

INTER-SN SCG LTM

TECHNICAL FIELD

[0001] The present disclosure relates to wireless communications, and more specifically to radio access network (RAN) units, methods, apparatuses, and computer readable medium for
5 inter-secondary node (inter-SN) secondary cell group (SCG) layer 1/layer 2 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
10 (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
15 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
20 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 configuration (RRC) reconfiguration signalling to trigger the synchronization
25 of target cell based on layer 3 (L3) measurements report. It leads to longer latency, larger overhead, and longer interruption time than beam level mobility.

[0004] 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 layer 1/layer 2 (L1/L2) signalling, in order to reduce the latency, overhead, and interruption time.
30 The LTM refers to a PCell (primary cell of a master cell group) or PSCell (primary cell of a

secondary cell group) cell switch procedure that the network triggers via a medium access control (MAC) control element (CE) based on L1 measurements.

SUMMARY

5 [0005] The present disclosure relates to base stations, user equipment, methods, apparatuses, and computer readable medium for inter-SN SCG LTM. According to the proposed solution, enhancements for supporting the SCG LTM are proposed.

10 [0006] In some implementations, there is provided a first base station. The first base station comprises at least one memory; and at least one processor coupled with the at least one memory and configured to cause the first base station to: transmit, to a second base station, a first request message comprising a first indicator associated with an SCG LTM of a user equipment; receive, from the second base station, a first response message comprising an SCG LTM candidate configuration for each of a plurality of candidate primary secondary cells (PSCells) of the second base station; and transmit, to the user equipment, the SCG LTM candidate configuration for each of the plurality of candidate PSCells and an SCG LTM
15 channel state information (CSI) resource configuration, wherein the SCG LTM CSI resource configuration comprises a plurality of reference signal (RS) configurations of the plurality of candidate PSCells, and each of the plurality of RS configurations is associated with an LTM candidate identity/identifier (ID).

20 [0007] In some implementations, there is provided a second base station. The second base station comprises at least one memory; and at least one processor coupled with the at least one memory and configured to cause the second base station to: receive, from a first base station, a first request message comprising a first indicator associated with an SCG LTM of a user equipment; and transmit, to the first base station, a first response message comprising an SCG LTM candidate configuration for each of a plurality of candidate PSCells of the
25 second base station.

30 [0008] In some implementations, there is provided a third base station. The third base station comprises at least one memory; and at least one processor coupled with the at least one memory and configured to cause the third base station to: receive, from a first base station, a second modification request message comprising a third indicator associated with an SCG LTM of a user equipment; and transmit, to the first base station, a second modification response message comprising an SCG LTM CSI report configuration for a serving cell of the user equipment.

[0009] In some implementations, there is provided a user equipment. The user equipment comprises at least one memory; and at least one processor coupled with the at least one memory and configured to cause the user equipment to: receive, from a first base station, an SCG LTM candidate configuration for each of a plurality of candidate PSCells of one or more second base stations and an SCG LTM CSI resource configuration, wherein the SCG LTM CSI resource configuration comprises a plurality of RS configurations of the plurality of candidate PSCells, and each of the plurality of RS configurations is associated with an LTM candidate ID; receive, from a third base station, an SCG LTM cell switch command comprising a target PSCell in the plurality of candidate PSCells, wherein the target PSCell is associated with a target base station in the one or more second base stations; and switch, based on the SCG LTM cell switch command, from a serving cell of the third base station to the target PSCell of the target base station.

[0010] In some implementations, there is provided a method performed by the first base station. The method comprises: transmitting, to a second base station, a first request message comprising a first indicator associated with an SCG LTM of a user equipment; receiving, from the second base station, a first response message comprising an SCG LTM candidate configuration for each of a plurality of candidate PSCells of the second base station; and transmitting, to the user equipment, the SCG LTM candidate configuration for each of the plurality of candidate PSCells and an SCG LTM CSI resource configuration, wherein the SCG LTM CSI resource configuration comprises a plurality of RS configurations of the plurality of candidate PSCells, and each of the plurality of RS configurations is associated with an LTM candidate ID.

[0011] In some implementations, there is provided a method performed by the second base station. The method comprises: receiving, from a first base station, a first request message comprising a first indicator associated with an SCG LTM of a user equipment; and transmitting, to the first base station, a first response message comprising an SCG LTM candidate configuration for each of a plurality of candidate PSCells of the second base station.

[0012] In some implementations, there is provided a method performed by the third base station. The method comprises: receiving, from a first base station, a second modification request message comprising a third indicator associated with an SCG LTM of a user equipment; and transmitting, to the first base station, a second modification response message comprising an SCG LTM CSI report configuration for a serving cell of the user equipment.

[0013] In some implementations, there is provided a method performed by the UE. The method comprises: receiving, from a first base station, an SCG LTM candidate configuration for each of a plurality of candidate PSCells of one or more second base stations and an SCG LTM CSI resource configuration, wherein the SCG LTM CSI resource configuration
5 comprises a plurality of RS configurations of the plurality of candidate PSCells, and each of the plurality of RS configurations is associated with an LTM candidate ID; receiving, from a third base station, an SCG LTM cell switch command comprising a target PSCell in the plurality of candidate PSCells, wherein the target PSCell is associated with a target base station in the one or more second base stations; and switching, based on the SCG LTM cell
10 switch command, from a serving cell of the third base station to the target PSCell of the target 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: transmit, to a second base station, a first request message
15 comprising a first indicator associated with an SCG LTM of a user equipment; receive, from the second base station, a first response message comprising an SCG LTM candidate configuration for each of a plurality of candidate PSCells of the second base station; and transmit, to the user equipment, the SCG LTM candidate configuration for each of the plurality of candidate PSCells and an SCG LTM CSI resource configuration, wherein the
20 SCG LTM CSI resource configuration comprises a plurality of RS configurations of the plurality of candidate PSCells, and each of the plurality of RS configurations is associated with an LTM candidate ID.

[0015] 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 first base station, a first request message
25 comprising a first indicator associated with an SCG LTM of a user equipment; and transmit, to the first base station, a first response message comprising an SCG LTM candidate configuration for each of a plurality of candidate PSCells of the second base station.

[0016] 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 first base station, a second modification
30 request message comprising a third indicator associated with an SCG LTM of a user equipment; and transmit, to the first base station, a second modification response message

comprising an SCG LTM CSI report configuration for a serving cell of the user equipment.

[0017] 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 first base station, an SCG LTM candidate configuration for each of a plurality of candidate PSCells of one or more second base stations and an SCG LTM CSI resource configuration, wherein the SCG LTM CSI resource configuration comprises a plurality of RS configurations of the plurality of candidate PSCells, and each of the plurality of RS configurations is associated with an LTM candidate ID; receive, from a third base station, an SCG LTM cell switch command comprising a target PSCell in the plurality of candidate PSCells, wherein the target PSCell is associated with a target base station in the one or more second base stations; and switch, based on the SCG LTM cell switch command, from a serving cell of the third base station to the target PSCell of the target base station.

[0018] In some implementations of the methods and the first base station described herein, further comprising: determining the SCG LTM CSI resource configuration, and wherein the first request message further comprises the SCG LTM CSI resource configuration.

[0019] In some implementations of the methods and the first base station described herein, wherein the first response message further comprises the plurality of RS configurations of the plurality of candidate PSCells, further comprising: determining the SCG LTM CSI resource configuration based on the first response message.

[0020] In some implementations of the methods and the first base station described herein, further comprising: transmitting, to a third base station, a third request message comprising a third indicator associated with the SCG LTM and the plurality of RS configurations of the plurality of candidate PSCells; and receiving, from the third base station, a third response message comprising the SCG LTM CSI resource configuration.

[0021] In some implementations of the methods and the first base station described herein, further comprising: receiving, from a third base station, a second request message comprising a second indicator associated with the SCG LTM; and transmitting, to the third base station, a second response message indicating that the plurality of candidate PSCells for the SCG LTM.

[0022] In some implementations of the methods and the first base station described herein, further comprising: transmitting, to the second base station, a first modification request

message comprising a third indicator associated with the SCG LTM; and receiving, from the second base station, a first modification response message comprising an SCG LTM CSI report configuration for each of the plurality of candidate PSCells.

5 [0023] In some implementations of the methods and the first base station described herein, further comprising: transmitting, to a third base station, a second modification request message comprising a third indicator associated with the SCG LTM; and receiving, from the third base station, a second modification response message comprising an SCG LTM CSI report configuration for a serving cell of the user equipment.

10 [0024] In some implementations of the methods and the first base station described herein, further comprising: receiving, from the second base station, a required message comprising a fourth indicator associated with the SCG LTM and at least one of the plurality of candidate PSCells, wherein the at least one of the plurality of candidate PSCells is associated with at least one of: an updated SCG LTM candidate configuration, or an updated SCG LTM CSI report configuration; and transmitting, to the second base station, a required response message indicating a confirmation of the required message.

15 [0025] In some implementations of the methods and the first base station described herein, further comprising: receiving, from a third base station, a notification message comprising an ID of a target PSCell in the plurality of candidate PSCells, wherein the notification message indicates an initiation of an SCG LTM cell switch command to the user equipment associated with the target PSCell.

[0026] In some implementations of the methods and the first base station described herein, further comprising: receiving, from the user equipment, a reconfiguration complete message comprising the LTM candidate ID, wherein the LTM candidate ID indicates the SCG LTM candidate configuration applied by the user equipment.

25 [0027] In some implementations of the methods and the first base station described herein, further comprising: receiving, from the user equipment, a reconfiguration complete message comprising a physical cell ID, wherein the physical cell ID indicates a target PSCell the user equipment connecting with after an SCG LTM cell switch.

30 [0028] In some implementations of the methods and the second base station described herein, further comprising: selecting, from the list of suggested PSCells, the plurality of candidate PSCells, wherein the first request message further comprises a list of suggested PSCells.

[0029] In some implementations of the methods and second base station described herein, further comprising: determining the SCG LTM reference configuration based on the first request message, wherein the first request message further comprises a request for an SCG LTM reference configuration.

5 [0030] In some implementations of the methods and the second base station described herein, further comprising: receiving, from the first base station, a first modification request message comprising a third indicator associated with the SCG LTM; and transmitting, to the first base station, a first modification response message comprising an SCG LTM CSI report configuration for each of the plurality of candidate PSCells.

10 [0031] In some implementations of the methods and the second base station described herein, further comprising: transmitting, to the first base station, a required message comprising a fourth indicator associated with the SCG LTM and at least one of the plurality of candidate PSCells, wherein the at least one of the plurality of candidate PSCells is associated with at least one of: an updated SCG LTM candidate configuration, or an updated
15 SCG LTM CSI report configuration; and receiving, from the first base station, a required response message indicating a confirmation of the required message.

[0032] In some implementations of the methods and the third base station described herein, further comprising: transmitting, to the first base station, a second request message comprising a second indicator associated with the SCG LTM; and receiving, from the first
20 base station, a second response message indicating that a plurality of candidate PSCells for the SCG LTM.

[0033] In some implementations of the methods and the third base station described herein, further comprising: receiving, from the first base station, a third request message comprising a third indicator associated with the SCG LTM and a plurality of RS configurations of a
25 plurality of candidate PSCells; determining, based on the third request message, an SCG LTM CSI resource configuration, wherein the SCG LTM CSI resource configuration comprises the plurality of RS configurations of the plurality of candidate PSCells, and each of the plurality of RS configurations is associated with an LTM candidate ID; and transmitting, to the first base station, a third response message comprising the SCG LTM CSI
30 resource configuration.

