

PREPARATION PROCEDURE FOR LTM

TECHNICAL FIELD

[0001] The present disclosure relates to wireless communications, and more specifically to base stations, processors, and methods for preparation procedure for layer 1/layer 2 (L1/L2)-triggered mobility (LTM), for example, preparation procedure for inter-central unit (CU) LTM.

BACKGROUND

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

[0003] In 3GPP, a new work item on further new radio (NR) mobility enhancements, named as LTM, was approved to change a serving cell via L1/L2 signalling, in order to reduce the latency, overhead and interruption time. The LTM is a PCell (primary cell of a master cell group) or PSCell (primary cell of a secondary cell group) cell switch procedure that the network triggers via medium access control - control element (MAC CE) based on L1 measurements. The potential applicable scenarios of LTM include intra-CU intra-distributed unit (DU) LTM, intra-CU inter-DU LTM, and inter-CU LTM. However, for the inter-CU LTM, there are still some open problems in initiating and modifying the inter-CU LTM candidate cell configuration that need to be studied.

SUMMARY

[0004] The present disclosure relates to methods, apparatuses, and systems that support a preparation procedure for LTM.

[0005] In a first aspect of the solution, A base station may comprises: a processor; and a transceiver coupled to the processor, wherein the base station is a source base station for layer 1/layer 2 (L1/L2)-triggered mobility (LTM), and the processor is configured to perform a LTM preparation procedure including: transmitting, via the transceiver and to one or more candidate base stations for LTM, one or more first request messages for one or more LTM candidate cells belonging to the one or more candidate base stations, respectively, each first request message includes a first LTM indication information and an identifier of a LTM candidate cell corresponding to the first request message; and receiving, via the transceiver and from the one or more candidate base stations, one or more first response messages for the one or more LTM candidate cells, wherein a configuration information of each LTM candidate cell of the one or more LTM candidate cells is included in at least one first response message.

[0006] In some implementations of the method and apparatuses described herein, the configuration information of a LTM candidate cell may include at least one of a LTM candidate cell configuration and a reference signal (RS) configuration of the LTM candidate cell.

[0007] In some implementations of the method and apparatuses described herein, the LTM candidate cell configuration and the RS configuration of the LTM candidate cell may be included in different first response messages or the same first response message.

[0008] In some implementations of the method and apparatuses described herein, the RS configuration of the LTM candidate cell may be included in the LTM candidate cell configuration of the LTM candidate cell.

[0009] In some implementations of the method and apparatuses described herein, the LTM preparation procedure may further include: assigning indexes to one or more LTM candidate cell configurations of the one or more LTM candidate cells.

[0010] In some implementations of the method and apparatuses described herein, the LTM preparation procedure may further include: transmitting, via the transceiver and to each of the one or more candidate base stations, a second request message including a

second LTM indication information, the indexes of the one or more LTM candidate cell configurations, and RS configurations of the one or more LTM candidate cells.

[0011] In some implementations of the method and apparatuses described herein, the LTM preparation procedure may further include: receiving, via the transceiver and from each of the one or more candidate base stations, a second response message as a response to the second request message.

[0012] In some implementations of the method and apparatuses described herein, the LTM preparation procedure may further include: transmitting, via the transceiver and to a user equipment (UE), a reconfiguration message including the one or more LTM candidate cell configurations, the indexes of the one or more LTM candidate cell configurations, and the RS configurations of the one or more LTM candidate cells.

[0013] In some implementations of the method and apparatuses described herein, the source base station may include a source central unit (CU) and one or more distributed units (DUs), the one or more DUs include a source DU serving the UE, wherein the indexes of the one or more LTM candidate cell configurations are assigned by the source CU.

[0014] In some implementations of the method and apparatuses described herein, transmitting a reconfiguration message may comprise: transmitting, from the source CU and to the source DU, the reconfiguration message, the indexes of the one or more LTM candidate cell configurations, and the RS configurations of the one or more LTM candidate cells; storing, at the source DU, the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells; and forwarding, from the source DU and to the UE, the reconfiguration message.

[0015] In some implementations of the method and apparatuses described herein, the identifier of the LTM candidate cell may include a new radio (NR) cell global identifier (NCGI) of the LTM candidate cell.

[0016] In some implementations of the method and apparatuses described herein, the first LTM indication information may be a LTM indicator with a first codepoint or a second codepoint, the first codepoint indicates to initiate a preparation of the LTM candidate cell configuration, and the second codepoint indicates an update of the LTM candidate cell configuration. The second LTM indication information may be the LTM

indicator with a third codepoint, the third codepoint indicates to store the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells.

[0017] In some implementations of the method and apparatuses described herein, the processor may be further configured to: perform the LTM preparation procedure in the case that a cancel message requesting a modification of an LTM candidate cell configuration is received from a candidate base station for LTM, the cancel message includes identifiers of one or more LTM candidate cells to be cancelled.

[0018] In some implementations of the method and apparatuses described herein, the cancel message may further include a cause value indicating LTM resources to be changed.

[0019] In some implementations of the method and apparatuses described herein, the processor may be further configured to: transmit, via the transceiver and to a candidate base station corresponding to a target LTM candidate cell, an identifier of the target LTM candidate cell when decide to execute LTM to a target LTM candidate cell.

[0020] In a first aspect of the solution, a base station may comprises: a processor; and a transceiver coupled to the processor, wherein the base station is a candidate base station for layer 1/layer 2 (L1/L2)-triggered mobility (LTM), and the processor is configured to perform a LTM preparation procedure including: receiving, via the transceiver and from a source base station for LTM, a first request message for a LTM candidate cell belonging to the candidate base station, the first request message includes a first LTM indication information and an identifier of the LTM candidate cell; preparing a configuration information of the LTM candidate cell based on the first request message; and transmitting, via the transceiver and to the source base station, at least one first response message including the configuration information of the LTM candidate cell.

[0021] In some implementations of the method and apparatuses described herein, the configuration information may include at least one of a LTM candidate cell configuration of the LTM candidate cell and a reference signal (RS) configuration of the LTM candidate cell.

[0022] In some implementations of the method and apparatuses described herein, the LTM candidate cell configuration and the RS configuration of the LTM candidate cell may be included in different first response messages or the same first response message.

[0023] In some implementations of the method and apparatuses described herein, the RS configuration of the LTM candidate cell may be included in the LTM candidate cell configuration of the LTM candidate cell.

[0024] In some implementations of the method and apparatuses described herein, the identifier of the LTM candidate cell may include a new radio (NR) cell global identifier (NCGI) of the LTM candidate cell.

[0025] In some implementations of the method and apparatuses described herein, the LTM preparation procedure may further include: receive, via the transceiver and from the source base station, a second request message including a second LTM indication information, RS configurations of one or more LTM candidate cells identified by the source base station, and indexes of one or more LTM candidate cell configurations of the one or more LTM candidate cells identified by the source base station; storing the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells.

[0026] In some implementations of the method and apparatuses described herein, the LTM preparation procedure may further include: transmit, via the transceiver and to the source base station, a second response message as a response to the second request message.

[0027] In some implementations of the method and apparatuses described herein, the first LTM indication information may be a LTM indicator with a first codepoint or a second codepoint, the first codepoint indicates to initiate a preparation of the LTM candidate cell configuration, and the second codepoint indicates an update of the LTM candidate cell configuration,. The second LTM indication information may be the LTM indicator with a third codepoint, the third codepoint indicates to store the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells.

[0028] In some implementations of the method and apparatuses described herein, the candidate base station may include a candidate central unit (CU) and one or more

candidate distributed units (DUs), wherein the first request message and the second request message are received by the candidate CU from the source base station, the first response message and the second response message are transmitted by the candidate CU to the source base station.

[0029] In some implementations of the method and apparatuses described herein, preparing the configuration information of the LTM candidate cell based on the first request message may comprise: transmitting, from the candidate CU to a candidate DU corresponding to the LTM candidate cell, a third request message including the identifier of the LTM candidate cell; and receiving, at the candidate CU and from the candidate DU, at least one third response message including the configuration information of the LTM candidate cell.

[0030] In some implementations of the method and apparatuses described herein, storing the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells may comprise: transmitting, from the candidate CU to a candidate DU corresponding to the LTM candidate cell, a fourth request message including the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells; and storing, at the candidate DU, the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells.

[0031] In some implementations of the method and apparatuses described herein, the processor may be further configured to: transmit, via the transceiver and to the source base station, a cancel message requesting a modification of an LTM candidate cell configuration, wherein the cancel message includes identifiers of one or more LTM candidate cells to be cancelled.

[0032] In some implementations of the method and apparatuses described herein, the cancel message may further include a cause value indicating LTM resources to be changed.

[0033] In some implementations of the method and apparatuses described herein, the cancel message may be generated by the candidate CU in response to receiving a modification message requesting a modification of one or more LTM candidate cell configurations from a candidate DU belonging to the candidate CU.

[0034] In some implementations of the method and apparatuses described herein, the modification message may include a cause value indicating LTM resources to be changed.

[0035] In some implementations of the method and apparatuses described herein, the processor may be further configured to: receive, via the transceiver and from the source base station, an identifier of a target LTM candidate cell in the case that the source base station decides to execute LTM to the target LTM candidate cell.

[0036] In a third aspect of the solution, a processor for wireless communication may comprising: at least one memory; and a controller coupled with the at least one memory and configured to cause the processor to perform a layer 1/layer 2 (L1/L2)-triggered mobility (LTM) preparation procedure, the LTM preparation procedure including: transmitting, via the transceiver and to one or more candidate base stations for LTM, one or more first request messages for one or more LTM candidate cells belonging to the one or more candidate base stations, respectively, each first request message includes a first LTM indication information and an identifier of a LTM candidate cell corresponding to the first request message; and receiving, via the transceiver and from the one or more candidate base stations, one or more first response messages for the one or more LTM candidate cells, wherein a configuration information of each LTM candidate cell of the one or more LTM candidate cells is included in at least one first response message.

[0037] In a fourth aspect of the solution, a method performed by a source base station for layer 1/layer 2 (L1/L2)-triggered mobility (LTM), the method comprises a LTM preparation procedure, the LTM preparation procedure including: transmitting, via the transceiver and to one or more candidate base stations for LTM, one or more first request messages for one or more LTM candidate cells belonging to the one or more candidate base stations, respectively, each first request message includes a first LTM indication information and an identifier of a LTM candidate cell corresponding to the first request message; and receiving, via the transceiver and from the one or more candidate base stations, one or more first response messages for the one or more LTM candidate cells, wherein a configuration information of each LTM candidate cell of the one or more LTM candidate cells is included in at least one first response message.

