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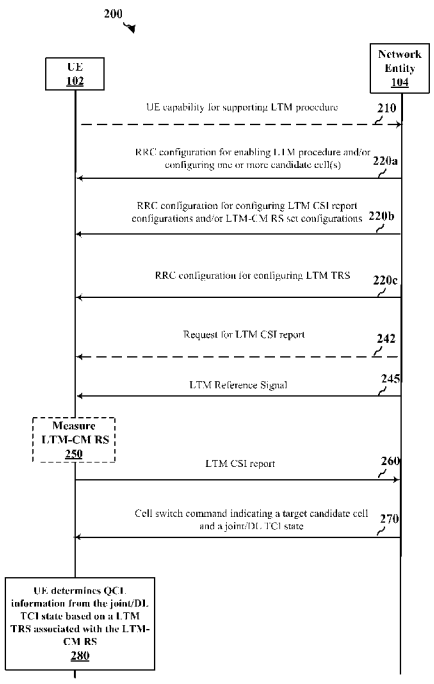

FIG. 2

(57) Abstract: This disclosure provides systems, devices, apparatus, and methods, including computer programs encoded on storage media, for indicating transmission configuration states for layer 1/layer 2 triggered mobility. A UE (102), receives (220), from a network entity (104), a configuration for LTM. The UE (102) receives (245), from the network entity (104), an LTM reference signal based on the configuration. The UE (102) receives (270), from the network entity (104), a CSC indicating a target cell and a TCI state. The QCL information is based on the TCI state and the LTM reference signal.

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INDICATING TRANSMISSION CONFIGURATION INDICATOR STATES FOR LAYER 1/LAYER 2 TRIGGERED MOBILITY

TECHNICAL FIELD

[0001] The present disclosure relates generally to wireless communication, and more particularly, to indicating transmission configuration indicator (TCI) states for layer 1/layer 2 triggered mobility (LTM).

BACKGROUND

[0002] The Third Generation Partnership Project (3GPP) specifies a radio interface referred to as fifth generation (5G) new radio (NR) (5G NR). An architecture for a 5G NR wireless communication system includes a 5G core (5GC) network, a 5G radio access network (5G-RAN), a user equipment (5G UE), etc. The 5G NR architecture seeks to provide increased data rates, decreased latency, and/or increased capacity compared to prior generation cellular communication systems.

[0003] Wireless communication systems, in general, provide various telecommunication services (e.g., telephony, video, data, messaging, etc.) based on multiple-access technologies, such as orthogonal frequency division multiple access (OFDMA) technologies, that support communication with multiple UEs. Improvements in mobile broadband continue the progression of such wireless communication technologies.

[0004] A user equipment (UE) switches from a serving cell to a target cell using layer 1/layer 2 (L1/L2) triggered mobility (LTM) procedures (may be referred to as lower layer triggered mobility procedures). The LTM procedures reduce latency during cell switching by reducing higher layer (e.g., layer 3) message exchange and reconfiguration. Before cell switching, a network entity transmits candidate cell configuration(s) to the UE. The network entity transmits a cell switch command (CSC) to the UE indicating information of the target cell or the target cell configuration which the UE applies when switching from the serving cell to the target cell. Before the UE switches to the target cell via the LTM procedure, the network entity indicates a beam (e.g., TCI state) for the UE to use for communication with the target cell.

[0005] Based on a quasi-colocation (QCL) indication rule, a unified TCI state applied for a downlink communication (e.g., physical downlink control channel (PDCCH) or physical downlink shared channel (PDSCH)) indicates or includes a tracking reference signal (TRS) as a source reference signal for QCL-Type A (e.g., Doppler shift, Doppler spread, average delay, delay spread). However, in some aspects, there is no TRS or TRS tracking method for a target cell or candidate cell before LTM is completed. Accordingly, there could be an issue with indicating a

unified TCI state for LTM (e.g., how to maintain or revise the QCL indication rule for a unified TCI state applied for downlink communications).

BRIEF SUMMARY

[0006] The following presents a simplified summary of one or more aspects in order to provide a basic understanding of such aspects. This summary is not an extensive overview of all contemplated aspects. This summary neither identifies key or critical elements of all aspects nor delineates the scope of any or all aspects. Its sole purpose is to present some concepts of one or more aspects in a simplified form as a prelude to the more detailed description that is presented later.

[0007] In order for the QCL indication rule for a TCI state to be maintained or implemented in downlink communications, an LTM reference signal is introduced. The UE may transmit a UE capability report to the network entity indicating support for LTM and/or the LTM reference signal. In some aspects, the UE receives a configuration for the LTM procedures. For example, the network entity transmits one or more configurations indicating a candidate cell configuration, a channel state information (CSI) report configuration, an LTM channel measurement (CM) reference signal (RS) set configuration, an LTM synchronization signal block (SSB) set configuration, and/or an LTM TRS configuration. The LTM reference signal may be an LTM TRS or an SSB. In some implementations, the network entity transmits the LTM reference signal to the UE. In such cases, the UE receives and measures the reference signal (e.g., measures reference signal received power (RSRP) or signal to interference plus noise ratio (SINR)). If the reference signal is an LTM TRS, the UE may receive the LTM TRS configuration from the network entity but may not execute time/frequency deviation tracking based on the LTM TRS. When the LTM reference signal is an SSB, the UE transmits a CSI report indicating the measurement(s) (e.g., RSRP or SINR) of the SSB. In some aspects, the UE transmits the CSI report periodically and/or in response to a request from the network entity (e.g., semi-persistent or aperiodic CSI report). In some cases, the network entity indicates a beam indication (e.g., TCI state) via the CSC based on the CSI report. The CSC indicates the target cell for the UE to switch to and the TCI state (e.g., joint TCI state or downlink TCI state). In some aspects, the UE determines QCL information based on the LTM reference signal and the TCI state.

[0008] When the LTM reference signal is an LTM SSB, the UE may receive a downlink communication (e.g., PDSCH or PDCCH) based on the TCI state using the LTM SSB as a QCL source reference signal. In some aspects, the UE may receive a downlink communication and rate match the downlink communication with the LTM TRS. In some other aspects, the UE may not rate match the downlink communication with the LTM TRS. In some aspects, the UE may receive

an LTM TRS from the network entity and use the LTM SSB as a QCL source reference signal for the LTM TRS.

[0009] According to some aspects, a UE receives, from a network entity, a configuration for LTM. The UE receives, from the network entity, an LTM reference signal. The UE receives, from the network entity, a CSC indicating a target cell and a TCI state. QCL information is based on the TCI state and the LTM reference signal.

[0010] According to some aspects, a network entity transmits, to a UE, a configuration for LTM. The network entity transmits, to the UE, an LTM reference signal. The network entity transmits, to the UE, a CSC indicating a target cell and a TCI state. QCL information is based on the TCI state and the LTM reference signal.

[0011] Technical benefits of the present disclosure include executing LTM while increasing the performance of demodulating downlink communications and/or complying with QCL rules.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 illustrates a diagram of a wireless communications system that includes a plurality of UEs and network entities in communication over one or more cells according to an embodiment.

[0013] FIG. 2 is a signaling diagram illustrating communications between a UE and a network entity for determining QCL information in LTM procedures according to an embodiment.

