DATA FORWARDING FOR LTM

TECHNICAL FIELD

[0001] The present disclosure relates to wireless communications, and more specifically to base stations (BSs), methods, apparatuses, and computer readable medium for data forwarding in L1/L2 triggered mobility (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] When the UE moves from one cell to another cell, at some point a serving cell change needs to be performed. In the legacy, the serving cell change is done by explicit radio resource control (RRC) reconfiguration signalling to trigger the synchronization of target cell based on layer 3 (L3) measurements report, which may lead to longer latency, larger overhead, and longer interruption time than beam level mobility. Therefore, in the third generation partner project (3GPP), a 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.

[0004] The potential applicable scenarios of LTM include intra-CU intra-DU mobility, intra CU inter-DU mobility, and inter-CU mobility. When the UE moves to a new cell in a new

gNB, the source gNB should perform data forwarding towards the new gNB for the UE. However, how to support the data forwarding for subsequent inter-CU LTM procedure is needed to be studied.

SUMMARY

[0005] The present disclosure relates to BSs, methods, apparatuses, processors, and computer readable medium for data forwarding for subsequent LTM procedure. According to embodiments in the present disclosure, the data forwarding from a new source BS to candidate BS(s) for the subsequent inter-CU LTM procedure is supported.

[0006] In some implementations, there is provided a BS. The BS comprises at least one memory; and at least one processor coupled with the at least one memory and configured to cause the BS, operating as a source base station for configuring LTM for a UE, to: receive first data forwarding information associated with a first candidate base station from the first candidate base station, and second data forwarding information associated with a second candidate base station from the second candidate base station, wherein the first and second data forwarding information includes respective transport layer information for establishment of data forwarding tunnels towards the first and second candidate base stations; and transmit at least the first data forwarding information associated with the first candidate base station to the second candidate base station, or at least the second data forwarding information associated with the second candidate base station to the first candidate base station.

[0007] In some implementations, there is provided a BS. The BS comprises at least one memory; and at least one processor coupled with the at least one memory and configured to cause the BS, operating as a first candidate base station in an LTM procedure for a UE, to: receive, from a source base station, at least second data forwarding information associated with a second candidate base station, wherein the second data forwarding information includes transport layer information for establishment of a data forwarding tunnel towards the second candidate base station; and perform data forwarding for the UE towards the second candidate base station, based on the at least second data forwarding information associated with the second candidate base station.

[0008] In some implementations, there is provided a BS. The BS comprises at least one memory; and at least one processor coupled with the at least one memory and configured to cause the BS, operating as a second candidate base station in an LTM procedure for a UE, to: receive, from a source base station for configuring LTM for the UE or a first candidate base

station, at least third data forwarding information associated with a third candidate base station, wherein the third data forwarding information includes transport layer information for establishment of a data forwarding tunnel towards the third candidate base station; and perform data forwarding for the UE towards the third candidate base station, based on the at least third data forwarding information associated with the third candidate base station.

[0009] In some implementations, there is provided a method performed by the BS, operating as a source base station for configuring LTM for a UE. The method comprises: receiving first data forwarding information associated with a first candidate base station from the first candidate base station, and second data forwarding information associated with a second candidate base station from the second candidate base station, wherein the first and second data forwarding information includes respective transport layer information for establishment of data forwarding tunnels towards the first and second candidate base stations; and transmitting at least the first data forwarding information associated with the first candidate base station to the second candidate base station, or at least the second data forwarding information associated with the second candidate base station to the first candidate base station.

[0010] In some implementations, there is provided a method performed by the BS operating as a first candidate base station in an LTM procedure for a UE. The method comprises: receiving, from a source base station, at least second data forwarding information associated with a second candidate base station, wherein the second data forwarding information includes transport layer information for establishment of a data forwarding tunnel towards the second candidate base station; and performing data forwarding for the UE towards the second candidate base station, based on the at least second data forwarding information associated with the second candidate base station.

[0011] In some implementations, there is provided a method performed by the BS operating as a second candidate base station in an LTM procedure for a UE. The method comprises: receiving, from a source base station for configuring LTM for the UE or a first candidate base station, at least third data forwarding information associated with a third candidate base station, wherein the third data forwarding information includes transport layer information for establishment of a data forwarding tunnel towards the third candidate base station; and performing data forwarding for the UE towards the third candidate base station, based on the at least third data forwarding information associated with the third candidate base station.

[0012] In some implementations, there is provided a processor for wireless communication. The processor comprises at least one controller coupled with at least one memory and configured to cause the processor to: receive first data forwarding information associated with a first candidate base station from the first candidate base station, and second data forwarding information associated with a second candidate base station from the second candidate base station, wherein the first and second data forwarding information includes respective transport layer information for establishment of data forwarding tunnels towards the first and second candidate base stations; and transmit at least the first data forwarding information associated with the first candidate base station to the second candidate base station, or at least the second data forwarding information associated with the second candidate base station to the first candidate base station.

[0013] In some implementations, there is provided a processor for wireless communication. The processor comprises at least one controller coupled with at least one memory and configured to cause the processor to: receive, from a source base station, at least second data forwarding information associated with a second candidate base station, wherein the second data forwarding information includes transport layer information for establishment of a data forwarding tunnel towards the second candidate base station; and perform data forwarding for the UE towards the second candidate base station, based on the at least second data forwarding information associated with the second candidate base station.

[0014] In some implementations, there is provided a processor for wireless communication. The processor comprises at least one controller coupled with at least one memory and configured to cause the processor to: receive, from a source base station for configuring LTM for the UE or a first candidate base station, at least third data forwarding information associated with a third candidate base station, wherein the third data forwarding information includes transport layer information for establishment of a data forwarding tunnel towards the third candidate base station; and perform data forwarding for the UE towards the third candidate base station, based on the at least third data forwarding information associated with the third candidate base station.

[0015] In some implementations of the methods and the BS operating as a source base station for configuring LTM for a UE described herein, further comprising: transmitting a first request to the first candidate base station and a second request to the second candidate base station for LTM configuration, and wherein, in response, the first data forwarding information is received from the first candidate base station and the second data forwarding

information is received from the second candidate base station.

[0016] In some implementations of the methods and the BS operating as a source base station for configuring LTM for a UE described herein, further comprising: transmitting, to the first candidate base station, at least the second data forwarding information associated with the second candidate base station based on one of: the UE is to access a target cell of the first candidate base station, or the UE has successfully accessed a target cell of the first candidate base station.

[0017] In some implementations of the methods and the BS operating as a source base station for configuring LTM for a UE described herein, further comprising: transmitting, to the second candidate base station, at least third data forwarding information associated with a third candidate base station, based on one of: a first message from the first candidate base station, wherein the first message indicates an initiation of a cell switch command to the UE by the first candidate base station and the first message comprises a cell ID of a target cell of the second candidate base station, or a second message from the second candidate base station, wherein the second message indicates that the UE has successfully accessed a target cell of the second candidate base station.

[0018] In some implementations of the methods and the BS operating as a source base station for configuring LTM for a UE described herein, further comprising: transmitting, to each of the first candidate base station and the second candidate base station, a data forwarding information pool comprising the first data forwarding information associated with the first candidate base station and the second data forwarding information associated with the second candidate base station.

[0019] In some implementations of the methods and the BS operating as a first candidate base station in an LTM procedure for a UE described herein, further comprising: receiving, from the source base station, a first request comprising a first cell identifier (ID) of a first LTM candidate cell of the first candidate base station; and in response, transmitting to the source base station, first data forwarding information associated with the first candidate base station.

[0020] In some implementations of the methods and the BS operating as a first candidate base station in an LTM procedure for a UE described herein, further comprising: transmitting, to the second candidate base station, at least third data forwarding information associated with a third candidate base station based on one of: the UE is to access a target cell of the

second candidate base station, or the UE has successfully accessed a target cell of the second candidate base station.

[0021] In some implementations of the methods and the BS operating as a first candidate base station in an LTM procedure for a UE described herein, further comprising: transmitting, to the source base station, a first message, wherein the first message indicates an initiation of a cell switch command to the UE by the first candidate base station and the first message comprises a cell ID of a target cell of the second candidate base station.

[0022] In some implementations of the methods and the BS operating as a first candidate base station in an LTM procedure for a UE described herein, further comprising: receiving, from the source base station, a data forwarding information pool comprising the first data forwarding information associated with the first candidate base station and the second data forwarding information associated with the second candidate base station.

[0023] In some implementations of the methods and the BS operating as a first candidate base station in an LTM procedure for a UE described herein, further comprising: transmitting, to the second candidate base station, a cell switch notification message comprising UE context reference at the source base station; and receiving, from the second candidate base station, data forwarding information associated with the second candidate base station.

[0024] In some implementations of the methods and the BS operating as a first candidate base station in an LTM procedure for a UE described herein, further comprising: providing, from a central unit control plane of the first candidate base station to a central unit user plane of the first candidate base station, an LTM related indicator.

[0025] In some implementations of the methods and the BS operating as a second candidate base station in an LTM procedure for a UE described herein, further comprising: receiving, from the source base station, a second request comprising a second cell ID of a second LTM candidate cell of the second candidate base station; and in response, transmitting, to the source base station, second data forwarding information associated with the second candidate base station.

[0026] In some implementations of the methods and the BS operating as a second candidate base station in an LTM procedure for a UE described herein, further comprising: transmitting, to the source base station or the first candidate base station, a second message indicating that the UE has successfully accessed a target cell of the second candidate base station.

[0027] In some implementations of the methods and the BS operating as a second candidate

base station in an LTM procedure for a UE described herein, further comprising: receiving, from first candidate base station, a cell switch notification message comprising UE context reference at the source base station.

[0028] In some implementations of the methods and the BS operating as a second candidate base station in an LTM procedure for a UE described herein, further comprising: transmitting, to the first candidate base station, data forwarding information associated with the second candidate base station in response to the cell switch notification message or based on a determination that the UE has successfully accessed a target cell of the second candidate base station.

[0029] In some implementations of the methods and the BS operating as a second candidate base station in an LTM procedure for a UE described herein, further comprising: providing, from a central unit control plane of the second candidate base station to a central unit user plane of the second candidate base station, an LTM related indicator.

[0030] In some implementations of the methods, the BS operating as a source base station for configuring LTM for a UE, the BS operating as a first candidate base station in an LTM procedure for the UE, and the BS operating as a second candidate base station in an LTM procedure for the UE described herein, the first request comprises a first cell identifier (ID) of a first LTM candidate cell of the first candidate base station, and the second request comprises a second cell ID of a second LTM candidate cell of the second candidate base station.