[0038] In a fifth aspect of the solution, a processor for wireless communication, comprises: at least one memory; and a controller coupled with the at least one memory and configured to cause the processor to perform a layer 1/layer 2 (L1/L2)-triggered

mobility (LTM) preparation procedure, the LTM preparation procedure including: receiving, via the transceiver and from a source base station for LTM, a first request message for a LTM candidate cell belonging to the candidate base station, the first request message includes a first LTM indication information and an identifier of the LTM candidate cell; preparing a configuration information of the LTM candidate cell based on the first request message; and transmitting, via the transceiver and to the source base station, at least one first response message including the configuration information of the LTM candidate cell.

[0039] In a sixth aspect of the solution, a method performed by a candidate base station for layer 1/layer 2 (L1/L2)-triggered mobility (LTM), the method comprises a LTM preparation procedure, the LTM preparation procedure including: receiving, via the transceiver and from a source base station for LTM, a first request message for a LTM candidate cell belonging to the candidate base station, the first request message includes a first LTM indication information and an identifier of the LTM candidate cell; preparing a configuration information of the LTM candidate cell based on the first request message; and transmitting, via the transceiver and to the source base station, at least one first response message including the configuration information of the LTM candidate cell.

[0040] It is to be understood that the summary section is not intended to identify key or essential features of embodiments of the present disclosure, nor is it intended to be used to limit the scope of the present disclosure. Other features of the present disclosure will become easily comprehensible through the following description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0041] FIG. 1 illustrates an example of a wireless communications system that supports a preparation procedure for LTM in accordance with aspects of the present disclosure.

[0042] FIGS. 2A to 2C illustrate example scenarios of LTM associated with aspects of the present disclosure.

[0043] FIG. 3 illustrates a signalling procedure for a preparation procedure for LTM in accordance with aspects of the present disclosure.

[0044] FIG. 4 illustrates an example of signalling procedure for the preparation procedure for LTM in accordance with aspects of the present disclosure.

[0045] FIG. 5 illustrates another example of signalling procedure for the preparation procedure for LTM in accordance with aspects of the present disclosure

[0046] FIGS. 6 and 7 illustrate examples of devices that support the preparation procedure for LTM in accordance with aspects of the present disclosure.

[0047] FIGS. 8 and 9 illustrate examples of processors that support the preparation procedure for LTM in accordance with aspects of the present disclosure.

[0048] FIGS. 10 and 11 illustrate flowcharts of methods that support the preparation procedure for LTM in accordance with aspects of the present disclosure.

DETAILED DESCRIPTION

[0049] Principles of the present disclosure will now be described with reference to some embodiments. It is to be understood that these embodiments are described only for the purpose of illustration and help those skilled in the art to understand and implement the present disclosure, without suggesting any limitation as to the scope of the disclosure. The disclosure described herein may be implemented in various manners other than the ones described below.

[0050] In the following description and claims, unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skills in the art to which this disclosure belongs.

[0051] References in the present disclosure to “one embodiment,” “an example embodiment,” “an embodiment,” “some embodiments,” and the like indicate that the embodiment(s) described may include a particular feature, structure, or characteristic, but it is not necessary that every embodiment includes the particular feature, structure, or characteristic. Moreover, such phrases do not necessarily refer to the same embodiment(s). Further, when a particular feature, structure, or characteristic is described in connection with an embodiment, it is submitted that it is within the knowledge of one skilled in the art to affect such feature, structure, or characteristic in connection with other embodiments whether or not explicitly described.

[0052] It shall be understood that although the terms “first” and “second” or the like may be used herein to describe various elements, these elements should not be limited by

these terms. These terms are only used to distinguish one element from another element. For example, a first element could also be termed as a second element, and similarly, a second element could also be termed as a first element, without departing from the scope of embodiments. As used herein, the term “and/or” includes any and all combinations of one or more of the listed terms.

[0053] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of example embodiments. As used herein, the singular forms “a”, “an” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms “comprises”, “comprising”, “has”, “having”, “includes” and/or “including”, when used herein, specify the presence of stated features, elements, and/or components etc., but do not preclude the presence or addition of one or more other features, elements, components and/ or combinations thereof.

[0054] As used herein, the term “communication network” refers to a network following any suitable communication standards, such as, 5G new radio (NR), long term evolution (LTE), LTE-advanced (LTE-A), wideband code division multiple access (WCDMA), high-speed packet access (HSPA), narrow band internet of things (NB-IoT), and so on. Further, the communications between a terminal device and a network device in the communication network may be performed according to any suitable generation communication protocols, including but not limited to, the first generation (1G), the second generation (2G), 2.5G, 2.75G, the third generation (3G), the fourth generation (4G), 4.5G, the fifth generation (5G) communication protocols, and/or any other protocols either currently known or to be developed in the future. Embodiments of the present disclosure may be applied in various communication systems. Given the rapid development in communications, there will also be future type communication technologies and systems in which the present disclosure may be embodied. It should not be seen as limiting the scope of the present disclosure to only the aforementioned systems.

[0055] As used herein, the term “network device” generally refers to a node in a communication network via which a terminal device can access the communication network and receive services therefrom. The network device may refer to a base station (BS) or an access point (AP), for example, a node B (NodeB or NB), a radio access network (RAN) node, an evolved NodeB (eNodeB or eNB), a NR NB (also referred to as

a gNB), a remote radio unit (RRU), a radio header (RH), an infrastructure device for a V2X (vehicle-to-everything) communication, a transmission and reception point (TRP), a reception point (RP), a remote radio head (RRH), a relay, an integrated access and backhaul (IAB) node, a low power node such as a femto BS, a pico BS, and so forth, depending on the applied terminology and technology.

[0056] As used herein, the term “terminal device” generally refers to any end device that may be capable of wireless communications. By way of example rather than a limitation, a terminal device may also be referred to as a communication device, a user equipment (UE), an end user device, a subscriber station (SS), an unmanned aerial vehicle (UAV), a portable subscriber station, a mobile station (MS), or an access terminal (AT). The terminal device may include, but is not limited to, a mobile phone, a cellular phone, a smart phone, a voice over IP (VoIP) phone, a wireless local loop phone, a tablet, a wearable terminal device, a personal digital assistant (PDA), a portable computer, a desktop computer, an image capture terminal device such as a digital camera, a gaming terminal device, a music storage and playback appliance, a vehicle-mounted wireless terminal device, a wireless endpoint, a mobile station, laptop-embedded equipment (LEE), laptop-mounted equipment (LME), a universal serial bus (USB) dongle, a smart device, wireless customer-premises equipment (CPE), an internet of things (IoT) device, a watch or other wearable, a head-mounted display (HMD), a vehicle, a drone, a medical device (for example, a remote surgery device), an industrial device (for example, a robot and/or other wireless devices operating in an industrial and/or an automated processing chain contexts), a consumer electronics device, a device operating on commercial and/or industrial wireless networks, and the like. In the following description, the terms: “terminal device,” “communication device,” “terminal,” “user equipment” and “UE,” may be used interchangeably.

[0057] As discussed above, when a UE moves from one cell to another cell, at some point, a serving cell change needs to be performed. In the legacy, the serving cell change is performed by explicit radio resource control (RRC) reconfiguration signalling to trigger a synchronization of target cell based on L3 measurement reports. It leads to longer latency, larger overhead, and longer interruption time than beam-level mobility.

[0058] In the 3rd generation partnership project (3GPP), a new work item on further NR mobility enhancements, named as LTM, was approved to change a serving cell via

L1/L2 signalling, in order to reduce the latency, overhead and interruption time during a cell switch.

[0059] FIGS. 2A to 2C illustrate example scenarios of LTM associated with aspects of the present disclosure. FIG. 2A shows a scenario for intra-CU intra-DU LTM, FIG. 3B shows a scenario for intra-CU inter-DU LTM, and FIG. 3C shows a scenario for inter-CU inter-DU LTM.

[0060] As shown in FIG. 2A, in the scenario for intra-CU intra-DU LTM, the UE moves between different cells within the same DU. As shown in FIG. 2B, in the scenario for intra-CU inter-DU LTM, the UE moves between different cells belonging to different DUs but within the same CU. As shown in FIG. 2C, in the scenario for inter-CU LTM, the UE moves between different cells belonging to different DUs, where the different DUs belong to different CUs.

[0061] In the LTM, two concepts, i.e., LTM candidate cell and LTM candidate cell configuration are proposed. An LTM candidate cell refers to a cell used for LTM, except the serving cell in the source DU. In some cases, the serving cell in the source DU may be the LTM candidate cell in case of subsequent LTM. There may be multiple LTM candidate cells prepared for a UE, and these LTM candidate cells may belong to the same or different candidate DUs (including different candidate DUs belonging to different candidate CUs). LTM candidate cell configuration refers to a configuration associated with an LTM candidate cell. Each LTM candidate cell configuration may be identified by an index, called as LTM candidate cell configuration index, LTM candidate configuration index, or other names. In one example, the LTM candidate cell configuration index may be LTM-CandidateId, which is used to identify an LTM candidate cell configuration.

[0062] Considering inter-CU LTM, there are several issues should be considered as follows. The first issue is, for the inter-CU LTM (e.g., the UE moves from a source CU to a candidate CU), LTM candidate cells may belong to different CUs. It is unclear how to initiate and modify the inter-CU LTM candidate cell configuration.

[0063] The second issue is that indexes of LTM candidate cell configurations are needed for LTM, but it is unclear how to orchestrate the index related to the inter-CU LTM candidate cell configuration to support L1 measurement report. The third issue is when executing inter-CU LTM, the UE moves between different cells belonging to different DUs, where these DUs belongs to different CUs, it shall avoid the early data

forwarding with unnecessary buffering of data at multiple candidate DUs and late data forwarding with high interruption time. It is unclear how to perform data forwarding towards the candidate DU in a timely manner. Thus, it needs a solution to solve above issues to support inter-CU LTM.

[0064] The present disclosure proposed a solution to support a preparation procedure for LTM, for example, for inter-CU LTM. In this solution, the source CU may interact with candidate CUs and manage (e.g. obtain, modify, or update) LTM candidate cell configurations and RS configurations of LTM candidate cells. By implementing the example embodiments of the present disclosure, a preparation procedure for LTM may be extended to the inter-CU LTM.

[0065] Aspects of the present disclosure are described in the context of a wireless communications system.