[0014] FIG. 3 is a signaling diagram illustrating communications between a UE and a network entity for determining QCL information in LTM procedures according to another embodiment.

[0015] FIG. 4 is a flowchart of a method of wireless communication at a UE according to another embodiment.

[0016] FIG. 5 is a flowchart of a method of wireless communication at a network entity according to another embodiment.

[0017] FIG. 6 is a diagram illustrating a hardware implementation for an example UE apparatus according to some embodiments.

[0018] FIG. 7 is a diagram illustrating a hardware implementation for one or more example network entities according to some embodiments.

[0019] In FIGs. 1-7 like reference numbers refer to like actions.

DETAILED DESCRIPTION

[0020] FIG. 1 illustrates a diagram 100 of a wireless communications system associated with a plurality of cells 190. The wireless communications system includes UEs 102 and base stations/network entities 104. Some base stations may include an aggregated base station architecture and other base stations may include a disaggregated base station architecture. The

aggregated base station architecture utilizes a radio protocol stack that is physically or logically integrated within a single radio access network (RAN) node. A disaggregated base station architecture utilizes a protocol stack that is physically or logically distributed among two or more units (e.g., radio unit (RU) 106, distributed unit (DU) 108, central unit (CU) 110). For example, a CU 110 is implemented within a RAN node, and one or more DUs 108 may be co-located with the CU 110, or alternatively, may be geographically or virtually distributed throughout one or multiple other RAN nodes. The DUs 108 may be implemented to communicate with one or more RUs 106. Any of the RU 106, the DU 108 and the CU 110 can be implemented as virtual units, such as a virtual radio unit (VRU), a virtual distributed unit (VDU), or a virtual central unit (VCU). The base station/network entity 104 (e.g., an aggregated base station or disaggregated units of the base station, such as the RU 106 or the DU 108), may be referred to as a transmission reception point (TRP).

[0021] Operations of the base station 104 and/or network designs may be based on aggregation characteristics of base station functionality. For example, disaggregated base station architectures are utilized in an integrated access backhaul (IAB) network, an open-radio access network (O-RAN) network, or a virtualized radio access network (vRAN), which may also be referred to a cloud radio access network (C-RAN). Disaggregation may include distributing functionality across the two or more units at various physical locations, as well as distributing functionality for at least one unit virtually, which can enable flexibility in network designs. The various units of the disaggregated base station architecture, or the disaggregated RAN architecture, can be configured for wired or wireless communication with at least one other unit. For example, the base stations 104d, 104e and/or the RUs 106a, 106b, 106c, 106d may communicate with the UEs 102a, 102b, 102c, 102d, and/or 102s via one or more radio frequency (RF) access links based on a Uu interface. In examples, multiple RUs 106 and/or base stations 104 may simultaneously serve the UEs 102, such as by intra-cell and/or inter-cell access links between the UEs 102 and the RUs 106/base stations 104.

[0022] The RU 106, the DU 108, and the CU 110 may include (or may be coupled to) one or more interfaces configured to transmit or receive information/signals via a wired or wireless transmission medium. For example, a wired interface can be configured to transmit or receive the information/signals over a wired transmission medium, such as via the fronthaul link 160 between the RU 106d and the baseband unit (BBU) 112 of the base station 104d associated with the cell 190d. The BBU 112 includes a DU 108 and a CU 110, which may also have a wired interface (e.g., midhaul link) configured between the DU 108 and the CU 110 to transmit or receive the information/signals between the DU 108 and the CU 110. In further examples, a wireless interface,

which may include a receiver, a transmitter, or a transceiver, such as an RF transceiver, configured to transmit and/or receive the information/signals via the wireless transmission medium, such as for information communicated between the RU 106a of the cell 190a and the base station 104e of the cell 190e via cross-cell communication beams 136-138 of the RU 106a and the base station 104e.

[0023] The RUs 106 may be configured to implement lower layer functionality. For example, the RU 106 is controlled by the DU 108 and may correspond to a logical node that hosts RF processing functions, or lower layer PHY functionality, such as execution of fast Fourier transform (FFT), inverse FFT (iFFT), digital beamforming, physical random access channel (PRACH) extraction and filtering, etc. The functionality of the RU 106 may be based on the functional split, such as a functional split of lower layers.

[0024] The RUs 106 may transmit or receive over-the-air (OTA) communication with one or more UEs 102. For example, the RU 106b of the cell 190b communicates with the UE 102b of the cell 190b via a first set of communication beams 132 of the RU 106b and a second set of communication beams 134b of the UE 102b, which may correspond to inter-cell communication beams or, in some examples, cross-cell communication beams. For instance, the UE 102b of the cell 190b may communicate with the RU 106a of the cell 190a via a third set of communication beams 134a of the UE 102b and a fourth set of communication beams 136 of the RU 106a. DUs 108 can control both real-time and non-real-time features of control plane and user plane communications of the RUs 106.

[0025] Any combination of the RU 106, the DU 108, and the CU 110, or reference thereto individually, may correspond to a base station 104. Thus, the base station 104 may include at least one of the RU 106, the DU 108, or the CU 110. The base stations 104 provide the UEs 102 with access to a core network 120. The base stations 104 may relay communications between the UEs 102 and the core network 120. The base stations 104 may be associated with macrocells for higher-power cellular base stations and/or small cells for lower-power cellular base stations. For example, the cell 190e may correspond to a macrocell, whereas the cells 190a-190d may correspond to small cells. Small cells include femtocells, picocells, microcells, etc. A network that includes at least one macrocell and at least one small cell may be referred to as a "heterogeneous network." One or more CUs 110 may communicate directly with a core network 120 via a backhaul link. For example, the CU 110 communicates with the core network 120 over a backhaul link based on a next generation (NG) interface. The one or more CUs 110 may also communicate indirectly with the core network 120 through one or more disaggregated base station units, such as a near-real

time RAN intelligent controller (RIC) via an E2 link and a service management and orchestration (SMO) framework, which may be associated with a non-real time RIC.

[0026] Transmissions from a UE 102 to a base station 104/RU 106 are referred to as uplink (UL) transmissions, whereas transmissions from the base station 104/RU 106 to the UE 102 are referred to as downlink (DL) transmissions. Uplink transmissions may also be referred to as reverse link transmissions and downlink transmissions may also be referred to as forward link transmissions. For example, the RU 106d utilizes antennas of the base station 104d of cell 190d to transmit a downlink/forward link communication to the UE 102d or receive an uplink/reverse link communication from the UE 102d based on the Uu interface associated with the access link between the UE 102d and the base station 104d/RU 106d.

[0027] Communication links between the UEs 102 and the base stations 104/RUs 106 may be based on multiple-input and multiple-output (MIMO) antenna technology, including spatial multiplexing, beamforming, and/or transmit diversity. The communication links may be associated with one or more carriers. The UEs 102 and the base stations 104/RUs 106 may utilize a spectrum bandwidth of Y MHz (e.g., 5, 10, 15, 20, 100, 400, 800, 1600, 2000, etc. MHz) per carrier allocated in a carrier aggregation of up to a total of Yx MHz, where x component carriers (CCs) are used for communication in each of the uplink and downlink directions. The carriers may or may not be adjacent to each other along a frequency spectrum. In examples, uplink and downlink carriers may be allocated in an asymmetric manner, with more or fewer carriers allocated to either the uplink or the downlink. A primary component carrier and one or more secondary component carriers may be included in the component carriers. The primary component carrier may be associated with a primary cell (PCell) and a secondary component carrier may be associated with a secondary cell (SCell).

