell in the list of candidate cells; an association between the first candidate cell and a second candidate cell, wherein the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement when an LTM cell switch procedure is executed from the second candidate cell to the first candidate cell; and an association between the serving cell of the UE and at least one candidate cell, wherein the serving cell and the at least one candidate cell belong to a same network node and satisfy a TAE requirement.

[0024] Some embodiments of the present disclosure provide a UE. The UE may include at least one memory; and at least one processor coupled with the at least one memory and configured to cause the UE to: receive, from a network node, a reconfiguration message including an LTM configuration for one or more candidate cells; and in response to receiving a handover command to switch to a second cell or in response to a condition for switching to the second cell being satisfied, switch from a serving cell of the UE to the second cell and set a UE-measured TA ID for the serving cell or a no-reset ID for the serving cell based on the reconfiguration message.

[0025] In some embodiments of the present disclosure, to set the UE-measured TA ID for the serving cell, the at least one processor is configured to cause the UE to perform one or more of the following: in response to receiving the handover command and the second cell being one of the one or more candidate cells, set a value of the UE-measured TA ID for the serving cell to a value of a UE-measured TA ID for the second cell indicated in the LTM configuration; in response to receiving the handover command and the second cell not being one of the one or more candidate cells, receive the UE-

measured TA ID for the second cell from the network node and set the value of the UE-measured TA ID for the serving cell to the value of the received UE-measured TA ID for the second cell; and in response to the condition for switching to the second cell being satisfied, receive the UE-measured TA ID for the second cell from the network node and set the value of the UE-measured TA ID for the serving cell to the value of the received UE-measured TA ID for the second cell.

[0026] In some embodiments of the present disclosure, to set the no-reset ID for the serving cell, the at least one processor is configured to cause the UE to perform one or more of the following: in response to receiving the handover command and the second cell being one of the one or more candidate cells, set a value of the no-reset ID for the serving cell to a value of a no-reset ID for the second cell indicated in the LTM configuration; in response to receiving the handover command and the second cell not being one of the one or more candidate cells, receive the no-reset ID for the second cell from the network node and set the value of the received no-reset ID for the serving cell to the value of the no-reset ID for the second cell; and in response to the condition for switching to the second cell being satisfied, receive the no-reset ID for the second cell from the network node and set the value of the no-reset ID for the serving cell to the value of the received no-reset ID for the second cell.

[0027] In some embodiments of the present disclosure, to receive the UE-measured TA ID for the second cell or the no-reset ID for the second cell, the at least one processor is configured to cause the UE to receive the UE-measured TA ID for the second cell or the no-reset ID for the second cell in or before the handover command or a configuration for the condition for switching to the second cell.

[0028] In some embodiments of the present disclosure, the condition for switching to the second cell is related to a conditional handover (CHO) or a conditional primary secondary cell change (CPC).

[0029] Some embodiments of the present disclosure provide a processor. The processor may include at least one controller coupled with at least one memory and configured to cause the processor to perform a method according to some embodiments of the present disclosure.

[0030] 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

[0031] 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.

[0032] FIG. 1 illustrates a schematic diagram of a wireless communication system in accordance with some embodiments of the present disclosure;

[0033] FIGs. 2-4 illustrate flowcharts of methods for wireless communication in accordance with some embodiments of the present disclosure;

[0034] FIGs. 5-7 illustrate flowcharts of methods for wireless communication performed by a network equipment (NE) in accordance with some embodiments of the present disclosure;

[0035] FIG. 8 illustrates a flowchart of a method for wireless communication performed by a UE in accordance with some embodiments of the present disclosure;

[0036] FIG. 9 illustrates an example of a UE in accordance with some embodiments of the present disclosure;

[0037] FIG. 10 illustrates an example of a processor in accordance with some embodiments of the present disclosure; and

[0038] FIG. 11 illustrates an example of an NE in accordance with some embodiments of the present disclosure.

DETAILED DESCRIPTION

[0039] 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.

[0040] 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.

[0041] 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 serving cell to a target cell. Solutions are desired to facilitate the LTM procedure. For example, solutions are desired to facilitate the indication or determination of UE-measured TA information and no-reset information in the LTM scenario. For example, solutions are desired to handle the coexistence of early TA acquisition and UE based measurement TA.

[0042] The present disclosure provides solutions to solve the above issues. For example, embodiments that can facilitate the indication or determination of UE-

measured TA information and no-reset information are provided. For example, embodiments that can handle the coexistence of early TA acquisition and UE based measurement TA are provided.

[0043] FIG. 1 illustrates a schematic diagram of wireless communication system 100 in accordance with some embodiments of the present disclosure.

[0044] 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.

[0045] 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.

[0046] 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.

[0047] 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.

[0048] 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.

[0049] 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.

[0050] 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.

[0051] 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).

[0052] 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.

[0053] 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).

[0054] 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.

[0055] 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.

[0056] 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.

[0057] 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.

[0058] 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.

[0059] 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.

[0060] 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.

[0061] 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.

[0062] 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.

[0063] Embodiments of the present disclosure propose technical solutions for facilitating the LTM procedure in a communication network. For example, solutions are provided to determine whether a UE can obtain TA for a candidate cell by performing a UE-based TA measurement when the UE performs an LTM cell switch from another cell to the candidate cell. For example, solutions are provided to determine whether a UE should perform an L2 reset or not when the UE performs an LTM cell switch from a cell to a candidate cell. For example, in some cases, early TA acquisition and UE-based TA measurement for LTM may coexist. For instance, in LTM, a CU may transmit, to a target DU, a request for a random access channel (RACH) resource for early TA acquisition. The RACH resource for early TA acquisition may be transmitted to the UE and the source DU. Source DU may trigger the UE to transmit a preamble to a candidate DU for early TA acquisition. The candidate DU may receive the preamble and calculate the TA value. The candidate DU may then transmit the TA value and its associated information to the source DU via the CU. For example, the associated information may include a preamble index, random access occasion (RO) information (e.g., random access-radio network temporary identifier (RA-RNTI)) and a candidate cell identity. The source DU can identify the UE based on the information. However, in some cases, a UE can obtain the TA value for a candidate cell by performing a UE-based TA measurement. Solutions are provided to handle the coexistence of early TA acquisition and UE based measurement TA. For example, in some cases, a handover command or satisfying a condition for path switch may trigger the handover of a UE from its serving cell to another cell which is configured as a candidate cell. Solutions are provided to handle the UE-measured TA

information and no-reset information for the serving cell after such handover or path switch. More details on the embodiments of the present disclosure will be illustrated in the following text in combination with the appended drawings.