[0066] FIG. 1 illustrates an example of a wireless communications system 100 that supports a preparation procedure for LTM in accordance with aspects of the present disclosure. The wireless communications system 100 may include one or more network entities 102 (also referred to as network equipment (NE)), one or more UEs 104, a core network 106, and a packet data network 108. The wireless communications system 100 may support various radio access technologies. In some implementations, the wireless communications system 100 may be a 4G network, such as an LTE network or an LTE-advanced (LTE-A) network. In some other implementations, the wireless communications system 100 may be a 5G network, such as an NR network. In other implementations, the wireless communications system 100 may be a combination of a 4G network and a 5G network, or other suitable radio access technology including institute of electrical and electronics engineers (IEEE) 802.11 (Wi-Fi), IEEE 802.16 (WiMAX), IEEE 802.20. The wireless communications system 100 may support radio access technologies beyond 5G. Additionally, the wireless communications system 100 may support technologies, such as time division multiple access (TDMA), frequency division multiple access (FDMA), or code division multiple access (CDMA), etc.

[0067] The one or more network entities 102 may be dispersed throughout a geographic region to form the wireless communications system 100. One or more of the network entities 102 described herein may be or include or may be referred to as a network node, a base station, a network element, a radio access network (RAN), a base transceiver

station, an access point, a NodeB, an eNodeB (eNB), a next-generation NodeB (gNB), or other suitable terminology. A network entity 102 and a UE 104 may communicate via a communication link 110, which may be a wireless or wired connection. For example, a network entity 102 and a UE 104 may perform wireless communication (e.g., receive signaling, transmit signaling) over a Uu interface.

[0068] A network entity 102 may provide a geographic coverage area 112 for which the network entity 102 may support services (e.g., voice, video, packet data, messaging, broadcast, etc.) for one or more UEs 104 within the geographic coverage area 112. For example, a network entity 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, a network entity 102 may be moveable, for example, a satellite associated with a non-terrestrial network. 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 112 may be associated with different network entities 102. Information and signals described herein may be represented using any of a variety of different technologies and techniques. For example, data, instructions, commands, information, signals, bits, symbols, and chips that may be referenced throughout the description may be represented by voltages, currents, electromagnetic waves, magnetic fields or particles, optical fields or particles, or any combination thereof.

[0069] The one or more UEs 104 may be dispersed throughout a geographic region of the wireless communications system 100. A UE 104 may include or may be referred to as a mobile device, a wireless device, a remote device, a remote unit, a handheld device, or a subscriber 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. In some implementations, a UE 104 may be stationary in the wireless communications system 100. In some other implementations, a UE 104 may be mobile in the wireless communications system 100.

[0070] The one or more UEs 104 may be devices in different forms or having different capabilities. Some examples of UEs 104 are illustrated in FIG. 1. A UE 104 may be

capable of communicating with various types of devices, such as the network entities 102, other UEs 104, or network equipment (e.g., the core network 106, the packet data network 108, a relay device, an integrated access and backhaul (IAB) node, or another network equipment), as shown in FIG. 1. Additionally, or alternatively, a UE 104 may support communication with other network entities 102 or UEs 104, which may act as relays in the wireless communications system 100.

[0071] A UE 104 may also be able to support wireless communication directly with other UEs 104 over a communication link 114. 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.

[0072] A network entity 102 may support communications with the core network 106, or with another network entity 102, or both. For example, a network entity 102 may interface with the core network 106 through one or more backhaul links 116 (e.g., via an S1, N2, N2, or another network interface). The network entities 102 may communicate with each other over the backhaul links 116 (e.g., via an X2, Xn, or another network interface). In some implementations, the network entities 102 may communicate with each other directly (e.g., between the network entities 102). In some other implementations, the network entities 102 may communicate with each other or indirectly (e.g., via the core network 106). In some implementations, one or more network entities 102 may include subcomponents, such as an access network entity, which may be an example of an access node controller (ANC). An ANC may communicate with the one or more UEs 104 through one or more other access network transmission entities, which may be referred to as a radio heads, smart radio heads, or transmission-reception points (TRPs).

[0073] In some implementations, a network entity 102 may be configured in a disaggregated architecture, which may be configured to utilize a protocol stack physically or logically distributed among two or more network entities 102, such as an integrated access backhaul (IAB) network, an open radio access network (O-RAN) (e.g., a network configuration sponsored by the O-RAN Alliance), or a virtualized RAN (vRAN) (e.g., a

cloud RAN (C-RAN)). For example, a network entity 102 may include one or more of a CU, a DU, a radio unit (RU), a RAN intelligent controller (RIC) (e.g., a near-real time RIC (Near-RT RIC), a non-real time RIC (Non-RT RIC)), a service management and orchestration (SMO) system, or any combination thereof.

[0074] An RU may also be referred to as a radio head, a smart radio head, a remote radio head (RRH), a remote radio unit (RRU), or a transmission reception point (TRP). One or more components of the network entities 102 in a disaggregated RAN architecture may be co-located, or one or more components of the network entities 102 may be located in distributed locations (e.g., separate physical locations). In some implementations, one or more network entities 102 of a disaggregated RAN architecture may be implemented as virtual units (e.g., a virtual CU (VCU), a virtual DU (VDU), a virtual RU (VRU)).

[0075] Split of functionality between a CU, a DU, and an RU may be flexible and may support different functionalities depending upon which functions (e.g., network layer functions, protocol layer functions, baseband functions, radio frequency functions, and any combinations thereof) are performed at a CU, a DU, or an RU. For example, a functional split of a protocol stack may be employed between a CU and a DU such that the CU may support one or more layers of the protocol stack and the DU may support one or more different layers of the protocol stack. In some implementations, the CU may host upper protocol layer (e.g., a layer 3 (L3), a layer 2 (L2)) functionality and signaling (e.g., radio resource control (RRC), service data adaptation protocol (SDAP), packet data convergence protocol (PDCP)). The CU may be connected to one or more DUs or RUs, and the one or more DUs or RUs may host lower protocol layers, such as a layer 1 (L1) (e.g., physical (PHY) layer) or an L2 (e.g., radio link control (RLC) layer, medium access control (MAC) layer) functionality and signaling, and may each be at least partially controlled by the CU 160.

[0076] Additionally, or alternatively, a functional split of the protocol stack may be employed between a DU and an RU such that the DU may support one or more layers of the protocol stack and the RU may support one or more different layers of the protocol stack. The DU may support one or multiple different cells (e.g., via one or more RUs). In some implementations, a functional split between a CU and a DU, or between a DU and an RU may be within a protocol layer (e.g., some functions for a protocol layer may be

performed by one of a CU, a DU, or an RU, while other functions of the protocol layer are performed by a different one of the CU, the DU, or the RU).

[0077] A CU may be functionally split further into CU control plane (CU-CP) and CU user plane (CU-UP) functions. A CU may be connected to one or more DUs via a midhaul communication link (e.g., F1, F1-c, F1-u), and a DU may be connected to one or more RUs via a fronthaul communication link (e.g., open fronthaul (FH) interface). In some implementations, a midhaul communication link or a fronthaul communication link may be implemented in accordance with an interface (e.g., a channel) between layers of a protocol stack supported by respective network entities 102 that are in communication via such communication links.

[0078] The core network 106 may support user authentication, access authorization, tracking, connectivity, and other access, routing, or mobility functions. The core network 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 network entities 102 associated with the core network 106.

[0079] The core network 106 may communicate with the packet data network 108 over one or more backhaul links 116 (e.g., via an S1, N2, N2, or another network interface). The packet data network 108 may include an application server 118. In some implementations, one or more UEs 104 may communicate with the application server 118. A UE 104 may establish a session (e.g., a protocol data unit (PDU) session, or the like) with the core network 106 via a network entity 102. The core network 106 may route traffic (e.g., control information, data, and the like) between the UE 104 and the application server 118 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 core network 106 (e.g., one or more network functions of the core network 106).

[0080] In the wireless communications system 100, the network entities 102 and the UEs 104 may use resources of the wireless communications system 100 (e.g., time resources (e.g., symbols, slots, subframes, frames, or the like) or frequency resources (e.g., subcarriers, carriers)) to perform various operations (e.g., wireless communications). In some implementations, the network entities 102 and the UEs 104 may support different resource structures. For example, the network entities 102 and the UEs 104 may support different frame structures. In some implementations, such as in 4G, the network entities 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 network entities 102 and the UEs 104 may support various frame structures (i.e., multiple frame structures). The network entities 102 and the UEs 104 may support various frame structures based on one or more numerologies.

[0081] One or more numerologies may be supported in the wireless communications system 100, and a numerology may include a subcarrier spacing and a cyclic prefix. A first numerology (e.g., $\mu=0$) may be associated with a first subcarrier spacing (e.g., 15 kHz) and a normal cyclic prefix. In some implementations, the first numerology (e.g., $\mu=0$) associated with the first subcarrier spacing (e.g., 15 kHz) may utilize one slot per subframe. A second numerology (e.g., $\mu=1$) may be associated with a second subcarrier spacing (e.g., 30 kHz) and a normal cyclic prefix. A third numerology (e.g., $\mu=2$) may be associated with a third subcarrier spacing (e.g., 60 kHz) and a normal cyclic prefix or an extended cyclic prefix. A fourth numerology (e.g., $\mu=3$) may be associated with a fourth subcarrier spacing (e.g., 120 kHz) and a normal cyclic prefix. A fifth numerology (e.g., $\mu=4$) may be associated with a fifth subcarrier spacing (e.g., 240 kHz) and a normal cyclic prefix.

[0082] 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.

[0083] Additionally or alternatively, a time interval of a resource (e.g., a communication resource) may be organized according to slots. For example, a subframe may include a number (e.g., quantity) of slots. The number of slots in each subframe may also depend on the one or more numerologies supported in the wireless communications system 100. For instance, the first, second, third, fourth, and fifth numerologies (i.e., $\mu=0$, $\mu=1$, $\mu=2$, $\mu=3$, $\mu=4$) associated with respective subcarrier spacings of 15 kHz, 30 kHz, 60 kHz, 120 kHz, and 240 kHz may utilize a single slot per subframe, two slots per subframe, four slots per subframe, eight slots per subframe, and 16 slots per subframe, respectively. Each slot may include a number (e.g., quantity) of symbols (e.g., OFDM symbols). In some implementations, the number (e.g., quantity) of slots for a subframe may depend on a numerology. For a normal cyclic prefix, a slot may include 14 symbols. For an extended cyclic prefix (e.g., applicable for 60 kHz subcarrier spacing), a slot may include 12 symbols. The relationship between the number of symbols per slot, the number of slots per subframe, and the number of slots per frame for a normal cyclic prefix and an extended cyclic prefix may depend on a numerology. It should be understood that reference to a first numerology (e.g., $\mu=0$) associated with a first subcarrier spacing (e.g., 15 kHz) may be used interchangeably between subframes and slots.