[0031] In some implementations of the methods, the BS operating as a source base station for configuring LTM for a UE, the BS operating as a first candidate base station in an LTM procedure for the UE, and the BS operating as a second candidate base station in an LTM procedure for the UE described herein, the first request further comprises the second cell ID of the second LTM candidate cell.

[0032] In some implementations of the methods, the BS operating as a source base station for configuring LTM for a UE, the BS operating as a first candidate base station in an LTM procedure for the UE, and the BS operating as a second candidate base station in an LTM procedure for the UE described herein, the second request further comprises the first cell ID of the first LTM candidate cell.

[0033] In some implementations of the methods, the BS operating as a source base station for configuring LTM for a UE, the BS operating as a first candidate base station in an LTM

procedure for the UE, and the BS operating as a second candidate base station in an LTM procedure for the UE described herein, the first data forwarding information associated with the first candidate base station comprises: first transport layer information for establishment of a first data forwarding tunnel from the source base station towards the first candidate base station, and second transport layer information for establishment of a second data forwarding tunnel from the second candidate base station towards the first candidate base station.

[0034] In some implementations of the methods, the BS operating as a source base station for configuring LTM for a UE, the BS operating as a first candidate base station in an LTM procedure for the UE, and the BS operating as a second candidate base station in an LTM procedure for the UE described herein, the data forwarding information pool is comprised in a cell switch notification message.

BRIEF DESCRIPTION OF THE DRAWINGS

[0035] FIG. 1 illustrates an example of a wireless communications system in which some embodiments of the present disclosure can be implemented;

[0036] FIG. 2A illustrates an example schematic of intra-CU intra-DU mobility;

[0037] FIG. 2B illustrates an example schematic of intra-CU inter-DU mobility;

[0038] FIG. 2C illustrates an example schematic of inter-CU mobility;

[0039] FIG. 2D illustrates an example schematic of subsequent LTM procedure;

[0040] FIG. 2E illustrates an overall procedure for LTM;

[0041] FIG. 2F illustrates a schematic diagram of an example communication network in which some embodiments of the present disclosure can be implemented;

[0042] FIG. 3 illustrates a signalling chart illustrating communication process in accordance with some example embodiments of the present disclosure;

[0043] FIGS. 4A-4D illustrate signalling charts illustrating communication processes for early data forwarding in accordance with some example embodiments of the present disclosure;

[0044] FIGS. 5A-5B illustrate signalling charts illustrating communication process for late data forwarding in accordance with some example embodiments of the present disclosure;

[0045] FIG. 6 illustrates an example of a device that is suitable for implementing embodiments of the present disclosure;

[0046] FIG. 7 illustrates an example of a processor that is suitable for implementing some embodiments of the present disclosure;

[0047] FIG. 8 illustrates a flowchart of an example method implemented at a source base station in accordance with aspects of the present disclosure;

[0048] FIG. 9 illustrates a flowchart of an example method implemented at a first candidate base station in accordance with aspects of the present disclosure; and

[0049] FIG. 10 illustrates a flowchart of an example method implemented at a second candidate base station in accordance with aspects of the present disclosure.

[0050] Throughout the drawings, the same or similar reference numerals represent the same or similar element.

DETAILED DESCRIPTION

[0051] 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 can be implemented in various manners other than the ones described below. 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.

[0052] 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.

[0053] 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. In some examples, values, procedures, or apparatuses are referred to as "best," "lowest," "highest," "minimum," "maximum," or the like. It will be appreciated that such descriptions are intended to indicate that a selection among many used functional alternatives can be made, and such selections need not be better, smaller, higher, or otherwise preferable to other selections.

[0054] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of 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, components and/or the like, but do not preclude the presence or addition of one or more other features, elements, components and/or combinations thereof. For example, the term "includes" and its variants are to be read as open terms that mean "includes, but is not limited to." The term "based on" is to be read as "based at least in part on." The term "one embodiment" and "an embodiment" are to be read as "at least one embodiment." The term "another embodiment" is to be read as "at least one other embodiment." The use of an expression such as "A and/or B" can mean either "only A" or "only B" or "both A and B." Other definitions, explicit and implicit, may be included below.

[0055] FIG. 1 illustrates an example of a wireless communications system 100 in which some embodiments of the present disclosure can be implemented. 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 (CN) 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 a long term evolution (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 a new radio (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) 702.11 (Wi-Fi), IEEE 702.16 (WiMAX), IEEE 702.20. 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.

[0056] 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.

[0057] 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, message, 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.

[0058] 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.

[0059] 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 CN 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.

[0060] 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 (SL). For example, a UE 104 may support wireless communication directly with another UE 104 over a PC5 interface.

[0061] A network entity 102 may support communications with the CN 106, or with another network entity 102, or both. For example, a network entity 102 may interface with the CN 106 through one or more backhaul links 116 (e.g., via an S1, N2, N3, 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 CN 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).

[0062] 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 RAN (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 central unit (CU), a distributed unit (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.

[0063] 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)).

[0064] 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 adaption 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.

[0065] 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).

[0066] 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.

[0067] The CN 106 may support user authentication, access authorization, tracking, connectivity, and other access, routing, or mobility functions. The CN 106 may be an evolved packet core (EPC), or a 5G core (5GC), which may include a control plane entity that manages access and mobility (e.g., a mobility management entity (MME), an access and mobility management functions (AMF)) and a user plane entity that routes packets or interconnects to external networks (e.g., a serving gateway (S-GW), a Packet Data Network (PDN) gateway (P-GW), or a user plane function (UPF)). In some implementations, the control plane entity may manage non-access stratum (NAS) functions, such as mobility, authentication, and bearer management (e.g., data bearers, signal bearers, etc.) for the one or more UEs 104 served by the one or more network entities 102 associated with the CN 106.

[0068] The CN 106 may communicate with the packet data network 108 over one or more backhaul links 116 (e.g., via an S1, N2, N3, 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 CN 106 via a network entity 102. The CN 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 CN 106 (e.g., one or more network functions of the CN 106).

[0069] 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.

[0070] 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., μ=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., μ=0) associated with the first subcarrier spacing (e.g., 15 kHz) may utilize one slot per subframe. A second numerology (e.g., μ=1) may be associated with a second subcarrier spacing (e.g., 30 kHz) and a normal cyclic prefix. A third numerology (e.g., μ=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., μ=3) may be associated with a fourth subcarrier spacing (e.g., 120 kHz) and a normal cyclic prefix. A fifth numerology (e.g., μ=4) may be associated with a fifth subcarrier spacing (e.g., 240 kHz) and a normal cyclic prefix.

[0071] 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.

[0072] 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., μ=0, μ=1, μ=2, μ=3, μ=4) associated with respective subcarrier spacings of 15 kHz, 30 kHz, 60 kHz, 120 kHz, and 240 kHz may utilize a single slot per subframe, two slots per subframe, four slots per subframe, eight slots per subframe, and 16 slots per subframe, respectively. Each slot may include a number (e.g., quantity) of symbols (e.g., orthogonal frequency-division multiplexing (OFDM) symbols). In some implementations, the number (e.g., quantity) of slots for a subframe may depend on a numerology. For a normal cyclic prefix, a slot may include 14 symbols. For an extended cyclic prefix (e.g., applicable for 60 kHz subcarrier spacing), a slot may include 12 symbols. The relationship between the number of symbols per slot, the number of slots per subframe, and the number of slots per frame for a normal cyclic prefix and an extended cyclic prefix may depend on a numerology. It should be understood that reference to a first numerology (e.g., μ=0) associated with a first subcarrier spacing (e.g., 15 kHz) may be used interchangeably between subframes and slots.

[0073] 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.

[0074] 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., μ=0), which includes 15 kHz subcarrier spacing; a second numerology (e.g., μ=1), which includes 30 kHz subcarrier spacing; and a third numerology (e.g., μ=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., μ=2), which includes 60 kHz subcarrier spacing; and a fourth numerology (e.g., μ=3), which includes 120 kHz subcarrier spacing.

[0075] LTM refers to a 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-DU mobility, intra-CU inter-DU mobility, and inter-CU mobility, as shown in FIGS. 2A-2C respectively. FIG. 2A illustrates an example schematic of intra-CU intra-DU mobility 201, in which the UE moves between different cells within a DU. FIG. 2B illustrates an example schematic of intra-CU inter-DU mobility 202 in which the UE moves between different cells belonging to different DUs but within a CU. FIG. 2C illustrates an example schematic of inter-CU mobility 203, in which the UE moves between different cells belonging to different DUs, where the DUs belongs to different CUs.

[0076] Subsequent LTM refers to LTM cell switch procedures between candidate cells without RRC reconfiguration by the network in between. FIG. 2D illustrates an example schematic of subsequent LTM procedure 204. When the UE connects to the source gNB, the source gNB prepares all the candidate configurations within the candidate gNB and provides them to the UE through RRC signalling. As shown, the LTM refers to the mobility from the source gNB to the candidate gNB1. The subsequent LTM refers to the mobility from the candidate gNB1 to the candidate gNB2, or the mobility from the candidate gNB1 back to the source gNB, without any further RRC reconfiguration.

[0077] LTM is a procedure in which a gNB receives L1 measurement report(s) from a UE, and on their basis the gNB changes UE serving cell by a cell switch command signalled via a MAC CE. The cell switch command indicates an LTM candidate configuration that the gNB previously prepared and provided to the UE through RRC signalling. Then the UE switches to the target configuration according to the cell switch command. The LTM procedure can be used to reduce the mobility latency.

[0078] When configured by the network, it is possible to activate transmission configuration indication (TCI) states of one or multiple cells that are different from the current serving cell. For instance, the TCI states of the LTM candidate cells can be activated in advance before any of those cells become the serving cell. This allows the UE to be DL synchronized with those cells, thereby facilitating a faster cell switch to one of those cells when cell switch is triggered.

[0079] When configured by the network, it is possible to initiate UL time advance (TA) acquisition (called early TA) procedure of one or multiple cells that are different from the current serving cells. If the cell has the same NTA as the current serving cells or NTA=0,

early TA acquisition procedure is not required. The network may request the UE to perform early TA acquisition of a candidate cell before a cell switch. The early TA acquisition procedure is triggered by PDCCH order or realized through UE-based TA measurement as configured by RRC. In the former case, the gNB to which the candidate cell belongs calculates the TA value and sends it to the gNB to which the serving cell belongs. The serving cell sends the TA value in the LTM cell switch command MAC CE when triggering LTM cell switch. In the latter case, the UE performs TA measurement for the candidate cells after being configured by RRC but the exact time the UE performs TA measurement is up to UE implementation. The UE applies the TA value measured by itself and performs RACH-less LTM upon receiving the cell switch command. The network may also send a TA value in the LTM cell switch command MAC CE without early TA acquisition.