[0064] 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 network nodes 202-208 may function as NE 102 shown in FIG. 1. In some embodiments, network nodes 202 and 208 may function as DUs of a BS and network node 206 may function as the CU of the BS. The BS can be referred to as the "serving BS" of UE 204 and is denoted as BS #A for clarity.

[0065] Referring to FIG. 2, at 211, UE 204 may connect to (or access) BS #A. For example, UE 204 may access a cell of network node 202, which can be referred to as the "serving cell" of UE 204. UE 204 may send a measurement report to BS #A. In some examples, UE 204 may access the network via single connectivity (e.g., via MCG only) and BS #A is associated with the MCG of UE 204. In some examples, UE 204 may access the network via dual connectivity (e.g., via MCG and SCG) and BS #A can be associated with either the MCG or SCG of UE 204.

[0066] BS #A may determine to initiate an LTM configuration procedure for UE 204. For example, at 213, network node 206 may determine to initiate an LTM configuration procedure for UE 204. For example, network node 206 may determine to configure at least one candidate cell (e.g., cell #A) for LTM cell switch for UE 204 and cell #A may belong to network node 208. Network node 208 thus can also be referred to as "candidate network node" or "candidate DU."

[0067] At 215, network node 206 may transmit a request message to network node 208. In some embodiments, the request message may indicate cell #A. For example, the request message may include an ID of cell #A. In some embodiments, the request message may further include an indication requesting information related to UE-measured TA or no-reset for cell #A. In the context of the present disclosure, "UE-measured TA" can also be referred to as "UE-based TA measurement."

[0068] By providing information related to UE-measured TA for cell #A, network node 206 can request network node 208 to determine whether UE 204 can obtain TA for cell #A via a UE-based TA measurement when an LTM cell switch procedure is executed from another cell (e.g., cell #B) to cell #A. Cell #B can be the serving cell of UE 204 or a prepared candidate cell of UE 204. In the context of the present disclosure, a prepared candidate cell of a UE refers to a candidate cell for which an LTM configuration has been provided by the candidate network node (e.g., provided by network node 208 to network node 206). In some embodiments, network node 206 may have transmitted the LTM configuration for the prepared candidate cell to UE 204. In response to the request message, network node 208 may provide an association between cell #A and cell #B.

[0069] For example, it is assumed that the current serving cell of UE 204 is cell #0 and network node 206 has prepared candidate cell #1 associated with network node 208 for LTM. Network node 206 may transmit a request message to network node 208 to prepare candidate cell #2. For example, network node 206 CU may request network node 208 to indicate whether UE 204 can calculate the TA for candidate cell #2 if the serving cell of UE 204 is cell#0 or prepared candidate cell #1.

[0070] In some embodiments, at 217, network node 208 may transmit a response message in response to the request message. For example, if network node 208 determines to accept the request for the LTM configuration related to the at least one candidate cell (e.g., cell #A) in the request message, network node 208 may transmit, to network node 206, a configuration for the accepted candidate cell(s).

[0071] In some embodiments, the response message may indicate a cell list. In some embodiments, the cell list may include at least one cell based on which the UE is able to obtain TA for the at least one candidate cell (e.g., cell #A) in the request message by performing a UE-based TA measurement. In some embodiments, the cell list may include at least one cell belonging to network node 208 (e.g., cells in the cell list and cell #A belong to the same candidate DU) and satisfying a TAE requirement. For example, the cell list may include the serving cell (e.g., cell #0) of UE 204 or a prepared candidate cell (e.g., cell #1).

[0072] In the context of the present disclosure, a TAE requirement may refer to that

the TAE between two cells is within a certain time (e.g., 260ns) such that a UE when served by one of the two cells can derive the TA for the other cell of the two cells based on UE-based TA measurement.

[0073] By providing information related to no-reset for cell #A, network node 206 can request network node 208 to determine whether UE 204 performs an L2 reset or not when the UE switches from another cell (e.g., cell #B') to cell #A (e.g., via an LTM cell switch procedure). Cell #B' can be the serving cell of UE 204 or a prepared candidate cell of UE 204. For example, network node 208 may have transmitted the LTM configuration for cell #B' to network node 206. In response to the request message, network node 208 may provide an association between cell #A and cell #B'.

[0074] For example, at 217, network node 208 may transmit a response message in response to the request message. For example, if network node 208 determines to accept the request for the LTM configuration related to the at least one candidate cell (e.g., cell #A) in the request message, network node 208 may transmit, to network node 206, a configuration for the accepted candidate cell(s).

[0075] In some embodiments, the response message may indicate a cell list. In some embodiments, the cell list may include at least one cell, wherein when the UE switches from the at least one cell in the cell list to cell #A, the UE does not need to perform an L2 reset. In some embodiments, the cell list may include at least one cell belonging to network node 208 (e.g., cells in the cell list and cell #A belong to the same candidate DU). For example, the cell list may include the current serving cell of UE 204 or a prepared candidate cell.

[0076] In some embodiments, the request message at 215 may be the UE context setup request message and the response message at 217 may be the UE context setup response message.

[0077] In some embodiments, network node 206 may not necessarily request the information related to UE-measured TA or no-reset for a candidate cell (e.g., cell #A) from the network node (e.g., a candidate DU) to which the candidate cell belongs. That is, operations 215 and 217 can be omitted. As an alternative or supplement, network node 206 may obtain such information from an operation, administration and

maintenance (OAM) entity. For example, network node 206 may transmit a request to the OAM to request information related to UE-measured TA or no-reset for at least one candidate cell and the OAM may respond with corresponding information.

[0078] At 219, network node 206 may transmit a configuration to network node 202 via the F1 interface. The configuration may be based on the response message at 217.

[0079] At 221, network node 206 may transmit a configuration to UE 204 (e.g., via network node 202). The configuration may be based on the response message at 217. For example, the configuration to UE 204 may include an LTM candidate cell configuration of one or more candidate cells (e.g., cell #A). In some examples, the LTM candidate cell configuration may be transmitted in a radio resource control (RRC) reconfiguration message.

[0080] For example, in some embodiments, network node 206 may generate an RRC reconfiguration message based on the configuration from a candidate network node (e.g., information included in the response message from network node 208). The RRC reconfiguration message includes an LTM candidate cell configuration of one or more candidate cells (e.g., cell #A). 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 a candidate cell (e.g., cell #A). For example, the RRC reconfiguration message may include a no-reset ID (e.g., "*ltm-NoResetID*" as specified in 3GPP standards) for a candidate cell (e.g., cell #A). For example, the RRC reconfiguration message may include both the UE-measured TA ID and no-reset ID for a candidate cell (e.g., cell #A). Network node 206 may then transmit the RRC reconfiguration message to UE 204 via network node 202, which can be referred to as "source network node" or "source DU."