[0028] Some UEs 102, such as the UEs 102a and 102s, may perform device-to-device (D2D) communications over sidelink. For example, a sidelink communication/D2D link utilizes a spectrum for a wireless wide area network (WWAN) associated with uplink and downlink communications. Such sidelink/D2D communication may be performed through various wireless communications systems, such as wireless fidelity (Wi-Fi) systems, Bluetooth systems, Long Term Evolution (LTE) systems, New Radio (NR) systems, etc.

[0029] The UEs 102 and the base stations 104/RUs 106 may each include a plurality of antennas. The plurality of antennas may correspond to antenna elements, antenna panels, and/or antenna arrays that may facilitate beamforming operations. For example, the RU 106b transmits a downlink beamformed signal based on a first set of communication beams 132 to the UE 102b in one or more transmit directions of the RU 106b. The UE 102b may receive the downlink

beamformed signal based on a second set of communication beams 134b from the RU 106b in one or more receive directions of the UE 102b. In a further example, the UE 102b may also transmit an uplink beamformed signal (e.g., sounding reference signal (SRS)) to the RU 106b based on the second set of communication beams 134b in one or more transmit directions of the UE 102b. The RU 106b may receive the uplink beamformed signal from the UE 102b in one or more receive directions of the RU 106b. The UE 102b may perform beam training to determine the best receive and transmit directions for the beamformed signals. The transmit and receive directions for the UEs 102 and the base stations 104/RUs 106 may or may not be the same.

[0030] In further examples, beamformed signals may be communicated between a first base station/RU 106a and a second base station 104e. For instance, the base station 104e of the cell 190e may transmit a beamformed signal to the RU 106a based on the communication beams 138 in one or more transmit directions of the base station 104e. The RU 106a may receive the beamformed signal from the base station 104e of the cell 190e based on the RU communication beams 136 in one or more receive directions of the RU 106a. In further examples, the base station 104e transmits a downlink beamformed signal to the UE 102e based on the communication beams 138 in one or more transmit directions of the base station 104e. The UE 102e receives the downlink beamformed signal from the base station 104e based on UE communication beams 130 in one or more receive directions of the UE 102e. The UE 102e may also transmit an uplink beamformed signal to the base station 104e based on the UE communication beams 130 in one or more transmit directions of the UE 102e, such that the base station 104e may receive the uplink beamformed signal from the UE 102e in one or more receive directions of the base station 104e.

[0031] The base station 104 may include and/or be referred to as a network entity. That is, "network entity" may refer to the base station 104 or at least one unit of the base station 104, such as the RU 106, the DU 108, and/or the CU 110. The base station 104 may also include and/or be referred to as a next generation evolved Node B (ng-eNB), a next generation NB (gNB), an evolved NB (eNB), an access point, a base transceiver station, a radio base station, a radio transceiver, a transceiver function, a basic service set (BSS), an extended service set (ESS), a TRP, a network node, network equipment, or other related terminology. The base station 104 or an entity at the base station 104 can be implemented as an IAB node, a relay node, a sidelink node, an aggregated (monolithic) base station, or a disaggregated base station including one or more RUs 106, DUs 108, and/or CUs 110. A set of aggregated or disaggregated base stations may be referred to as a next generation-radio access network (NG-RAN). In some examples, the UE 102a operates in dual connectivity (DC) with the base station 104e and the base station/RU 106a. In

such cases, the base station 104e can be a master node and the base station/RU 160a can be a secondary node.

[0032] Still referring to FIG. 1, in certain aspects, any of the UEs 102 may include a QCL rule component 140 configured to receive, from a network entity 104, a configuration for LTM. The QCL rule component 140 is further configured to receive, from the network entity 104, an LTM reference signal. The QCL rule component 140 is further configured to receive, from the network entity 104, a CSC indicating a target cell and a TCI state. QCL information is based on the TCI state and the LTM reference signal.

[0033] In certain aspects, any of the base stations 104 or a network entity of the base stations 104 may include an LTM configuration component 150 configured to transmit, to a UE 102, a configuration for LTM. The LTM configuration component 150 is further configured to transmit, to the UE 102, an LTM reference signal. The LTM configuration component 150 is further configured to transmit, to the UE 102, a CSC indicating a target cell and a TCI state. QCL information is based on the TCI state and the LTM reference signal.

[0034] Accordingly, FIG. 1 describes a wireless communication system that may be implemented in connection with aspects of one or more other figures described herein. Further, although the following description may be focused on 5G NR, the concepts described herein may be applicable to other similar areas, such as 5G-Advanced and future versions, LTE, LTE-advanced (LTE-A), and other wireless technologies, such as 6G.

[0035] FIG. 2 is a signaling diagram of a method 200 illustrating communications between a UE 102 and a network entity 104 for determining QCL information in LTM procedures according to an embodiment. The UE 102 transmits 210 a UE capability indicator to the network entity 104. In this regard, the UE 102 transmits 210 the UE capability indicator to network entity 104 via RRC messaging. In some aspects, the UE capability indicator indicates whether the UE 102 supports a joint TCI state and/or a downlink TCI state for LTM with an LTM SSB or LTM TRS configured as a QCL source reference signal for a QCL type. In some aspects, the UE capability indicator indicates support for an LTM TRS. In some aspects, the UE capability indicator indicates a maximum number of TCI states for LTM per bandwidth part, per component carrier (CC), per frequency band and/or per frequency band combination. In some aspects, the UE capability indicator configures a time domain channel property (TDCP) measurement and report based on an LTM TRS or a LTM TRS set. A TRS set may be referred to or replaced with a CSI-RS resource set for time/frequency tracking. In some cases, a TRS set may be a CSI-RS resource set configured with *trs-info*. A TRS set may be referred to or replaced with a TRS resource set. A TRS may be referred to or replaced with a TRS resource.

[0036] The UE 102 receives 220a a configuration from the network entity 104 for enabling LTM procedures and/or for configuring one or more candidate cells for the UE 102 to switch to using LTM procedures. The UE 102 receives 220b a configuration from the network entity 104 for CSI reporting and/or LTM channel measurement (CM) reference signal (RS) set configurations (e.g., may be referred to as LTM reference signal set configurations). In some aspects, the LTM CM RS set may include a subset of the LTM SSB set. The UE 102 receives 220c a configuration from the network entity 104 for LTM TRS(s) (e.g., LTM TRS set). The network entity 104 transmits 220 an RRC configuration for enabling the LTM procedure and/or for configuring one or more candidate cell(s). The network entity 104 transmits 220 an RRC configuration for configuring one or more LTM CSI report configurations and/or one or more LTM-CM RS set configurations. The LTM TRS may be configured in the candidate cell configuration, the LTM configuration, and/or the serving cell configuration. In some aspects, the one or more LTM CSI report configurations and the one or more LTM TRSs may be configured in the same RRC configuration. In some aspects, the QCL source RS may be configured in the TCI state for receiving the LTM TRS. In some other aspects, the QCL source RS may not be configured in the TCI state for receiving the LTM TRS. The LTM TRS or LTM SSB may not be used as a QCL source RS for a TCI state in the serving cell.