[0084] In the wireless communications system 100, an electromagnetic (EM) spectrum may be split, based on frequency or wavelength, into various classes, frequency bands, frequency channels, etc. By way of example, the wireless communications system 100 may support one or multiple operating frequency bands, such as frequency range designations FR1 (410 MHz – 7.125 GHz), FR2 (24.25 GHz – 52.6 GHz), FR3 (7.125 GHz – 24.25 GHz), FR4 (52.6 GHz – 114.25 GHz), FR4a or FR4-1 (52.6 GHz – 71 GHz), and FR5 (114.25 GHz – 300 GHz). In some implementations, the network entities 102 and the UEs 104 may perform wireless communications over one or more of the operating frequency bands. In some implementations, FR1 may be used by the network entities 102 and the UEs 104, among other equipment or devices for cellular communications traffic (e.g., control information, data). In some implementations, FR2 may be used by the network entities 102 and the UEs 104, among other equipment or devices for short-range, high data rate capabilities.

[0085] 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.

[0086] FIG. 3 illustrates an example signalling procedure 300 for a preparation procedure for LTM (that is, an LTM preparation procedure) in accordance with aspects of the present disclosure. A source base station 102-1 and candidate base stations 102-2 to 102- N shown in FIG. 3 are base stations for LTM (i.e., supporting LTM), and they may be, for example, a gNB, or other kinds of base station applicable for LTM. The source base station 102-1 may include a source central unit (CU) and one or more distributed units (DUs), the one or more DUs may include a source DU serving a UE. Furthermore, each of the candidate base stations 102-2 to 102- N may include a candidate central unit (CU) and one or more candidate distributed units (DUs). Hereafter, for easy understanding, an interaction between source base station 102-1 and candidate base station 102-2 is described as an example, but the interactions between source base station 102-1 and other candidate base stations are similar to it, and thus is omitted for conciseness.

[0087] As shown in FIG. 3, at step 302, the source base station 102-1 transmits, to one or more candidate base stations 102-2 to 102- N for LTM, one or more first request messages for one or more LTM candidate cells belonging to the one or more candidate base stations 102-2 to 102- N, respectively, each first request message includes a first LTM indication information and an identifier of an LTM candidate cell corresponding to the first request message. That is to say, for example, when the source base station 102-1 identifies 8 LTM candidate cells and determines to obtain configuration information of them, the source base station 102-1 may generate 8 first request messages, each of them corresponding to one of the 8 LTM candidate cells, and then transmit these first request messages to one or more candidate base stations to which the 8 LTM candidate cells belong, respectively.

[0088] In some example embodiments, the identifier of the LTM candidate cell may include a new radio (NR) cell global identifier (NCGI) of the LTM candidate cell.

[0089] In some example embodiments, the first LTM indication information may be (or be indicated by) an LTM indicator which indicates to initiate a preparation of the LTM candidate cell configuration (hereafter may be referred as LTM-initiation), or indicates an update of the LTM candidate cell configuration (hereafter may be referred as LTM-update or LTM-replace). For example, the first LTM indication information may be an LTM indicator with a first codepoint or a second codepoint, the first codepoint indicates to initiate a preparation of the LTM candidate cell configuration, and the second codepoint indicates an update of the LTM candidate cell configuration. That is to say, when the source base station 102-1 wants to initiate an LTM preparation procedure or it wants to update or replace existing configuration information of LTM candidate cells obtained previously, the source base station 102-1 may perform step 302 and use the first indication information to indicate the purpose of the first request message.

[0090] Each of the one or more candidate base stations 102-2 to 102- N may receive, from the source base station 102-1, a first request message for an LTM candidate cell belonging to the candidate base station itself transmitted by the source base station 102-1 at step 302. Although it is shown in FIG. 3 that one first request message is received by each candidate base station, the present disclosure is not limited thereto, a candidate base station may receive more first request messages. For example, when two LTM candidate cells, identifiers of which are included in the first request messages transmitted by the source base station, belong to the candidate base station 102-2, the candidate base station 102-2 may receive two first request messages, each of which corresponds to one of the two LTM candidate cells.

[0091] After the first request message is received, at step 304, each candidate base station may prepare the configuration information of an LTM candidate cell based on the received first request message. For example, the candidate base station may prepare the configuration information of an LTM candidate cell, the identifier of which is included in the received first request message. Thereafter, at step 306, each candidate base station may transmit the prepared configuration information of the LTM candidate cell to the source base station 102-1. For example, each candidate base station may transmit at least one first response message including the configuration information of the LTM candidate cell to the source base station 102-1. In some example embodiments, the candidate base station may transmit a maximum number of LTM preparations to the source base station

102-1, which indicates the maximum number of concurrently prepared LTM candidate cells for a UE at the candidate base station.

[0092] That is, at step 306, the source base station 102-1 may receive, from the one or more candidate base stations 102-2 to 102- N, one or more first response messages for the one or more LTM candidate cells. In some example embodiments, a configuration information of each LTM candidate cell of the one or more LTM candidate cells may be included in at least one first response message. That is, for each LTM candidate cell, the configuration information of it may be transmitted to the source base station 102-1 via at least one message.

[0093] In some example embodiments, the configuration information of an LTM candidate cell may include at least one of an LTM candidate cell configuration and a reference signal (RS) configuration of the LTM candidate cell. For example, an LTM candidate cell configuration and a RS configuration of an LTM candidate cell may be included in the same first response message and transmitted to the source base station 102-1 together, e.g. the RS configuration of the LTM candidate cell may be included in the LTM candidate cell configuration of the LTM candidate cell and then transmitted to the source base station 102-1 via one first response message, or, the RS configuration of the LTM candidate cell and the LTM candidate cell configuration of the LTM candidate cell may be separate from each other in a first response message and then transmitted to the source base station 102-1 together via the first response message. As another example, the LTM candidate cell configuration and the RS configuration of the LTM candidate cell may be included in different first response messages, and then be transmitted the source base station 102-1 separately. Or, only one of the LTM candidate cell configuration and the RS configuration of the LTM candidate cell may be transmitted to the source base station 102-1 via the first response message, as requested by the source base station 102-1 (for example, based on an additional indication from the source base station 102-1).

[0094] In some example embodiments, the first request message includes the first LTM indication information and identifiers of LTM candidate cells. That is to say, for example, when the source base station 102-1 identifies 4 LTM candidate cells and determines to obtain configuration information of them, the source base station 102-1 may generate a first request message corresponding to the 4 LTM candidate cells, and then transmit the first request message to one candidate base station to which the 4 LTM

candidate cells belong. Accordingly, the first response message includes the configuration information of the 4 LTM candidate cells.

[0095] In some example embodiments, when preparing the configuration information of the LTM candidate cell at each candidate base station at step 304, taking the candidate base station 102-2 as an example, the candidate CU of the candidate base station 102-2 may receive the first request message, and then generate and transmit a third request message including an identifier of an LTM candidate cell included in the first request message to a candidate DU corresponding to the LTM candidate cell identified by the identifier. Based on the identifier, this candidate DU may obtain the configuration information of the LTM candidate cell and transmit the same to the candidate CU. Then, the candidate CU may receive the configuration information of the LTM candidate cell from the candidate DU. For example, the candidate CU may receive at least one third response message including the configuration information of the LTM candidate cell from the candidate DU. That is to say, the LTM candidate cell configuration and the RS configuration of the LTM candidate cell may be included in the same third response message and transmitted to the candidate CU together, e.g. the RS configuration of the LTM candidate cell may be included in the LTM candidate cell configuration of the LTM candidate cell and then transmitted to the candidate CU via one third response message, or, the RS configuration of the LTM candidate cell and the LTM candidate cell configuration of the LTM candidate cell may be separate from each other in a third response message and then transmitted to the candidate CU together via the third response message. As another example, the LTM candidate cell configuration and the RS configuration of the LTM candidate cell may be included in different third response messages, and then be transmitted the candidate CU separately. Or, only one of the LTM candidate cell configuration and the RS configuration of the LTM candidate cell may be transmitted to the candidate CU via the third response message, as requested by the source base station (for example, based on an additional indication from the source base station). A more detailed description regarding the configuration information will be described with reference to FIG. 4 as below.

[0096] In some example embodiments, the third request message includes multiple identifiers of LTM candidate cells. That is to say, for example, when the candidate CU identifies 4 LTM candidate cells and determines to obtain configuration information of them, the candidate CU may generate a third request message corresponding to the 4 LTM

candidate cells, and then transmit the third request message to one candidate DU to which the 4 LTM candidate cells belong. Accordingly, the third response message includes the configuration information of the 4 LTM candidate cells.

[0097] In some example embodiments, after step 306, the source base station 102-1 may obtain one or more LTM candidate cell configurations and/or RS configurations of the one or more LTM candidate cells. The source base station 102-1 (for example, the source CU of the source base station 102-1) may assign indexes to the one or more LTM candidate cell configurations of the one or more LTM candidate cells.

[0098] In some example embodiments, the source base station 102-1 may transmit a second request message including a second LTM indication information, the indexes of the one or more LTM candidate cell configurations, and RS configurations of the one or more LTM candidate cells (if any) to each of the one or more candidate base stations 102-2 to 102-N. That is, for a candidate base station of the one or more candidate base stations 102-2 to 102-N, it (for example, the candidate CU of it) may receive a second request message including a second LTM indication information, RS configurations of one or more LTM candidate cells identified by the source base station, and indexes of one or more LTM candidate cell configurations of the one or more LTM candidate cells identified by the source base station.

[0099] In some example embodiments, each candidate base station (for example, the candidate CU of the candidate base station) may transmit a second response message as a response to the second request message to the source base station 102-1.

[0100] In some example embodiments, the second LTM indication information may also be (or be indicated by) the LTM indicator same to the first LTM indication information. For example, the second LTM indication information may be (or be indicated by) the LTM indicator with a third codepoint, the third codepoint indicates to store the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells. That is to say, an LTM indicator may be used to represent the first and the second LTM indication information with different codepoints.

[0101] In some example embodiments, after the second request message is received by the candidate base station (for example, the candidate CU of the candidate base station),

the candidate base station may store the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells.

[0102] In some example embodiments, when storing the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells at a candidate base station, the candidate CU of the candidate base station may transmit, to a candidate DU corresponding to the LTM candidate cell identified by the source base station, a fourth request message including the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells. Then the candidate DU of the candidate base station may store the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells, and then may send a fourth response message to the candidate CU.

[0103] In some example embodiments, the source base station 102-1 may also transmit, to a user equipment (UE) 104, a reconfiguration message including the one or more LTM candidate cell configurations, the indexes of the one or more LTM candidate cell configurations, and the RS configurations of the one or more LTM candidate cells.