[0081] In some embodiments, the configuration to network node 202 may include information to assistant network node 202 to determine whether to trigger UE 204 to perform an early TA acquisition procedure (e.g., not to transmit a preamble for early TA acquisition). For example, in the case that UE 204 can obtain the TA for a candidate cell by performing a UE-based TA measurement, network node 202 will not trigger UE 204 to perform an early TA acquisition procedure for the candidate cell.

[0082] For example, at 219, network node 206 may transmit, to network node 202, a configuration indicating one of the following:

- (1a) one or more UE-measured TA IDs for a candidate cell (e.g., cell #A) of UE 204 and a UE-measured TA ID for a serving cell (e.g., "*ltn-ServingCellUE-MeasuredTA-ID*" as specified in 3GPP standards) of UE 204;
- (1b) a list of candidate cells, wherein UE 204 is able to obtain TA for each candidate cell in the list of candidate cells by performing a UE-based TA measurement when an LTM cell switch procedure is executed from the current serving cell to a corresponding candidate cell in the list of candidate cells;
- (1c) an association between a plurality of candidate cells (e.g., cell #A and cell #B), wherein UE 204 is able to obtain TA for one cell (e.g., cell #A) of the plurality of candidate cells by performing a UE-based TA measurement when an LTM cell switch procedure is executed from another cell (e.g., cell #B) of the plurality of candidate cells to the one cell (e.g., cell #A);
- (1d) an association between the serving cell of UE 204 and at least one candidate cell configured for UE 204, wherein the serving cell and the at least one candidate cell belong to the same network node and satisfy the TAE requirement.

[0083] For example, based on the response message received at 217, network node 206 may know that UE 204 can obtain TA for cell #A via a UE-based TA measurement when an LTM cell switch procedure is executed from the current serving cell to cell #A. Then, at 219, network node 206 may inform network node 202 of such information, for example, network node 206 may transmit a cell list including cell #A to network node 202. Based on the cell list, network node 202 will not trigger UE 204 to transmit a preamble for early TA acquisition to cell #A.

[0084] In some embodiments, as an alternative or supplement, UE 204 itself may determine whether to perform the TA acquisition when triggered. For example, network node 206 may not transmit, to network node 202, the assistant information for determining whether or not to trigger an early TA acquisition procedure. UE 204 itself may determine whether to perform the TA acquisition when triggered by network node 202. For example, in the case that UE 204 can obtain the TA for a candidate cell by

performing a UE-based TA measurement, UE 204 will ignore the physical downlink control channel (PDCCH) order for triggering TA acquisition of the candidate cell from network node 202.

[0085] For example, at 223 (denoted by a dotted arrow as an option), UE 204 may receive, from network node 202, a PDCCH order for triggering TA acquisition to a candidate cell. UE 204 may ignore the PDCCH order if UE 204 can obtain the TA for this candidate cell by performing a UE-based TA measurement, for example, if the UE-measured TA ID for this candidate cell is equal to the UE-measured TA ID for the serving cell of UE 204.

[0086] In some embodiments, network node 202 may decide to execute a cell switch to a target cell. At 225, network node 202 may transmit an LTM cell switching command (e.g., via a medium access control (MAC) control element (CE)) to UE 204. In some embodiments network node 202 may also transmit an indication of cell switching towards the target cell to network node 206.

[0087] 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.

[0088] 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 network node 302 may function as NE 103 shown in FIG. 1. In some embodiments, network node 302 may include a CU and at least one DU.

[0089] Referring to FIG. 3, at 311, UE 304 may connect to (or access) network node 302. UE 304 may send a measurement report to network node 302. Network node 302 may be associated with either the MCG or SCG of UE 304. For example, in the case that UE 304 accesses the network via single connectivity (e.g., via MCG only), network node 302 is associated with the MCG of UE 304. In the case that UE 304 accesses the network via dual connectivity (e.g., via MCG and SCG), network node

302 can be associated with either the MCG or SCG of UE 304.

[0090] Network node 302 may determine to initiate an LTM configuration procedure for UE 304. For example, at 315, network node 302 (can also be referred to as the serving or source BS of UE 304) may determine to configure one or more candidate cells for LTM cell switch for UE 304. Network node 302 may prepared an LTM candidate cell configuration for the one or more candidate cells. At 317, network node 302 may transmit the LTM configuration to UE 304. The LTM configuration may be transmitted via an RRC reconfiguration message. That is, the RRC reconfiguration message may include the LTM configuration. Network node 302 may generate the RRC reconfiguration message based on a configuration from each candidate cell.

[0091] In some embodiments, the LTM configuration transmitted to UE 304 may include, for example, the LTM cell configuration for the one or more candidate cells, a UE-measured TA ID for the serving cell of UE 304 (e.g., "*ltm-ServingCellUE-MeasuredTA-ID*"), a UE-measured TA ID(s) for a candidate cell(s) of the one or more candidate cells (e.g., "*ltm-UE-MeasuredTA-ID*"), a no-reset ID for the serving cell of UE 304 (e.g., "*ltm-ServingCellNoResetID*"), a no-reset ID(s) for a candidate cell(s) of the one or more candidate cells (e.g., "*ltm-NoResetID*"), or any combination thereof.

[0092] At 319, network node 302 may transmit a handover command (e.g., an L3 handover) to instruct UE 304 to switch to a target cell. For example, the handover command may indicate the target cell (hereinafter denoted as cell #C for clarity). Such handover command may trigger a primary cell (PCell) change or a primary secondary cell (PSCell) change at UE 304.

[0093] At 321, UE 304 may perform the handover to switch from the current serving cell to cell #C in response to receiving the handover command. It would be beneficial if UE 304 can update the LTM configuration stored at UE 304 in response to receiving the handover command.

[0094] For example, in some embodiments, in response to receiving the handover command (e.g., after the handover procedure), UE 304 may set a UE-measured TA ID for the serving cell or a no-reset ID for the serving cell based on the RRC reconfiguration message or the LTM configuration.

[0095] For example, in response to receiving the handover command and cell #C being one of the one or more candidate cells, UE 304 may set a value of the UE-measured TA ID for the serving cell (e.g., "*ltm-ServingCellUE-MeasuredTA-ID*") to a value of a UE-measured TA ID (e.g., "*ltm-UE-MeasuredTA-ID*") for cell #C indicated in the LTM configuration.