[0037] In some aspects, only one LTM TRS set with only one LTM TRS is configured, or only one LTM TRS set with one or more LTM TRSs is configured. In some aspects, one or more LTM TRS set are configured, each of which includes only one LTM TRS, or one or more LTM TRS set are configured, each of which includes one or more LTM TRSs. In some aspects, only one LTM-CM RS set or LTM SSB set associated with all candidate cells is configured, where different subset of the only one LTM-CM RS set or LTM SSB set is associated with different activated or configured target/candidate cell. In some aspects, more than one LTM-CM RS set or LTM SSB set, each of which is associated with one candidate cell, is configured.

[0038] In some aspects, an LTM TRS set is associated with one activated or configured target/candidate cell, more than one activated or configured target/candidate cells and/or all activated or configured target/candidate cells. In some aspects, an LTM TRS is associated with one activated or configured target/candidate cell, more than one activated or configured target/candidate cells and/or all activated or configured target/candidate cells. In some aspects, an LTM TRS is associated with one LTM SSB from associated activated or configured target/candidate cells, more than one LTM SSB from associated activated or configured target/candidate cells and/or all SSBs from associated activated or configured target/candidate cells.

[0039] In some aspects, a LTM TRS is associated with only one LTM-CM RS set or LTM SSB set. In some aspects, a LTM TRS is associated with one or more LTM-CM RS set or LTM SSB set. In some aspects, a LTM TRS is associated with a subset of one LTM-CM RS set or LTM SSB set. In some aspects, the amount of the one or more LTM TRS in a LTM TRS set may be the same as that of the associated one or more LTM-CM RS sets or LTM SSB sets.

[0040] In some aspects, an LTM TRS is associated with one LTM SSB from one activated or configured target/candidate cell and the amount of LTM TRSs in a LTM TRS set is the same amount as that of an associated LTM-CM RS set or LTM SSB set. In some aspects, each SSB in an LTM-CM RS set or LTM SSB set is the QCL source RS of a TCI state for receiving the associated LTM TRS in the associated LTM TRS set. In some aspects, there is a one-to-one mapping between a LTM TRS in a LTM TRS set and a SSB in an LTM-CM RS set or LTM SSB set, where the LTM TRS set and the LTM-CM RS set (or LTM SSB set) are associated. The amount of LTM TRS or LTM TRS set may be the same as the amount of all configured LTM-CM RS set or LTM SSB set, or the amount of elements in an LTM-CM RS set or LTM SSB set, or the amount of elements in a subset of a LTM-CM RS set or LTM SSB set.

[0041] Optionally, if an LTM CSI report is aperiodic or semi-persistent, the BS 104 transmits a triggering DCI or a MAC-CE activation for the LTM CSI report. The UE 102 measures one or more LTM-CM RS from the one or more configured LTM-CM RS sets based on the trigger. In some aspects, the network entity 104 transmits 220 an RRC configuration that configures the UE 102 with a set of LTM CSI reports (configuration). The network entity 104 may configure the UE 102 for each LTM CSI report in the set of LTM CSI reports via each corresponding LTM CSI report configuration. The set of LTM CSI reports may include one or more LTM CSI reports for a target cell or candidate cell(s). In some aspects, the network entity 104 may configure or indicate an association between an LTM CSI report from the set of LTM CSI reports and one or more LTM-CM RS sets. Although FIG. 2 describes the UE 102 receiving three separate communications 220a, 220b, and 220c for the configurations related to LTM, the present disclosure is not so limited and any number of communications including a single communication may be used to transmit the configurations 220a, 220b, and/or 220c. In this regard, the UE 102 may receive 220 the configuration(s) via RRC messaging.

[0042] The UE 102 receives 242 a request (e.g., trigger or activation) for an LTM CSI report from the network entity 104. In this regard, the UE 102 may receive the trigger or activation for an LTM CSI report via DCI and/or MAC-CE (e.g., aperiodic CSI report or semi-persistent CSI report). Additionally or alternatively, the UE 102 may be configured to periodically transmit a CSI report to the network entity 104.

[0043] Optionally, the UE 102 receives 245 an LTM reference signal from the network entity 104. The LTM reference signal may be an LTM TRS configured in the LTM TRS configuration and/or an LTM SSB configured in the LTM-CM RS set. The UE 102 may measure 250 the LTM reference signal. In some aspects, the UE 102 measures a reference signal received power (RSRP) of the LTM SSB. In some aspects, UE 102 measures a subset of LTM SSBs transmitted by the network entity 104. In some other aspects, the UE 102 receives 245 the LTM TRS from the network entity 104 but does not measure the LTM TRS and/or execute time/frequency deviation tracking based on the LTM TRS. In other words, the LTM TRS may be considered as a "dummy" or virtual or empty TRS.

[0044] In some aspects, a TRS configuration may indicate whether the TRS in the TRS configuration is for QCL information for LTM or for time/frequency tracking for serving cell or source cell. In some cases, the TRS configuration includes an RRC parameter (e.g., "*trs-Info-ForLTM*") indicating whether the TRS is for QCL information for LTM or for time/frequency tracking for serving cell or source cell. In some other cases, if the TRS configuration includes an ID of an activated or configured candidate cell, the UE determines the TRS is for QCL information for LTM. For example, the ID may be a logical ID in a candidate cell list or a configuration ID or a cell index or a PCI or a logical PCI index. In some other cases, if a TCI state applied for the TRS includes a QCL source RS as being a SSB associated with an activated or configured candidate cell or a SSB included in an LTM-CM RS set or LTM SSB set for an activated or configured candidate cell, the UE determines the TRS is for QCL information for LTM. In some other cases, if the TRS configuration includes an RRC parameter (e.g., "*resourceType*") indicating "aperiodic" without an associated periodic TRS set or TRS configured, or indicating "semi-persistent," the UE determines the TRS is for QCL information for LTM. In some other cases, if the TRS configuration does not include a RRC parameter for resource mapping (e.g., *resourceMapping* or *CSI-RS-ResourceMapping*) or the TRS configuration includes a RRC parameter for resource mapping which does not indicates valid RRC parameters for time/frequency resource, the UE determines the TRS is for QCL information for LTM. In some aspects, if a TRS is for QCL information for LTM, the TRS may be a LTM TRS. In some aspects, the UE 102 may track the LTM TRS after the LTM procedure is completed.

[0045] In some aspects, the UE 102 may use the LTM TRS to track time/frequency deviation. In some aspects, the UE 102 receives 245 an LTM TRS and uses an LTM SSB as a QCL source reference signal. The UE 102 may refrain from using an LTM TRS or LTM TRS set for time domain channel property (TDCP) measurement and report. For example, if the UE 102 receives 220c a configuration for using an LTM TRS or LTM TRS set for TDCP measurement and report,

the UE 102 may not perform the corresponding TDCP measurement and/or transmission of the TDCP report.