[0104] In some example embodiments, the source CU of the source base station 102-1 may transmit, to a source DU serving the UE, the reconfiguration message, the indexes of the one or more LTM candidate cell configurations, and the RS configurations of the one or more LTM candidate cells. The source DU may store the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells, and forward the reconfiguration message to the UE 104.

[0105] After above steps and various processes, the UE 104, the source base station (including the source CU and the source DU) 102-1, and each candidate base stations corresponding to LTM candidate cells identified by the source base station 102-1 (including the candidate CU and the candidate DU corresponding to the LTM candidate cells) know the configuration information of these LTM candidate cells, thereby, the preparation procedure for LTM is completed.

[0106] In some example embodiments, after the preparation procedure for LTM is completed, the source base station 102-1 may receive L1 measurement reports from the UE 104, and decide whether to execute LTM to a target LTM candidate cell. When the source base station 102-1 decides to execute LTM to the target LTM candidate cell, it

may transmit, to a candidate base station corresponding to a target LTM candidate cell, an identifier of the target LTM candidate cell. Also, the source base station 102-1 may transmit an index of the LTM candidate cell configuration of the target LTM candidate cell to the UE 104.

[0107] In some example embodiments, when a cancel message requesting a modification of an LTM candidate cell configuration is received from a candidate base station for LTM by the source base station 102-1, the source base station 102-1 may perform (or initiate) the LTM preparation procedure 300 again.

[0108] In some example embodiments, the cancel message may include identifiers of one or more LTM candidate cells to be cancelled. In addition, the cancel message may further include a cause value indicating LTM resources to be changed.

[0109] In some example embodiments, the cancel message is generated by a candidate CU of the candidate base station in response to receiving a modification message requesting a modification of one or more LTM candidate cell configurations from a candidate DU of the candidate base station. The modification message may include a cause value indicating LTM resources to be changed.

[0110] That is to say, when a candidate base station, which has configuration information of LTM candidate cell(s) identified by the source base station, find that the configuration information of the LTM candidate cell(s) is modified, this candidate base station may make the source base station 102-1 to perform the LTM preparation procedure 300 again via the cancel message, thereby realizing the update of LTM candidate cell configurations initiated by the candidate base station.

[0111] A more detailed description for these steps will be described below with reference to FIGS. 4 and 5.

[0112] FIG. 4 illustrates an example of signalling procedure 400 for the preparation procedure for LTM in accordance with aspects of the present disclosure. FIG. 4 relates to initiation or source CU initiated modification of an inter-CU LTM candidate cell configuration.

[0113] As shown in FIG. 4, the signalling procedure 400 involves a UE 104, a source base station 102-1 and a candidate base station 102-2. Herein, both the source base station 102-1 and the candidate base station 102-2 may be base stations for LTM (i.e., supporting

LTM), and they may be, for example, gNBs, or other kinds of base stations applicable for LTM. Furthermore, although only the candidate base station 102-2 is shown in FIG. 4, the signalling procedure between the source base station 102-1 and the candidate base station 102-2 is applicable to those between the source base station 102-1 and other candidate base stations.

[0114] In some example embodiments, the source base station 102-1 may include a source CU 102-10 and one or more DUs, the one or more DUs include a source DU 102-11 serving the UE 104. The candidate base station 102-2 may include a candidate CU 102-20 and one or more candidate DUs. Herein, only a candidate DU 102-21 of the one or more candidate DUs is shown in FIG. 4 for conciseness.

[0115] In some example embodiments, at step 402, the source CU 102-10 may transmit a Handover Request message (corresponding to the first request message in FIG. 3) to the candidate CU 102-20. The Handover Request message may include an identifier of an LTM candidate cell (e.g., a NCGI of the LTM candidate cell) and an LTM indicator indicating the handover request is for an LTM. In one example, the LTM indicator may include a first codepoint, which indicates a request for an LTM-initiation. That is, the candidate CU 102-20 should initiate the preparation of the LTM candidate cell configuration for the LTM candidate cell. For example, the first codepoint is “LTM-initiation”. In another example, the LTM indicator may further include an additional indicator, which indicates a request for the LTM candidate cell configuration, or the RS configuration, or both the LTM candidate cell configuration and the RS configuration. In another example, the LTM indicator may include a second codepoint, which indicates a request for update of LTM candidate cell configuration. That is, the candidate CU 102-20 should remove the existing prepared LTM candidate cell configuration identified by the NCGI of the LTM candidate cell, and after that, the candidate CU 102-20 initiates a new preparation of the LTM candidate cell configuration for the LTM candidate cell. For example, the second codepoint may be “LTM-update” or “LTM-replace”. In another example, the Handover Request message may include identifiers of multiple LTM candidate cells. In another example, the source CU 102-10 may use other messages instead of the Handover Request message transmitted to the candidate CU 102-20.

[0116] In some example embodiments, at step 404, the candidate CU 102-20 may transmit a UE Context Setup Request message (corresponding to the third request

message in FIG. 3) including the NCGI of the LTM candidate cell to the candidate DU 102-21.

[0117] In some example embodiments, at step 406, the candidate DU 102-21 may responds to the candidate CU 102-20 with a UE Context Setup Response message (corresponding to the third response message in FIG. 3) including the LTM candidate cell configuration and/or the RS configuration of the LTM candidate cell. The RS configuration may include a group of one or more RS resources for the LTM candidate cell. The RS resource may be for example a non-zero-power channel state information reference signal (NZP-CSI-RS)-Resource, a channel state information synchronization signal / physical broadcast channel block (CSI-SSB)-Resource and/or a channel state information interference management (CSI-IM) resource. That is, the candidate CU 102-20 and the candidate DU 102-21 may prepare an LTM candidate cell configuration and/or a RS configuration of an LTM candidate cell requested by using the NCGI of the LTM candidate cell at step 404 and step 406.

[0118] In some example embodiments, at step 408, the candidate CU 102-20 may transmit a Handover Request Acknowledge message (corresponding to the first response message in FIG. 3) to the source CU 102-10. The Handover Request Acknowledge message may include the prepared LTM candidate cell configuration and/or the RS configuration of the requested LTM candidate cell. In one example, the RS configuration may be included in the LTM candidate cell configuration.

[0119] In some example embodiments, at step 410, the source CU 102-10 may assign an index for each LTM candidate cell configuration. The index may be used to identify an LTM candidate cell configuration. For example, the index is LTM-CandidateId, which has a value from 0 to 7.

[0120] In some example embodiments, at step 412, the source CU 102-10 may transmit a DL RRC Message Transfer message to the source DU 102-11. The DL RRC Message Transfer message may include an RRCReconfiguration message, which includes LTM candidate cell configurations of one or more LTM candidate cells received by the source CU 102-10, the indexes of the LTM candidate cell configurations, and RS configurations of the one or more LTM candidate cells received by the source CU 102-10. Furthermore, the DL RRC Message Transfer message may further includes the indexes and the RS configurations of the one or more LTM candidate cells, which will be stored by the source

DU 102-11. In some example embodiments, the source CU 102-10 may use other messages (e.g., a UE Context Modification Request message) instead of the DL RRC Message Transfer message to transmit the above information to the source DU 102-11.

[0121] In some example embodiments, at step 414, the source DU 102-11 may forward the received RRCReconfiguration message to the UE 104. Then at step 416, the UE 104 may respond to the source DU 102-11 with an RRCReconfigurationComplete message, and at step 418, the source DU 102-11 may forward the RRCReconfigurationComplete message to the source CU 102-10 via a UL RRC Message Transfer message. In some example embodiments, the source DU 102-11 may use other messages (e.g., a UE Context Modification Response message) instead of the UL RRC Message Transfer message to transmit the RRCReconfigurationComplete message to the source CU 102-10.

[0122] In some example embodiments, at step 420, the source CU 102-10 may transmit a Handover Request message (corresponding to the second request message in FIG. 3) to the candidate CU 102-20. The Handover Request message may include an LTM indicator indicating the request is for an LTM, the indexes, and the RS configurations of the one or more LTM candidate cells. The LTM indicator may include a third codepoint, which indicates the candidate CU 102-20 to store the indexes and the RS configurations of the one or more LTM candidate cells. The third codepoint may also indicate the candidate CU 102-20 to forward the indexes and the RS configurations of the one or more LTM candidate cells to the candidate DU 102-21. For example, the third codepoint may be “LTM-store” or “LTM-forward”. In one example, the indexes and the RS configurations of the one or more LTM candidate cells may be included in the LTM indicator. In another example, the indexes and the RS configurations of the one or more LTM candidate cells may be included in the RRC Context (HandoverPreparationInformation). In another example, the RS configurations may be included in the LTM candidate cell configurations of the one or more LTM candidate cells (that is, the indexes and the LTM candidate cell configurations may be included in the LTM indicator or the RRC Context). In yet another example, the source CU 102-10 may use other messages (e.g., a new UE-associated signalling) to transmit the indexes and the RS configurations of the one or more LTM candidate cells to the candidate CU 102-20.

[0123] In some example embodiments, at step 422, the candidate CU 102-20 may transmit a UE Context Modification Request message (corresponding to the fourth

request message in FIG. 3) including the indexes and the RS configurations of the one or more LTM candidate cells to the candidate DU 102-21. At step 424, the candidate DU 102-21 may respond to the candidate CU 102-20 with a UE Context Modification Response message (corresponding to the fourth response message in FIG. 3), and at step 426, the candidate CU 102-20 may transmit a Handover Request Acknowledge message (corresponding to the second response message in FIG. 3) to the source CU 102-10. Herein, if the Handover Request message is not used at the step 420, the step 426 is optional or may use another message to respond.

[0124] Although it is shown in FIG. 4 that the steps 420-426 are performed after steps 412-418, the steps 420-426 may be performed before or in parallel with any one of steps 412-418. After the step 426, the preparation procedure for LTM is completed.

[0125] In some example embodiments, after the preparation procedure for LTM complete, at step 428, the UE 104 may transmit an L1 measurement result to the source DU 102-11. The source DU 102-11 may, at step 430, decide to execute LTM to a target LTM candidate cell, and transmit, at step 432, an LTM Cell Switch Command (e.g., MAC CE) including the index related to the target LTM candidate cell to the UE 104. At this time, the source DU 102-11 may, at step 434, transmit an LTM Cell Change Notification message including the identifier (e.g. target cell ID) of the target LTM candidate cell to the source CU 102-10, to indicate the initiation of the LTM cell switch command to the UE. The source CU 102-10 may transmit, at step 436, an SN Status Transfer message or an Early Status Transfer message or other message including the target cell ID to the candidate CU 102-20, to indicate the target LTM candidate cell selected by the source DU 102-11 as a target cell for LTM cell switch. Thereafter, on receipt of the user data sent from the source CU 102-10, the candidate CU 102-20 only needs to forward the user data to a candidate DU hosting the target LTM candidate cell, but not to all candidate DUs.