[0080] Depending on the availability of a valid TA value, the UE performs either a RACH-less LTM or RACH-based LTM cell switch. If the TA value is provided in the cell switch command, the UE applies the TA value as instructed by the network. In the case where UE-based TA measurement is configured, but no TA value is provided in the cell switch command, the UE applies the TA value by itself if available. Meanwhile, the UE performs RACH-less LTM cell switch upon receiving the cell switch command. If no valid TA value is available, the UE performs RACH-based LTM cell switch.

[0081] Regardless of whether the UE is configured for UE-based TA measurement for a certain candidate cell, it will still follow the PDCCH order, which includes requesting a random access procedure towards the candidate cells. This also applies to the candidate cells for which the UE is capable of deriving TA values by itself. Additionally, regardless of whether the UE has already performed a random access procedure towards the candidate cells, it will still follow the UE-based measurement configuration if configured by the network.

[0082] For RACH-less LTM, the UE accesses the target cell using either a configured grant or a dynamic grant. The configured grant is provided in the LTM candidate configuration, and the UE selects the configured grant occasion associated with the beam indicated in the cell switch command. Upon initiation of LTM cell switch to the target cell, the UE starts to monitor PDCCH on the target cell for dynamic scheduling. Before RACH-less LTM procedure completion, the UE shall not trigger random access procedure if it does not have a valid PUCCH resource for triggered SRs.

[0083] The following principles apply to LTM: Security key is maintained upon an LTM cell switch; and Subsequent LTM is supported.

[0084] LTM supports both intra-gNB-DU and intra-gNB-CU inter-gNB-DU mobility. LTM supports both intra-frequency and inter-frequency mobility, including mobility to inter-frequency cell that is not a current serving cell. LTM is supported only for licensed spectrum. The following scenarios are supported: -PCell change in non-CA scenario and non-DC scenario; -PCell and SCell(s) change in CA scenario; -Dual connectivity scenario, PCell and MCG SCell(s) change and intra-SN PSCell and SCG SCell(s) change without MN involvement. LTM for simultaneous PCell and PSCell change is not supported. While the UE has stored LTM candidate configurations the UE can also execute any L3 handover command sent by the network.

[0085] Cell switch command is conveyed in a MAC CE, which contains the necessary information to perform the LTM cell switch. FIG. 2E illustrates an overall procedure for LTM 205. Subsequent LTM is done by repeating the early synchronization, LTM cell switch execution, and LTM cell switch completion steps without releasing other LTM candidate cell configurations after each LTM cell switch completion. The general procedure over the air interface is applicable to SCG LTM.

[0086] At step 1 in FIG. 2E, the UE sends a Measurement Report message to the gNB. The gNB decides to configure LTM and initiates candidate cell(s) preparation. At step 2, the gNB transmits an RRC Reconfiguration message to the UE including the LTM candidate cell configurations of one or multiple candidate cells. At step 3, the UE stores the LTM candidate cell configurations and transmits an RRC Reconfiguration Complete message to the gNB.

[0087] At step 4a, the UE may performs DL synchronization with candidate cell(s) before receiving the cell switch command. It is understood that DL synchronization for candidate cell(s) before cell switch command is supported, at least based on synchronization signal block (SSB).

[0088] At step 4b, if requested by the network, the UE performs early TA acquisition with candidate cell(s) before receiving the cell switch command. This is done via CFRA triggered by a PDCCH order from the source cell, following which the UE sends preamble towards the indicated candidate cell. In order to minimize the data interruption of the source cell due to CFRA towards the candidate cell(s), the UE doesn't receive RAR for the purpose

of TA value acquisition and the TA value of the candidate cell is indicated in the cell switch command. The UE doesn't maintain the TA timer for the candidate cell and relies on network implementation to guarantee the TA validity.

[0089] At step 5, the UE performs L1 measurements on the configured candidate cell(s) and transmits L1 measurement reports to the gNB. L1 measurement should be performed as long as apply the RRC reconfiguration in step 2.

[0090] At step 6, the gNB decides to execute cell switch to a target cell and transmits a MAC CE triggering cell switch by including the candidate configuration index of the target cell. The UE switches to the target cell and applies the configuration indicated by candidate configuration index.

[0091] At step 7, the UE performs the random access procedure towards the target cell, if UE does not have valid TA of the target cell.

[0092] At step 8, the UE completes the LTM cell switch procedure by sending RRC Reconfiguration Complete message to target cell. If the UE has performed a RA procedure in step 7, the UE considers that LTM execution is successfully completed when the random access procedure is successfully completed. For RACH-less LTM, the UE considers that LTM execution is successfully completed when the UE determines that the network has successfully received its first UL data. The UE determines successful reception of its first UL data by receiving a PDCCH addressing the UE's C-RNTI in the target cell, which schedules a new transmission following the first UL data.

[0093] In some cases, the steps 4-8 can be performed multiple times for subsequent LTM using the LTM candidate cell configuration(s) provided in step 2.

[0094] The procedure over the air interface is applicable to both intra-DU LTM and inter-DU LTM. The overall LTM procedures over F1-C and Xn interface are captured in prior art which will be repeated in the present disclosure.

[0095] In 3GPP release 18 (R18), the LTM focuses on the intra-CU LTM (including intra-CU intra-DU LTM and intra-CU inter-DU LTM) only. In R19, the LTM will focus on the inter-CU LTM, including specify support for inter-CU Layer 2 Mobility (LTM):

- Prioritize the case when CU is acting as MN when DC is not configured.
- As secondary priority, support the case when NR-DC is configured and CU is acting as SN and MCG is unchanged.

- As secondary priority, support the case when NR-DC is configured, CU is acting as MN and SCG is unchanged or SCG is released. Note: The case that LTM is configured in both MCG and SCG is excluded.
- Specify support for subsequent LTM mobility procedures aiming to avoid RRC configuration between cell switches as per Rel-18 LTM. Coordination with SA3 needed with respect to security key handling.
- Note: Rel. 18 intra-CU LTM procedure is considered as baseline for adding inter-CU support.

[0096] When the UE moves to a new cell in the new gNB, the source gNB should perform data forwarding towards the new gNB for the UE. The data forwarding could be the early data forwarding or the late data forwarding. Early data forwarding refers to data forwarding that is initiated before the UE executes the handover. Late data forwarding refers to data forwarding that is initiated after the source NG-RAN node knows that the UE has successfully accessed a target NG-RAN node. In the procedure of inter-CU LTM, how to support the data forwarding from the new source gNB to the candidate gNBs for the subsequent inter-CU LTM should be studied.

[0097] Embodiments of the present disclosure provide a solution of communication. In the solution, a BS, which is a source BS for configuring LTM for the UE, may receive first data forwarding information associated with a first candidate base station from the first candidate base station, and second data forwarding information associated with a second candidate base station from the second candidate base station. In addition, the source BS may further transmit at least the first data forwarding information associated with the first candidate base station to the second candidate base station, and/or or at least the second data forwarding information associated with the second candidate base station to the first candidate base station. As such, the data forwarding at the first candidate base station and the second candidate base station can be supported. Principles and implementations of the present disclosure will be described in detail below with reference to the figures.

[0098] FIG. 2F illustrates a schematic diagram of an example communication network 200 in which some embodiments of the present disclosure can be implemented. As shown in FIG. 2F, the communication network 200 may include a UE 230, and base stations 210, 211, 212, and 213. Each of the base stations 210, 211, 212, and 213 may be a gNB. For example, each of the base stations 210, 211, 212, and 213 may be a NG-RAN node.

[0099] While considering a mobility of the UE 230, the mobility may be an inter-CU mobility. For ease of description, in a subsequent inter-CU LTM procedure, the base station 210 is assumed as a source base station (S-BS) of the LTM procedure, and the base stations 211-213 are candidate base stations (C-BS) of the LTM procedure. For example, the BS 210 is a source BS and the BS 211 is a target BS when the UE 230 moves from the BS 210 towards the BS 211. For example, the BS 211 is a source BS and the BS 212 is a target BS when the UE 230 moves from the BS 211 towards the BS 212.

[00100] In case a subsequent LTM is performed, the UE 230 may hand over (or switch) from the source BS to a candidate BS, then to another candidate BS. For example, the UE 230 may hand over from the S-BS 210 to the C-BS 211, and then the UE 230 hands over from the C-BS 211 to the C-BS 212.

[00101] In the present disclosure, it is assumed that the S-BS 210 is a BS which triggers the LTM preparation or initiates the LTM configuration, i.e., sending the RRC reconfiguration to the UE including the LTM candidate configurations. In the present disclosure, each of the C-BSs 211-213 is a BS which is responsible for the LTM candidate cell(s). Different LTM candidate cells may be in a same C-BS or different C-BSs. For ease of description, in the following description, it is assumed that an LTM candidate cell 1 is in the C-BS 211, an LTM candidate cell 2 is in the C-BS 212, and an LTM candidate cell 3 is in the C-BS 213.

[00102] It is to be understood that the number of devices in FIG. 2F is given for the purpose of illustration without suggesting any limitations to the present disclosure. For example, there may be more candidate BSs for the UE 230 during the inter-CU mobility. For example, there may be a CN entity such as an AMF.

[00103] In the present disclosure, the term "source base station" may refer to a source NG-RAN node, which initiates the LTM configuration, i.e., sending the RRC reconfiguration to the UE including the LTM candidate configurations. For simplicity, the S-BS denotes the source NG-RAN node.

[00104] In the present disclosure, the term "candidate base station" may refer to a candidate NG-RAN node, which is responsible for the LTM candidate cell(s). The LTM candidate cells will be in the same candidate NG-RAN node or different candidate NG-RAN nodes. For simplicity, the LTM candidate cell 1 is in the candidate NG-RAN node 1, the LTM candidate cell 2 is in the candidate NG-RAN node 2, and the LTM candidate cell 3 is in the candidate NG-RAN node 3. For simplicity, the C-BS denotes the candidate NG-RAN node.

In some cases, the LTM candidate cell is in the source NG-RAN node, where the source NG-RAN node is also a candidate NG-RAN node. In some cases, the candidate base station may refer to a target base station.

[00105] In the present disclosure, the term "data forwarding information" may refer to transport layer (TNL) information for the establishment of data forwarding tunnels towards the NG-RAN node. It includes at least one of the following:

- PDU session level downlink (DL) data forwarding UP TNL information, used to forward NG-U DL SDAP service data units (SDU) to the NG-RAN node.
- PDU session level uplink (UL) data forwarding UP TNL information, used to forward NG-U UL SDAP SDU to the NG-RAN node.
- Data radio bearer (DRB) level DL forwarding UP TNL information.
- DRB level UL forwarding UP TNL information.