[0046] In some aspects, the network entity 104 may refrain from configuring an RRC parameter for indicating time domain restriction of channel or interference measurement for an LTM CSI report. In some other aspects, the network entity 104 may configure an RRC parameter for indicating time domain restriction of channel or interference measurement for an LTM CSI report. If configured, the network entity 104 may refrain from configuring/setting "configured" to the RRC parameter for indicating time domain restriction of channel or interference measurement. In some other aspects, the network entity 104 may configure an RRC parameter for indicating time domain restriction of channel or interference measurement for an LTM CSI report, and, if configured, the network entity 104 may configure/set "not configured" to the RRC parameter for indicating time domain restriction of channel or interference measurement. For example, the RRC parameter for indicating time domain restriction of channel or interference measurement may be indicated by the parameter "*timeRestrictionForChannelMeasurements*"or "*timeRestrictionForInterferenceMeasurements*."

[0047] In some aspects, if the UE 102 receives an RRC parameter for indicating time domain restriction of channel or interference measurement for a LTM CSI report, or if the UE receives an RRC parameter for indicating time domain restriction of channel or interference measurement for an LTM CSI report, where the RRC parameter indicates "configured", the UE 102 may perform one of the following actions: consider configuration of the RRC parameter as an error case and optionally perform an RRC reconfiguration procedure, discard or refrain from applying the RRC parameter, and/or refrain from performing the LTM CSI report and/or corresponding channel/interference measurement. In some aspects, the UE may report 210 the UE capability indicating whether it supports time domain restriction for channel and/or interference measurement for an LTM CSI report. For example, the UE may report 210 the UE capability for a certain frequency range (e.g., frequency range 2 (24.25GHz – 100GHz), frequency range 3 (7.125GHz – 24.25GHz), or a frequency range above 7GHz.)

[0048] The UE 102 transmits 260 an LTM CSI report to the network entity 104 indicating the measurement(s) (e.g., RSRP) of the SSB. The UE 102 may transmit 260 the LTM CSI report in response to receiving 242 the LTM CSI report request. Additionally or alternatively, the UE 102 transmits 260 the LTM CSI report periodically. In some aspects, the UE 102 transmits 260 the LTM CSI report with measurement results of one or more candidate cell(s). In some aspects, the UE 102 transmits 260 the LTM CSI report with measurement results of the one or more LTM-

CM RS sets. In some aspects, the UE 102 transmits 260 the LTM CSI report with measurement results of one or more candidate cell(s).

[0049] The UE 102 receives 270 a CSC from the network entity 104 indicating a target cell (e.g., a candidate cell indicated by the CSC as the target cell) for the UE 102 to switch to and a joint TCI state or a DL TCI state. In this regard, the UE 102 receives 270 the CSC via MAC-CE and/or a PDSCH communication. The PDSCH communication carrying the CSC may be scheduled via DCI. The CSC indicates the configuration for the target cell via a candidate cell configuration ID. Upon completing the LTM procedure, the target cell indicated by the CSC becomes the new serving cell for the UE 102.

[0050] In some aspects, the CSC may include one or some of a target cell identifier, timing advance information, a beam identifier for the target cell, a joint TCI state identifier, a pair of UL and DL unified TCI state identifiers, an active downlink/uplink BWP identifier(s) for the target cell, a command to trigger CSI acquisition of the target cell and corresponding report to the target cell, a command to trigger aperiodic sounding reference signal (SRS) transmission to the target cell, and/or a cell radio network temporary identifier (C-RNTI) of the target cell.

[0051] The UE 102 determines 280 the QCL information based on the joint/DL TCI state and the LTM reference signal. When the LTM reference signal is an LTM TRS, the TCI state indicates or includes the LTM TRS as a QCL source reference signal for a QCL type. The QCL type may include QCL Type A (e.g., for Doppler shift, Doppler spread, average delay, delay spread), QCL Type B (e.g., for Doppler shift, Doppler spread), QCL Type C (e.g., for Doppler shift, average delay), QCL Type D (e.g., for spatial reception parameter), and/or QCL-Type E (e.g., for one or a subset of parameters for QCL Type A). In some aspects, the UE 102 determines 280 the QCL information based on an LTM TRS for QCL Type A indication and an LTM SSB for QCL Type D indication, where in some cases the LTM SSB is a QCL source reference signal in a TCI state for the LTM TRS. In some aspects, the UE 102 determines 280 the QCL information from an LTM SSB for QCL Type A indication and QCL Type D indication. In some aspects, the UE 102 determines 280 the QCL information from an LTM SSB for QCL Type C indication and QCL Type D indication, where the LTM SSB is a source reference signal for the LTM TRS. In some aspects, the UE 102 determines 280 the QCL information from an LTM TRS for QCL Type A indication and QCL Type D indication, where the LTM SSB is a QCL source reference signal in a TCI state for the LTM TRS. In some aspects, the UE 102 determines 280 the QCL information from a first LTM SSB or first LTM TRS for the QCL Type A, QCL Type B, QCL Type C, or QCL Type E indication and a second LTM SSB or second LTM TRS for QCL Type D indication. In some aspects, the UE 102 determines 280 the QCL information from a serving cell TRS for

one of the QCL Type A/B/C/E indication and the same serving cell TRS or a second SSB for QCL-Type D indication. In such aspects, the network entity may apply or perform pre-compensation of the time and frequency offset between the serving cell and candidate/target cell to transmit the serving cell TRS. A serving cell TRS may be referred to or replaced with a TRS configured for time/frequency tracking for the serving cell or a TRS configured in serving cell configuration. The network entity may ensure to configure/set QCL source RS in a beam indication applied for a serving cell TRS is a SSB transmitted from the serving cell or a SSB associated with serving cell PCI. The network entity may refrain from configuring/setting QCL source RS in a beam indication applied for a serving cell TRS is a SSB transmitted from a cell with PCI different from serving cell PCI or a SSB associated with additional PCI or candidate/target cell.

[0052] In some aspects where only SSB(s) serving for QCL indication in a joint/DL TCI state for LTM (or a joint/DL TCI state indicated by the CSC) or in some aspects where only LTM SSB(s) serving for QCL indication in a TCI state for a LTM TRS, and the LTM TRS is QCL source RS in a joint/DL TCI state for LTM (or a joint/DL TCI state indicated by the CSC), the network entity may refrain from indicating a MCS index larger than M and/or a PDSCH layers larger than N for a PDSCH, if or before the joint/DL TCI state for LTM is applied for receiving the PDSCH. In some cases, the value of M and N may be configured or indicated by the network entity. In some other cases, the value of M and N may be pre-defined or specified. In one example, M indicates the MCS with modulation order higher than 16QAM. In another example, N is 2. In some implementations, if the UE receives indication of a MCS index larger than M and/or a PDSCH layers larger than N for a PDSCH, where the joint/DL TCI state is applied for receiving the PDSCH, the UE may determine or consider it is an error case. In some implementations, if the UE receives indication of a MCS index larger than M and/or a PDSCH layers larger than N for a PDSCH, where the joint/DL TCI state is applied for receiving the PDSCH, the UE may discard or may not use/apply the corresponding scheduling DCI or scheduling information for the PDSCH. In some other implementations, the network entity may refrain from scheduling a PDSCH based on a DCI format other than the fallback DCI format (e.g., DCI format 1_0), if or before the joint/DL TCI state for LTM is applied for receiving the PDSCH.