[0034] In some implementations of the methods and the third base station described herein, further comprising: transmitting, to the user equipment, an SCG LTM cell switch command

comprising a target PSCell in the plurality of candidate PSCells; and transmitting, to the first base station, a notification message comprising an ID of the target PSCell, wherein the notification message indicates an initiation of the SCG LTM cell switch command to the user equipment.

- 5 **[0035]** In some implementations of the methods and the UE described herein, further comprising: transmitting, to the first base station, a reconfiguration complete message comprising the LTM candidate ID, wherein the LTM candidate ID indicates the SCG LTM candidate configuration applied by the user equipment.

- 10 **[0036]** In some implementations of the methods and the UE described herein, further comprising: transmitting, to the first base station, a reconfiguration complete message comprising a physical cell ID, wherein the physical cell ID indicates the target PSCell the user equipment connecting with after an SCG LTM cell switch.

[0037] In some implementations of the methods and the base stations described herein, the third request message further comprises an SCG LTM reference configuration.

- 15 **[0038]** In some implementations of the methods and the base stations described herein, the third request message further comprises a request for an SCG LTM reference configuration, and the third response message further comprises the SCG LTM reference configuration.

- 20 **[0039]** In some implementations of the methods and the base stations described herein, the second request message comprises one of: a second indicator associated with the SCG LTM, an ID of the second base station, a list of suggested PSCells, an SCG LTM reference configuration, or the SCG LTM CSI resource configuration.

- 25 **[0040]** In some implementations of the methods and the base stations described herein, the first request message further comprises one of: a list of suggested PSCells, an SCG LTM reference configuration, a request for the SCG LTM reference configuration, the SCG LTM CSI resource configuration, or a maximum number of the plurality of candidate PSCells.

- 30 **[0041]** In some implementations of the methods and the base stations described herein, the first response message further comprises one of: a plurality of IDs of the plurality of PSCells, an SCG LTM reference configuration, the plurality of RS configurations of the plurality of candidate PSCells, or an SCG LTM CSI report configuration for each of the plurality of candidate PSCells.

[0042] In some implementations of the methods and the base stations described herein, the

first modification request message comprises one of: a third indicator associated with the SCG LTM, the SCG LTM CSI resource configuration, or an SCG LTM reference configuration.

5 [0043] In some implementations of the methods and the base stations described herein, the first modification response message further comprises an updated SCG LTM candidate configuration for each of the plurality of candidate PSCells, and wherein the updated SCG LTM candidate configuration is based on an SCG LTM reference configuration.

[0044] In some implementations of the methods and the base stations described herein, the second modification request message comprises one of: a third indicator associated with the SCG LTM, the SCG LTM CSI resource configuration, or a request for an SCG LTM reference configuration.

[0045] In some implementations of the methods and the base stations described herein, the second modification response message further comprises the SCG LTM reference configuration.

15 BRIEF DESCRIPTION OF THE DRAWINGS

[0046] FIG. 1 illustrates an example of a wireless communications system in which some embodiments of the present disclosure can be implemented;

[0047] FIGS. 2A-2B illustrate control plane architectures for evolved universal terrestrial radio access new radio dual connectivity (EN-DC) and multi-radio dual connectivity (MR-DC) with fifth generation core (5GC) respectively;

[0048] FIG. 2C illustrates a radio protocol architecture for master cell group (MCG), SCG and split bearers from a UE perspective in MR-DC with evolved packet core (EPC);

[0049] FIG. 2D illustrates a radio protocol architecture for MCG, SCG and split bearers from a UE perspective in MR-DC with 5GC;

25 [0050] FIG. 2E illustrates network side protocol termination options for MCG, SCG and split bearers in MR-DC with EPC;

[0051] FIG. 2F illustrates network side protocol termination options for MCG, SCG and split bearers in MR-DC with 5GC;

[0052] FIG. 2G illustrates an overall procedure for LTM;

30 [0053] FIG. 2H illustrates a schematic diagram of an example communication network in

which some embodiments of the present disclosure can be implemented;

[0054] FIG. 3 illustrates a signalling chart illustrating communication process for SCG LTM in accordance with some example embodiments of the present disclosure;

5 [0055] FIG. 4 illustrates a signalling chart illustrating communication process for SCG LTM in accordance with some example embodiments of the present disclosure;

[0056] FIG. 5 illustrates a signalling chart illustrating communication process for SCG LTM in accordance with some example embodiments of the present disclosure;

[0057] FIG. 6 illustrates an example of a device that is suitable for implementing embodiments of the present disclosure;

10 [0058] FIG. 7 illustrates an example of a processor that is suitable for implementing some embodiments of the present disclosure;

[0059] FIG. 8 illustrates a flowchart of an example method implemented at a first base station in accordance with aspects of the present disclosure;

15 [0060] FIG. 9 illustrates a flowchart of an example method implemented at a second base station in accordance with aspects of the present disclosure;

[0061] FIG. 10 illustrates a flowchart of an example method implemented at a third base station in accordance with aspects of the present disclosure; and

[0062] FIG. 11 illustrates a flowchart of an example method implemented at a UE in accordance with aspects of the present disclosure.

20 [0063] Throughout the drawings, the same or similar reference numerals represent the same or similar element.

DETAILED DESCRIPTION

25 [0064] 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
30 by one of ordinary skills in the art to which this disclosure belongs.

[0065] 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.

[0066] 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.

[0067] 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.

[0068] 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 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) 802.11 (Wi-Fi), IEEE 802.16 (WiMAX), IEEE 802.20. The wireless communications system 100 may support radio access technologies beyond 5G. Additionally, the wireless communications system 100 may support technologies, such as time division multiple access (TDMA), frequency division multiple access (FDMA), or code division multiple access (CDMA), etc.

[0069] 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.

[0070] 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, 5 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.

[0071] 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 10 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) 15 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.

[0072] 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 20 capable of communicating with various types of devices, such as the network entities 102, other UEs 104, or network equipment (e.g., the core network 106, the packet data network 108, a relay device, an integrated access and backhaul (IAB) node, or another network equipment), as shown in FIG. 1. Additionally, or alternatively, a UE 104 may support communication with other network entities 102 or UEs 104, which may act as relays in the 25 wireless communications system 100.

[0073] 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- 30 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.

[0074] A network entity 102 may support communications with the core network 106, or with another network entity 102, or both. For example, a network entity 102 may interface with the core network 106 through one or more backhaul links 116 (e.g., via an S1, N2, 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 core network 106). In some implementations, one or more network entities 102 may include subcomponents, such as an access network entity, which may be an example of an access node controller (ANC). An ANC may communicate with the one or more UEs 104 through one or more other access network transmission entities, which may be referred to as a radio heads, smart radio heads, or transmission-reception points (TRPs).

[0075] 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.

[0076] 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)).

[0077] Split of functionality between a CU, a DU, and an RU may be flexible and may support different functionalities depending upon which functions (e.g., network layer functions, protocol layer functions, baseband functions, radio frequency functions, and any combinations thereof) are performed at a CU, a DU, or an RU. For example, a functional

split of a protocol stack may be employed between a CU and a DU such that the CU may support one or more layers of the protocol stack and the DU may support one or more different layers of the protocol stack. In some implementations, the CU may host upper protocol layer (e.g., a layer 3 (L3), a layer 2 (L2)) functionality and signaling (e.g., radio resource control (RRC), service data adaptation protocol (SDAP), packet data convergence protocol (PDCP)). The CU may be connected to one or more DUs or RUs, and the one or more DUs or RUs may host lower protocol layers, such as a layer 1 (L1) (e.g., physical (PHY) layer) or an L2 (e.g., radio link control (RLC) layer, medium access control (MAC) layer) functionality and signaling, and may each be at least partially controlled by the CU.

- 10 **[0078]** 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
15 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).

- [0079]** 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
20 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
25 communication links.

- [0080]** The core network 106 may support user authentication, access authorization, tracking, connectivity, and other access, routing, or mobility functions. The core network 106 may be an evolved packet core (EPC), or a 5G core (5GC), which may include a control plane entity that manages access and mobility (e.g., a mobility management entity (MME),
30 an access and mobility management functions (AMF)) and a user plane entity that routes packets or interconnects to external networks (e.g., a serving gateway (S-GW), a packet data network (PDN) gateway (P-GW), or a user plane function (UPF)). In some implementations, the control plane entity may manage non-access stratum (NAS) functions,

such as mobility, authentication, and bearer management (e.g., data bearers, signal bearers, etc.) for the one or more UEs 104 served by the one or more network entities 102 associated with the core network 106.

[0081] The core network 106 may communicate with the packet data network 108 over one or more backhaul links 116 (e.g., via an S1, N2, 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 core network 106 via a network entity 102. The core network 106 may route traffic (e.g., control information, data, and the like) between the UE 104 and the application server 118 using the established session (e.g., the established PDU session). The PDU session may be an example of a logical connection between the UE 104 and the core network 106 (e.g., one or more network functions of the core network 106).

[0082] 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.

[0083] One or more numerologies may be supported in the wireless communications system 100, and a numerology may include a subcarrier spacing and a cyclic prefix. A first numerology (e.g., $\mu=0$) may be associated with a first subcarrier spacing (e.g., 15 kHz) and a normal cyclic prefix. In some implementations, the first numerology (e.g., $\mu=0$) associated with the first subcarrier spacing (e.g., 15 kHz) may utilize one slot per subframe. A second numerology (e.g., $\mu=1$) may be associated with a second subcarrier spacing (e.g., 30 kHz) and a normal cyclic prefix. A third numerology (e.g., $\mu=2$) may be associated with a third subcarrier spacing (e.g., 60 kHz) and a normal cyclic prefix or an extended cyclic

prefix. A fourth numerology (e.g., $\mu=3$) may be associated with a fourth subcarrier spacing (e.g., 120 kHz) and a normal cyclic prefix. A fifth numerology (e.g., $\mu=4$) may be associated with a fifth subcarrier spacing (e.g., 240 kHz) and a normal cyclic prefix.

[0084] 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.

[0085] Additionally or alternatively, a time interval of a resource (e.g., a communication resource) may be organized according to slots. For example, a subframe may include a number (e.g., quantity) of slots. The number of slots in each subframe may also depend on the one or more numerologies supported in the wireless communications system 100. For instance, the first, second, third, fourth, and fifth numerologies (i.e., $\mu=0$, $\mu=1$, $\mu=2$, $\mu=3$, $\mu=4$) associated with respective subcarrier spacings of 15 kHz, 30 kHz, 60 kHz, 120 kHz, and 240 kHz may utilize a single slot per subframe, two slots per subframe, four slots per subframe, eight slots per subframe, and 16 slots per subframe, respectively. Each slot may include a number (e.g., quantity) of symbols (e.g., OFDM symbols). In some implementations, the number (e.g., quantity) of slots for a subframe may depend on a numerology. For a normal cyclic prefix, a slot may include 14 symbols. For an extended cyclic prefix (e.g., applicable for 60 kHz subcarrier spacing), a slot may include 12 symbols. The relationship between the number of symbols per slot, the number of slots per subframe, and the number of slots per frame for a normal cyclic prefix and an extended cyclic prefix may depend on a numerology. It should be understood that reference to a first numerology (e.g., $\mu=0$) associated with a first subcarrier spacing (e.g., 15 kHz) may be used interchangeably between subframes and slots.