[0096] For example, in response to receiving the handover command and cell #C not being one of the one or more candidate cells, UE 304 may receive the UE-measured TA ID (e.g., "*ltm-UE-MeasuredTA-ID*") for cell #C from network node 302 and set the value of the UE-measured TA ID for the serving cell (e.g., "*ltm-ServingCellUE-MeasuredTA-ID*") to the received value of UE-measured TA ID for cell #C. In some embodiments, UE 304 may receive the UE-measured TA ID for cell #C in or before the handover command. For example, the handover command may include the UE-measured TA ID for cell #C.

[0097] For example, if cell #C is one of the one or more candidate cells and the value of "*ltm-ServingCellUE-MeasuredTA-ID*" is different from that of "*ltm-UE-MeasuredTA-ID*" related to cell #C as indicated in the LTM configuration, UE 304 replaces "*ltm-ServingCellUE-MeasuredTA-ID*" with "*ltm-UE-MeasuredTA-ID*" related to cell #C. If cell #C is one of the one or more candidate cells and the value of "*ltm-ServingCellUE-MeasuredTA-ID*" is the same as the value of "*ltm-UE-MeasuredTA-ID*" related to cell #C, UE 304 keeps the current value of "*ltm-ServingCellUE-MeasuredTA-ID*". For example, if cell #C is not one of the one or more candidate cells, UE 304 may receive "*ltm-UE-MeasuredTA-ID*" related to cell #C from network node 302 and replace "*ltm-ServingCellUE-MeasuredTA-ID*" with the received "*ltm-UE-MeasuredTA-ID*" related to cell #C. That is, network node 302 configures "*ltm-UE-MeasuredTA-ID*" related to cell #C to UE 304.

[0098] For example, in response to receiving the handover command and cell #C being one of the one or more candidate cells, UE 304 may set a value of the no-reset ID for the serving cell (e.g., "*ltm-ServingCellNoResetID*") to a value of a no-reset ID (e.g., "*ltm-NoResetID*") for cell #C indicated in the LTM configuration.

[0099] For example, in response to receiving the handover command and cell #C not being one of the one or more candidate cells, UE 304 may receive the no-reset ID (e.g.,

"*ltm-NoResetID*") for cell #C from network node 302 and set the value of the no-reset ID for the serving cell (e.g., "*ltm-ServingCellNoResetID*") to the received value of no-reset ID for cell #C. In some embodiments, UE 304 may receive the no-reset ID for cell #C in or before the handover command. For example, the handover command may include the no-reset ID for cell #C.

[00100] For example, if cell #C is one of the one or more candidate cells and the value of "*ltm-ServingCellNoResetID*" is different from that of "*ltm-NoResetID*" related to cell #C as indicated in the LTM configuration, UE 304 replaces "*ltm-ServingCellNoResetID*" with "*ltm-NoResetID*" related to cell #C. If cell #C is one of the one or more candidate cells and the value of "*ltm-ServingCellNoResetID*" is the same as the value of "*ltm-NoResetID*" related to cell #C, UE 304 keeps the current value of "*ltm-ServingCellNoResetID*". For example, if cell #C is not one of the one or more candidate cells, UE 304 may receive "*ltm-NoResetID*" related to cell #C from network node 302 and replace "*ltm-ServingCellNoResetID*" with the received "*ltm-NoResetID*" related to cell #C. That is, network node 302 configures "*ltm-NoResetID*" related to cell #C to UE 304.

[00101] In some embodiments, network node 302 may always configure the UE-measured TA ID or no-reset ID for cell #C when it decides to hand over UE 304 to cell #C. That is, regardless of whether cell #C is one of the one or more candidate cells in the LTM configuration or not, network node 302 may configure the UE-measured TA ID or no-reset ID for cell #C to UE 304. For example, the handover command may include the UE-measured TA ID or no-reset ID for cell #C. In response to receiving the handover command (e.g., after the handover procedure), UE 304 may set the UE-measured TA ID or the no-reset ID for the serving cell to the UE-measured TA ID or no-reset ID for cell #C.

[00102] 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.

[00103] 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 network node 402 may function as NE 104 shown in FIG. 1. In some embodiments, network node 402 may include a CU and at least one DU.

[00104] Referring to FIG. 4, at 411, UE 404 may connect to (or access) network node 402. UE 404 may send a measurement report to network node 402. Network node 402 may be associated with either the MCG or SCG of UE 404. For example, in the case that UE 404 accesses the network via single connectivity (e.g., via MCG only), network node 402 is associated with the MCG of UE 404. In the case that UE 404 accesses the network via dual connectivity (e.g., via MCG and SCG), network node 402 can be associated with either the MCG or SCG of UE 404.

[00105] Network node 402 may determine to initiate an LTM configuration procedure for UE 404. For example, at 415, network node 402 (can also be referred to as the serving or source BS of UE 404) may determine to configure one or more candidate cells for LTM cell switch for UE 404. Network node 402 may prepared an LTM candidate cell configuration for the one or more candidate cells. At 417, network node 402 may transmit the LTM configuration to UE 404. The LTM configuration may be transmitted via an RRC reconfiguration message. That is, the RRC reconfiguration message may include the LTM configuration. Network node 402 may generate the RRC reconfiguration message based on a configuration from each candidate cell.

[00106] In some embodiments, the LTM configuration transmitted to UE 404 may include, for example, the LTM cell configuration for the one or more candidate cells, a UE-measured TA ID for the serving cell of UE 404 (e.g., "*ltm-ServingCellUE-MeasuredTA-ID*"), a UE-measured TA ID(s) for a candidate cell(s) of the one or more candidate cells (e.g., "*ltm-UE-MeasuredTA-ID*"), a no-reset ID for the serving cell of UE 404 (e.g., "*ltm-ServingCellNoResetID*"), a no-reset ID(s) for a candidate cell(s) of the one or more candidate cells (e.g., "*ltm-NoResetID*"), or any combination thereof.

[00107] In some embodiments, network node 402 may transmit a configuration for conditional path switch (e.g., configuration for CHO or CPC) to UE 404. For example, the configuration may be included in an RRC configuration message. For example, the configuration may indicate at least one candidate cell for CHO or CPC and a

corresponding condition(s) for CHO or CPC to a candidate cell. UE 404 may evaluate the condition(s) for CHO or CPC. At 419, UE 404 may determine that a condition for switching to a cell (hereinafter denoted as cell #D for clarity) is met and may then perform a path switch to cell #D. Such path switch may be a PCell change or a PSCell change.