[0053] In some cases, a LTM SSB from an LTM-CM RS set or LTM SSB set may be a QCL source RS in a TCI state applied for a LTM TRS. In some cases, if a LTM SSB is associated with a LTM RS, it may imply that the LTM SSB is a QCL source RS in a TCI state applied for the LTM TRS. In some cases, a LTM SSB may be a QCL source RS in a TCI state applied for the LTM TRS for QCL-Type C and QCL-Type D indication. In some cases, a LTM SSB may be a

QCL source RS in a TCI state applied for the LTM TRS for QCL-Type D indication. In some cases, the LTM SSB, which is associated with the LTM TRS, may be associated with or transmitted from the candidate cell indicated in the CSC. In some implementations, the LTM SSB, which is associated with the LTM TRS, may be reported by the UE in the LTM CSI report.

[0054] In some cases, the UE may update the QCL source RS in a TCI state applied for the LTM TRS with a LTM SSB. In some implementations, the UE may determine the LTM SSB is the QCL source RS in a TCI state applied for the LTM TRS, where the network entity may not configure or indicate QCL source RS in a TCI state for the LTM TRS, or the network entity may not configure or indicate the TCI state for the LTM TRS.

[0055] In some aspects, the UE 102 may receive a downlink communication (e.g., a PDCCH and/or PDSCH and/or DL RS) from the network entity 104 and not rate match the downlink communication around the LTM reference signal. In some cases, the UE may count or determine resource elements (REs) of the LTM reference signal as available REs for PDSCH, demodulation reference signal (DMRS) for PDSCH and/or DL phase tracking reference signal (PT-RS). The UE 102 may perform rate matching around the LTM reference signal (i.e., REs of the LTM reference signal is not available for reception of the downlink communication), after receiving the CSC or after transmitting an acknowledgement (ACK) to the network entity 104 in response to decoding the CSC or completing the LTM procedure triggered by the CSC, where the joint/DL TCI state indicated by the CSC includes the LTM reference signal as a QCL source RS. In some aspects, the network entity 104 may puncture the resource elements of the LTM TRS or LTM TRS set for a PDSCH, DMRS, or PT-RS transmission.

[0056] In some aspects, the UE may determine the REs of the LTM reference signal as REs not available for PDSCH, DMRS for PDSCH, and/or DL PT-RS. In some cases, the UE may determine the REs of the LTM reference signal as REs not available for PDSCH, DMRS for PDSCH, and/or DL PT-RS, if the network entity configures time/frequency resource elements for the LTM reference signal, and the LTM reference signal is a LTM TRS. In some aspects, the network entity may refrain from using REs (if configured) of the LTM reference signal to transmit a PDSCH to the UE.

[0057] In some aspects, the UE may perform PDSCH rate-matching on a DL signal for the serving cell. A DL signal for the serving cell may be a DL signal associated with or transmitted from the serving cell. In some cases, the UE may refrain from counting or determining REs of the DL signal for the serving cell as available REs for PDSCH, DMRS for PDSCH, and/or DL PT-RS. Thus, the UE may determine the REs of the DL signal for the serving cell as not available for PDSCH, DMRS for PDSCH and/or DL PT-RS. In some implementations, the network entity may

refrain from using REs of the DL signal for the serving cell to transmit a PDSCH, DMRS for PDSCH, and/or PT-RS to the UE.

[0058] In some aspects, the UE may not perform rate-matching for PDSCH, DMRS for PDSCH, and/or DL PT-RS on the DL signal for the serving cell or the UE may count or determine REs of the DL signal for the serving cell as available REs for PDSCH reception, if the UE receives a CSC, or the UE transmits an acknowledgement signal for the CSC. In some aspects, the network entity may use REs of the DL signal for the serving cell to transmit a PDSCH, DMRS for PDSCH, and/or DL PT-RS to the UE, if the network entity transmits a CSC or the network entity receives an acknowledgement signal for the CSC.

[0059] FIG. 3 is a signaling diagram of a method 300 illustrating communications between a UE 102 and a network entity 104 for determining QCL information in LTM procedures according to another embodiment. The UE 102 transmits 210 a UE capability indicator to network entity 104 as described with reference to FIG. 2. The UE 102 receives 220a a configuration from the network entity 104 for enabling LTM procedures and/or for configuring one or more candidate cells for the UE 102 to switch to using LTM procedures as described with reference to FIG. 2. The UE 102 receives 220b a configuration from the network entity 104 for CSI reporting and/or LTM-CM RS reference signal set configurations as described with reference to FIG. 2. In the example of FIG. 2, the UE 102 receives 220c an LTM TRS configuration from the network entity 104. However, in the example of FIG. 3, the UE 102 does not receive a configuration from the network entity 104 for LTM TRS(s).

[0060] The UE 102 receives 242 a request for an LTM CSI report from the network entity 104 as described with reference to FIG. 2. The UE 102 receives 245 an LTM SSB from the network entity 104 as described with reference to FIG. 2. The UE 102 measures 250 the RSRP of the LTM SSB as described with reference to FIG. 2. The UE 102 transmits 260 an LTM CSI report to network entity 104 indicating the RSRP measurement(s) of the LTM SSB as described with reference to FIG. 2.

[0061] The UE 102 receives 270 a CSC from network entity 104 indicating a target cell (e.g., a candidate cell indicated by the CSC as the target cell) for the UE 102 to switch to and a joint TCI state or a DL TCI state as described with reference to FIG. 2.

[0062] The UE 102 determines 380 the QCL information from the joint/DL TCI state based on the LTM reference signal configured in the LTM-CM RS set. Here, the LTM reference signal includes an SSB, and the UE 102 may use the SSB as a source reference signal for determining QCL information.

[0063] FIG. 4 illustrates a flowchart 400 of a method of wireless communication at a UE. With reference to FIGs. 1-3, the method may be performed by the UE 102.

[0064] The UE 102 transmits 410, to a network entity 104, a UE capability report indicating support for an LTM procedure. For example, referring to FIGs. 2-3, UE 102 transmits 210, to a network entity 104, a UE capability report indicating support for an LTM procedure.

[0065] The UE 102 receives 420, from the network entity 104, a configuration for LTM. For example, referring to FIGs. 2-3, UE 102 receives 220, from network entity 104, a configuration for enabling LTM procedures and/or for configuring a serving cell and/or one or more candidates cells for the UE 102 to switch to using LTM. The UE 102 receives 220b a configuration from the network entity 104 for CSI reporting and/or LTM reference signal set configurations. Referring to FIG. 2, the UE 102 receives 220c a configuration for LTM TRS(s) from the network entity 104. Referring to FIG. 3, the UE 102 does not receive a configuration for LTM TRS(s) from the network entity 104.

[0066] The UE 102 receives 442, from network entity 104, a request for a CSI report. For example, referring to FIGs. 2-3, UE 102 receives 242, from network entity 104, a request for a CSI report.

[0067] The UE 102 receives 445, from network entity 104, an LTM reference signal based on the LTM configuration or candidate cell configuration. For example, referring to FIGs. 2-3, UE 102 receives 445, from network entity 104, an LTM reference signal based on the LTM configuration. The LTM reference signal may be an LTM TRS or an LTM SSB.

[0068] The UE 102 measures 450, the LTM reference signal. For example, referring to FIGs. 2-3, when the LTM reference signal is an LTM SSB, the UE measures 250 an RSRP of the LTM SSB.

[0069] The UE 102 transmits 460 a CSI report indicating the RSRP of the LTM reference signal. For example, referring to FIGs. 2-3, when the LTM reference signal is an LTM SSB, the UE transmits 260 a CSI report indicating the RSRP of the LTM SSB.