[0126] FIG. 5 illustrates another example of signalling procedure 500 for the preparation procedure for LTM in accordance with aspects of the present disclosure. FIG. 5 relates to a candidate CU initiated modification of an inter-CU LTM candidate cell configuration.

[0127] In some example embodiments, as shown in FIG. 5, at step 502, the candidate DU 102-21 may transmit a UE Context Modification Required message to the candidate

CU 102-20 to request a modification of one or more LTM candidate cell configurations. The UE Context Modification Required message may include the NCGI(s) of one or more LTM candidate cells to be cancelled. That is, the candidate CU 102-20 shall consider that the resources reserved for these LTM candidate cells are about to be released by the candidate DU 102-21. Furthermore, the UE Context Modification Required message may further include a cause value indicating LTM resources to be changed. That is, the candidate CU 102-20 shall consider that the candidate DU 102-21 require the candidate CU 102-20 to replace/update the existing LTM candidate cell configuration(s). In some example embodiments, the candidate DU 102-21 may use other messages (e.g., UE Context Release Request message) to request the modification of one or more LTM candidate cell configuration. That is, the NCGI(s) of one or more LTM candidate cells to be cancelled and the cause value may be included in the UE Context Release Request message.

[0128] In some example embodiments, at step 504, the candidate CU 102-20 may respond to the candidate DU 102-21 with a UE Context Modification Confirm message. However, if another message such as a UE Context Release Request message is used at the step 502, the step 504 is not needed.

[0129] In some example embodiments, at step 506, the candidate CU 102-20 may transmit a Conditional Handover Cancel message to the source CU 102-10 to request a modification of an LTM candidate cell configuration. The Conditional Handover Cancel message may include the identifier(s) (e.g. the NCGI(s)) of the one or more LTM candidate cells to be cancelled. That is, the source CU 102-10 shall consider that the resources reserved for the LTM candidate cell(s) are about to be released by the candidate CU 102-20. The Conditional Handover Cancel message may further include a cause value indicating the LTM resources to be changed. That is, the source CU 102-10 shall consider that the prepared resources for the LTM candidate cell configuration(s) are to be changed. In some example embodiments, the candidate CU 102-20 may use other messages (e.g., a new UE-associated signalling) to request the modification of the one or more LTM candidate cell configurations. Moreover, the candidate CU 102-20 may decide to modify the LTM candidate cell configurations by itself, and in this case, the step 502 and step 504 are not needed.

[0130] After step 506, the source CU 102-10 may initiate the preparation procedure for LTM as described in FIGS. 3 and 4 (e.g. steps 402- 426).

[0131] FIG. 6 illustrates an example of a device 600 that supports a preparation procedure for LTM in accordance with aspects of the present disclosure. The device 600 may be an example of a source base station 102-1 as described herein. The device 600 may support wireless communication with one or more network entities 102 (for example, candidate base station 102-2 to 102- N) and the UE 104. The device 600 may include components for bi-directional communications including components for transmitting and receiving communications, such as a processor 602, a memory 604, a transceiver 606, and, optionally, an I/O controller 608. 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).

[0132] The processor 602, the memory 604, the transceiver 606, or various combinations thereof or various components thereof may be examples of means for performing various aspects of the present disclosure as described herein. For example, the processor 602, the memory 604, the transceiver 606, or various combinations or components thereof may support a method for performing one or more of the operations described herein.

[0133] In some implementations, the processor 602, the memory 604, the transceiver 606, or various combinations or components thereof may be implemented in hardware (e.g., in communications management circuitry). The hardware may include a processor, a digital signal processor (DSP), an application-specific integrated circuit (ASIC), a field-programmable gate array (FPGA) or other programmable logic device, a discrete gate or transistor logic, discrete hardware components, or any combination thereof configured as or otherwise supporting a means for performing the functions described in the present disclosure. In some implementations, the processor 602 and the memory 604 coupled with the processor 602 may be configured to perform one or more of the functions described herein (e.g., executing, by the processor 602, instructions stored in the memory 604).

[0134] For example, the processor 602 may support wireless communication at the device 600 in accordance with examples as disclosed herein. The processor 602 may be configured to operable to support a means for transmitting, via the transceiver 606 and to one or more candidate base stations for LTM 102-2 to 102-N, one or more first request

messages for one or more LTM candidate cells belonging to the one or more candidate base stations, respectively, each first request message includes a first LTM indication information and an identifier of a LTM candidate cell corresponding to the first request message; and means for receiving, via the transceiver 606 and from the one or more candidate base stations 102-2 to 102-N, one or more first response messages for the one or more LTM candidate cells, wherein a configuration information of each LTM candidate cell of the one or more LTM candidate cells is included in at least one first response message.

[0135] The processor 602 may include an intelligent hardware device (e.g., a general-purpose processor, a DSP, a CPU, a microcontroller, an ASIC, an FPGA, a programmable logic device, a discrete gate or transistor logic component, a discrete hardware component, or any combination thereof). In some implementations, the processor 602 may be configured to operate a memory array using a memory controller. In some other implementations, a memory controller may be integrated into the processor 602. The processor 602 may be configured to execute computer-readable instructions stored in a memory (e.g., the memory 604) to cause the device 600 to perform various functions of the present disclosure.

[0136] The memory 604 may include random access memory (RAM) and read-only memory (ROM). The memory 604 may store computer-readable, computer-executable code including instructions that, when executed by the processor 602 cause the device 600 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. In some implementations, the code may not be directly executable by the processor 602 but may cause a computer (e.g., when compiled and executed) to perform functions described herein. In some implementations, the memory 604 may include, among other things, a basic I/O system (BIOS) which may control basic hardware or software operation such as the interaction with peripheral components or devices.

[0137] The I/O controller 608 may manage input and output signals for the device 600. The I/O controller 608 may also manage peripherals not integrated into the device 600. In some implementations, the I/O controller 608 may represent a physical connection or port to an external peripheral. In some implementations, the I/O controller 608 may utilize an operating system such as iOS®, ANDROID®, MS-WINDOWS®,

OS/2®, UNIX®, LINUX®, or another known operating system. In some implementations, the I/O controller 608 may be implemented as part of a processor, such as the processor 606. In some implementations, a user may interact with the device 600 via the I/O controller 608 or via hardware components controlled by the I/O controller 608.

[0138] In some implementations, the device 600 may include a single antenna 610. However, in some other implementations, the device 600 may have more than one antenna 610 (i.e., multiple antennas), including multiple antenna panels or antenna arrays, which may be capable of concurrently transmitting or receiving multiple wireless transmissions. The transceiver 606 may communicate bi-directionally, via the one or more antennas 610, wired, or wireless links as described herein. For example, the transceiver 606 may represent a wireless transceiver and may communicate bi-directionally with another wireless transceiver. The transceiver 606 may also include a modem to modulate the packets, to provide the modulated packets to one or more antennas 610 for transmission, and to demodulate packets received from the one or more antennas 610. The transceiver 606 may include one or more transmit chains, one or more receive chains, or a combination thereof.

[0139] A transmit chain may be configured to generate and transmit signals (e.g., control information, data, packets). The transmit chain 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 transmit chain 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 transmit chain may also include one or more antennas 610 for transmitting the amplified signal into the air or wireless medium.

[0140] A receive chain may be configured to receive signals (e.g., control information, data, packets) over a wireless medium. For example, the receive chain may include one or more antennas 610 for receive the signal over the air or wireless medium. The receive chain may include at least one amplifier (e.g., a low-noise amplifier (LNA)) configured to amplify the received signal. The receive chain 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 receive chain may include at least one decoder for decoding the processing the demodulated signal to receive the transmitted data.

[0141] FIG. 7 illustrates an example of a device 700 that supports the preparation procedure for LTM in accordance with aspects of the present disclosure. The device 700 may be an example of a candidate base station of candidate base stations 102-2 to 102-N as described herein. The device 700 may support wireless communication with UE 104 and the source base station 102-1. The device 700 may include components for bi-directional communications including components for transmitting and receiving communications, such as a processor 702, a memory 704, a transceiver 706, and, optionally, an I/O controller 708. These components may be in electronic communication or otherwise coupled (e.g., operatively, communicatively, functionally, electronically, electrically) via one or more interfaces (e.g., buses).

[0142] The processor 702, the memory 704, the transceiver 706, or various combinations thereof or various components thereof may be examples of means for performing various aspects of the present disclosure as described herein. For example, the processor 702, the memory 704, the transceiver 706, or various combinations or components thereof may support a method for performing one or more of the operations described herein.

[0143] In some implementations, the processor 702, the memory 704, the transceiver 706, or various combinations or components thereof may be implemented in hardware (e.g., in communications management circuitry). The hardware may include a processor, a digital signal processor (DSP), an application-specific integrated circuit (ASIC), a field-programmable gate array (FPGA) or other programmable logic device, a discrete gate or transistor logic, discrete hardware components, or any combination thereof configured as or otherwise supporting a means for performing the functions described in the present disclosure. In some implementations, the processor 702 and the memory 704 coupled with the processor 702 may be configured to perform one or more of the functions described herein (e.g., executing, by the processor 702, instructions stored in the memory 704).

[0144] For example, the processor 702 may support wireless communication at the device 700 in accordance with examples as disclosed herein. The processor 702 may be

configured to operable to support a means for receiving, via the transceiver 706 and from a source base station for LTM 102-1, a first request message for a LTM candidate cell belonging to the candidate base station, the first request message includes a first LTM indication information and an identifier of the LTM candidate cell; means for preparing a configuration information of the LTM candidate cell based on the first request message; and means for transmitting, via the transceiver 706 and to the source base station 102-1, at least one first response message including the configuration information of the LTM candidate cell.

[0145] The processor 702 may include an intelligent hardware device (e.g., a general-purpose processor, a DSP, a CPU, a microcontroller, an ASIC, an FPGA, a programmable logic device, a discrete gate or transistor logic component, a discrete hardware component, or any combination thereof). In some implementations, the processor 702 may be configured to operate a memory array using a memory controller. In some other implementations, a memory controller may be integrated into the processor 702. The processor 702 may be configured to execute computer-readable instructions stored in a memory (e.g., the memory 704) to cause the device 700 to perform various functions of the present disclosure.

[0146] The memory 704 may include random access memory (RAM) and read-only memory (ROM). The memory 704 may store computer-readable, computer-executable code including instructions that, when executed by the processor 702 cause the device 700 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. In some implementations, the code may not be directly executable by the processor 702 but may cause a computer (e.g., when compiled and executed) to perform functions described herein. In some implementations, the memory 704 may include, among other things, a basic I/O system (BIOS) which may control basic hardware or software operation such as the interaction with peripheral components or devices.