[0086] 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.

[0087] FR1 may be associated with one or multiple numerologies (e.g., at least three numerologies). For example, FR1 may be associated with a first numerology (e.g., $\mu=0$), which includes 15 kHz subcarrier spacing; a second numerology (e.g., $\mu=1$), which includes 30 kHz subcarrier spacing; and a third numerology (e.g., $\mu=2$), which includes 60 kHz subcarrier spacing. FR2 may be associated with one or multiple numerologies (e.g., at least 2 numerologies). For example, FR2 may be associated with a third numerology (e.g., $\mu=2$), which includes 60 kHz subcarrier spacing; and a fourth numerology (e.g., $\mu=3$), which includes 120 kHz subcarrier spacing.

[0088] As mentioned, LTM is a cell switch procedure that the network triggers via MAC CE based on L1 measurements. For the dual connectivity (DC) scenario, in R18, the LTM focuses on the intra-CU PCell change and the intra-SN PSCell change. During the pre-R19 discussion, the inter-SN SCG LTM is proposed, and the following agreements were made in RP-232618:

- Specify support for inter -CU Layer 2 Mobility (LTM)
 - Next level questions still to be discussed/decided:
 - Whether to support cases where CU is acting as master node (MN), and when CU is acting secondary node (SN)?
 - For case where CU is acting as SN, whether it is support for EN-DC and/or NR-NR dual connectivity (NR-DC)?
 - In answering the above questions, focus should be practical deployments.
- NR-DC cases supported by LTM. Note the following common understanding from the offline: LTM is important for MCG only case. In case of NR-DC then LTM on the SCG is the important case (e.g. in FR2), followed by LTM in MCG with SCG configured (SCG unchanged by MCG LTM).

[0089] In MR-DC, the UE has a single RRC state, based on the MN RRC and a single C-plane connection towards the Core Network. FIGS. 2A-2B illustrate control plane

architectures for EN-DC and MR-DC with 5GC respectively. Each radio node has its own RRC entity (E-UTRA version if the node is an eNB or NR version if the node is a gNB) which can generate RRC PDUs to be sent to the UE.

5 [0090] RRC PDUs generated by the SN can be transported via the MN to the UE. The MN always sends the initial SN RRC configuration via MCG SRB (SRB1), but subsequent reconfigurations may be transported via MN or SN. When transporting RRC PDU from the SN, the MN does not modify the UE configuration provided by the SN.

10 [0091] In E-UTRA connected to EPC, at initial connection establishment SRB1 uses E-UTRA PDCP. If the UE supports EN-DC, regardless whether EN-DC is configured or not, after initial connection establishment, MCG SRBs (SRB1 and SRB2) can be configured by the network to use either E-UTRA PDCP or NR PDCP (either SRB1 and SRB2 are both configured with E-UTRA PDCP, or they are both configured with NR PDCP). Change from E-UTRA PDCP to NR PDCP (or vice-versa) is supported via a handover procedure (reconfiguration with mobility) or, for the initial change of SRB1 from E-UTRA PDCP to
15 NR PDCP, with a reconfiguration without mobility before the initial security activation.

[0092] If the SN is a gNB (i.e. for EN-DC, NGEN-DC and NR-DC), the UE can be configured to establish a signaling radio bearer (SRB) with the SN (SRB3) to enable RRC PDUs for the SN to be sent directly between the UE and the SN. RRC PDUs for the SN can only be transported directly to the UE for SN RRC reconfiguration not requiring any
20 coordination with the MN. Measurement reporting for mobility within the SN can be done directly from the UE to the SN if SRB3 is configured.

[0093] Split SRB is supported for all MR-DC options, allowing duplication of RRC PDUs generated by the MN, via the direct path and via the SN. Split SRB uses NR PDCP. This version of the specification does not support the duplication of RRC PDUs generated by the
25 SN via the MN and SN paths.

[0094] In EN-DC, the SCG configuration is kept in the UE during suspension. During connection resumption, if the UE supports resuming with EN-DC, the UE can be configured to release, restore, or reconfigure the SCG configuration. Otherwise, the UE releases the SCG configuration (but not the radio bearer configuration) during resumption initiation.

30 [0095] In MR-DC with 5GC, the UE stores the PDCP/SDAP configuration and the SCG configuration when moving to RRC Inactive. During connection resumption, if the UE supports resuming with MR-DC, the UE can be configured to release, restore, or reconfigure

the SCG configuration. Otherwise, it releases the SCG configuration.

[0096] In MR-DC, from a UE perspective, three bearer types exist: MCG bearer, SCG bearer and split bearer. FIG. 2C illustrates a radio protocol architecture for MCG, SCG and split bearers from a UE perspective in MR-DC with EPC (EN-DC), and FIG. 2D illustrates a radio protocol architecture for MCG, SCG and split bearers from a UE perspective in MR-DC with 5GC (NGEN-DC, NE-DC and NR-DC).

[0097] In E-UTRA connected to EPC, if the UE supports EN-DC, regardless whether EN-DC is configured or not, the network can configure either E-UTRA PDCP or NR PDCP for MN terminated MCG bearers while NR PDCP is always used for all other bearers. Change from E-UTRA to NR PDCP or vice-versa can be performed via a reconfiguration procedure (with or without handover), either using release and add of the DRBs or using the full configuration option.

[0098] In MR-DC with 5GC, NR PDCP is always used for all bearer types. In NGEN-DC, E-UTRA RLC/MAC is used in the MN while NR RLC/MAC is used in the SN. In NE-DC, NR RLC/MAC is used in the MN while E-UTRA RLC/MAC is used in the SN. In NR-DC, NR RLC/MAC is used in both MN and SN.

[0099] From a network perspective, each bearer (MCG, SCG and split bearer) can be terminated either in MN or in SN. FIG. 2E illustrates network side protocol termination options for MCG, SCG and split bearers in MR-DC with EPC (EN-DC), and FIG. 2F illustrates network side protocol termination options for MCG, SCG and split bearers in MR-DC with 5GC (NGEN-DC, NE-DC and NR-DC).

[00100] It is noted that even if only SCG bearers are configured for a UE, for SRB1 and SRB2 the logical channels are always configured at least in the MCG, i.e. this is still an MR-DC configuration and a PCell always exists. If only MCG bearers are configured for a UE, i.e. there is no SCG, this is still considered an MR-DC configuration, as long as at least one of the bearers is terminated in the SN.

[00101] As mentioned above, the LTM is a procedure in which a gNB receives L1 measurement report(s) from a UE, and on their basis the gNB changes UE's serving cell by a cell switch command signaled via a MAC CE. The cell switch command indicates an LTM candidate cell configuration that the gNB previously prepared and provided to the UE through RRC signalling. Then the UE switches to the target cell according to the cell switch command. The LTM procedure can be used to reduce the mobility latency.

[00102] Network may request the UE to perform early TA acquisition of a candidate cell before a cell switch. The early TA acquisition is triggered by PDCCH order or through UE-based TA measurement. It is noted that RAN1 confirmed the working assumption to support UE-based TA measurement (UE derives TA based on Rx timing difference between
5 current serving cell and candidate cell as well as TA value for the current serving cell). The description of UE-based TA management is pending RAN1 and RAN4 progress.

[00103] The network indicates in the cell switch command whether the UE shall access the target cell with a random access (RA) procedure if a TA value is not provided or with PUSCH transmission using the indicated TA value. For RACH-less LTM, the UE accesses the target
10 cell via the configured grant provided in the RRC signalling and selects the configured grant occasion associated with the beam indicated in the cell switch command. If the UE does not receive the configured grant in the RRC signalling, the UE monitors PDCCH for dynamic scheduling from the target cell upon LTM cell switch. Before RACH-less LTM procedure completion, the UE shall not trigger random access procedure if it does not have a valid
15 PUCCH resource for triggered SRs.

[00104] The following principles apply to LTM: - The UE doesn't update its security key in LTM; and - Subsequent LTM is supported.

[00105] 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-
20 frequency cell that is not a current serving cell. The following scenarios are supported: - PCell change in non-CA scenario and non-DC scenario, -PCell change in CA scenario, and - Dual connectivity scenario, PSCell change without MN involvement case, i.e., intra-SN PSCell change.

[00106] While the UE has stored LTM candidate cell configurations, the UE can also execute
25 any L3 handover command sent by the network. It is up to the network to avoid any issue due to a collision between LTM execution and L3 handover execution, e.g., avoiding sending LTM cell switch command and L3 handover command simultaneously.

[00107] Cell switch command is conveyed in a MAC CE, which contains the necessary information to perform the LTM cell switch. FIG. 2G illustrates an overall procedure for
30 LTM. Subsequent LTM is done by repeating the early synchronization, LTM execution, and LTM completion steps without releasing other LTM candidate cell configurations after each LTM completion.

[00108] At step 1 in FIG. 2G, the UE sends a MeasurementReport message to the gNB. The gNB decides to configure LTM and initiates candidate cell(s) preparation. At step 2, the gNB transmits an RRCReconfiguration 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 RRCReconfigurationComplete message to the gNB.

[00109] At step 4a, the UE may perform 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).

[00110] 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.

[00111] 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.

[00112] 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.

[00113] 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.

[00114] At step 8, the UE completes the LTM cell switch procedure by sending RRCReconfigurationComplete 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.

5 [00115] 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.

[00116] The procedure over the air interface described in FIG. 2G 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.

10 [00117] However, in the DC scenario, details on inter-SN SCG LTM have not been discussed. For example, how to orchestrate the index related to the inter-SN SCG LTM candidate cell configuration to support L1 measurement report.

15 [00118] Embodiments of the present disclosure provide a solution of communication. In the solution, a first base station (such as a master node) transmits a first request message to a second base station (such as a candidate target secondary node), the first request message may include a first indicator which is associated with an SCG LTM of a user equipment. The second base station may transmit a first response message to the first base station, and the first response message includes an SCG LTM candidate configuration for each candidate PSCell. In the solution, the first base station may provide an SCG LTM CSI resource configuration and the SCG LTM candidate configuration for each candidate PSCell to the
20 user equipment. As such, the SCG LTM CSI resource configuration may be used for L1 measurement and the SCG LTM candidate configuration may be used for connecting to a target PSCell. Therefore, an inter SN SCG LTM may be supported. Principles and implementations of the present disclosure will be described in detail below with reference to the figures.

25 [00119] FIG. 2H 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. 2H, the communication network 200 may include a first base station 210, a second base station 220-1, a second base station 220-2, a third base station 230, and a UE 250.

30 [00120] Each of the first base station 210, the second base station 220-1, the second base station 220-2, and the third base station 230 may be a gNB. For example, the first base station 210 may be a master node (MN), and each of the second base station 220-1, the second base station 220-2, and the third base station 230 may be a secondary node (SN). The first

base station 210 and the third base station 230 may serve the UE 230 as shown in FIG. 2H.