[00106] The UP TNL information provides the transport layer information associated with the next generation (NG) or Xn user plane transport. It corresponds to a transport layer address (internet protocol (IP) address) and a general packet radio service tunneling protocol (GTP) Tunnel Endpoint Identifier.

[00107] The data forwarding information may also include the quality of service (QoS) flows accepted for data forwarding towards the NG-RAN node.

[00108] FIG. 3 illustrates a signalling chart illustrating communication process 300 in accordance with some example embodiments of the present disclosure. The process 300 may involve the UE 230, the S-BS 210, the C-BS 211, and the C-BS 212 as discussed with reference to FIG. 2F. For example, the C-BS 211 may refer to a first candidate base station and the C-BS 212 may refer to a second candidate base station. It would be appreciated that the process 300 may be applied to other communication scenarios, which will not be described in detail.

[00109] The UE 230 may be initially connected to the S-BS 210. The UE 230 may be subject to a subsequent LTM procedure. The LTM procedure may include an LTM preparation phase and one or more LTM cell switch phases. For example, the LTM preparation phase may be performed, e.g., initiated by the S-BS 210. For example, the one or more LTM cell switch phases may include an initial LTM cell switch (e.g. an initial LTM) phase and one or multiple LTM subsequent LTM cell switch (e.g. subsequent LTM) phases.

For example, in the initial LTM cell switch (e.g. an initial LTM) phase, the S-BS 210 is a source base station and the C-BS 211 is a target base station when the UE 230 switches towards an LTM candidate cell of the C-BS 211. For example, in a subsequent LTM cell switch (e.g. subsequent LTM) phase, the C-BS 211 is a source base station and the C-BS 212 is a target base station when the UE 230 switches towards an LTM candidate cell of the C-BS 212. It is to be understood that the LTM cell switch phase also refers to LTM execution phase.

[00110] In the process 300, at 305, the S-BS 210 may transmit a first request to the C-BS 211 (305a) and a second request to the C-BS 212 (305b). In some implementations, each of the first and second requests may be implemented as a Handover Request for requesting corresponding LTM candidate configurations associate with LTM candidate cells.

[00111] In some implementations, in case there are a plurality of candidate base stations, the S-BS 210 may transmit a plurality of messages (e.g. a plurality of requests) to a plurality of C-BSs respectively. In some implementations, each message may be implemented as a Handover Request message. In some examples, each message may request corresponding LTM candidate configuration associated with one or more LTM candidate cells, for example, one or more cell IDs of the one or more LTM candidate cells may be included in each message.

[00112] In some embodiments, a message to a respective C-BS may include a cell ID of an LTM candidate cell which belongs to the respective C-BS, and optionally may further include one or multiple cell IDs of one or multiple LTM candidate cells which belong to other C-BS(s).

[00113] In some examples, a message to the C-BS 211 (i.e. the first request) may include a cell ID of an LTM candidate cell 1 which belongs to the C-BS 211, a message to the C-BS 212 (i.e. the second request) may include a cell ID of an LTM candidate cell 2 which belongs to the C-BS 212. Optionally, the message to the C-BS 211 (i.e. the first request) may further include a cell ID of an LTM candidate cell 2 which belongs to the C-BS 212, similarly, the message to the C-BS 212 (i.e. the second request) may further include a cell ID of an LTM candidate cell 1 which belongs to the C-BS 211.

[00114] At 310, the C-BS 211 transmits first data forwarding information associated with the C-BS 211 to the S-BS 210 (310a), and the C-BS 212 transmits second data forwarding information associated with the C-BS 212 to the S-BS 210 (310b). In some implementations, each of the first and second data forwarding information may be carried in

a Handover Request Acknowledge message, which may be in response to the Handover Request.

[00115] For example, a first Handover Request Acknowledge message, which is transmitted by the C-BS 211 may include a first LTM candidate configuration and the first data forwarding information associated with the C-BS 211. For example, a second Handover Request Acknowledge message, which is transmitted by the C-BS 212 may include a second LTM candidate configuration and the second data forwarding information associated with the C-BS 212.

[00116] In some implementations, in case there are a plurality of candidate base stations, and the S-BS 210 transmits a plurality of messages (e.g. a plurality of requests) to a plurality of candidate base stations respectively. Each C-BS in the plurality of candidate base stations may transmit a response to the S-BS 210. Accordingly, the S-BS 210 may receive a plurality of responses from the plurality of candidate base stations respectively. In some implementations, each response may be implemented as a Handover Request Acknowledge message.

[00117] In some embodiments, a response from a respective C-BS may include data forwarding information associated with the respective C-BS. In some examples, data forwarding information associated with the respective C-BS may include transport layer information for establishment of a data forwarding tunnel towards the respective C-BS. In some examples, the data forwarding information is determined based on the cell ID(s) in the received request.

[00118] In some instances, take C-BS 211 for example, if the first request from the S-BS 210 includes a cell ID of an LTM candidate cell 1 which belongs to the C-BS 211 (but not include other cell ID of other LTM candidate cell in other C-BS), the response generated by the C-BS 211 may include data forwarding information associated with the C-BS 211 or associated with the LTM candidate cell 1, and the data forwarding information is used for data forwarding towards the C-BS 211, no matter from which node (which BS).

[00119] In some instances, take C-BS 211 for example, if the first request from the S-BS 210 includes a cell ID of an LTM candidate cell 1 which belongs to the C-BS 211 and a cell ID of an LTM candidate cell 2 which belongs to the C-BS 212, the response generated by the C-BS 211 may include data forwarding information associated with the C-BS 211 or associated with the LTM candidate cell 1, and the data forwarding information includes first data

forwarding information being used for data forwarding from the S-BS 210 to the C-BS 211 (e.g. including first transport layer information for establishment of a first data forwarding tunnel from the S-BS 210 to the C-BS 211) and second data forwarding information being used for data forwarding from the C-BS 212 to the C-BS 211(e.g. including second transport layer information for establishment of a second data forwarding tunnel from the C-BS 212 to the C-BS 211).

[00120] It is to be understood that the response from the C-BS 212 is similar with that from the C-BS 211, thus will not be repeated herein for brevity.

[00121] In addition or alternatively, the S-BS 210 may transmit an RRC reconfiguration message to the UE 230 at 315, where the RRC reconfiguration message may include the LTM candidate configurations. Accordingly, the UE 230 may reply (which is not shown in FIG. 3) with an RRC reconfiguration complete message.

[00122] At 320, the S-BS 210 transmits at least the second data forwarding information associated with the C-BS 212 to the C-BS 211 (320a), and/or transmits at least the first data forwarding information associated with the C-BS 211 to the C-BS 212 (320b).

[00123] In some implementations, in case there are a plurality of candidate base stations, for a specific candidate base station, the S-BS 210 may determine data forwarding information associated with other candidate base stations (e.g., the plurality of candidate base stations other than the specific candidate base station), and transmit the data forwarding information associated with other candidate base stations to the specific candidate base station. In some examples, the specific candidate base station may be a base station that the UE 230 is to access or that the UE 230 has successfully accessed. For example, the specific candidate base station may be the C-BS 211 which is a target BS for an initial LTM cell switch. For example, the specific candidate base station may be the C-BS 212 which is a target BS for a subsequent LTM cell switch.

[00124] As such, the S-BS 210 may provide data forwarding information associated with other candidate base stations to a specific candidate base station, the specific candidate base station may obtain the data forwarding information associated with each candidate base station, and accordingly the data forwarding procedure can be enabled.

[00125] In some examples, the S-BS 210 may transmit the data forwarding information associated with other candidate base stations to a specific candidate base station which is a target BS for an initial LTM cell switch, but not transmit to other specific candidate base

station. For example, the data forwarding information associated with other candidate base stations (e.g., including C-BS 212, C-BS 213, etc.) is transmitted to the C-BS 211 from the S-BS 210. In some instances, the C-BS 211, which is a source BS for a subsequent LTM cell switch, may transmit data forwarding information associated with other candidate base stations (e.g., including C-BS 213, etc., optionally including C-BS 211 or not including C-BS 211) to a different candidate base station, e.g., a target BS for a subsequent LTM cell switch (such as C-BS 212).

[00126] In some implementations, the S-BS 210 may transmit, at least to the C-BS 211, a data forwarding information pool which includes data forwarding information associated with the plurality of candidate base stations. In some embodiments, the data forwarding information pool includes the first data forwarding information associated with the C-BS 211 and the second data forwarding information associated with the C-BS 212.

[00127] In some implementations, the data forwarding information pool may include multiple pieces of data forwarding information which are associated with the plurality of C-BSs (e.g., all C-BSs).

[00128] In some embodiments, the S-BS 210 may transmit, to the C-BS 211, the data forwarding information pool, e.g., when the UE 230 is to access a target cell of the C-BS 211 or the UE 230 has successfully accessed a target cell of the C-BS 211. Accordingly, the data forwarding may be performed by the C-BS 211, e.g. that shown at 325.

[00129] In some examples, the C-BS 211 may transmit, to the C-BS 212, the data forwarding information pool, e.g., when the UE 230 is to access a target cell of the C-BS 212 or the UE 230 has successfully accessed a target cell of the C-BS 212. Details of which may refer to FIG. 4B below.

[00130] In some implementations, the S-BS 210 may transmit a cell switch notification message which includes the data forwarding information pool. In some examples, the data forwarding information pool to the C-BS 211may be transmitted after deciding to execute LTM to the LTM candidate cell 1 which belongs to the C-BS 211. For example, if the UE 230 is to access the LTM candidate cell 1 of C-BS 211, the data forwarding information pool may be transmitted to the C-BS 211. In some examples, the data forwarding information pool to the C-BS 211may be transmitted after the LTM cell switch to the LTM candidate cell 1 which belongs to the C-BS 211. For example, if the UE 230 has successfully accessed the LTM candidate cell 1 of C-BS 211, the data forwarding information pool may be

transmitted to the C-BS 211. In addition or alternatively, the early data forwarding may be performed by the C-BS 211. In some implementations, the C-BS 211 may transmit a cell switch notification message to the C-BS 212, and the cell switch notification message includes the data forwarding information pool.

[00131] In some embodiments, the S-BS 210 may transmit, to each of the plurality of C-BSs, the data forwarding information pool. In some examples, the data forwarding information pool may be provided in an LTM preparation stage, details of which may refer to FIG. 4C below.

[00132] As such, the operations at the S-BS 210 may be simplified, there is no need to determine different data forwarding information for different candidate base stations.