[0147] The I/O controller 708 may manage input and output signals for the device 700. The I/O controller 708 may also manage peripherals not integrated into the device 700. In some implementations, the I/O controller 708 may represent a physical connection or port to an external peripheral. In some implementations, the I/O controller 708 may utilize an operating system such as iOS®, ANDROID®, MS-WINDOWS®,

OS/2®, UNIX®, LINUX®, or another known operating system. In some implementations, the I/O controller 708 may be implemented as part of a processor, such as the processor 706. In some implementations, a user may interact with the device 700 via the I/O controller 708 or via hardware components controlled by the I/O controller 708.

[0148] In some implementations, the device 700 may include a single antenna 710. However, in some other implementations, the device 700 may have more than one antenna 710 (i.e., multiple antennas), including multiple antenna panels or antenna arrays, which may be capable of concurrently transmitting or receiving multiple wireless transmissions. The transceiver 706 may communicate bi-directionally, via the one or more antennas 710, wired, or wireless links as described herein. For example, the transceiver 706 may represent a wireless transceiver and may communicate bi-directionally with another wireless transceiver. The transceiver 706 may also include a modem to modulate the packets, to provide the modulated packets to one or more antennas 710 for transmission, and to demodulate packets received from the one or more antennas 710. The transceiver 706 may include one or more transmit chains, one or more receive chains, or a combination thereof.

[0149] A transmit chain may be configured to generate and transmit signals (e.g., control information, data, packets). The transmit chain 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 transmit chain 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 transmit chain may also include one or more antennas 710 for transmitting the amplified signal into the air or wireless medium.

[0150] A receive chain may be configured to receive signals (e.g., control information, data, packets) over a wireless medium. For example, the receive chain may include one or more antennas 710 for receive the signal over the air or wireless medium. The receive chain may include at least one amplifier (e.g., a low-noise amplifier (LNA)) configured to amplify the received signal. The receive chain 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 receive chain may include at least one decoder for decoding the processing the demodulated signal to receive the transmitted data.

[0151] FIG. 8 illustrates an example of a processor 800 that supports the preparation procedure for LTM in accordance with aspects of the present disclosure. The processor 800 may be an example of a processor configured to perform various operations in accordance with examples as described herein. The processor 800 may include a controller 802 configured to perform various operations in accordance with examples as described herein. The processor 800 may optionally include at least one memory 804, such as L1/L2/L3 cache. Additionally, or alternatively, the processor 800 may optionally include one or more arithmetic-logic units (ALUs) 800. 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).

[0152] The processor 800 may be a processor chipset and include a protocol stack (e.g., a software stack) executed by the processor chipset to perform various operations (e.g., receiving, obtaining, retrieving, transmitting, outputting, forwarding, storing, determining, identifying, accessing, writing, reading) in accordance with examples as described herein. The processor chipset may include one or more cores, one or more caches (e.g., memory local to or included in the processor chipset (e.g., the processor 800) or other memory (e.g., random access memory (RAM), read-only memory (ROM), dynamic RAM (DRAM), synchronous dynamic RAM (SDRAM), static RAM (SRAM), ferroelectric RAM (FeRAM), magnetic RAM (MRAM), resistive RAM (RRAM), flash memory, phase change memory (PCM), and others).

[0153] The controller 802 may be configured to manage and coordinate various operations (e.g., signaling, receiving, obtaining, retrieving, transmitting, outputting, forwarding, storing, determining, identifying, accessing, writing, reading) of the processor 800 to cause the processor 800 to support various operations of a base station in accordance with examples as described herein. For example, the controller 802 may operate as a control unit of the processor 800, generating control signals that manage the operation of various components of the processor 800. These control signals include

enabling or disabling functional units, selecting data paths, initiating memory access, and coordinating timing of operations.

[0154] The controller 802 may be configured to fetch (e.g., obtain, retrieve, receive) instructions from the memory 804 and determine subsequent instruction(s) to be executed to cause the processor 800 to support various operations in accordance with examples as described herein. The controller 802 may be configured to track memory address of instructions associated with the memory 804. The controller 802 may be configured to decode instructions to determine the operation to be performed and the operands involved. For example, the controller 802 may be configured to interpret the instruction and determine control signals to be output to other components of the processor 800 to cause the processor 800 to support various operations in accordance with examples as described herein. Additionally, or alternatively, the controller 802 may be configured to manage flow of data within the processor 800. The controller 802 may be configured to control transfer of data between registers, arithmetic logic units (ALUs), and other functional units of the processor 800.

[0155] The memory 804 may include one or more caches (e.g., memory local to or included in the processor 800 or other memory, such RAM, ROM, DRAM, SDRAM, SRAM, MRAM, flash memory, etc. In some implementation, the memory 804 may reside within or on a processor chipset (e.g., local to the processor 800). In some other implementations, the memory 804 may reside external to the processor chipset (e.g., remote to the processor 800).

[0156] The memory 804 may store computer-readable, computer-executable code including instructions that, when executed by the processor 800, cause the processor 800 to perform various functions described herein. The code may be stored in a non-transitory computer-readable medium such as system memory or another type of memory. The controller 802 and/or the processor 800 may be configured to execute computer-readable instructions stored in the memory 804 to cause the processor 800 to perform various functions. For example, the processor 800 and/or the controller 802 may be coupled with or to the memory 804, and the processor 800, the controller 802, and the memory 804 may be configured to perform various functions described herein. In some examples, the processor 800 may include multiple processors and the memory 804 may include multiple memories. One or more of the multiple processors may be coupled with one or more of

the multiple memories, which may, individually or collectively, be configured to perform various functions herein.

[0157] The one or more ALUs 800 may be configured to support various operations in accordance with examples as described herein. In some implementation, the one or more ALUs 800 may reside within or on a processor chipset (e.g., the processor 800). In some other implementations, the one or more ALUs 800 may reside external to the processor chipset (e.g., the processor 800). One or more ALUs 800 may perform one or more computations such as addition, subtraction, multiplication, and division on data. For example, one or more ALUs 800 may receive input operands and an operation code, which determines an operation to be executed. One or more ALUs 800 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 800 may support logical operations such as AND, OR, exclusive-OR (XOR), not-OR (NOR), and not-AND (NAND), enabling the one or more ALUs 800 to handle conditional operations, comparisons, and bitwise operations.

[0158] The processor 800 may support wireless communication in accordance with examples as disclosed herein. The processor 800 may be configured to or operable to support a means for transmitting, via the transceiver 606 and to one or more candidate base stations for LTM 102-2 to 102-N, one or more first request messages for one or more LTM candidate cells belonging to the one or more candidate base stations, respectively, each first request message includes a first LTM indication information and an identifier of a LTM candidate cell corresponding to the first request message; and means for receiving, via the transceiver 606 and from the one or more candidate base stations 102-2 to 102-N, one or more first response messages for the one or more LTM candidate cells, wherein a configuration information of each LTM candidate cell of the one or more LTM candidate cells is included in at least one first response message.

[0159] FIG. 9 illustrates an example of a processor 900 that supports the preparation procedure for LTM in accordance with aspects of the present disclosure. The processor 900 may be an example of a processor configured to perform various operations in accordance with examples as described herein. The processor 900 may include a controller 902 configured to perform various operations in accordance with examples as described herein. The processor 900 may optionally include at least one memory 904, such as L1/L2/L3 cache. Additionally, or alternatively, the processor 900 may optionally

include one or more arithmetic-logic units (ALUs) 900. 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).

[0160] The processor 900 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 900) 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).

[0161] The controller 902 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 900 to cause the processor 900 to support various operations of a UE in accordance with examples as described herein. For example, the controller 902 may operate as a control unit of the processor 900, generating control signals that manage the operation of various components of the processor 900. These control signals include enabling or disabling functional units, selecting data paths, initiating memory access, and coordinating timing of operations.

[0162] The controller 902 may be configured to fetch (e.g., obtain, retrieve, receive) instructions from the memory 904 and determine subsequent instruction(s) to be executed to cause the processor 900 to support various operations in accordance with examples as described herein. The controller 902 may be configured to track memory address of instructions associated with the memory 904. The controller 902 may be configured to decode instructions to determine the operation to be performed and the operands involved. For example, the controller 902 may be configured to interpret the instruction and determine control signals to be output to other components of the processor 900 to cause the processor 900 to support various operations in accordance with examples as described

herein. Additionally, or alternatively, the controller 902 may be configured to manage flow of data within the processor 900. The controller 902 may be configured to control transfer of data between registers, arithmetic logic units (ALUs), and other functional units of the processor 900.

[0163] The memory 904 may include one or more caches (e.g., memory local to or included in the processor 900 or other memory, such as RAM, ROM, DRAM, SDRAM, SRAM, MRAM, flash memory, etc. In some implementation, the memory 904 may reside within or on a processor chipset (e.g., local to the processor 900). In some other implementations, the memory 904 may reside external to the processor chipset (e.g., remote to the processor 900).

[0164] The memory 904 may store computer-readable, computer-executable code including instructions that, when executed by the processor 900, cause the processor 900 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 902 and/or the processor 900 may be configured to execute computer-readable instructions stored in the memory 904 to cause the processor 900 to perform various functions. For example, the processor 900 and/or the controller 902 may be coupled with or to the memory 904, and the processor 900, the controller 902, and the memory 904 may be configured to perform various functions described herein. In some examples, the processor 900 may include multiple processors and the memory 904 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.

[0165] The one or more ALUs 900 may be configured to support various operations in accordance with examples as described herein. In some implementation, the one or more ALUs 900 may reside within or on a processor chipset (e.g., the processor 900). In some other implementations, the one or more ALUs 900 may reside external to the processor chipset (e.g., the processor 900). One or more ALUs 900 may perform one or more computations such as addition, subtraction, multiplication, and division on data. For example, one or more ALUs 900 may receive input operands and an operation code, which determines an operation to be executed. One or more ALUs 900 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 900 may support logical operations such as AND, OR, exclusive-OR (XOR), not-OR (NOR), and not-AND (NAND), enabling the one or more ALUs 900 to handle conditional operations, comparisons, and bitwise operations.

[0166] The processor 900 may support wireless communication in accordance with examples as disclosed herein. The processor 900 may be configured to or operable to support a means for receiving, via the transceiver 706 and from a source base station for LTM 102-1, a first request message for a LTM candidate cell belonging to the candidate base station, the first request message includes a first LTM indication information and an identifier of the LTM candidate cell; means for preparing a configuration information of the LTM candidate cell based on the first request message; and means for transmitting, via the transceiver 706 and to the source base station 102-1, at least one first response message including the configuration information of the LTM candidate cell.