[0070] The UE 102 receives 470, from the network entity 104, a CSC indicating a target cell and a TCI state. The QCL information is derived or determined by the UE based on the TCI state and the LTM reference signal. For example, referring to FIGs. 2-3, the UE 102 receives 270, from the network entity 104, a CSC indicating a target cell and a TCI state. In some cases, based on the target cell and the TCI state, the UE determines or derives the LTM reference signal as being QCL source RS of the TCI state indicated in the CSC. Optionally, in case the LTM reference signal is a LTM TRS, the UE may further determine or derive a LTM SSB as being a QCL source RS in a beam indication for the LTM TRS. The network entity may indicate the LTM SSB as being a

QCL source RS in a beam indication for the LTM TRS via the CSC or other signal. The network entity may further indicate an LTM-CM RS set (ID) or a LTM SSB set (ID) or a candidate cell configuration, via the CSC or other signal. For example, the UE may derive or determine a LTM SSB as being a QCL source RS in a beam indication for the LTM TRS, via a SSB resource index or a SSB logical index in an LTM-CM RS set or LTM SSB set, and the candidate cell (configuration) ID indicated in the CSC.

[0071] The UE 102 determines 480 the QCL information based on the LTM reference signal and a joint TCI state or a downlink TCI state. For example, referring to FIGs. 2-3, the UE 102 determines 280 the QCL information based on the LTM reference signal and a joint TCI state or a downlink TCI state.

[0072] FIG. 4 describes a method from a UE-side of a wireless communication link, whereas FIG. 5 describes a method from a network-side of the wireless communication link.

[0073] FIG. 5 illustrates a flowchart 500 of a method of wireless communication at a network entity. With reference to FIGs. 1-3, the method may be performed by the network entity 104.

[0074] The network entity 104 receives 510, from a UE 102, a UE capability report indicating support for an LTM procedure. For example, referring to FIGs. 2-3, network entity 104 receives 210, from the UE 102, a UE capability report indicating support for an LTM procedure.

[0075] The network entity 104 transmits 520, to the UE 102, a configuration for LTM. For example, referring to FIGs. 2-3, network entity 104 transmits 220a a configuration to the UE 102 for enabling LTM procedures and/or for configuring one or more candidates cells for the UE 102 to switch to using LTM procedures. The network entity 104 transmits 220b a configuration to the UE 102 for CSI reporting and/or LTM reference signal set configurations. The network entity 104 transmits 220c a configuration to the UE 102 for LTM TRS(s).

[0076] The network entity 104 transmits 542, to the UE102, a request for a CSI report. For example, referring to FIGs. 2-3, network entity 104 transmits 242, to the UE 102, a request for a CSI report.

[0077] The network entity 104 transmits 545, to the UE 102, an LTM reference signal based on the LTM configuration. For example, referring to FIGs. 2-3, network entity transmits 245, to the UE 102, an LTM reference signal based on the LTM configuration. The LTM reference signal may be an LTM TRS and/or an LTM SSB.

[0078] The network entity 104 receives 560 a CSI report indicating the RSRP of the LTM reference signal. For example, referring to FIGs. 2-3, when the LTM reference signal is an LTM SSB, the network entity 104 receives 260 a CSI report indicating the RSRP of the LTM SSB.

[0079] The network entity 104 transmits 570, to the UE 102, a CSC indicating a target cell and a TCI state. The QCL information is derived or determined by the UE based on the TCI state and the LTM reference signal. For example, referring to FIGs. 2-3, the network entity 104 transmits 270, to the UE 102, a CSC indicating a target cell and a TCI state. The UE 102 determines the QCL information based on the LTM reference signal and a joint TCI state or a downlink TCI state.

[0080] FIG. 6 is a diagram 600 illustrating an example of a hardware implementation for a UE apparatus 602. The UE apparatus 602 may be the UE 102, a component of the UE 102, or may implement UE functionality. The UE apparatus 602 may include an application processor 606, which may have on-chip memory 606'. In examples, the application processor 606 may be coupled to a secure digital (SD) card 608 and/or a display 610. The application processor 606 may also be coupled to a sensor(s) module 612, a power supply 614, an additional module of memory 616, a camera 618, and/or other related components.

[0081] The UE apparatus 602 may further include a wireless baseband processor 626, which may be referred to as a modem. The wireless baseband processor 626 may have on-chip memory 626'. Along with, and similar to, the application processor 606, the wireless baseband processor 626 may also be coupled to the sensor(s) module 612, the power supply 614, the additional module of memory 616, the camera 618, and/or other related components. The wireless baseband processor 626 may be additionally coupled to one or more subscriber identity module (SIM) card(s) 620 and/or one or more transceivers 630 (e.g., wireless RF transceivers).

[0082] Within the one or more transceivers 630, the UE apparatus 602 may include a Bluetooth module 632, a WLAN module 634, an SPS module 636 (e.g., GNSS module), and/or a cellular module 638. The Bluetooth module 632, the WLAN module 634, the SPS module 636, and the cellular module 638 may each include an on-chip transceiver (TRX), or in some cases, just a transmitter (TX) or just a receiver (RX). The Bluetooth module 632, the WLAN module 634, the SPS module 636, and the cellular module 638 may each include dedicated antennas and/or utilize antennas 640 for communication with one or more other nodes. For example, the UE apparatus 602 can communicate through the transceiver(s) 630 via the antennas 640 with another UE (e.g., sidelink communication) and/or with a network entity 104 (e.g., uplink/downlink communication), where the network entity 104 may correspond to a base station or a unit of the base station, such as the RU 106, the DU 108, or the CU 110.

[0083] The wireless baseband processor 626 and the application processor 606 may each include a computer-readable medium / memory 626', 606', respectively. The additional module of memory 616 may also be considered a computer-readable medium / memory. Each computer-

readable medium / memory 626', 606', 616 may be non-transitory. The wireless baseband processor 626 and the application processor 606 may each be responsible for general processing, including execution of software stored on the computer-readable medium / memory 626', 606', 616. The software, when executed by the wireless baseband processor 626 / application processor 606, causes the wireless baseband processor 626 / application processor 606 to perform the various functions described herein. The computer-readable medium / memory may also be used for storing data that is manipulated by the wireless baseband processor 626 / application processor 606 when executing the software. The wireless baseband processor 626 / application processor 606 may be a component of the UE 102. The UE apparatus 602 may be a processor chip (e.g., modem and/or application) and include just the wireless baseband processor 626 and/or the application processor 606. In other examples, the UE apparatus 602 may be the entire UE 102 and include the additional modules of the apparatus 602.

[0084] As discussed in FIG. 1 and implemented with respect to FIG. 4, the QCL rule component 140 is configured to receive, from a network entity 104, a configuration for LTM. The QCL rule component 140 is further configured to receive, from the network entity 104, an LTM reference signal. The QCL rule component 140 is further configured to receive, from the network entity 104, a CSC indicating a target cell and a TCI state. QCL information is based on the TCI state and the LTM reference signal.