[00133] In some embodiments, the S-BS 210 may transmit, to the C-BS 211, the data forwarding information pool, e.g., when the UE 230 is to access a target cell of the C-BS 211 or the UE 230 has successfully accessed a target cell of the C-BS 211. In some examples, the S-BS 210 may transmit, to the C-BS 212, the data forwarding information pool, e.g., when the UE 230 is to access a target cell of the C-BS 212 or the UE 230 has successfully accessed a target cell of the C-BS 212. Details of which may refer to FIG. 4D below. For example, the S-BS 210 may determine whether the UE 230 is to be or has successfully accessed a target cell of the C-BS 212 based on a first message from the C-BS 211 or based on a second message from the C-BS 212. For instance, the first message may indicate an initiation of cell switch command to the UE 230 by the C-BS 211 and the first message comprises a cell ID of a target cell of the C-BS 212. For instance, the second message may indicate that the UE 230 has successfully accessed a target cell of the C-BS 212. For instance, the second message may be a handover success message.

[00134] In some implementations, the S-BS 210 may transmit another cell switch notification message to the C-BS 212, and the cell switch notification message includes the data forwarding information pool. In some examples, the data forwarding information pool to the C-BS 212 may be transmitted after deciding to execute LTM to the LTM candidate cell 2 which belongs to the C-BS 212. For example, if the UE 230 is to access the LTM candidate cell 2 of C-BS 212, the data forwarding information pool may be transmitted to the C-BS 212. In some examples, the data forwarding information pool to the C-BS 212 may be transmitted after the LTM cell switch to the LTM candidate cell 2 which belongs to the C-

BS 212. For example, if the UE 230 has successfully accessed the LTM candidate cell 2 of C-BS 212, the data forwarding information pool may be transmitted to the C-BS 212.

[00135] It is to be understood that the embodiments with reference to FIG. 3 are only for illustration without any limitation, for example, some step(s) in FIG. 3 may be omitted, reordered, modified, or combined, some further step(s) may be also included, the present disclosure does not limit for this aspect. For example, although two candidate base stations (C-BS 211 and C-BS 212) are shown in FIG. 3, there may be more C-BSs for the subsequent LTM procedure. For example, the step 320b may be omitted.

[00136] As detailed examples, FIGS. 4A-4D are provided below with an assumption that the UE 230 executes a subsequent LTM procedure including a handover from the S-BS 210 to the C-BS 211 in an initial LTM phase, and a further handover from the C-BS 211 to the C-BS 212 in a subsequent LTM phase. It is to be noted that the embodiments of FIGS 4A-4D are discussed with regard to a data forwarding information pool, however, other embodiments different from the data forwarding information pool may be included, for example, different data forwarding information may be provided to different candidate base stations.

[00137] FIG. 4A illustrates a signalling chart illustrating communication process 400 which involves the UE 230, the S-BS 210, the C-BS 211 (C-BS1), the C-BS 212 (C-BS 2), and the C-BS 213 (C-BS3) as discussed with reference to FIG. 2F. The UE 230 is initially connected to the S-BS 210.

[00138] In the process 400, the S-BS 210 may request LTM configuration for one or more LTM candidate cells belonging to one or more C-BSs by sending a Handover Request message. As shown in FIG. 4A, a Handover Request message is transmitted to the C-BS 211 at 401a, a Handover Request message is transmitted to the C-BS 212 at 401b, and a Handover Request message is transmitted to the C-BS 213 at 401c.

[00139] The Handover Request message to the C-BS 211 at 401a includes a cell ID of an LTM candidate cell 1 belonging to the C-BS 211. Optionally, the Handover Request message to the C-BS 211 at 401a may also include cell IDs of LTM candidate cells in other C-BSs, e.g., a cell ID of an LTM candidate cell 2 in the C-BS 212 and a cell ID of an LTM candidate cell 3 in the C-BS 213.

[00140] For ease of description, the cell IDs of an LTM candidate cells 1-3 may be referred to as a cell1 ID, a cell2 ID, and a cell3 ID respectively.

[00141] In the description for the process 400, it is assumed that C-BS 211 is with a split architecture. The C-BS 211 may include or may be a central unit (CU) of a gNB. The C-BS 211 may include a central unit control plane (CU-CP) and a central unit user plane (CU-UP). The C-BS 211 may also include a distributed unit (DU), which is not shown in the figure.

[00142] The CU-CP of C-BS 211 may provide a Bearer Context Setup Request message to the CU-UP of C-BS 211 at 402, and the CU-UP of C-BS 211 may respond with a Bearer Context Setup Response message at 403. The Bearer Context Setup Request message may be used to setup a bearer context in the CU-UP of the C-BS 211. The Bearer Context Setup Request message may include an indicator, to indicate the request concerning LTM. For example, the indicator is LTM initiation, where the value is set to TRUE.

[00143] In some instances, the Bearer Context Setup Request message includes the indicator indicating LTM, in other words, the indicator is received by the CU-UP of C-BS 211, in this case, the CU-UP of C-BS 211 should not initiate sending DL packets until the UE 230 successfully accesses the C-BS 211. The CU-UP of the C-BS 211 may also ignore the included security context in the received Bearer Context Setup Request message until the UE 230 successfully accesses the C-BS 211. As such, unnecessary early data forwarding between the CU and the DU in the C-BS 211 can be avoided, and accordingly the resources can be reduced.

[00144] It is to be noted that the steps 402-403 may be not needed if the C-BS 211 is not with the split architecture. It is to be noted that the C-BS 212 or 213 may perform steps similar with the steps 402-403 if the C-BS 212 or 213 is with the split architecture.

[00145] In the process 400, each of C-BSs may reply with a Handover Request Acknowledge message to the S-BS 210, and the Handover Request Acknowledge message may include the LTM candidate configuration. In some examples, The LTM candidate configuration may be included in the HandoverCommand message embedded in the Handover Request Acknowledge message.

[00146] As shown in FIG. 4A, a Handover Request Acknowledge message is transmitted from the C-BS 211 at 404a, a Handover Request Acknowledge message is transmitted from the C-BS 212 at 404b, and a Handover Request Acknowledge message is transmitted from the C-BS 213 at 404c.

[00147] The Handover Request Acknowledge message from the C-BS 211 at 404a may include LTM candidate configuration associated with the LTM candidate cell 1. The Handover Request Acknowledge message from the C-BS 211 at 404a may include data forwarding information associated with the C-BS 211.

[00148] In some examples, if cell IDs of LTM candidate cell in other candidate BSs is not included in the Handover Request message (at 401a), the data forwarding information associated with the C-BS 211 is used for data forwarding towards the C-BS 211, no matter from which node. For example, if the Handover Request message at 401a includes the cell1 ID, the Handover Request Acknowledge message may include the data forwarding information used for data forwarding from the S-BS 210 or C-BS 212 or C-BS 213 to the C-BS 211.

[00149] In some examples, if cell IDs of LTM candidate cells in other candidate BSs are included in the Handover Request message (at 401a), the Handover Request Acknowledge message (at 404a) may also include the data forwarding information used for data forwarding towards the C-BS 211 from other candidate BSs. For example, if the cell2 ID and the cell3 ID are included in the Handover Request message at 401a, the Handover Request Acknowledge message at 404a may include the data forwarding information used for data forwarding from the S-BS 210 to the C-BS 211, the data forwarding information used for data forwarding from the C-BS 212 to the C-BS 211, and the data forwarding information used for data forwarding from the C-BS 213 to the C-BS 211, which may be represented by the Table 1 below.

Table 1

data forwarding information	**Used for establishment of data forwarding tunnel of**
Data forwarding information 1	From S-BS 210 to C-BS 211
Data forwarding information 2	From C-BS 212 to C-BS 211
Data forwarding information 3	From C-BS 213 to C-BS 211

[00150] It is to be noted that although the above description is related to the step 404a, details of the steps 404b and 404c are similar and are not repeated herein.

[00151] In the process 400, the S-BS 210 sends the RRCReconfiguration message to the UE 230 at 405 and the RRC Reconfiguration message includes the LTM candidate configuration.

At 406, the UE 230 may reply with the RRCReconfigurationComplete message to the S-BS 210.

[00152] In addition, additional steps may be further performed, details are provided in FIGS. 4B-4D.

[00153] FIG. 4B illustrates a signalling chart illustrating communication process 450 which involves the UE 230, the S-BS 210, the C-BS 211 (C-BS1), the C-BS 212 (C-BS 2), and the C-BS 213 (C-BS3) as discussed with reference to FIG. 2F. The process 450 may include steps 401a-406 that discussed in the process 400 in FIG. 4A.

[00154] In the process 450, the S-BS 210 may make an LTM cell switch decision towards the LTM candidate cell 1 at 407. In some examples, the S-BS 210 may decide to execute LTM to the LTM candidate cell 1 belonging to the C-BS 211, e.g., based on the L1 measurement result received from the UE 230.

[00155] The S-BS 210 transmits a cell switch notification message (such as an LTM Cell Switch Notification message) to the C-BS 211 at 408, to indicate the initiation of the cell switch command to the UE 230. The cell switch notification message may include the data forwarding information pool that is determined based on the information received at 404a-404c (the Handover Request Acknowledge message).

[00156] In some examples, the data forwarding information pool includes the data forwarding information associated with all the candidate BSs (including C-BS 211, C-BS 212, C-BS 213). For example, the data forwarding information pool includes data forwarding information used for data forwarding towards the C-BS 211, data forwarding information used for data forwarding towards the C-BS 212, and data forwarding information used for data forwarding towards the C-BS 213.

[00157] In some examples, the data forwarding information pool may include multiple pieces of data forwarding information, and each of which is associated with a BS ID of a C-BS or a cell ID of an LTM candidate cell. For example, a C-BS may determine, based on the associated cell ID of an LTM candidate cell, a C-BS where the data forwarding information is associated with.

[00158] For instance, if the handover request at 401a-401c does not include a cell ID of an LTM candidate cell of other C-BSs, the data forwarding information pool may be represented by the Table 2 below.

Table 2

Data forwarding information 11	C-BS1 node ID / cell1 ID
Data forwarding information 12	C-BS2 node ID / cell2 ID
Data forwarding information 13	C-BS3 node ID / cell3 ID

[00159] For instance, if the handover request at 401a-401c includes cell IDs of other LTM candidate cells of other C-BSs, the data forwarding information pool may be represented by the Table 3 below, where the cell 1 is the LTM candidate cell of the C-BS1, the cell 2 is the LTM candidate cell of the C-BS2, and the cell 3 is the LTM candidate cell of the C-BS3.