[00121] While considering a mobility of the UE 250, the mobility may be an intra-MN inter-SN mobility. The third base station 230 may be considered as a source base station, such as a source SN (S-SN). The UE 250 may switch to the second base station 220-1, for example, the UE 250 may move to a location 251, in this case, the second base station 220-1 is a target base station, such as a target SN (T-SN). The UE 250 may switch to the second base station 220-2, for example, the UE 250 may move to a location 252, in this case, the second base station 220-2 is a target base station, such as a target SN (T-SN).

[00122] For ease of description, the second base station 220-1 and the second base station 220-2 may be separately or collectively referred to as the second base station 220, such as a candidate target SN (or candidate SN). It is to be understood that the number of devices in FIG. 2H is given for the purpose of illustration without suggesting any limitations to the present disclosure. For example, there may be multiple candidate target SNs for the UE 250 during the inter-SN mobility.

[00123] For ease of description, some related terms are provided below:

[00124] LTM candidate cell: a candidate cell configured to the UE for LTM. There may be multiple LTM candidate cells prepared for the UE, where the LTM candidate cells may belong to the same or different candidate nodes. For the inter-SN SCG LTM, the LTM candidate cells are LTM candidate PSCells, where the LTM candidate PSCells may belong to the same or different candidate SNs. In some use cases, the PSCells in the source SN may also be the LTM candidate PSCells.

[00125] LTM candidate cell configuration: a configuration associated with an LTM candidate cell. An LTM candidate cell configuration can be a complete LTM candidate cell configuration or a delta (difference) configuration with respect to an LTM reference configuration. Each LTM candidate cell configuration is identified by an index, called as LTM candidate cell configuration index, LTM candidate configuration index, or other names. In one example, the LTM candidate cell configuration index is *LTM-CandidateId*, which is used to identity an LTM candidate cell configuration. For better understanding, the LTM candidate cell configuration is also referred to LTM delta configuration. In addition, for the SCG LTM, the LTM candidate cell configuration is also referred to LTM candidate PSCell configuration, LTM candidate SCG configuration, or SCG LTM candidate configuration.

[00126] LTM reference configuration: a configuration provided by the network to the UE

that is common to all the configured LTM candidate cells. It is used by the UE to generate a complete LTM candidate cell configuration (i.e., by applying an LTM candidate cell configuration on top of an LTM reference configuration). In addition, for the SCG LTM, the LTM reference configuration includes the MCG part and/or SCG part, where the MCG part of the LTM reference configuration is referred to the MCG LTM reference configuration, and the SCG part of the LTM reference configuration is referred to the SCG LTM reference configuration.

[00127] Complete LTM candidate cell configuration: a configuration that contains all the necessary fields needed to perform an LTM cell switch procedure. This configuration can be an LTM candidate cell configuration itself or be generated by applying an LTM candidate cell configuration on top of an LTM reference configuration.

[00128] MN: in DC, the radio access node that provides the control plane connection to the core network.

[00129] SN: in DC, the radio access node, with no control plane connection to the core network, providing additional resources to the UE.

[00130] SCG: in DC, a group of serving cells associated with the SN, comprising the PSCell and optionally one or more SCCells.

[00131] It is to be understood that the present disclosure is discussed for inter-SN SCG LTM. For example, the information or message exchanged between an MN and an SN (such as S-SN or candidate T-SN) is for the SCG LTM, without explicit description.

[00132] Reference is further made to FIG. 3, which illustrates a signalling chart illustrating communication process 300 for the SCG LTM in accordance with some example embodiments of the present disclosure. The process 300 may involve the UE 250, the first base station (MN) 210, the third base station (S-SN), the second base stations (candidate T-SN) 220-1 and 220-2, as show in FIG. 2H. It would be appreciated that the process 300 may be applied to other communication scenarios, which will not be described in detail.

[00133] In the process 300, the first base station 210 transmits a first request message to the second base station 220 at 310. For example, the first request message may be transmitted to each of the second base station 220-1 and the second base station 220-2. The first request message may include a first indicator which indicates that the first request message is associated with LTM, for example, the first indicator is associated with SCG LTM of the UE 250. For example, the first request message may be implemented as an SN Addition

Request message. In some example embodiments, the first indicator may be also called as a first LTM indicator or a first SCG LTM indicator.

[00134] In some example embodiments, the first indicator may be carried in a specific information element (IE) of the first request message. For example, the first indicator may be included in the Conditional PSCell Addition Information Request IE embedded in the SN Addition Request message, e.g., an Enumerated value with TRUE. For example, the first indicator may be included in a newly defined IE in the SN Addition Request message.

[00135] In some implementations, the first request message may include a list of suggested PSCells. In this case, the second base station 220 may configure the SCG LTM by considering the list of suggested PSCells.

[00136] In some example embodiments, the first base station 210 may determine one or more suggested PSCells (recommended PSCells) of each second base station 220 for the UE 250. As a non-limited example, the first base station 210 may determine that one or more suggested PSCells include PSCell 1, PSCell 2 and PSCell 3 of the second base station 220-1 and PSCell 4, PSCell 5 and PSCell 6 of the second base station 220-2. In some examples, the first request message to the second base station 220-1 may include the list of suggested PSCells: PSCell 1, PSCell 2 and PSCell 3, and the first request message to the second base station 220-2 may include the list of suggested PSCells: PSCell 4, PSCell 5 and PSCell 6. It is to be understood that although three suggested PSCells are included in the examples, in some other examples, there may be more or less suggested PSCells.

[00137] In some examples, the list of suggested PSCells may be provided via the measurement results. In some examples, the list of suggested PSCells may be included in the CG-ConfigInfo message embedded in the SN Addition Request message, in this case, the CG-ConfigInfo message includes the list of suggested PSCells.

[00138] In some implementations, the first request message may include an SCG LTM reference configuration. For example, if the first base station 210 has an available SCG LTM reference configuration, then the first request message may include the SCG LTM reference configuration. In some example embodiments, the first request message may further include an MCG LTM reference configuration.

[00139] In some examples, the SCG LTM reference configuration may be included in the first indicator. In some examples, the SCG LTM reference configuration may be included in the CG-ConfigInfo message embedded in the SN Addition Request message, in this case,

the CG-ConfigInfo message includes the SCG LTM reference configuration.

[00140] In some implementations, the first request message may include a request for an SCG LTM reference configuration. For example, if the first base station 210 does not have an available SCG LTM reference configuration, then the first request message may include an indication which indicates that the first base station 210 is requesting the second base station 220 to provide the SCG LTM reference configuration. For example, the indication may be included in the first indicator.

[00141] In some examples, the first request message to the second base station 220-1 may include the indication for requesting an SCG LTM reference configuration, while the first request message to the second base station 220-2 may not include the indication for requesting an SCG LTM reference configuration. In other words, the second base station 220-1 is requested for providing the SCG LTM reference configuration.

[00142] It should be appreciated that the first request message may not include the indication for requesting an SCG LTM reference configuration even though the first base station 210 does not have an available SCG LTM reference configuration.

[00143] In some implementations, the first request message may include a maximum number of candidate PSCells that the second base station 220 may prepare for SCG LTM. For example, the maximum number of candidate PSCells may be included in the first indicator. In some examples, the first request message to the second base station 220-1 may include N1 to indicate a maximum number of candidate PSCells that the second base station 220-1 may prepare for SCG LTM, for example N1=3. In some examples, the first request message to the second base station 220-2 may include N2 to indicate a maximum number of candidate PSCells that the second base station 220-2 may prepare for SCG LTM, for example N2=3 or N2=2. In some examples, the first request message to the second base station 220-2 (or the second base station 220-1) may not include the maximum number of candidate PSCells.

[00144] The second base station 220-1 transmits a first response message to the first base station 210 at 312, and the second base station 220-2 transmits a first response message to the first base station 210 at 314. The first response message may include an SCG LTM candidate configuration for each candidate PSCell. For example, the first response message may be implemented as an SN Addition Request Acknowledge message.

[00145] In some example embodiments, the received first request message may not include a list of suggested PSCells, then the second base station 220 may determine one or more

candidate PSCells, and further determine an SCG LTM candidate configuration for each candidate PSCell. In some other example embodiments, the received first request message may include a list of suggested PSCells, then the second base station 220 may select one or more candidate PSCells from the list of suggested PSCells, and further determine an SCG LTM candidate configuration for each candidate PSCell. In some other example embodiments, the received first request message may include a list of suggested PSCells, then the second base station 220 may take the list of suggested PSCells as one or more candidate PSCells, and further determine an SCG LTM candidate configuration for each candidate PSCell. In some examples, if the received first request message includes a maximum number of candidate PSCells, then the number of the one or more candidate PSCells is not larger than the maximum number.

[00146] In some examples, the SCG LTM candidate configuration may be included in the CG-Config message or the CG-CandidateList message which is embedded in the SN Addition Request Acknowledge message. In this case, the CG-Config message or the CG-CandidateList message includes the SCG LTM candidate configuration for each candidate PSCell.

[00147] In some examples, if the first request message includes the SCG LTM reference configuration, then the SCG LTM candidate configuration for each candidate PSCell in the first response message may be represented as a delta candidate configuration relative to the SCG LTM reference configuration. In this event, the overhead may be reduced.

[00148] In some implementations, the first response message may include the one or more candidate PSCells. For example, one or more IDs of the one or more candidate PSCells provided by the second base station 220 may be included in the first response message. For example, the one or more candidate PSCells are those the second base station 220 prepared for the SCG LTM, for example, the one or more candidate PSCells may be called as one or more prepared candidate PSCells.

[00149] In some implementations, the first response message may include one or more reference signal (RS) configurations of the one or more candidate PSCells. For example, the first response message may include a RS configuration for each candidate PSCell, where the RS may be the synchronization signal / physical broadcast channel block (SSB), and/or channel state information - reference signal (CSI-RS). For example, the RS configuration is the RS resource configuration, where the RS resource configuration may be at least one of:

the non-zero-power channel state information reference signal (NZP-CSI-RS) resource, channel state information synchronization signal / physical broadcast channel block (CSI-SSB) resource, or channel state information interference management (CSI-IM) resource.

5 [00150] In some implementations, the first response message may include an SCG LTM reference configuration. In some examples, if the first request message does not include the SCG LTM reference configuration or if the first request message includes a request for the SCG LTM reference configuration (such as an indication indicating to the second base station 220 to provide the SCG LTM reference configuration), then the first response message may include an SCG LTM reference configuration.

10 [00151] In the process 300, the first base station 210 determines an SCG LTM CSI resource configuration at 320. The SCG LTM CSI resource configuration may be a common SCG LTM CSI resource configuration for all candidate PSCells.

[00152] It is to be understood that although the operation 320 is shown after the operations 312 and 314 in FIG. 3, in some other examples, the operation 320 may be performed earlier, e.g., before the operation 310. In some implementations, the first request message may include the SCG LTM CSI resource configuration. In some example embodiments, the SCG LTM CSI resource configuration may be included in the first indicator in the first request message. In some example embodiments, the SCG LTM CSI resource configuration may be included in the CG-ConfigInfo message embedded in the SN Addition Request message. In this case, the CG-ConfigInfo message includes the SCG LTM CSI resource configuration.

[00153] In some implementations, in case the first request message includes the SCG LTM CSI resource configuration, the first response message may include an SCG LTM CSI report configuration for each candidate PSCell. In some example embodiments, the SCG LTM CSI report configuration for each candidate PSCell may be included in the CG-Config message or the CG-CandidateList message which is embedded in the SN Addition Request Acknowledge message. In this case, the CG-Config message or the CG-CandidateList message includes the SCG LTM CSI report configuration for each candidate PSCell.