[0167] FIG. 10 illustrates a flowchart of a method 1000 that supports the preparation procedure for LTM in accordance with aspects of the present disclosure. The operations of the method 1000 may be implemented by a device or its components as described herein. For example, the operations of the method 1000 may be performed by a source base station 102-1 as described herein. In some implementations, the device may execute a set of instructions to control the function elements of the device to perform the described functions. Additionally, or alternatively, the device may perform aspects of the described functions using special-purpose hardware.

[0168] At 1005, the method may include transmitting, to one or more candidate base stations for LTM 102-2 to 102-N, one or more first request messages for one or more LTM candidate cells belonging to the one or more candidate base stations 102-2 to 102-N, respectively, each first request message includes a first LTM indication information and an identifier of a LTM candidate cell corresponding to the first request message. The operations of 1005 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 1005 may be performed by a device as described with reference to FIG. 1.

[0169] At 1010, the method may include receiving, from the one or more candidate base stations 102-2 to 102-N, one or more first response messages for the one or more LTM candidate cells, wherein a configuration information of each LTM candidate cell of

the one or more LTM candidate cells is included in at least one first response message. The operations of 1010 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 1010 may be performed by a device as described with reference to FIG. 1.

[0170] FIG. 11 illustrates a flowchart of a method 1100 that supports the preparation procedure for LTM in accordance with aspects of the present disclosure. The operations of the method 1100 may be implemented by a device or its components as described herein. For example, the operations of the method 1100 may be performed by any one of candidate base stations 102-2 to 102-N as described herein. In some implementations, the device may execute a set of instructions to control the function elements of the device to perform the described functions. Additionally, or alternatively, the device may perform aspects of the described functions using special-purpose hardware.

[0171] At 1105, the method may include receiving, from a source base station for LTM 102-1, a first request message for a LTM candidate cell belonging to the candidate base station, the first request message includes a first LTM indication information and an identifier of the LTM candidate cell. The operations of 1105 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 1105 may be performed by a device as described with reference to FIG. 1.

[0172] At 1110, the method may include preparing a configuration information of the LTM candidate cell based on the first request message. The operations of 1110 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 1110 may be performed by a device as described with reference to FIG. 1.

[0173] At 1115, the method may include transmitting, to the source base station 102-1, at least one first response message including the configuration information of the LTM candidate cell. The operations of 1110 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 1110 may be performed by a device as described with reference to FIG. 1.

[0174] It should be noted that the methods described herein describes possible implementations, and that the operations and the steps may be rearranged or otherwise modified and that other implementations are possible. Further, aspects from two or more of the methods may be combined.

[0175] The various illustrative blocks and components described in connection with the disclosure herein may be implemented or performed with a general-purpose processor, a DSP, an ASIC, a CPU, an FPGA or other programmable logic device, discrete gate or transistor logic, discrete hardware components, or any combination thereof designed to perform the functions described herein. A general-purpose processor may be a microprocessor, but in the alternative, the processor may be any processor, controller, microcontroller, or state machine. A processor may also be implemented as a combination of computing devices (e.g., a combination of a DSP and a microprocessor, multiple microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration).

[0176] The functions described herein may be implemented in hardware, software executed by a processor, firmware, or any combination thereof. If implemented in software executed by a processor, the functions may be stored on or transmitted over as one or more instructions or code on a computer-readable medium. Other examples and implementations are within the scope of the disclosure and appended claims. For example, due to the nature of software, functions described herein may be implemented using software executed by a processor, hardware, firmware, hardwiring, or combinations of any of these. Features implementing functions may also be physically located at various positions, including being distributed such that portions of functions are implemented at different physical locations.

[0177] 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. By way of example, non-transitory computer-readable media may include RAM, ROM, electrically erasable programmable ROM (EEPROM), flash memory, compact disk (CD) ROM or other optical disk storage, magnetic disk storage or other magnetic storage devices, or any other non-transitory medium that may be used to carry or store desired program code means in the form of instructions or data structures and that may be accessed by a general-purpose or special-purpose computer, or a general-purpose or special-purpose processor.

[0178] As used herein, including in the claims, 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.

[0179] The description herein is provided to enable a person having ordinary skill in the art to make or use the disclosure. Various modifications to the disclosure will be apparent to a person having ordinary skill in the art, and the generic principles defined herein may be applied to other variations without departing from the scope of the disclosure. Thus, the disclosure is not limited to the examples and designs described herein but is to be accorded the broadest scope consistent with the principles and novel features disclosed herein.

CLAIMS

What is claimed is:

1. A base station, comprising:

a processor; and

a transceiver coupled to the processor,

wherein the base station is a source base station for layer 1/layer 2 (L1/L2)-triggered mobility (LTM), and the processor is configured to perform a LTM preparation procedure including:

transmitting, via the transceiver and to one or more candidate base stations for LTM, one or more first request messages for one or more LTM candidate cells belonging to the one or more candidate base stations, respectively, each first request message includes a first LTM indication information and an identifier of a LTM candidate cell corresponding to the first request message; and

receiving, via the transceiver and from the one or more candidate base stations, one or more first response messages for the one or more LTM candidate cells, wherein a configuration information of each LTM candidate cell of the one or more LTM candidate cells is included in at least one first response message.

2. The base station of claim 1, wherein the configuration information of a LTM candidate cell includes at least one of a LTM candidate cell configuration and a reference signal (RS) configuration of the LTM candidate cell.

3. The base station of claim 2, wherein the LTM preparation procedure further includes:

assigning indexes to one or more LTM candidate cell configurations of the one or more LTM candidate cells.

4. The base station of claim 3, wherein the LTM preparation procedure further includes:

transmitting, via the transceiver and to each of the one or more candidate base stations, a second request message including a second LTM indication information, the

indexes of the one or more LTM candidate cell configurations, and RS configurations of the one or more LTM candidate cells.

5. The base station of claim 4, wherein

the first LTM indication information is a LTM indicator with a first codepoint or a second codepoint, the first codepoint indicates to initiate a preparation of the LTM candidate cell configuration, and the second codepoint indicates an update of the LTM candidate cell configuration, and

the second LTM indication information is the LTM indicator with a third codepoint, the third codepoint indicates to store the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells.

6. The base station of any one of claims 1 to 5, the processor is further configured to:

perform the LTM preparation procedure in the case that a cancel message requesting a modification of an LTM candidate cell configuration is received from a candidate base station for LTM, the cancel message includes identifiers of one or more LTM candidate cells to be cancelled.

7. The base station of claim 6, wherein the cancel message further includes a cause value indicating LTM resources to be changed.

8. The base station of claim 3, wherein the processor is further configured to:

transmit, via the transceiver and to a candidate base station corresponding to a target LTM candidate cell, an identifier of the target LTM candidate cell when decide to execute LTM to a target LTM candidate cell.

9. A base station, comprising:

a processor; and

a transceiver coupled to the processor,

wherein the base station is a candidate base station for layer 1/layer 2 (L1/L2)-triggered mobility (LTM), and the processor is configured to perform a LTM preparation procedure including:

receiving, via the transceiver and from a source base station for LTM, a first request message for a LTM candidate cell belonging to the candidate base station, the first request message includes a first LTM indication information and an identifier of the LTM candidate cell;

preparing a configuration information of the LTM candidate cell based on the first request message; and

transmitting, via the transceiver and to the source base station, at least one first response message including the configuration information of the LTM candidate cell.

10. The base station of claim 9, wherein the configuration information includes at least one of a LTM candidate cell configuration of the LTM candidate cell and a reference signal (RS) configuration of the LTM candidate cell.

11. The base station of claim 10, wherein the LTM preparation procedure further includes:

receive, via the transceiver and from the source base station, a second request message including a second LTM indication information, RS configurations of one or more LTM candidate cells identified by the source base station, and indexes of one or more LTM candidate cell configurations of the one or more LTM candidate cells identified by the source base station;

storing the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells.

12. The base station of claim 11, wherein

the first LTM indication information is a LTM indicator with a first codepoint or a second codepoint, the first codepoint indicates to initiate a preparation of the LTM candidate cell configuration, and the second codepoint indicates an update of the LTM candidate cell configuration, and

the second LTM indication information is the LTM indicator with a third codepoint, the third codepoint indicates to store the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells.

13. The base station of claim 11, wherein storing the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells comprises:

transmitting, from a candidate central unit (CU) of the candidate base station to a candidate distributed unit (DU) of the candidate base station corresponding to the LTM candidate cell, a fourth request message including the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells; and

storing, at the candidate DU, the indexes of the one or more LTM candidate cell configurations and the RS configurations of the one or more LTM candidate cells.

14. The base station of claim 9, wherein the processor is further configured to:

transmit, via the transceiver and to the source base station, a cancel message requesting a modification of an LTM candidate cell configuration,

wherein the cancel message includes identifiers of one or more LTM candidate cells to be cancelled.

15. The base station of claim 14, wherein the cancel message further includes a cause value indicating LTM resources to be changed.

16. The base station of claim 15, wherein the cancel message is generated by the candidate CU in response to receiving a modification message requesting a modification of one or more LTM candidate cell configurations from a candidate DU belonging to the candidate CU.

17. The base station of claim 16, wherein the modification message includes a cause value indicating LTM resources to be changed.

18. The base station of claim 9, wherein the processor is further configured to:
receive, via the transceiver and from the source base station, an identifier of a target LTM candidate cell in the case that the source base station decides to execute LTM to the target LTM candidate cell.

19. A method performed by a source base station for layer 1/layer 2 (L1/L2)-triggered mobility (LTM), the method comprising a LTM preparation procedure, the LTM preparation procedure including:

transmitting, via the transceiver and to one or more candidate base stations for LTM, one or more first request messages for one or more LTM candidate cells belonging to the one or more candidate base stations, respectively, each first request message includes a first LTM indication information and an identifier of a LTM candidate cell corresponding to the first request message; and

receiving, via the transceiver and from the one or more candidate base stations, one or more first response messages for the one or more LTM candidate cells, wherein a configuration information of each LTM candidate cell of the one or more LTM candidate cells is included in at least one first response message.

20. A method performed by a candidate base station for layer 1/layer 2 (L1/L2)-triggered mobility (LTM), the method comprising a LTM preparation procedure, the LTM preparation procedure including:

receiving, via the transceiver and from a source base station for LTM, a first request message for a LTM candidate cell belonging to the candidate base station, the first request message includes a first LTM indication information and an identifier of the LTM candidate cell;

preparing a configuration information of the LTM candidate cell based on the first request message; and

transmitting, via the transceiver and to the source base station, at least one first response message including the configuration information of the LTM candidate cell.