Table 3

Data forwarding information 1	C-BS1 node ID / cell1 ID, from S-BS to C-BS1
Data forwarding information 2	C-BS1 node ID / cell1 ID, from C-BS2 to C-BS1
Data forwarding information 3	C-BS1 node ID / cell1 ID, from C-BS3 to C-BS1
Data forwarding information 4	C-BS2 node ID / cell2 ID, from S-BS to C-BS2
Data forwarding information 5	C-BS2 node ID / cell2 ID, from C-BS1 to C-BS2
Data forwarding information 6	C-BS2 node ID / cell2 ID, from C-BS3 to C-BS2
Data forwarding information 7	C-BS3 node ID / cell3 ID, from S-BS to C-BS3
Data forwarding information 8	C-BS3 node ID / cell3 ID, from C-BS1 to C-BS3
Data forwarding information 9	C-BS3 node ID / cell3 ID, from C-BS2 to C-BS3

[00160] At 409, the S-BS 210 transmits a cell switch command (e.g., LTM Cell Switch Command MAC CE) to the UE 230. In addition, the LTM cell switch to the LTM candidate cell 1 of the C-BS 211 may be performed at 410.

[00161] At 411, the C-BS 211 transmits a Handover Success message to the S-BS 210, to inform that the UE 230 has successfully accessed the LTM candidate cell 1 (i.e. the target cell).

[00162] Optionally, the S-BS 210 may transmit a data forwarding information notification to the C-BS 211 at 412, and the data forwarding information notification includes the data forwarding information pool. In some examples, if the cell switch notification at 408 does

not include the data forwarding information pool, then the step 412 may be performed; otherwise, the step 412 may be omitted (i.e. not needed).

[00163] According to the steps 407-412, the LTM cell switch from the S-BS 210 to the C-BS 211 is finished. In other words, the UE 230 has successfully accessed the C-BS 211, and the C-BS 211 will be a source base station for a subsequent LTM cell switch.

[00164] In the process 450, the C-BS 211 may make an LTM cell switch decision towards the LTM candidate cell 2 at 413. In some examples, the C-BS 211 may decide to execute LTM to the LTM candidate cell 2 belonging to the C-BS 212, e.g., based on the L1 measurement result received from the UE 230.

[00165] The C-BS 211 transmits a cell switch notification message (such as an LTM Cell Switch Notification message) to the C-BS 212 at 414, to indicate the initiation of the cell switch command to the UE 230. The cell switch notification message may include the data forwarding information pool that is discussed with reference to step 408.

[00166] At 415, the C-BS 211 transmits a cell switch command (e.g., LTM Cell Switch Command MAC CE) to the UE 230. In addition, the LTM cell switch to the LTM candidate cell 2 of the C-BS 212 may be performed at 416.

[00167] At 417, the C-BS 212 transmits a Handover Success message to the C-BS 211, to inform that the UE 230 has successfully accessed the LTM candidate cell 2 (i.e. the target cell). Optionally, the C-BS 211 may transmit a data forwarding information notification to the C-BS 212 at 418, and the data forwarding information notification includes the data forwarding information pool. In some examples, if the cell switch notification at 414 does not include the data forwarding information pool, then the step 418 may be performed; otherwise, the step 418 may be omitted (i.e. not needed).

[00168] According to the steps 413-418, the subsequent LTM cell switch from the C-BS 211 to the C-BS 212 is finished. In other words, the UE 230 has successfully accessed the C-BS 212, and the C-BS 212 will be a source base station for the next subsequent LTM cell switch.

[00169] It is to be noted that the subsequent LTM cell switch from a source BS (C-BS 211) to a target BS (C-BS 212) at steps 413-418 is similar with the initial LTM cell switch from a source BS (S-BS 210) to a target BS (C-BS 211) at steps 407-412.

[00170] According to embodiments in the process 450, the C-BS 211 may provide the data forwarding information pool to the C-BS 212.

[00171] It is to be appreciated that the process 450 in FIG. 4B is only for illustration without any limitation. In some examples, a next subsequent LTM cell switch from a source BS (C-BS 212) to a target BS (C-BS 213) may be further performed, with steps similar with steps 413-418. In some examples, the steps 412 and 418 may be not performed. In some examples, the step 409 may be performed before step 408, the step 415 may be performed before step 414. In some examples, a name of any message may be changed. In some examples, some additional steps may be included. For example, the S-BS 210 may receive a measurement result from the UE 230 before step 407. For example, the C-BS 211 may receive a measurement result from the UE 230 before step 413. It is to be understood that some further embodiments may be obtained and are still in the protection scope of the present disclosure.

[00172] FIG. 4C illustrates a signalling chart illustrating communication process 460 which involves the UE 230, the S-BS 210, the C-BS 211 (C-BS1), the C-BS 212 (C-BS 2), and the C-BS 213 (C-BS3) as discussed with reference to FIG. 2F. The process 460 may include steps 401a-406 that discussed in the process 400 in FIG. 4A.

[00173] In the process 460, the S-BS 210 may notify the data forwarding information pool to each of C-BSs at 427. As shown in FIG. 4C, a data forwarding information notification is transmitted to the C-BS 211 at 427a, a data forwarding information notification is transmitted to the C-BS 212 at 427b, and a data forwarding information notification is transmitted to the C-BS 213 at 427c. Each of the data forwarding information notification may include the data forwarding information pool, e.g., that shown in Table 2 or 3.

[00174] In some examples, the data forwarding information notification may be included in a Handover Request message, an Early Status Transfer message, or a dedicated message, and the present disclosure does not limit for this aspect.

[00175] In the process 460, the S-BS 210 may make an LTM cell switch decision towards the LTM candidate cell 1 at 428. In some examples, the S-BS 210 may decide to execute LTM to the LTM candidate cell 1 belonging to the C-BS 211, e.g., based on the L1 measurement result received from the UE 230.

[00176] The S-BS 210 transmit a cell switch notification message (such as an LTM Cell Switch Notification message) to the C-BS 211 at 429, to indicate the initiation of the cell switch command to the UE 230.

[00177] At 430, the S-BS 210 transmits a cell switch command (e.g., LTM Cell Switch Command MAC CE) to the UE 230. In addition, the LTM cell switch to the LTM candidate cell 1 of the C-BS 211 may be performed at 431.

[00178] At 432, the C-BS 211 transmits a Handover Success message to the S-BS 210, to inform that the UE 230 has successfully accessed the LTM candidate cell 1 (i.e. the target cell).

[00179] According to the steps 428-432, the LTM cell switch from the S-BS 210 to the C-BS 211 is finished. In other words, the UE 230 has successfully accessed the C-BS 211, and the C-BS 211 will be a source base station for a subsequent LTM cell switch.

[00180] In the process 460, the C-BS 211 may make an LTM cell switch decision towards the LTM candidate cell 2 at 433. In some examples, the C-BS 211 may decide to execute LTM to the LTM candidate cell 2 belonging to the C-BS 212, e.g., based on the L1 measurement result received from the UE 230.

[00181] The C-BS 211 transmit a cell switch notification message (such as an LTM Cell Switch Notification message) to the C-BS 212 at 434, to indicate the initiation of the cell switch command to the UE 230.

[00182] At 435, the C-BS 211 transmits a cell switch command (e.g., LTM Cell Switch Command MAC CE) to the UE 230. In addition, the LTM cell switch to the LTM candidate cell 2 of the C-BS 212 may be performed at 436. At 437, the C-BS 212 transmits a Handover Success message to the C-BS 211, to inform that the UE 230 has successfully accessed the LTM candidate cell 2 (i.e. the target cell).

[00183] According to the steps 433-437, the subsequent LTM cell switch from the C-BS 211 to the C-BS 212 is finished. In other words, the UE 230 has successfully accessed the C-BS 212, and the C-BS 212 will be a source base station for the next subsequent LTM cell switch.

[00184] It is to be noted that the subsequent LTM cell switch from a source BS (C-BS 211) to a target BS (C-BS 212) at steps 433-437 is similar with the initial LTM switch from a source BS (S-BS 210) to a target BS (C-BS 211) at steps 428-432.

[00185] According to embodiments in the process 460, the S-BS 210 may provide the data forwarding information pool to each of the C-BSs, e.g. during an LTM preparation stage.

[00186] It is to be appreciated that the process 460 in FIG. 4C is only for illustration without any limitation. In some examples, a next subsequent LTM cell switch from a source BS (C-BS 212) to a target BS (C-BS 213) may be further performed, with steps similar with steps 433-437. In some examples, the step 430 may be performed before step 429, the step 435 may be performed before step 434. In some examples, a name of any message may be changed. In some examples, some additional steps may be included. For example, the S-BS 210 may receive a measurement result from the UE 230 before step 428. For example, the C-BS 211 may receive a measurement result from the UE 230 before step 433. It is to be understood that some further embodiments may be obtained and are still in the protection scope of the present disclosure.

[00187] FIG. 4D illustrates a signalling chart illustrating communication process 470 which involves the UE 230, the S-BS 210, the C-BS 211 (C-BS1), the C-BS 212 (C-BS 2), and the C-BS 213 (C-BS3) as discussed with reference to FIG. 2F. The process 470 may include steps 401a-406 that discussed in the process 400 in FIG. 4A and include steps 407-412 that discussed in the process 450 in FIG. 4B.

[00188] In the process 470, the C-BS 211 may make an LTM cell switch decision towards the LTM candidate cell 2 at 443. In some examples, the C-BS 211 may decide to execute LTM to the LTM candidate cell 2 belonging to the C-BS 212, e.g., based on the L1 measurement result received from the UE 230.

[00189] The C-BS 211 transmit a cell switch notification message (such as an LTM Cell Switch Notification message) to the C-BS 212 at 444a, to indicate the initiation of the cell switch command to the UE 230. The C-BS 211 may also transmit a cell switch notification message (such as an LTM Cell Switch Notification message) to the S-BS 210 at 444b, to indicate the initiation of the cell switch command to the UE 230.

[00190] Optionally, the S-BS 210 may transmit a data forwarding information notification to the C-BS 212 at 445, and the data forwarding information notification includes the data forwarding information pool, e.g., that shown in Table 2 or 3.

[00191] At 446, the C-BS 211 transmits a cell switch command (e.g., LTM Cell Switch Command MAC CE) to the UE 230. In addition, the LTM cell switch to the LTM candidate cell 2 of the C-BS 212 may be performed at 447.

[00192] At 448a, the C-BS 212 transmits a Handover Success message to the C-BS 211, to inform that the UE 230 has successfully accessed the LTM candidate cell 2 (i.e. the target cell). At 448b, the C-BS 212 transmits a Handover Success message to the S-BS 210, to inform that the UE 230 has successfully accessed the LTM candidate cell 2 (i.e. the target cell).

[00193] Optionally, the S-BS 210 may transmit a data forwarding information notification to the C-BS 212 at 449, and the data forwarding information notification includes the data forwarding information pool, e.g., that shown in Table 2 or 3. In some examples, if the step 445 is not performed, then the step 449 may be performed; otherwise, the step 449 may be omitted (i.e. not needed).