30 [00154] In some other implementations, the operation 320 may be performed after the operations 312 and 314. In some examples, the first base station 210 may determine (or generate) the SCG LTM CSI resource configuration based on the first response message.

[00155] The SCG LTM CSI resource configuration is common for all candidate PSCells.

The SCG LTM CSI resource configuration includes one or more (e.g. multiple) RS configurations of one or more (e.g. multiple) candidate PSCells. In some examples, each RS configuration of a candidate PSCell is associated with an LTM candidate ID (LTM-CandidateId). In other words, the one or more (e.g. multiple) RS configurations are associated with a unique LTM-CandidateId. In some examples, the LTM candidate ID (LTM-CandidateId) may be determined (or assigned) by the first base station 210, which may be used to identify the SCG LTM candidate configuration.

[00156] In the process 300, the first base station 210 may transmit a second modification request message to the third base station 230 at 330, and the third base station 230 may transmit a second modification response message to the first base station 210 at 335. As mentioned above, the third base station 230 may be the S-SN of the UE 250. In some examples, the second modification request message may be implemented as an SN Modification Request, and the second modification response message may be implemented as an SN Modification Request Acknowledge.

[00157] In some implementations, the second modification request message includes a third indicator, the third indicator may indicate that the second modification request message is for LTM. In some examples, the third indicator (or be called as a third LTM indicator) is associated with SCG LTM of the UE 250.

[00158] In some example embodiments, the third indicator may be carried in a specific IE of the second modification request message. For example, the third indicator may be included in the Conditional PSCell Addition Information Modification Request IE or the Conditional PSCell Change Information Update IE embedded in the SN Modification Request message, e.g., an Enumerated value with TRUE. For example, the third indicator may be included in a newly defined IE in the SN Modification Request message.

[00159] In some implementations, the second modification request message may include the SCG LTM CSI resource configuration. In some examples, the SCG LTM CSI resource configuration may be included in the third indicator. In some examples, the SCG LTM CSI resource configuration may be included in the CG-ConfigInfo message embedded in the SN Modification Request message, that is, the CG-ConfigInfo message includes the SCG LTM CSI resource configuration.

[00160] In some implementations, the second modification request message may include a request for an SCG LTM reference configuration. For example, if the first base station 210

does not have an available SCG LTM reference configuration, then the second modification request message may include an indication which indicates that the first base station 210 is requesting the third base station 230 to provide the SCG LTM reference configuration. For example, the indication may be included in the third indicator.

5 **[00161]** For example, neither of the first request message nor the first response message include the SCG LTM reference configuration, the first base station 210 does not have an available SCG LTM reference configuration, then the second modification request message may include an indication indicating to the third base station 230 to provide the SCG LTM reference configuration.

10 **[00162]** In some implementations, the second modification response message may include an SCG LTM CSI report configuration for a serving cell of the UE 250, where the serving cell is provided by the third base station 230. In some examples, the SCG LTM CSI report configuration for the serving cell may be used to configure LTM L1 measurement report on the serving cell (serving PSCell) in the third base station 230.

15 **[00163]** In some implementations, the second modification response message may include the SCG LTM reference configuration. For example, if the second modification request message is requesting for the SCG LTM reference configuration, then the third base station 230 may provide the SCG LTM reference configuration in the second modification response message.

20 **[00164]** It is to be understood that in case the first base station 210 already has the SCG LTM CSI report configuration for the serving cell, the operations 330 and 335 may be omitted in the process 300, or the operations 330 and 335 may be performed before the operation 310.

25 **[00165]** In the process 300, the first base station 210 transmits a first modification request message to the second base station 220 at 340. The first base station 210 receives a first modification response message from the second base station 220-1 at 342, and receives a first modification response message from the second base station 220-2 at 344. In some examples, the first modification request message may be implemented as an SN modification Request, and the first modification response message may be implemented as an SN Modification Request Acknowledge.

30 **[00166]** In some implementations, the first modification request message includes a third indicator, the third indicator may indicate that the first modification request message is for LTM. In some examples, the third indicator (or be called as a third LTM indicator) is

associated with SCG LTM of the UE 250.

[00167] In some example embodiments, the third indicator may be carried in a specific IE of the first modification request message. For example, the third indicator may be included in the Conditional PSCell Addition Information Modification Request IE or the Conditional PSCell Change Information Update IE embedded in the SN Modification Request message, e.g., an Enumerated value with TRUE. For example, the third indicator may be included in a newly defined IE in the SN Modification Request message.

[00168] In some implementations, the first modification request message may include the SCG LTM CSI resource configuration. In some examples, the SCG LTM CSI resource configuration may be included in the third indicator. In some examples, the SCG LTM CSI resource configuration may be included in the CG-ConfigInfo message embedded in the SN Modification Request message, that is, the CG-ConfigInfo message includes the SCG LTM CSI resource configuration.

[00169] In some implementations, the first modification request message may include an SCG LTM reference configuration. For example, neither of the first request message nor the first response message include the SCG LTM reference configuration, then the first modification request message may include the SCG LTM reference configuration.

[00170] In some examples, the SCG LTM reference configuration may be included in the third indicator. In some examples, the SCG LTM reference configuration may be included in the CG-ConfigInfo message embedded in the SN Modification Request message, that is, the CG-ConfigInfo message includes the SCG LTM reference configuration.

[00171] In some implementations, the first modification response message may include an SCG LTM CSI report configuration for each candidate PSCell. In some examples, the SCG LTM CSI report configuration for each candidate PSCell may be used to configure LTM L1 measurement report on the candidate PSCell in the second base station 220.

[00172] For example, the first modification response message from the second base station 220-1 may include a first SCG LTM CSI report configuration for candidate PSCell 1, a second SCG LTM CSI report configuration for candidate PSCell 2, and a third SCG LTM CSI report configuration for candidate PSCell 3. For example, the first modification response message from the second base station 220-2 may include a fourth SCG LTM CSI report configuration for candidate PSCell 4, a fifth SCG LTM CSI report configuration for candidate PSCell 5, and a sixth SCG LTM CSI report configuration for candidate PSCell 6.

[00173] In some other implementations, the first modification response message may include an updated SCG LTM candidate configuration for each candidate PSCell. In some example embodiments, if the first request message does not include the SCG LTM reference configuration but the first modification request message includes the SCG LTM reference configuration, then the second base station 220 may determine an updated SCG LTM candidate configuration for each candidate PSCell, e.g., a delta candidate configuration relative to the SCG LTM reference configuration for each candidate PSCell.

[00174] It is to be understood that in case the first base station 210 already has the SCG LTM CSI report configuration for each candidate PSCell, the operations 340 through 344 may be omitted in the process 300. In some examples, the second base station 220-1 has provided the SCG LTM CSI report configuration for each candidate PSCell (such as PSCells 1-3) at 312, but the second base station 220-2 does not provide the SCG LTM CSI report configuration for each candidate PSCell (such as PSCells 4-6) at 314, then the first modification request and response messages may be performed associated with the second base station 220-2.

[00175] In the process 300, the first base station 210 may receive a required message from the second base station 220-1 at 346, may receive a required message from the base station 220-2 at 248 and may transmit a required response message to each second base station 220 at 349. In some examples, the required message may be implemented as an SN Modification Required message, and the required response message may be implemented as an SN Modification Confirm message.

[00176] In some implementations, the required message may include a fourth indicator, the fourth indicator may indicate that the required message is for LTM. In some examples, the fourth indicator (or be called as a fourth LTM indicator) is associated with SCG LTM of the UE 250.

[00177] In some example embodiments, the fourth indicator may be carried in a specific IE of the required message. For example, the fourth indicator may be included in the Conditional PSCell Addition Information Modification Request IE or the CPAC Information Required IE embedded in the SN Modification Required message, e.g., an Enumerated value with TRUE. For example, the fourth indicator may be included in a newly defined IE in the SN Modification Required message.

[00178] In some implementations, the required message may include at least one candidate

PSCell, e.g., at least one ID of the at least one candidate PSCell in the one or more (e.g. multiple) candidate PSCells. In some implementations, the required message may include an updated SCG LTM candidate configuration of the at least one candidate PSCell.

5 [00179] In some examples, the at least one candidate PSCell indicated by the required message may be associated with an updated SCG LTM candidate configuration. In some examples, the at least one candidate PSCell indicated by the required message may be associated with an updated SCG LTM CSI report configuration.

10 [00180] For example, the candidate PSCells of the second base station 220-1 include PSCell 1, PSCell 2, and PSCell 3. If the required message from the second base station 220-1 include the PSCell 1, then it may indicate that PSCell 1 is associated with the updated SCG LTM candidate configuration (and/or the updated SCG LTM CSI report configuration). For example, the SCG LTM candidate configuration (and/or the SCG LTM CSI report configuration) for PSCell 2 and PSCell 3 is not updated.

15 [00181] For example, the candidate PSCells of the second base station 220-1 include PSCell 1, PSCell 2, and PSCell 3. If the required message from the second base station 220-1 include the PSCell 1 and PSCell 2, then it may indicate that PSCell 1 and PSCell are associated with the updated SCG LTM candidate configuration (and/or the updated SCG LTM CSI report configuration), while PSCell 3 is no longer the candidate PSCell. In this case, the candidate PSCells of the second base station 220-1 include PSCell 1 and PSCell 2.

20 [00182] It is to be understood that in case the candidate PSCells and the SCG LTM candidate configuration (and/or the SCG LTM CSI report configuration) of the second base station 220 are unchanged, the operations 346 through 349 may be omitted in the process 300. In some examples, the SCG LTM candidate configuration (and/or the SCG LTM CSI report configuration) of candidate PSCells (e.g. PSCells 1-3) of the second base station 220-1 has
25 been updated, but the SCG LTM candidate configuration (and/or the SCG LTM CSI report configuration) of candidate PSCells (e.g. PSCells 4-6) of the second base station 220-2 is unchanged, then the required and required response message associated with the second base station 220-1 may be performed.

30 [00183] In the process 300, the first base station 210 transmits an RRCReconfiguration message to the UE 250 at 350. In some implementations, the RRCReconfiguration message may include one or more of: the SCG LTM candidate configuration for each candidate PSCell, the SCG LTM CSI report configuration for each candidate PSCell, and the SCG LTM CSI

resource configuration for all candidate PSCells. The UE 250 responds to the first base station 210 with an RRCReconfigurationComplete message at 355. In some implementations, the RRCReconfiguration message is embedded in another RRCReconfiguration message sent from the first base station 210 to the UE 250 at 350, and
5 the RRCReconfiguration complete message is embedded in another RRCReconfigurationComplete message sent from the UE 250 to the first base station 210 at 355.

[00184] In some implementations, in the process 300, the third base station 230 transmits an RRCReconfiguration message to the UE 250 at 350. In some implementations, the
10 RRCReconfiguration message may include one or more of: the SCG LTM candidate configuration for each candidate PSCell, the SCG LTM CSI report configuration for each candidate PSCell, and the SCG LTM CSI resource configuration for all candidate PSCells. The UE 250 responds to the third base station 230 with an RRCReconfigurationComplete message at 355.