[00108] It would be beneficial if UE 404 can update the LTM configuration stored at UE 404 in response to the conditional path switch. In some embodiments, UE 404 may receive the UE-measured TA ID for cell #D or no-reset ID for cell #D from network node 402. For example, the UE-measured TA ID for cell #D or no-reset ID for cell #D may be included in the RRC reconfiguration message including the CHO or CPC configuration. In response to the condition for switching to cell #D being satisfied (e.g., after the CHO or CPC procedure), UE 404 may set a UE-measured TA ID for the serving cell or a no-reset ID for the serving cell based on the RRC reconfiguration message. For example, in response to the condition for switching to cell #D being satisfied, UE 404 may set the value of the UE-measured TA ID or no-reset ID for the serving cell to the received value of the UE-measured TA ID or no-reset ID for cell #D.

[00109] 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.

[00110] FIG. 5 illustrates a flowchart of method 500 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. 5. In some examples, method 500 may be performed by a network node, for example, a BS, an NE, a CU of a BS or a CU of 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.

[00111] At 511, a first network node may transmit, to a second network node, a request message, wherein the request message includes an ID of a first candidate cell and an indication requesting information related to UE-measured TA or no-reset for the first

candidate cell. At 513, the first network node may receive, from the second network node, a response message in response to the request message. At 515, the first network node may transmit, to a UE, a third network node or both, a configuration based on the response message.

[00112] In some embodiments of the present disclosure, the information related to UE-measured TA for the first candidate cell may indicate whether the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement when an LTM cell switch procedure is executed from a second cell to the first candidate cell. In some embodiments of the present disclosure, the response message may indicate a cell list including: at least one cell based on which the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement; or at least one cell belonging to the second network node and satisfying a TAE requirement.

[00113] In some embodiments of the present disclosure, the information related to no reset for the first candidate cell may indicate whether the UE performs an L2 reset or not when the UE switches from a second cell to the first candidate cell. In some embodiments of the present disclosure, the response message may indicate a cell list including: at least one cell, when the UE switches from the at least one cell to the first candidate cell, the UE does not perform an L2 reset; or at least one cell belonging to the second network node.

[00114] In some embodiments of the present disclosure, the second cell may include a serving cell of the UE or a candidate cell for which an LTM configuration has been provided by the second network node to the first network node.

[00115] In some embodiments of the present disclosure, the cell list may include the second cell.

[00116] In some embodiments of the present disclosure, the configuration may indicate one of the following: one or more UE-measured TA IDs for the first candidate cell and a UE-measured TA ID for a serving cell of the UE; a list of candidate cells, wherein the UE is able to obtain TA for each candidate cell in the list of candidate cells by performing a UE-based TA measurement when an LTM cell switch procedure is executed from the serving cell to a corresponding candidate cell in the list of candidate

cells; an association between the first candidate cell and a second candidate cell, wherein the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement when an LTM cell switch procedure is executed from the second candidate cell to the first candidate cell; an association between the serving cell of the UE and at least one candidate cell, wherein the serving cell and the at least one candidate cell belong to a same network node and satisfy a TAE requirement.

[00117] In some embodiments of the present disclosure, the first network node is associated with an MCG of the UE or an SCG of the UE.

[00118] 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.

[00119] 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, an NE, a DU of a BS or a DU of 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.

[00120] At 611, a second network node may receive, from a first network node, a request message, wherein the request message includes an ID of a first candidate cell and an indication requesting information related to UE-measured TA or no-reset for the first candidate cell. At 613, the second network node may transmit, to the first network node, a response message in response to the request message.

[00121] In some embodiments of the present disclosure, the information related to UE-measured TA for the first candidate cell may indicate whether a UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement when an LTM cell switch procedure is executed from a second cell to the first candidate cell.

[00122] In some embodiments of the present disclosure, the response message may indicate a cell list including: at least one cell based on which the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement; or at least one cell belonging to the second network node and satisfying a TAE requirement.

[00123] In some embodiments of the present disclosure, the information related to no reset for the first candidate cell may indicate whether a UE performs an L2 reset or not when the UE switches from a second cell to the first candidate cell.

[00124] In some embodiments of the present disclosure, the response message may indicate a cell list including: at least one cell, when the UE switches from the at least one cell to the first candidate cell, the UE does not perform an L2 reset; or at least one cell belonging to the second network node.

[00125] In some embodiments of the present disclosure, the second cell may include a serving cell of the UE or a cell for which an LTM configuration has been provided by the second network node to the first network node.

[00126] In some embodiments of the present disclosure, the cell list may include the second cell.

[00127] 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.

[00128] 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, an NE, a DU of a BS or a DU of 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.

[00129] At 711, a third network node may receive a configuration from a first network node, wherein the configuration includes information related to UE-measured TA for a first candidate cell. At 713, the third network node may determine whether to trigger a UE to perform early TA acquisition with respect to the first candidate cell based on the received configuration.

[00130] In some embodiments of the present disclosure, the configuration may indicate one of the following: one or more UE-measured TA IDs for the first candidate cell and a UE-measured TA ID for a serving cell of the UE; a list of candidate cells, wherein the UE is able to obtain TA for each candidate cell in the list of candidate cells by performing a UE-based TA measurement when an LTM cell switch procedure is executed from the serving cell to a corresponding candidate cell in the list of candidate cells; an association between the first candidate cell and a second candidate cell, wherein the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement when an LTM cell switch procedure is executed from the second candidate cell to the first candidate cell; and an association between the serving cell of the UE and at least one candidate cell, wherein the serving cell and the at least one candidate cell belong to a same network node and satisfy a TAE requirement.

[00131] 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.

[00132] FIG. 8 illustrates a flowchart of method 800 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. 8. In some examples, method 800 may be performed by a UE, for example, UE 104 as described with reference to FIG. 1. In some embodiments, the UE may execute a set of instructions to control the functional elements of the UE to perform the described functions or operations.

[00133] At 811, a UE may receive, from a network node, a reconfiguration message including an LTM configuration for one or more candidate cells. At 813, the UE may, in response to receiving a handover command to switch to a second cell or in response

to a condition for switching to the second cell being satisfied, switch from a serving cell of the UE to the second cell and set a UE-measured TA ID for the serving cell or a no-reset ID for the serving cell based on the reconfiguration message.