[00194] According to the steps 443-449, the subsequent LTM cell switch from the C-BS 211 to the C-BS 212 is finished. In other words, the UE 230 has successfully accessed the C-BS 212, and the C-BS 212 will be a source base station for the next subsequent LTM cell switch.

[00195] According to embodiments in the process 470, the S-BS 210 may provide the data forwarding information pool to each of the C-BSs, e.g. during an LTM execution stage.

[00196] It is to be appreciated that the process 470 in FIG. 4D is only for illustration without any limitation. In some examples, a next subsequent LTM cell switch from a source BS (C-BS 212) to a target BS (C-BS 213) may be further performed, with steps similar with steps 443-449. In some examples, the step 446 may be performed before step 444a. In some examples, a name of any message may be changed. In some examples, some additional steps may be included. For example, the C-BS 211 may receive a measurement result from the UE 230 before step 443. It is to be understood that some further embodiments may be obtained and are still in the protection scope of the present disclosure.

[00197] According to some embodiments with reference to FIGS. 3-4D, an early data forwarding among BSs in an LTM procedure is enabled. Therefore, the data delay for the UE during the LTM procedure can be reduced.

[00198] Reference is further made to FIGS. 5A-5B. FIG. 5A illustrates a signalling chart illustrating communication process 500 of an LTM preparation stage, and FIG. 5B illustrates a signalling chart illustrating communication process 550 for a late data forwarding. The process 500 and the process 550 involve the UE 230, the S-BS 210, the C-BS 211 (C-BS1), the C-BS 212 (C-BS 2), and the C-BS 213 (C-BS3) as discussed with reference to FIG. 2F.

[00199] In the process 500, the S-BS 210 may request LTM configuration for one or more LTM candidate cells belonging to one or more C-BSs by sending a Handover Request message. As shown in FIG. 5A, a Handover Request message is transmitted to the C-BS 211 at 501a, and the Handover Request message to the C-BS 211 at 501a includes a cell ID of an LTM candidate cell 1 (i.e. cell1 ID) belonging to the C-BS 211. A Handover Request message is transmitted to the C-BS 212 at 501b, and the Handover Request message to the C-BS 212 at 501b includes a cell ID of an LTM candidate cell 2 (i.e. cell2 ID) belonging to the C-BS 212. A Handover Request message is transmitted to the C-BS 213 at 501c, and the Handover Request message to the C-BS 213 at 501c includes a cell ID of an LTM candidate cell 3 (i.e. cell3 ID) belonging to the C-BS 213.

[00200] In the description for the process 500, it is assumed that the C-BS 211 is with a split architecture. In this case, the steps 502-503 which are similar with the steps 402-403 in FIG. 4A may be performed. It is to be noted that the steps 502-503 may be not needed if the C-BS 211 is not with the split architecture. It is to be noted that the C-BS 212 or 213 may perform steps similar with the steps 502-503 if the C-BS 212 or 213 is with the split architecture.

[00201] In the process 500, each of C-BSs may reply with a Handover Request Acknowledge message to the S-BS 210, and the Handover Request Acknowledge message may include the LTM candidate configuration. In some examples, The LTM candidate configuration may be included in the HandoverCommand message embedded in the Handover Request Acknowledge message.

[00202] As shown in FIG. 5A, a Handover Request Acknowledge message is transmitted from the C-BS 211 at 504a, and the Handover Request Acknowledge message may include data forwarding information associated with the C-BS 211, e.g. the data forwarding information 11 as in Table 2. A Handover Request Acknowledge message is transmitted from the C-BS 212 at 504b, and the Handover Request Acknowledge message may include data forwarding information associated with the C-BS 212, e.g. the data forwarding information 12 as in Table 2. A Handover Request Acknowledge message is transmitted from the C-BS 213 at 504c, and the Handover Request Acknowledge message may include data forwarding information associated with the C-BS 213, e.g. the data forwarding information 13 as in Table 2.

[00203] In the process 500, the S-BS 210 sends the RRCReconfiguration message to the UE 230 at 505 and the RRC Reconfiguration message includes the LTM candidate configuration. At 506, the UE 230 may reply with the RRCReconfigurationComplete message to the S-BS 210.

[00204] In addition, additional steps may be further performed, details are provided in FIG. 5B. As shown in FIG. 5B, the process 550 may include steps 501a-506 that discussed in the process 500 in FIG. 5A.

[00205] In the process 550, the S-BS 210 may make an LTM cell switch decision towards the LTM candidate cell 1 at 507. In some examples, the S-BS 210 may decide to execute LTM to the LTM candidate cell 1 belonging to the C-BS 211, e.g., based on the L1 measurement result received from the UE 230.

[00206] The S-BS 210 transmit a cell switch notification message (such as an LTM Cell Switch Notification message) to the C-BS 211 at 508, to indicate the initiation of the cell switch command to the UE 230.

[00207] At 509, the S-BS 210 transmits a cell switch command (e.g., LTM Cell Switch Command MAC CE) to the UE 230. In addition, the LTM cell switch to the LTM candidate cell 1 of the C-BS 211 may be performed at 510.

[00208] At 511, the C-BS 211 transmits a Handover Success message to the S-BS 210, to inform that the UE 230 has successfully accessed the LTM candidate cell 1 (i.e. the target cell).

[00209] According to the steps 507-511, the LTM cell switch from the S-BS 210 to the C-BS 211 is finished. In other words, the UE 230 has successfully accessed the C-BS 211, and the C-BS 211 will be a source base station for a subsequent LTM cell switch.

[00210] In the process 550, the C-BS 211 may make an LTM cell switch decision towards the LTM candidate cell 2 at 512. In some examples, the C-BS 211 may decide to execute LTM to the LTM candidate cell 2 belonging to the C-BS 212, e.g., based on the L1 measurement result received from the UE 230.

[00211] The C-BS 211 transmit a cell switch notification message (such as an LTM Cell Switch Notification message) to the C-BS 212 at 513, to indicate the initiation of the cell switch command to the UE 230.

[00212] In some examples, the cell switch notification message (such as an LTM Cell Switch Notification message) may include the UE context reference at the S-BS 210. For example, the UE context reference at the S-BS 210 may include the UE (Xn application protocol) XnAP ID at the S-BS 210. For example, the UE context reference at the S-BS 210 also include the node ID of the S-BS 210.

[00213] Optionally, the C-BS 212 may transmit data forwarding information associated with the C-BS 212 to the C-BS 211 at 514. As such, the C-BS 212 may notify the data forwarding information to the C-BS 211. In some examples, the data forwarding information associated with the C-BS 212 at 514 may be the same or may be different from that transmitted at step 504b.

[00214] At 515, the C-BS 211 transmits a cell switch command (e.g., LTM Cell Switch Command MAC CE) to the UE 230. In addition, the LTM cell switch to the LTM candidate cell 2 of the C-BS 212 may be performed at 516.

[00215] At 517, the C-BS 212 transmits a Handover Success message to the C-BS 211, to inform that the UE 230 has successfully accessed the LTM candidate cell 2 (i.e. the target cell). Optionally, the handover success message at 517 may include data forwarding information associated with the C-BS 212, if the step 514 is not performed. In some examples, the data forwarding information associated with the C-BS 212 at 517 may be the same or may be different from that transmitted at step 504b.

[00216] According to the steps 512-517, the subsequent LTM cell switch from the C-BS 211 to the C-BS 212 is finished. In other words, the UE 230 has successfully accessed the C-BS 212, and the C-BS 212 will be a new source base station for the next subsequent LTM cell switch.

[00217] According to embodiments in the process 550, a target BS (such as the C-BS 212) may provide the data forwarding information associated with the target BS to a source BS (such as the C-BS 211) in a subsequent LTM cell switch.

[00218] It is to be appreciated that the process 550 in FIG. 5B is only for illustration without any limitation. In some examples, a next subsequent LTM cell switch from a source BS (C-BS 212) to a target BS (C-BS 213) may be further performed, with steps similar with steps 512-517. In some examples, the step 509 may be performed before step 5089, the step 515 may be performed before step 513. In some examples, a name of any message may be changed. In some examples, some additional steps may be included. For example, the S-

BS 210 may receive a measurement result from the UE 230 before step 507. For example, the C-BS 211 may receive a measurement result from the UE 230 before step 512. It is to be understood that some further embodiments may be obtained and are still in the protection scope of the present disclosure.

[00219] As such, a solution is provided for supporting the data forwarding from the new source BS to the target BS for the subsequent inter-CU LTM, if the data forwarding information provided during the LTM preparation could not be used.

[00220] According to some embodiments discussed above, a solution for supporting data forwarding in LTM is provided. It is to be appreciated that the processes discussed with reference to FIGS. 3-5B are only for illustration without any limitation. For example, some step(s) may be omitted, reordered, modified, or combined, or some further step(s) may be also included, the present disclosure does not limit for this aspect.

[00221] In the present disclosure, the terms procedure, process, phase, and stage may be used interchangeably in some embodiments.

[00222] FIG. 6 illustrates an example of a device 600 that is suitable for implementing embodiments of the present disclosure. The device 600 may be an example of a base station as described herein. The device 600 may support wireless communication with the S-BS 210, the C-BS 211/212/213, or any combination thereof. 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).

[00223] 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.

[00224] 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).

[00225] 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 operations discussed above.

[00226] 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.

[00227] 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.

[00228] 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 602. 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.

[00229] 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.

[00230] 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.

[00231] 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.

[00232] FIG. 7 illustrates an example of a processor 700 that is suitable for implementing some embodiments of the present disclosure. The processor 700 may be an example of a processor configured to perform various operations in accordance with examples as described herein. The processor 700 may include a controller 702 configured to perform various operations in accordance with examples as described herein. The processor 700 may optionally include at least one memory 704, such as L1/L2/L3 cache. Additionally, or alternatively, the processor 700 may optionally include one or more arithmetic-logic units (ALUs) 706. 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).

[00233] The processor 700 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 700) 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).

[00234] The controller 702 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 700 to cause the processor 700 to support various operations in accordance with examples as described herein. For example, the controller 702 may operate as a control unit of the processor 700, generating control signals that manage the operation of various components of the processor 700. These control signals include enabling or disabling functional units, selecting data paths, initiating memory access, and coordinating timing of operations.