15 **[00185]** In some example embodiments, the RRCReconfiguration message may include the SCG LTM candidate configuration for each candidate PSCell and the SCG LTM CSI report configuration for each candidate PSCell, while the SCG LTM CSI resource configuration for all candidate PSCells may be provided to the UE 250 via another separate message.

[00186] In the process 300, the UE 250 may perform L1 measurements, may transmit the L1
20 measurement report to the third base station 230 at 360. In some examples, the UE 250 may perform the L1 measurements on the candidate PSCells, and may further perform the L1 measurements on the serving cell. In some examples, the L1 measurement report may include L1 measurement results on each of the candidate PSCells, and may further include L1 measurement results on the serving cell. In some examples, the UE 250 determines
25 which candidate PSCells should be reported with the L1 measurement results.

[00187] In the process 300, the third base station 230 transmits an LTM cell switch command to the UE 250 at 370. In some implementations, the LTM cell switch command may include the LTM candidate ID (LTM-CandidateId), and the LTM cell switch command may be used to trigger the SCG LTM cell switch.

30 **[00188]** In some implementations, the LTM cell switch command may include an ID of a target PSCell which is one of the candidate PSCells. In some examples, the third base station 230 may determine the target PSCell based on the L1 measurement report.

[00189] In the process 300, the third base station 230 transmits a notification message to the first base station 210 at 380. For example, the notification message may be implemented as an LTM Cell Change Notification message.

5 [00190] In some implementations, the notification message may include an ID of the target PSCell, which may be used to indicate an initiation of the LTM cell switch command to the UE 250 for the SCG LTM.

[00191] The UE 250 may perform the SCG LTM at 390, that is, the UE 250 may connect to the target PSCell via a random access procedure or a RACH-less procedure. For example, it is assumed that the target PSCell is provided by the second base station 220-1, and the UE
10 250 is switched to the second base station 220-1 at 390.

[00192] In the process 300, the UE 250 transmits an RRCReconfigurationComplete message to the first base station 210 at 395. In some implementations, the RRCReconfigurationComplete message may include the LTM candidate ID (LTM-CandidateId), which may indicate that the SCG LTM candidate configuration associated with
15 the LTM candidate ID (LTM-CandidateId) is applied. In some examples, the RRCReconfigurationComplete message may be embedded in another message sent to the first base station 210 at 395, e.g., ULInformationTransferMRDC message.

[00193] According to some embodiments discussed with reference to FIG. 3, the first base station (e.g. MN) may initiate the inter-SN SCG LTM preparation, e.g. by transmitting a first
20 request message to the second base station; and assign an ID (i.e. LTM candidate ID) for the SCG LTM candidate configuration. As such, the inter-SN SCG LTM may be supported.

[00194] Reference is further made to FIG. 4, which illustrates a signalling chart illustrating communication process 400 for the SCG LTM in accordance with some example
25 embodiments of the present disclosure. The process 400 may involve the UE 250, the first base station (MN) 210, the third base station (S-SN), the second base stations (candidate T-SN) 220-1 and 220-2, as show in FIG. 2H. It would be appreciated that the process 400 may be applied to other communication scenarios, which will not be described in detail.

[00195] In the process 400, the third base station 230 transmits a second request message to the first base station 210 at 401. The second request message may include a second
30 indicator which indicates that the second request message is associated with LTM, for example, the second indicator is associated with SCG LTM of the UE 250. For example, the second request message may be implemented as an SN Change Required message. In

some example embodiments, the second indicator may be also called as a second LTM indicator or a second SCG LTM indicator.

5 [00196] In some example embodiments, the second indicator may be carried in a specific IE of the second request message. For example, the second indicator may be included in the Conditional PSCell Change Information Required IE embedded in the SN Change Required message, e.g., an Enumerated value with TRUE. For example, the second indicator may be included in a newly defined IE in the SN Change Required message.

10 [00197] In some examples, the second indicator may include an indication which is used to indicate that the second request message is for LTM-initiation, LTM-modification, or LTM-cancellation.

[00198] In some implementations, the second request message may include a list of suggested PSCells. In some example embodiments, the third base station 230 may suggest or recommend one or more suggested PSCells for the UE 250. For example, the list of suggested PSCells may be used by the second base station(s) to configure the SCG LTM.

15 [00199] In some examples, the list of suggested PSCells may be included in the CG-Config message or the CG-CandidateList message embedded in the SN Change Required message, that is, the CG-Config message or the CG-CandidateList message includes the list of suggested PSCells.

20 [00200] In some implementations, the second request message may include at least one ID of at least one second base station. For example, the at least one ID of at least one second base station may be included in the second indicator. In some example embodiments, the list of suggested PSCells may include one or more suggested PSCells which are belong to (located at) more than one second base station, then the second request message may include more than one ID of the more than one second base station.

25 [00201] For example, the second request message may include a first ID of the second base station 220-1 and associated list of suggested PSCells (such as PSCells 1-3), and include a second ID of the second base station 220-2 and associated list of suggested PSCells (such as PSCells 4-6).

30 [00202] In some implementations, the second request message may include an SCG LTM reference configuration. In some examples, the third base station 230 may have an available SCG LTM reference configuration, and the third base station 230 may provide the SCG LTM reference configuration to the first base station 210 through the second request message.

[00203] In some examples, the SCG LTM reference configuration may be included in the second indicator. In some examples, the SCG LTM reference configuration may be included in the CG-Config message or the CG-CandidateList message embedded in the SN Change Required message, in this case, the CG-Config message or the CG-CandidateList message includes the SCG LTM reference configuration.

[00204] In the process 400, the first base station 210 transmits a first request message to the second base station 220 at 410. The first request message may be implemented as an SN Addition Request message. The first request message may include a first indicator.

[00205] In some implementations, the second request message may include at least one ID of at least one second base station, then the first base station 210 may transmit the first request message to each of the at least one second base station.

[00206] In some implementations, the first request message may include a list of suggested PSCells. For example, in case the second request message includes a list of suggested PSCells, then a list of suggested PSCells may be included in the first request message to an associated second base station. In some examples, the list of suggested PSCells may be included in the CG-ConfigInfo message embedded in the SN Addition Request message, in this case, the CG-ConfigInfo message includes the list of suggested PSCells.

[00207] In some implementations, the first request message may include the SCG LTM reference configuration. For example, in case the second request message includes the SCG LTM reference configuration, or in case the first base station 210 has an available SCG LTM reference configuration, then the SCG LTM reference configuration may be included in the first request message to the second base station 220.

[00208] In some implementations, the first request message may include a request for the SCG LTM reference configuration, e.g. if the first base station 210 does not have an available SCG LTM reference configuration. For example, the second request message does not include the SCG LTM reference configuration.

[00209] It is to be understood that the list of suggested PSCells and/or the SCG LTM reference configuration are/is determined (or provided) by the third base station 230, i.e. S-SN of the UE 250.

[00210] In the process 400, the first base station 210 receives a first response message from the second base station 220-1 at 412, receives a first response message from the second base station 220-2 at 414.

[00211] In some implementations, the first response message may include an SCG LTM candidate configuration for each candidate PSCell. In some examples, if the first request message includes the SCG LTM reference configuration, then the SCG LTM candidate configuration for each candidate PSCell in the first response message may be represented as
5 a delta candidate configuration relative to the SCG LTM reference configuration.

[00212] In some implementations, the first response message may include the one or more candidate PSCells. For example, the one or more candidate PSCells may be selected from the list of suggested PSCells by the second base station 220. In some implementations, the first response message may include one or more RS configurations of the one or more
10 candidate PSCells.

[00213] In some implementations, the first response message may include the SCG LTM reference configuration, e.g., if the first request message includes a request for the SCG LTM reference configuration.

[00214] It is to be understood that the information included in the first response message
15 may refer to those discussed with reference to FIG. 3, which will not be repeated herein.

[00215] In the process 400, the first base station 210 determines an SCG LTM CSI resource configuration at 420. The SCG LTM CSI resource configuration may be a common SCG LTM CSI resource configuration for all candidate PSCells. In some examples, the first base station 210 may determine (or generate) the SCG LTM CSI resource configuration based on
20 the first response message.

[00216] The SCG LTM CSI resource configuration includes one or more (e.g. multiple) RS configurations of one or more (e.g. multiple) candidate PSCells. In some examples, each RS configuration of a candidate PSCell is associated with an LTM candidate ID (LTM-CandidateId). In other words, the one or more (e.g. multiple) RS configurations are
25 associated with a unique LTM-CandidateId. In some examples, the LTM candidate ID (LTM-CandidateId) may be determined (or assigned) by the first base station 210, which may be used to identify the SCG LTM candidate configuration.

[00217] In some other implementations, as discussed with reference to FIG. 3, the operation 420 may be performed before the operation 410, for example, the first request message may
30 include the SCG LTM CSI resource configuration. For example, the first response message may include an SCG LTM CSI report configuration for each candidate PSCell.

[00218] In the process 400, the first base station 210 may transmit a second modification

request message to the third base station 230 at 430, and the third base station 230 may transmit a second modification response message to the first base station 210 at 435. In some examples, the second modification request message may be implemented as an SN Modification Request, and the second modification response message may be implemented
5 as an SN Modification Request Acknowledge.

[00219] In some implementations, the second modification request message includes a third indicator. In some implementations, the second modification request message may include the SCG LTM CSI resource configuration.

[00220] In some implementations, the second modification request message may include a request for an SCG LTM reference configuration. For example, if the first base station 210
10 does not have an available SCG LTM reference configuration, (e.g., the second request message does not include the SCG LTM reference configuration), then the second modification request message may include an indication which indicates that the first base station 210 is requesting the third base station 230 to provide the SCG LTM reference
15 configuration.

[00221] In some implementations, the second modification response message may include an SCG LTM CSI report configuration for a serving cell of the UE 250.

[00222] In FIG. 4, the operations 440 through 455 may refer to the operations 340 through 355 in FIG. 3 respectively, and thus will not be repeated herein.

[00223] In the process 400, the first base station 210 transmits a second response message to the third base station 230 at 402. For example, the second response message may be
20 implemented as an SN Change Confirm message.

[00224] In some implementations, the second response message may indicate the one or more candidate PSCells prepared for SCG LTM. In some examples, the second response
25 message may include one or more IDs of the one or more candidate PSCells and one or more IDs of at least one second base station, for example, the one or more candidate PSCells may be determined by the second base station 220-1, e.g. selected from the list of suggested PSCells. For example, each of the one or more candidate PSCells is configured with an SCG LTM candidate configuration by the second base station.

[00225] In FIG. 4, the operations 460 through 495 may refer to the operations 360 through 395 in FIG. 3 respectively, and thus will not be repeated herein.
30

[00226] According to some embodiments discussed with reference to FIG. 4, the third base station (e.g. S-SN) may initiate the inter-SN SCG LTM preparation, e.g. by transmitting a second request message to the first base station (e.g. MN), and the first base station (e.g. MN) may assign an ID (i.e. LTM candidate ID) for the SCG LTM candidate configuration. As such, the inter-SN SCG LTM may be supported.