[00134] In some embodiments of the present disclosure, to set the UE-measured TA ID for the serving cell, the UE may perform one or more of the following: in response to receiving the handover command and the second cell being one of the one or more candidate cells, set a value of the UE-measured TA ID for the serving cell to a value of a UE-measured TA ID for the second cell indicated in the LTM configuration; in response to receiving the handover command and the second cell not being one of the one or more candidate cells, receive the UE-measured TA ID for the second cell from the network node and set the value of the UE-measured TA ID for the serving cell to the value of the received UE-measured TA ID for the second cell; and in response to the condition for switching to the second cell being satisfied, receive the UE-measured TA ID for the second cell from the network node and set the value of the UE-measured TA ID for the serving cell to the value of the received UE-measured TA ID for the second cell.

[00135] In some embodiments of the present disclosure, to set the no-reset ID for the serving cell, the UE may perform one or more of the following: in response to receiving the handover command and the second cell being one of the one or more candidate cells, set a value of the no-reset ID for the serving cell to a value of a no-reset ID for the second cell indicated in the LTM configuration; in response to receiving the handover command and the second cell not being one of the one or more candidate cells, receive the no-reset ID for the second cell from the network node and set the value of the received no-reset ID for the serving cell to the value of the no-reset ID for the second cell; and in response to the condition for switching to the second cell being satisfied, receive the no-reset ID for the second cell from the network node and set the value of the no-reset ID for the serving cell to the value of the received no-reset ID for the second cell.

[00136] In some embodiments of the present disclosure, to receive the UE-measured TA ID for the second cell or the no-reset ID for the second cell, the UE may receive the UE-measured TA ID for the second cell or the no-reset ID for the second cell in or

before the handover command or a configuration for the condition for switching to the second cell.

[00137] In some embodiments of the present disclosure, the condition for switching to the second cell is related to a CHO or a CPC.

[00138] It should be appreciated by persons skilled in the art that the sequence of the operations in exemplary method 800 may be changed and some of the operations in exemplary method 800 may be eliminated or modified, without departing from the spirit and scope of the disclosure.

[00139] FIG. 9 illustrates an example of a UE 900 in accordance with aspects of the present disclosure. The UE 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.

[00140] 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 digital signal processor (DSP), an application-specific integrated circuit (ASIC), or other programmable logic device, or any combination thereof configured as or otherwise supporting a means for performing the functions described in the present disclosure.

[00141] 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 UE 900 to perform various functions of the present disclosure.

[00142] 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 UE 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.

[00143] In some implementations, the processor 902 and the memory 904 coupled with the processor 902 may be configured to cause the UE 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 UE 900 in accordance with examples as disclosed herein.

[00144] For example, the UE 900 may be configured to support means for performing the operations as described with respect to FIG. 8. For example, the UE 900 may be configured to support: a means for receiving, from a network node, a reconfiguration message including an LTM configuration for one or more candidate cells; and a means for switching from a serving cell of the UE to a second cell and set a UE-measured TA ID for the serving cell or a no-reset ID for the serving cell based on the reconfiguration message in response to receiving a handover command to switch to the second cell or in response to a condition for switching to the second cell being satisfied.

[00145] The controller 906 may manage input and output signals for the UE 900. The controller 906 may also manage peripherals not integrated into the UE 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.

[00146] In some implementations, the UE 900 may include at least one transceiver 908. In some other implementations, the UE 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.

[00147] 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., a low-noise amplifier (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.

[00148] 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 amplitude modulation (AM), frequency modulation (FM), or digital modulation schemes like phase-shift keying (PSK) or quadrature amplitude modulation (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.

[00149] It should be appreciated by persons skilled in the art that the components in exemplary UE 900 may be changed, for example, some of the components in exemplary UE 900 may be omitted or modified or a new component(s) may be added to exemplary UE 900, without departing from the spirit and scope of the disclosure. For example, in some embodiments, the UE 900 may not include the controller 906.

[00150] FIG. 10 illustrates an example of a processor 1000 in accordance with aspects of the present disclosure. The processor 1000 may be an example of a processor configured to perform various operations in accordance with examples as described herein. The processor 1000 may include a controller 1002 configured to perform

various operations in accordance with examples as described herein. The processor 1000 may optionally include at least one memory 1004, which may be, for example, an L1/L2/L3 cache. Additionally, or alternatively, the processor 1000 may optionally include one or more arithmetic-logic units (ALUs) 1006. 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).

[00151] The processor 1000 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 1000) 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).

[00152] The controller 1002 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 1000 to cause the processor 1000 to support various operations in accordance with examples as described herein. For example, the controller 1002 may operate as a control unit of the processor 1000, generating control signals that manage the operation of various components of the processor 1000. These control signals include enabling or disabling functional units, selecting data paths, initiating memory access, and coordinating timing of operations.

[00153] The controller 1002 may be configured to fetch (e.g., obtain, retrieve, receive) instructions from the memory 1004 and determine a subsequent instruction(s) to be executed to cause the processor 1000 to support various operations in accordance with examples as described herein. The controller 1002 may be configured to track memory address of instructions associated with the memory 1004. The controller

1002 may be configured to decode instructions to determine the operation to be performed and the operands involved. For example, the controller 1002 may be configured to interpret the instruction and determine control signals to be output to other components of the processor 1000 to cause the processor 1000 to support various operations in accordance with examples as described herein. Additionally, or alternatively, the controller 1002 may be configured to manage flow of data within the processor 1000. The controller 1002 may be configured to control transfer of data between registers, ALUs, and other functional units of the processor 1000.

[00154] The memory 1004 may include one or more caches (e.g., memory local to or included in the processor 1000 or other memory, such RAM, ROM, DRAM, SDRAM, SRAM, MRAM, flash memory, etc. In some implementations, the memory 1004 may reside within or on a processor chipset (e.g., local to the processor 1000). In some other implementations, the memory 1004 may reside external to the processor chipset (e.g., remote to the processor 1000).

[00155] The memory 1004 may store computer-readable, computer-executable code including instructions that, when executed by the processor 1000, cause the processor 1000 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 1002 and/or the processor 1000 may be configured to execute computer-readable instructions stored in the memory 1004 to cause the processor 1000 to perform various functions. For example, the processor 1000 and/or the controller 1002 may be coupled with or to the memory 1004, the processor 1000, the controller 1002, and the memory 1004 may be configured to perform various functions described herein. In some examples, the processor 1000 may include multiple processors and the memory 1004 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.

[00156] The one or more ALUs 1006 may be configured to support various operations in accordance with examples as described herein. In some implementations, the one or more ALUs 1006 may reside within or on a processor chipset (e.g., the processor 1000). In some other implementations, the one or more ALUs 1006 may reside

external to the processor chipset (e.g., the processor 1000). One or more ALUs 1006 may perform one or more computations such as addition, subtraction, multiplication, and division on data. For example, one or more ALUs 1006 may receive input operands and an operation code, which determines an operation to be executed. One or more ALUs 1006 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 1006 may support logical operations such as AND, OR, exclusive-OR (XOR), not-OR (NOR), and not-AND (NAND), enabling the one or more ALUs 1006 to handle conditional operations, comparisons, and bitwise operations.