[00235] The controller 702 may be configured to fetch (e.g., obtain, retrieve, receive) instructions from the memory 704 and determine subsequent instruction(s) to be executed to

cause the processor 700 to support various operations in accordance with examples as described herein. The controller 702 may be configured to track memory address of instructions associated with the memory 704. The controller 702 may be configured to decode instructions to determine the operation to be performed and the operands involved. For example, the controller 702 may be configured to interpret the instruction and determine control signals to be output to other components of the processor 700 to cause the processor 700 to support various operations in accordance with examples as described herein. Additionally, or alternatively, the controller 702 may be configured to manage flow of data within the processor 700. The controller 702 may be configured to control transfer of data between registers, arithmetic logic units (ALUs), and other functional units of the processor 700.

[00236] The memory 704 may include one or more caches (e.g., memory local to or included in the processor 700 or other memory, such RAM, ROM, DRAM, SDRAM, SRAM, MRAM, flash memory, etc. In some implementations, the memory 704 may reside within or on a processor chipset (e.g., local to the processor 700). In some other implementations, the memory 704 may reside external to the processor chipset (e.g., remote to the processor 700).

[00237] The memory 704 may store computer-readable, computer-executable code including instructions that, when executed by the processor 700, cause the processor 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. The controller 702 and/or the processor 700 may be configured to execute computer-readable instructions stored in the memory 704 to cause the processor 700 to perform various functions. For example, the processor 700 and/or the controller 702 may be coupled with or to the memory 704, the processor 700, the controller 702, and the memory 704 may be configured to perform various functions described herein. In some examples, the processor 700 may include multiple processors and the memory 704 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.

[00238] The one or more ALUs 706 may be configured to support various operations in accordance with examples as described herein. In some implementations, the one or more ALUs 706 may reside within or on a processor chipset (e.g., the processor 700). In some other implementations, the one or more ALUs 706 may reside external to the processor chipset (e.g., the processor 700). One or more ALUs 706 may perform one or more

computations such as addition, subtraction, multiplication, and division on data. For example, one or more ALUs 706 may receive input operands and an operation code, which determines an operation to be executed. One or more ALUs 706 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 706 may support logical operations such as AND, OR, exclusive-OR (XOR), not-OR (NOR), and not-AND (NAND), enabling the one or more ALUs 706 to handle conditional operations, comparisons, and bitwise operations.

[00239] The processor 700 may support wireless communication in accordance with examples as disclosed herein. The processor 700 may be configured to or operable to support a means for operations described in some embodiments of the present disclosure.

[00240] FIG. 8 illustrates a flowchart of a method 800 performed by a source BS in accordance with aspects of the present disclosure. The operations of the method 800 may be implemented by a device or its components as described herein. For example, the operations of the method 800 may be performed by the S-BS 210 in FIG. 2F. 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.

[00241] At 810, the method may include receiving first data forwarding information associated with a first candidate base station from the first candidate base station, and second data forwarding information associated with a second candidate base station from the second candidate base station, wherein the first and second data forwarding information includes respective transport layer information for establishment of data forwarding tunnels towards the first and second candidate base stations. The operations of 810 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 810 may be performed by the S-BS 210 as described with reference to FIG. 2F.

[00242] At 820, the method may include transmitting at least the first data forwarding information associated with the first candidate base station to the second candidate base station, or at least the second data forwarding information associated with the second candidate base station to the first candidate base station. The operations of 820 may be performed in accordance with examples as described herein. In some implementations,

aspects of the operations of 820 may be performed by the S-BS 210 as described with reference to FIG. 2F.

[00243] FIG. 9 illustrates a flowchart of a method 900 performed by a first candidate BS in accordance with aspects of the present disclosure. The operations of the method 900 may be implemented by a device or its components as described herein. For example, the operations of the method 900 may be performed by the C-BS 211 in FIG. 2F. 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.

[00244] At 910, the method may include receiving, from a source base station for configuring LTM for a UE, at least second data forwarding information associated with a second candidate base station, wherein the second data forwarding information includes transport layer information for establishment of a data forwarding tunnel towards the second candidate base station. The operations of 910 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 910 may be performed by the C-BS 211 as described with reference to FIG. 2F.

[00245] At 920, the method may include performing data forwarding for the UE towards the second candidate base station, based on the at least second data forwarding information associated with the second candidate base station. The operations of 920 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 920 may be performed by the C-BS 211 as described with reference to FIG. 2F.

[00246] FIG. 10 illustrates a flowchart of a method 1000 performed by a second candidate BS 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 the C-BS 212/213 in FIG. 2F. 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.

[00247] At 1010, the method may include receiving, from a source base station for configuring LTM for the UE or a first candidate base station, at least third data forwarding information associated with a third candidate base station, wherein the third data forwarding information includes transport layer information for establishment of a data forwarding

tunnel towards the third candidate base station. 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 the C-BS 212/213 as described with reference to FIG. 2F.

[00248] At 1020, the method may include performing data forwarding for the UE towards the third candidate base station, based on the at least third data forwarding information associated with the third candidate base station. The operations of 1020 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 1020 may be performed by the C-BS 212/213 as described with reference to FIG. 2F.

[00249] 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.

[00250] 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.

[00251] 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.

[00252] 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.

[00253] 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.

[00254] 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:

at least one memory; and

at least one processor coupled with the at least one memory and configured to cause the base station, operating as a source base station for configuring L1/L2 Triggered Mobility (LTM) for a user equipment (UE), to:

receive first data forwarding information associated with a first candidate base station from the first candidate base station, and second data forwarding information associated with a second candidate base station from the second candidate base station, wherein the first and second data forwarding information includes respective transport layer information for establishment of data forwarding tunnels towards the first and second candidate base stations; and

transmit at least the first data forwarding information associated with the first candidate base station to the second candidate base station, or at least the second data forwarding information associated with the second candidate base station to the first candidate base station.

2. The base station of claim 1, wherein the at least one processor is further configured to cause the base station to:

transmit a first request to the first candidate base station and a second request to the second candidate base station for LTM configuration, and

wherein, in response, the first data forwarding information is received from the first candidate base station and the second data forwarding information is received from the second candidate base station.

3. The base station of claim 2, wherein the first request comprises a first cell identifier (ID) of a first LTM candidate cell of the first candidate base station, and the second request comprises a second cell ID of a second LTM candidate cell of the second candidate base station.

4. The base station of claim 3, wherein the first request further comprises the second cell ID of the second LTM candidate cell, and the second request further comprises

the first cell ID of the first LTM candidate cell.

5. The base station of claim 4, wherein the first data forwarding information associated with the first candidate base station comprises:

first transport layer information for establishment of a first data forwarding tunnel from the base station towards the first candidate base station, and

second transport layer information for establishment of a second data forwarding tunnel from the second candidate base station towards the first candidate base station.

6. The base station of claim 1, wherein the at least one processor is further configured to cause the base station to:

transmit, to the first candidate base station, at least the second data forwarding information associated with the second candidate base station based on one of:

the UE is to access a target cell of the first candidate base station, or

the UE has successfully accessed a target cell of the first candidate base station.

7. The base station of claim 1, wherein the at least one processor is configured to cause the base station to:

transmit, to the second candidate base station, at least third data forwarding information associated with a third candidate base station, based on one of:

a first message from the first candidate base station, wherein the first message indicates an initiation of a cell switch command to the UE by the first candidate base station and the first message comprises a cell ID of a target cell of the second candidate base station, or

a second message from the second candidate base station, wherein the second message indicates that the UE has successfully accessed a target cell of the second candidate base station.

8. The base station of claim 1, wherein the at least one processor is configured to cause the base station to:

transmit, to each of the first candidate base station and the second candidate base station, a data forwarding information pool comprising the first data forwarding information associated with the first candidate base station and the second data forwarding information associated with the second candidate base station.

9. The base station of claim 8, wherein the data forwarding information pool is comprised in a cell switch notification message.

10. A base station comprising:

at least one memory; and

at least one processor coupled with the at least one memory and configured to cause the base station, operating as a first candidate base station in an L1/L2 Triggered Mobility (LTM) procedure for a user equipment (UE) to:

receive, from a source base station, at least second data forwarding information associated with a second candidate base station, wherein the second data forwarding information includes transport layer information for establishment of a data forwarding tunnel towards the second candidate base station; and

perform data forwarding for the UE towards the second candidate base station, based on the at least second data forwarding information associated with the second candidate base station.

11. The base station of claim 10, wherein the at least one processor is further configured to cause the base station operating as the first candidate base station to:

receive, from the source base station, a request comprising a first cell identifier (ID) of a first LTM candidate cell of the base station; and

in response, transmit to the source base station, first data forwarding information associated with the base station.

12. The base station of claim 11, wherein the request further comprises a second cell ID of a second LTM candidate cell of the second candidate base station.

13. The base station of claim 12, wherein the first data forwarding information associated with the base station operating as the first candidate base station, comprises:

first transport layer information for establishment of a first data forwarding tunnel from the source base station towards the first candidate base station, and

second transport layer information for establishment of a second data forwarding tunnel from the second candidate base station towards the first candidate base station.

14. The base station of claim 10, wherein the at least one processor is further configured to cause the base station to:

transmit, to the second candidate base station, at least third data forwarding information associated with a third candidate base station based on one of:

the UE is to access a target cell of the second candidate base station, or

the UE has successfully accessed a target cell of the second candidate base station.

15. The base station of claim 10, wherein the at least one processor is further configured to cause the base station to:

transmit, to the source base station, a first message, wherein the first message indicates an initiation of a cell switch command to the UE by the first candidate base station and the first message comprises a cell ID of a target cell of the second candidate base station.

16. The base station of claim 11, wherein the at least one processor is further configured to cause the base station to:

receive, from the source base station, a data forwarding information pool comprising the first data forwarding information associated with the first candidate base station and the second data forwarding information associated with the second candidate base station.

17. The base station of claim 16, wherein the data forwarding information pool is comprised in a cell switch notification message.

18. The base station of claim 10, wherein the at least one processor is further configured to cause the base station to:

transmit, to the second candidate base station, a cell switch notification message comprising UE context reference at the source base station; and

receive, from the second candidate base station, data forwarding information associated with the second candidate base station.

19. The base station of claim 10, wherein the at least one processor is further configured to cause the base station to:

provide, from a central unit control plane of the base station to a central unit user plane of the base station, an LTM related indicator.

20. A base station comprising:

at least one memory; and

at least one processor coupled with the at least one memory and configured to cause the base station, operating as a second candidate base station in an L1/L2 Triggered Mobility (LTM) procedure for a user equipment (UE) to:

receive, from a source base station for configuring LTM for the UE or a first candidate base station, at least third data forwarding information associated with a third candidate base station, wherein the third data forwarding information includes transport layer information for establishment of a data forwarding tunnel towards the third candidate base station; and

perform data forwarding for the UE towards the third candidate base station, based on the at least third data forwarding information associated with the third candidate base station.