[00227] According to some embodiments discussed with reference to FIG. 3 or FIG. 4, the first base station (e.g. MN) obtains the RS configuration of each candidate PSCell from the second base station (e.g. candidate T-SN), and generates an SCG LTM CSI resource configuration common for all candidate PSCells. The SCG LTM CSI resource configuration includes RS configurations of all candidate PSCells, and each RS configuration is associated with an LTM candidate ID which is assigned for the SCG LTM candidate configuration. In the solution, the first base station (e.g. MN) transmits the SCG LTM CSI resource configuration to the second base station (e.g. candidate T-SN) and the third base station (e.g. S-SN), and each of the second base station (e.g. candidate T-SN) and the third base station (e.g. S-SN) may generate an SCG LTM CSI report configuration separately. In this case, the LTM candidate ID may be generated by the MN, and the L1 measurement report for inter-SN SCG LTM may be supported.

[00228] Reference is further made to FIG. 5, which illustrates a signalling chart illustrating communication process 500 for the SCG LTM in accordance with some example embodiments of the present disclosure. The process 500 may involve the UE 250, the first base station (MN) 210, the third base station (S-SN), the second base stations (candidate T-SN) 220-1 and 220-2, as show in FIG. 2H. It would be appreciated that the process 500 may be applied to other communication scenarios, which will not be described in detail.

[00229] In the process 500, the third base station 230 transmits a second request message to the first base station 210 at 501. For example, the second request message may be implemented as an SN Change Required message.

[00230] In some implementations, the second request message may include a second indicator. In some implementations, the second request message may include a list of suggested PSCells. In some implementations, the second request message may include at least one ID of at least one second base station. In some implementations, the second request message may include an SCG LTM reference configuration. Details on the information in the second request message may refer to those discussed in FIG. 4, and thus will not be repeated herein.

[00231] In some implementations, if the third base station 230 already has an SCG LTM CSI resource configuration, the second request message may include the SCG LTM CSI resource configuration. In some examples, the SCG LTM CSI resource configuration may be included in the CG-Config message or the CG-CandidateList message embedded in the SN Change Required message, that is, the CG-Config message or the CG-CandidateList message includes SCG LTM CSI resource configuration.

[00232] In the process 500, the first base station 210 transmits a first request message to the second base station 220 at 510. The first request message may be implemented as an SN Addition Request message. The first request message may include a first indicator.

[00233] In some implementations, the first request message may include a list of suggested PSCells which is suggested or recommended by the third base station 230. In some implementations, the first request message may include the SCG LTM reference configuration or include a request for the SCG LTM reference configuration.

[00234] In some implementations, the first request message may include an SCG LTM CSI resource configuration, e.g. if the second request message include the SCG LTM CSI resource configuration, which may be determined by the third base station 230.

[00235] The first base station 210 receives a first response message from the second base station 220-1 at 512, receives a first response message from the second base station 220-2 at 514. The first response message may be implemented as an SN Addition Request Acknowledge message. The first response message may include an SCG LTM candidate configuration for each candidate PSCell.

[00236] In some implementations, the first response message may include the one or more candidate PSCells. In some implementations, the first response message may include one or more RS configurations of the one or more candidate PSCells. In some implementations, the first response message may include an SCG LTM reference configuration, e.g., if the first request message includes a request for the SCG LTM reference configuration.

[00237] In some implementations, the first response message may include an SCG LTM CSI report configuration for each candidate PSCell, e.g., if the first request message includes the SCG LTM CSI resource configuration.

[00238] In the process 500, the first base station 210 transmits a third request message to the third base station 230 at 520, the third request message includes a third indicator. For example, the third request message may be implemented as an SN Modification Request

message.

[00239] In some implementations, the third request message may include one or more RS configurations of the one or more candidate PSCells. In some examples, the one or more RS configurations of the one or more candidate PSCells may be included in the third indicator.

5 In some examples, the one or more RS configurations of the one or more candidate PSCells may be included in the CG-ConfigInfo message embedded in the SN Modification Request message, that is, the CG-ConfigInfo message includes the RS configuration for each candidate PSCell.

[00240] In some implementations, the third request message may include an SCG LTM reference configuration. For example, the second request message does not include the SCG LTM reference configuration and the first response message includes the SCG LTM reference configuration, then the first base station 210 may provide the SCG LTM reference configuration to the third base station 230. In some examples, the SCG LTM reference configuration may be included in the third indicator. In some examples, the SCG LTM reference configuration may be included in the CG-ConfigInfo message embedded in the SN Modification Request message, that is, the CG-ConfigInfo message includes the SCG LTM reference configuration.

[00241] In some other implementations, the third request message may include a request for the SCG LTM reference configuration. For example, if the first base station 210 does not have an available SCG LTM reference configuration (e.g., none of the second request message or the first response message includes the SCG LTM reference configuration), then the first base station 210 may transmit an indication in the third request message to the third base station 230, which may indicate to the third base station 230 to provide the SCG LTM reference configuration. In some examples, the indication for requesting the SCG LTM reference configuration may be included in the third indicator.

[00242] In the process 500, the third base station 230 determines the SCG LTM CSI resource configuration at 522. In some implementations, the third base station 230 may generate the SCG LTM CSI resource configuration based on the third request message.

[00243] The SCG LTM CSI resource configuration is common for all candidate PSCells. The SCG LTM CSI resource configuration includes one or more (e.g. multiple) RS configurations of one or more (e.g. multiple) candidate PSCells. In some examples, each RS configuration of a candidate PSCell is associated with an LTM candidate ID (LTM-

CandidateId). In other words, the one or more (e.g. multiple) RS configurations are associated with a unique LTM-CandidateId. In some examples, the LTM candidate ID (LTM-CandidateId) may be determined (or assigned) by the third base station 230, which may be used to identify the SCG LTM candidate configuration.

5 [00244] In the process 500, the third base station 230 transmits a third response message to the first base station 210 at 525. The third response message may be implemented as an SN Modification Request Acknowledge message. The third response message includes the SCG LTM CSI resource configuration determined by the third base station 230.

10 [00245] In some implementations, the third response message may include the SCG LTM reference configuration, e.g. if the third request message includes a request for the SCG LTM reference configuration.

[00246] As mentioned above, the second request message may include the SCG LTM CSI resource configuration, that is, the third base station 230 already has the SCG LTM CSI resource configuration e.g. before the operation 501. In this case, the operations 520 to 525
15 may be omitted.

[00247] In FIG. 5, the operations 540 through 549 may refer to operations 340 through 349 discussed with reference to FIG. 3, and thus will not be repeated herein.

[00248] In the process 500, the first base station 210 transmits a second modification request message to the third base station 230 at 530, and the third base station 230 transmits a second
20 modification response message to the first base station 210 at 535.

[00249] In some examples, the second modification request message may be implemented as an SN Modification Request message, and the second modification response message may be implemented as an SN Modification Request Acknowledge message.

[00250] In some implementations, the second modification request message may include a
25 third indicator. In some implementations, the second modification request message may include the SCG LTM candidate configuration for each candidate PSCell. In some examples, the SCG LTM candidate configuration for each candidate PSCell may be included in the third indicator. In some examples, the SCG LTM candidate configuration for each candidate PSCell may be included in the CG-ConfigInfo message embedded in the SN
30 Modification Request message, that is, the CG-ConfigInfo message includes the SCG LTM candidate configuration for each candidate PSCell.

[00251] In some implementations, the second modification response message may include an RRCReconfiguration message generated by the third base station 230. In some examples, the RRCReconfiguration message generated by the third base station 230 may include one or more of: the SCG LTM candidate configuration for each candidate PSCell, the SCG LTM
5 CSI report configuration for each candidate PSCell, and the SCG LTM CSI resource configuration for all candidate PSCells.

[00252] In FIG. 5, the operations 550-555, 502, and 560-590 may refer to the operations 350-355 in FIG. 3, the operation 402 in FIG. 4, and operations 360-390 in FIG. 3 respectively, and thus will not be repeated herein.

10 [00253] In the process 500, the UE 250 transmits an RRCReconfigurationComplete message to the first base station 210 at 595. In some implementations, the RRCReconfigurationComplete message may include a physical cell ID (PCI) of the target PSCell which the UE 250 connects with after the SCG LTM cell switch. In some implementations, the RRCReconfigurationComplete message may include an absolute radio
15 frequency channel number (ARFCN) of the target PSCell.

[00254] According to some embodiments discussed with reference to FIG. 5, the third base station (e.g. S-SN) may initiate the inter-SN SCG LTM preparation, e.g. by transmitting a second request message to the first base station (e.g. MN), and the third base station (e.g. S-SN) may assign an ID (i.e. LTM candidate ID) for the SCG LTM candidate configuration.
20 As such, the inter-SN SCG LTM may be supported.

[00255] According to some embodiments discussed with reference to FIG. 5, after obtaining the RS configurations of each candidate PSCell, the first base station (e.g. MN) sends the RS configurations to the third base station (e.g. S-SN), and the third base station (e.g. S-SN) generates an SCG LTM CSI resource configuration common for all candidate PSCells. In
25 this case, the LTM candidate ID may be generated by the S-SN, and the L1 measurement report for inter-SN SCG LTM may be supported.

[00256] In the present disclosure, an RRCReconfigurationComplete message may be sent from the UE to the first base station (e.g. MN), where the RRCReconfigurationComplete message may indicate an SCG LTM candidate configuration which the UE applied for the
30 execution of SCG LTM. For example, the RRCReconfigurationComplete message may include an index of the SCG LTM candidate configuration which the UE applied for the execution of SCG LTM, where the index may be an LTM candidate ID. As such, the MN

may be aware of the configuration applying at the UE, accordingly the data forwarding towards the candidate SN may be performed for the MN terminated SCG bearer in a timely manner.

5 [00257] In the present disclosure, after sending the LTM cell switch command to the UE, the third base station (e.g. S-SN) sends a notification message to the first base station (e.g. MN) to indicate the initiation of the LTM cell switch command to the UE, where the notification message may include an ID (such as an index, a PCI, an ARFCN, or the like) of the target PSCell. As such, the MN may be aware of the target PSCell in time, accordingly the data forwarding towards the candidate SN may be performed for the MN terminated SCG bearer
10 in a timely manner.

[00258] In some embodiments of the present disclosure, an SCG LTM reference configuration may be used, which may be determined (generated or provided) by the first base station (e.g. MN), the second base station (e.g. candidate T-SN), or the third base station (e.g. S-SN). As such, a delta configuration for the inter-SN SCG LTM may be supported,
15 and an overhead may be reduced.

[00259] In the present disclosure, a first indicator (first LTM indicator) is introduced, e.g., for the MN initiated inter-SN SCG LTM preparation, in an SN Addition Request message, to indicate the request is for an SCG LTM. A second indicator (second LTM indicator) is introduced, e.g., for the SN initiated inter-SN SCG LTM preparation, into the SN Change
20 Required message, to indicate the request is for an SCG LTM. A third indicator (third LTM indicator) is introduced, e.g., for the MN initiated modification, into the SN Modification Request message, to indicate the request is to update the SCG LTM configurations. A fourth indicator (fourth LTM indicator) is introduced, e.g., for the candidate T-SN initiated modification, into the SN Modification Required message, to update the SCG LTM candidate
25 configuration prepared by the candidate T-SN. As such, an initiation and modification of the inter-SN SCG LTM may be supported, and an efficiency of the SCG LTM may be improved.