[00157] The processor 1000 may support wireless communication in accordance with examples as disclosed herein.

[00158] For example, the processor 1000 may be configured to support means for performing the operations as described with respect to FIG. 5. For example, the processor 1000 may be configured to or operable to support: a means for transmitting, to a second network node, a request message, wherein the request message may include an ID of a first candidate cell and an indication requesting information related to UE-measured TA or no-reset for the first candidate cell; a means for receiving, from the second network node, a response message in response to the request message; and transmit, to a UE, a third network node or both, a configuration based on the response message.

[00159] For example, the processor 1000 may be configured to support means for performing the operations as described with respect to FIG. 6. For example, the processor 1000 may be configured to or operable to support: a means for receiving, from a first network node, a request message, wherein the request message may include an ID of a first candidate cell and an indication requesting information related to UE-measured TA or no-reset for the first candidate cell; and a means for transmitting, to the first network node, a response message in response to the request message.

[00160] For example, the processor 1000 may be configured to support means for performing the operations as described with respect to FIG. 7. For example, the processor 1000 may be configured to or operable to support: a means for receiving a

configuration from a first network node, wherein the configuration may include information related to UE-measured TA for a first candidate cell; and a means for determining whether to trigger a UE to perform early TA acquisition with respect to the first candidate cell based on the received configuration.

[00161] For example, the processor 1000 may be configured to support means for performing the operations as described with respect to FIG. 8. For example, the processor 1000 may be configured to or operable to support: a means for receiving, from a network node, a reconfiguration message including an LTM configuration for one or more candidate cells; and a means for switching from a serving cell of a UE to a second cell and set a UE-measured TA ID for the serving cell or a no-reset ID for the serving cell based on the reconfiguration message in response to receiving a handover command to switch to the second cell or in response to a condition for switching to the second cell being satisfied.

[00162] It should be appreciated by persons skilled in the art that the components in exemplary processor 1000 may be changed, for example, some of the components in exemplary processor 1000 may be omitted or modified or a new component(s) may be added to exemplary processor 1000, without departing from the spirit and scope of the disclosure. For example, in some embodiments, the processor 1000 may not include the ALUs 1006.

[00163] FIG. 11 illustrates an example of an NE 1100 in accordance with aspects of the present disclosure. The NE 1100 may include a processor 1102, a memory 1104, a controller 1106, and a transceiver 1108. The processor 1102, the memory 1104, the controller 1106, or the transceiver 1108, 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.

[00164] The processor 1102, the memory 1104, the controller 1106, or the transceiver 1108, 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.

[00165] The processor 1102 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 1102 may be configured to operate the memory 1104. In some other implementations, the memory 1104 may be integrated into the processor 1102. The processor 1102 may be configured to execute computer-readable instructions stored in the memory 1104 to cause the NE 1100 to perform various functions of the present disclosure.

[00166] The memory 1104 may include volatile or non-volatile memory. The memory 1104 may store computer-readable, computer-executable code including instructions when executed by the processor 1102 cause the NE 1100 to perform various functions described herein. The code may be stored in a non-transitory computer-readable medium such as the memory 1104 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.

[00167] In some implementations, the processor 1102 and the memory 1104 coupled with the processor 1102 may be configured to cause the NE 1100 to perform one or more of the functions described herein (e.g., executing, by the processor 1102, instructions stored in the memory 1104). For example, the processor 1102 may support wireless communication at the NE 1100 in accordance with examples as disclosed herein.

[00168] For example, the NE 1100 may be configured to support means for performing the operations as described with respect to FIG. 5. For example, the NE 1100 may be configured to or operable to support: a means for transmitting, to a second network node, a request message, wherein the request message may include an ID of a first candidate cell and an indication requesting information related to UE-measured TA or no-reset for the first candidate cell; a means for receiving, from the second network node, a response message in response to the request message; and transmit, to a UE, a

third network node or both, a configuration based on the response message.

[00169] For example, the NE 1100 may be configured to support means for performing the operations as described with respect to FIG. 6. For example, the NE 1100 may be configured to or operable to support: a means for receiving, from a first network node, a request message, wherein the request message may include an ID of a first candidate cell and an indication requesting information related to UE-measured TA or no-reset for the first candidate cell; and a means for transmitting, to the first network node, a response message in response to the request message.

[00170] For example, the NE 1100 may be configured to support means for performing the operations as described with respect to FIG. 7. For example, the NE 1100 may be configured to or operable to support: a means for receiving a configuration from a first network node, wherein the configuration may include information related to UE-measured TA for a first candidate cell; and a means for determining whether to trigger a UE to perform early TA acquisition with respect to the first candidate cell based on the received configuration.

[00171] The controller 1106 may manage input and output signals for the NE 1100. The controller 1106 may also manage peripherals not integrated into the NE 1100. In some implementations, the controller 1106 may utilize an operating system such as iOS®, ANDROID®, WINDOWS®, or other operating systems. In some implementations, the controller 1106 may be implemented as part of the processor 1102.

[00172] In some implementations, the NE 1100 may include at least one transceiver 1108. In some other implementations, the NE 1100 may have more than one transceiver 1108. The transceiver 1108 may represent a wireless transceiver. The transceiver 1108 may include one or more receiver chains 1110, one or more transmitter chains 1112, or a combination thereof.

[00173] A receiver chain 1110 may be configured to receive signals (e.g., control information, data, or packets) over a wireless medium. For example, the receiver chain 1110 may include one or more antennas for receive the signal over the air or wireless medium. The receiver chain 1110 may include at least one amplifier (e.g., an LNA) configured to amplify the received signal. The receiver chain 1110 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 1110 may include at least one decoder for decoding the processing the demodulated signal to receive the transmitted data.

[00174] A transmitter chain 1112 may be configured to generate and transmit signals (e.g., control information, data, or packets). The transmitter chain 1112 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 1112 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 1112 may also include one or more antennas for transmitting the amplified signal into the air or wireless medium.

[00175] It should be appreciated by persons skilled in the art that the components in exemplary NE 1100 may be changed, for example, some of the components in exemplary NE 1100 may be omitted or modified or a new component(s) may be added to exemplary NE 1100, without departing from the spirit and scope of the disclosure. For example, in some embodiments, the NE 1100 may not include the controller 1106.

[00176] 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.