[00260] It is to be appreciated that some example embodiments or implementations described above are only for illustration, without any limitation, some other example
30 embodiments or implementations may be obtained by modifying, adding, deleting, updating some information, steps in some example embodiments or implementations described above. For example, in case all candidate PSCells belong to a same candidate T-SN such as the

second base station 220-1, the second base station 220-2 may be removed from the process discussed above. For example, in case the candidate PSCells belong to more than two candidate T-SNs, there may be more second base stations in the process, and each of the candidate T-SN is similar with the second base station 220. For example, there may be one
5 or more than one candidate PSCell belongs to the third base station (e.g. S-SN), in this case, the procedure between the first base station (e.g. MN) and the second base station (e.g. candidate T-SN) may also be applied between the first base station (e.g. MN) and the third base station (e.g. S-SN), for example, the third base station may be regarded as one of candidate T-SNs.

10 **[00261]** 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 or a UE as described herein. The device 600 may support wireless communication with a first base station 210, a second base station 220, a third base station 230, a UE 250, or any combination thereof. The device 600 may include components for bi-directional
15 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).

20 **[00262]** 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.

25 **[00263]** 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
30 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).

[00264] 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.

5 **[00265]** 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
10 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.

[00266] The memory 604 may include random access memory (RAM) and read-only
15 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
20 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.

[00267] The I/O controller 608 may manage input and output signals for the device 600.
25 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
30 608 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.

[00268] 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.

[00269] 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.

[00270] 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.

[00271] 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).

[00272] 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).

[00273] 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.

[00274] 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
5 700.

[00275] 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
10 memory 704 may reside external to the processor chipset (e.g., remote to the processor 700).

[00276] 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
15 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
20 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.

[00277] 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
25 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
30 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.

[00278] 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.

[00279] FIG. 8 illustrates a flowchart of a method 800 performed by a first base station 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 first base station 210 in FIG. 2H. 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.

[00280] At 810, the method may include transmitting, to a second base station, a first request message comprising a first indicator associated with an SCG LTM of a user equipment. 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 first base station 210 as described with reference to FIG. 2H.

[00281] At 820, the method may include receiving, from the second base station, a first response message comprising an SCG LTM candidate configuration for each of a plurality of candidate PSCells of the second 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 first base station 210 as described with reference to FIG. 2H.

[00282] At 830, the method may include transmitting, to the user equipment, the SCG LTM candidate configuration for each of the plurality of candidate PSCells and an SCG LTM CSI resource configuration, wherein the SCG LTM CSI resource configuration comprises a plurality of RS configurations of the plurality of candidate PSCells, and each of the plurality of RS configurations is associated with an LTM candidate ID. The operations of 830 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 830 may be performed by the first base station 210 as described with reference to FIG. 2H.

[00283] FIG. 9 illustrates a flowchart of a method 900 performed by a second base station 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 second base station 220 in FIG. 2H. 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.

[00284] At 910, the method may include receiving, from a first base station, a first request message comprising a first indicator associated with an SCG LTM of a user equipment. 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 second base station 220 as described with reference to FIG. 2H.

[00285] At 920, the method may include transmitting, to the first base station, a first response message comprising an SCG LTM candidate configuration for each of a plurality of candidate PSCells of the second 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 second base station 220 as described with reference to FIG. 2H.

[00286] FIG. 10 illustrates a flowchart of a method 1000 performed by a third base station 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 third base station 230 in FIG. 2H. 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.

[00287] At 1010, the method may include receiving, from a first base station, a second modification request message comprising a third indicator associated with an SCG LTM of a user equipment. 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 third base station 230 as described with reference to FIG. 2H.

[00288] At 1020, the method may include transmitting, to the first base station, a second modification response message comprising an SCG LTM CSI report configuration for a serving cell of the user equipment. 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 third base station 230 as described with reference to FIG. 2H.

[00289] FIG. 11 illustrates a flowchart of a method 1100 performed by a UE in accordance with aspects of the present disclosure. The operations of the method 1100 may be implemented by a device or its components as described herein. For example, the operations of the method 1100 may be performed by the UE 250 in FIG. 2H. 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.

10 **[00290]** At 1110, the method may include receiving, from a first base station, an SCG LTM candidate configuration for each of a plurality of candidate PSCells of one or more second base stations and an SCG LTM CSI resource configuration, wherein the SCG LTM CSI resource configuration comprises a plurality of RS configurations of the plurality of candidate PSCells, and each of the plurality of RS configurations is associated with an LTM candidate ID. The operations of 1110 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 1110 may be performed by the UE 250 as described with reference to FIG. 2H.

20 **[00291]** At 1120, the method may include receiving, from a third base station, an SCG LTM cell switch command comprising a target PSCell in the plurality of candidate PSCells, wherein the target PSCell is associated with a target base station in the one or more second base stations. The operations of 1120 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 1120 may be performed by the UE 250 as described with reference to FIG. 2H.

25 **[00292]** At 1130, the method may include switching, based on the SCG LTM cell switch command, from a serving cell of the third base station to the target PSCell of the target base station. The operations of 1130 may be performed in accordance with examples as described herein. In some implementations, aspects of the operations of 1130 may be performed by the UE 250 as described with reference to FIG. 2H.

30 **[00293]** 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.

[00294] 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.

[00295] 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.

[00296] 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.

[00297] 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”
5 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.

[00298] The description herein is provided to enable a person having ordinary skill in the art
10 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.

15

CLAIMS

What is claimed is:

1. A first base station comprising:
at least one memory; and
5 at least one processor coupled with the at least one memory and configured to cause the first base station to:
transmit, to a second base station, a first request message comprising a first indicator associated with a secondary cell group (SCG) layer 1 or layer 2 triggered mobility (LTM) of a user equipment;
10 receive, from the second base station, a first response message comprising an SCG LTM candidate configuration for each of a plurality of candidate primary secondary cells (PSCells) of the second base station; and
transmit, to the user equipment, the SCG LTM candidate configuration for each of the plurality of candidate PSCells and an SCG LTM channel state information (CSI) resource configuration, wherein the SCG LTM CSI resource configuration comprises a
15 plurality of reference signal (RS) configurations of the plurality of candidate PSCells, and each of the plurality of RS configurations is associated with an LTM candidate identifier (ID).
2. The first base station of claim 1, wherein the at least one processor is further
20 configured to cause the first base station to:
determine the SCG LTM CSI resource configuration, and wherein
the first request message further comprises the SCG LTM CSI resource configuration.
3. The first base station of claim 1, wherein the first response message further
25 comprises the plurality of RS configurations of the plurality of candidate PSCells, and wherein the at least one processor is further configured to cause the first base station to:
determine the SCG LTM CSI resource configuration based on the first response message.
- 30 4. The first base station of claim 1, wherein the at least one processor is further configured to cause the first base station to:
transmit, to a third base station, a third request message comprising a third indicator associated with the SCG LTM and the plurality of RS configurations of the plurality of

candidate PSCells; and

receive, from the third base station, a third response message comprising the SCG LTM CSI resource configuration.

5 5. The first base station of claim 4, wherein the third request message further comprises an SCG LTM reference configuration.

 6. The first base station of claim 4, wherein the third request message further comprises a request for an SCG LTM reference configuration, and the third response message
10 further comprises the SCG LTM reference configuration.

 7. The first base station of claim 1, wherein the at least one processor is further configured to cause the first base station to:
 receive, from a third base station, a second request message comprising a second
15 indicator associated with the SCG LTM; and
 transmit, to the third base station, a second response message indicating that the plurality of candidate PSCells for the SCG LTM.

 8. The first base station of claim 7, wherein the second request message further
20 comprises one of:
 an ID of the second base station,
 a list of suggested PSCells,
 an SCG LTM reference configuration, or
 the SCG LTM CSI resource configuration.

25
 9. The first base station of claim 1, wherein the first request message further comprises one of:
 a list of suggested PSCells,
 an SCG LTM reference configuration,
30 a request for the SCG LTM reference configuration,
 the SCG LTM CSI resource configuration, or
 a maximum number of the plurality of candidate PSCells.

 10. The first base station of claim 1, wherein the first response message further

comprises one of:

- a plurality of IDs of the plurality of PSCells,
- an SCG LTM reference configuration,
- the plurality of RS configurations of the plurality of candidate PSCells, or
- 5 an SCG LTM CSI report configuration for each of the plurality of candidate PSCells.

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

- transmit, to the second base station, a first modification request message comprising
- 10 a third indicator associated with the SCG LTM; and
- receive, from the second base station, a first modification response message comprising an SCG LTM CSI report configuration for each of the plurality of candidate PSCells.

12. The first base station of claim 11, wherein the first modification request message further comprises one of:

- the SCG LTM CSI resource configuration, or
- an SCG LTM reference configuration.

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

- transmit, to a third base station, a second modification request message comprising a third indicator associated with the SCG LTM; and
- receive, from the third base station, a second modification response message
- 25 comprising an SCG LTM CSI report configuration for a serving cell of the user equipment.

14. The first base station of claim 13, wherein the second modification request message further comprises one of:

- the SCG LTM CSI resource configuration, or
- 30 a request for an SCG LTM reference configuration.

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

- receive, from a third base station, a notification message comprising an ID of a target

PSCell in the plurality of candidate PSCells, wherein the notification message indicates an initiation of an SCG LTM cell switch command to the user equipment associated with the target PSCell.

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

 receive, from the user equipment, a reconfiguration complete message comprising the LTM candidate ID, wherein the LTM candidate ID indicates the SCG LTM candidate configuration applied by the user equipment.

10

 17. A second base station comprising:

 at least one memory; and

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

15 receive, from a first base station, a first request message comprising a first indicator associated with a secondary cell group (SCG) layer 1 or layer 2 triggered mobility (LTM) of a user equipment; and

 transmit, to the first base station, a first response message comprising an SCG LTM candidate configuration for each of a plurality of candidate primary secondary cells
20 (PSCells) of the second base station.

 18. A third base station comprising:

 at least one memory; and

25 at least one processor coupled with the at least one memory and configured to cause the third base station to:

 receive, from a first base station, a second modification request message comprising a third indicator associated with a secondary cell group (SCG) layer 1 or layer 2 triggered mobility (LTM) of a user equipment; and

30 transmit, to the first base station, a second modification response message comprising an SCG LTM channel state information (CSI) report configuration for a serving cell of the user equipment.

 19. A user equipment comprising:

 at least one memory; and

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

receive, from a first base station, a secondary cell group (SCG) layer 1 or layer 2 triggered mobility (LTM) candidate configuration for each of a plurality of candidate primary secondary cells (PSCells) of one or more second base stations and an SCG LTM channel state information (CSI) resource configuration, wherein the SCG LTM CSI resource configuration comprises a plurality of reference signal (RS) configurations of the plurality of candidate PSCells, and each of the plurality of RS configurations is associated with an LTM candidate identifier (ID);

receive, from a third base station, an SCG LTM cell switch command comprising a target PSCell in the plurality of candidate PSCells, wherein the target PSCell is associated with a target base station in the one or more second base stations; and

switch, based on the SCG LTM cell switch command, from a serving cell of the third base station to the target PSCell of the target base station.

20. The user equipment of claim 19, wherein the at least one processor is further configured to cause the user equipment to:

transmit, to the first base station, a reconfiguration complete message comprising the LTM candidate ID, wherein the LTM candidate ID indicates the SCG LTM candidate configuration applied by the user equipment.