[00177] 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.

[00178] In this document, this document, the terms “handover” and “path switch” may be used interchangeably. The terms "path switch" and "path 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 network node, comprising:
 - at least one memory; and
 - at least one processor coupled with the at least one memory and configured to cause the first network node to:
 - transmit, to a second network node, a request message, wherein the request message comprises an ID of a first candidate cell and an indication requesting information related to user equipment (UE)-measured timing advance (TA) or no-reset for the first candidate cell;
 - receive, from the second network node, a response message in response to the request message; and
 - transmit, to a UE, a third network node or both, a configuration based on the response message.
2. The first network node of Claim 1, wherein the information related to UE-measured TA for the first candidate cell indicates whether the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement when an L1/L2 Triggered Mobility (LTM) cell switch procedure is executed from a second cell to the first candidate cell.
3. The first network node of Claim 2, wherein the response message indicates a cell list comprising:
 - at least one cell based on which the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement; or
 - at least one cell belonging to the second network node and satisfying a time alignment error (TAE) requirement.

4. The first network node of Claim 1, wherein the information related to no reset for the first candidate cell indicates whether the UE performs an L2 reset or not when the UE switches from a second cell to the first candidate cell.

5. The first network node of Claim 4, wherein the response message indicates a cell list comprising:

at least one cell, when the UE switches from the at least one cell to the first candidate cell the UE does not perform an L2 reset; or

at least one cell belonging to the second network node.

6. The first network node of any of Claims 2-5, wherein the second cell comprises a serving cell of the UE or a candidate cell for which an L1/L2 Triggered Mobility (LTM) configuration has been provided by the second network node to the first network node.

7. The first network node of Claim 3 or 5, wherein the cell list comprises the second cell.

8. The first network node of Claim 1, wherein the configuration indicates one of the following:

one or more UE-measured TA IDs for the first candidate cell and a UE-measured TA ID for a serving cell of the UE;

a list of candidate cells, wherein the UE is able to obtain TA for each candidate cell in the list of candidate cells by performing a UE-based TA measurement when an L1/L2 Triggered Mobility (LTM) cell switch procedure is executed from the serving cell to a corresponding candidate cell in the list of candidate cells;

an association between the first candidate cell and a second candidate cell, wherein the UE is able to obtain TA for the first candidate cell by performing a UE-

based TA measurement when an LTM cell switch procedure is executed from the second candidate cell to the first candidate cell;

an association between the serving cell of the UE and at least one candidate cell, wherein the serving cell and the at least one candidate cell belong to a same network node and satisfy a time alignment error (TAE) requirement.

9. The first network node of Claim 1, wherein the first network node is associated with a master cell group (MCG) of the UE or a secondary cell group (SCG) of the UE.

10. A second network node, comprising:

at least one memory; and

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

receive, from a first network node, a request message, wherein the request message comprises an ID of a first candidate cell and an indication requesting information related to user equipment (UE)-measured timing advance (TA) or no-reset for the first candidate cell; and

transmit, to the first network node, a response message in response to the request message.

11. The second network node of Claim 10, wherein the information related to UE-measured TA for the first candidate cell indicates whether a UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement when an L1/L2 Triggered Mobility (LTM) cell switch procedure is executed from a second cell to the first candidate cell.

12. The second network node of Claim 11, wherein the response message indicates a cell list comprising:

at least one cell based on which the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement; or

at least one cell belonging to the second network node and satisfying a time alignment error (TAE) requirement.

13. The second network node of Claim 10, wherein the information related to no reset for the first candidate cell indicates whether a UE performs an L2 reset or not when the UE switches from a second cell to the first candidate cell.

14. The second network node of Claim 13, wherein the response message indicates a cell list comprising:

at least one cell, when the UE switches from the at least one cell to the first candidate cell the UE does not perform an L2 reset; or

at least one cell belonging to the second network node.

15. The second network node of any of Claims 11-14, wherein the second cell comprises a serving cell of the UE or a cell for which an L1/L2 Triggered Mobility (LTM) configuration has been provided by the second network node to the first network node.

16. The second network node of Claim 12 or 14, wherein the cell list comprises the second cell.

17. A third network node, comprising:

at least one memory; and

at least one processor coupled with the at least one memory and configured to cause the third network node to:

receive a configuration from a first network node, wherein the configuration comprises information related to user equipment (UE)-measured timing advance (TA) for a first candidate cell; and

determine whether to trigger a UE to perform early TA acquisition with respect to the first candidate cell based on the received configuration.

18. The third network node of Claim 17, wherein the configuration indicates one of the following:

one or more UE-measured TA IDs for the first candidate cell and a UE-measured TA ID for a serving cell of the UE;

a list of candidate cells, wherein the UE is able to obtain TA for each candidate cell in the list of candidate cells by performing a UE-based TA measurement when an L1/L2 Triggered Mobility (LTM) cell switch procedure is executed from the serving cell to a corresponding candidate cell in the list of candidate cells;

an association between the first candidate cell and a second candidate cell, wherein the UE is able to obtain TA for the first candidate cell by performing a UE-based TA measurement when an LTM cell switch procedure is executed from the second candidate cell to the first candidate cell; and

an association between the serving cell of the UE and at least one candidate cell, wherein the serving cell and the at least one candidate cell belong to a same network node and satisfy a time alignment error (TAE) requirement.

19. A user equipment (UE), comprising:

at least one memory; and

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

receive, from a network node, a reconfiguration message comprising an L1/L2 Triggered Mobility (LTM) configuration for one or more candidate cells; and

in response to receiving a handover command to switch to a second cell or in response to a condition for switching to the second cell being satisfied, switch from a serving cell of the UE to the second cell and set a UE-measured timing advance (TA) ID for the serving cell or a no-reset ID for the serving cell based on the reconfiguration message.

20. The UE of Claim 19, wherein to set the UE-measured TA ID for the serving cell, the at least one processor is configured to cause the UE to perform one or more of the following:

in response to receiving the handover command and the second cell being one of the one or more candidate cells, set a value of the UE-measured TA ID for the serving cell to a value of a UE-measured TA ID for the second cell indicated in the LTM configuration;

in response to receiving the handover command and the second cell not being one of the one or more candidate cells, receive the UE-measured TA ID for the second cell from the network node and set the value of the UE-measured TA ID for the serving cell to the value of the received UE-measured TA ID for the second cell; and

in response to the condition for switching to the second cell being satisfied, receive the UE-measured TA ID for the second cell from the network node and set the value of the UE-measured TA ID for the serving cell to the value of the received UE-measured TA ID for the second cell.