[0085] The QCL rule component 140 may be within the application processor 606 (e.g., at 140a), the wireless baseband processor 626 (e.g., at 140b), or both the application processor 606 and the wireless baseband processor 626. The QCL rule component 140a-140b may be one or more hardware components specifically configured to carry out the stated processes/algorithm, implemented by one or more processors configured to perform the stated processes/algorithm, stored within a computer-readable medium for implementation by the one or more processors, or a combination thereof.

[0086] FIG. 7 is a diagram 700 illustrating an example of a hardware implementation for one or more network entities 104. The one or more network entities 104 may be a base station, a component of a base station, or may implement base station functionality. The one or more network entities 104 may include, or may correspond to, at least one of the RU 106, the DU, 108, or the CU 110. The CU 110 may include a CU processor 746, which may have on-chip memory 746'. In some aspects, the CU 110 may further include an additional module of memory 756 and/or a communications interface 748, both of which may be coupled to the CU processor 746. The CU 110 can communicate with the DU 108 through a midhaul link 162, such as an F1 interface

between the communications interface 748 of the CU 110 and a communications interface 728 of the DU 108.

[0087] The DU 108 may include a DU processor 726, which may have on-chip memory 726'. In some aspects, the DU 108 may further include an additional module of memory 736 and/or the communications interface 728, both of which may be coupled to the DU processor 726. The DU 108 can communicate with the RU 106 through a fronthaul link 160 between the communications interface 728 of the DU 108 and a communications interface 708 of the RU 106.

[0088] The RU 106 may include an RU processor 706, which may have on-chip memory 706'. In some aspects, the RU 106 may further include an additional module of memory 716, the communications interface 708, and one or more transceivers 730, all of which may be coupled to the RU processor 706. The RU 106 may further include antennas 740, which may be coupled to the one or more transceivers 730, such that the RU 106 can communicate through the one or more transceivers 730 via the antennas 740 with the UE 102.

[0089] The on-chip memory 706', 726', 746' and the additional modules of memory 716, 736, 756 may each be considered a computer-readable medium / memory. Each computer-readable medium / memory may be non-transitory. Each of the processors 706, 726, 746 is responsible for general processing, including execution of software stored on the computer-readable medium / memory. The software, when executed by the corresponding processor(s) 706, 726, 746 causes the processor(s) 706, 726, 746 to perform the various functions described herein. The computer-readable medium / memory may also be used for storing data that is manipulated by the processor(s) 706, 726, 746 when executing the software. In examples, the LTM configuration component 150 may sit at any of the one or more network entities 104, such as at the CU 110; both the CU 110 and the DU 108; each of the CU 110, the DU 108, and the RU 106; the DU 108; both the DU 108 and the RU 106; or the RU 106.

[0090] As discussed in FIG. 1 and implemented with respect to FIG. 5, the LTM configuration component 150 is configured to transmit, to a UE 102, a configuration for LTM. The LTM configuration component 150 is further configured to transmit, to the UE 102, an LTM reference signal. The LTM configuration component 150 is further configured to transmit, to the UE 102, a CSC indicating a target cell and a TCI state. QCL information is based on the TCI state and the LTM reference signal.

[0091] The LTM configuration component 150 may be within one or more processors of the one or more network entities 104, such as the RU processor 706 (e.g., at 150a), the DU processor 726 (e.g., at 150b), and/or the CU processor 746 (e.g., at 150c). The LTM configuration component 150a-150c may be one or more hardware components specifically configured to carry

out the stated processes/algorithm, implemented by one or more processors 706, 726, 746 configured to perform the stated processes/algorithm, stored within a computer-readable medium for implementation by the one or more processors 706, 726, 746, or a combination thereof.

[0092] The specific order or hierarchy of blocks in the processes and flowcharts disclosed herein is an illustration of example approaches. Hence, the specific order or hierarchy of blocks in the processes and flowcharts may be rearranged. Some blocks may also be combined or deleted. Dashed lines may indicate optional elements of the diagrams. The accompanying method claims present elements of the various blocks in an example order, and are not limited to the specific order or hierarchy presented in the claims, processes, and flowcharts.

[0093] The detailed description set forth herein describes various configurations in connection with the drawings and does not represent the only configurations in which the concepts described herein may be practiced. The detailed description includes specific details for the purpose of providing a thorough explanation of various concepts. However, these concepts may be practiced without these specific details. In some instances, well known structures and components are shown in block diagram form in order to avoid obscuring such concepts.

[0094] Aspects of wireless communication systems, such as telecommunication systems, are presented with reference to various apparatuses and methods. These apparatuses and methods are described in the following detailed description and are illustrated in the accompanying drawings by various blocks, components, circuits, processes, call flows, systems, algorithms, etc. (collectively referred to as "elements"). These elements may be implemented using electronic hardware, computer software, or combinations thereof. Whether such elements are implemented as hardware or software depends upon the particular application and design constraints imposed on the overall system.

[0095] An element, or any portion of an element, or any combination of elements may be implemented as a "processing system" that includes one or more processors. Examples of processors include microprocessors, microcontrollers, graphics processing units (GPUs), central processing units (CPUs), application processors, digital signal processors (DSPs), reduced instruction set computing (RISC) processors, systems-on-chip (SoC), baseband processors, field programmable gate arrays (FPGAs), programmable logic devices (PLDs), state machines, gated logic, discrete hardware circuits, and other similar hardware configured to perform the various functionality described throughout this disclosure. One or more processors in the processing system may execute software, which may be referred to as software, firmware, middleware, microcode, hardware description language, or otherwise. Software shall be construed broadly to mean instructions, instruction sets, code, code segments, program code, programs, subprograms,

software components, applications, software applications, software packages, routines, subroutines, objects, executables, threads of execution, procedures, functions, or any combination thereof.

[0096] If the functionality described herein is implemented in software, the functions may be stored on, or encoded as, one or more instructions or code on a computer-readable medium, such as a non-transitory computer-readable storage medium. Computer-readable media includes computer storage media and can include a random-access memory (RAM), a read-only memory (ROM), an electrically erasable programmable ROM (EEPROM), optical disk storage, magnetic disk storage, other magnetic storage devices, combinations of these types of computer-readable media, or any other medium that can be used to store computer executable code in the form of instructions or data structures that can be accessed by a computer. Storage media may be any available media that can be accessed by a computer.

[0097] Aspects, implementations, and/or use cases described herein may be implemented across many differing platform types, devices, systems, shapes, sizes, and packaging arrangements. For example, the aspects, implementations, and/or use cases may come about via integrated chip implementations and other non-module-component based devices, such as end-user devices, vehicles, communication devices, computing devices, industrial equipment, retail/purchasing devices, medical devices, artificial intelligence (AI)-enabled devices, machine learning (ML)-enabled devices, etc. The aspects, implementations, and/or use cases may range from chip-level or modular components to non-modular or non-chip-level implementations, and further to aggregate, distributed, or original equipment manufacturer (OEM) devices or systems incorporating one or more techniques described herein.

[0098] Devices incorporating the aspects and features described herein may also include additional components and features for the implementation and practice of the claimed and described aspects and features. For example, transmission and reception of wireless signals necessarily includes a number of components for analog and digital purposes, such as hardware components, antennas, RF-chains, power amplifiers, modulators, buffers, processor(s), interleavers, adders/summers, etc. Techniques described herein may be practiced in a wide variety of devices, chip-level components, systems, distributed arrangements, aggregated or disaggregated components, end-user devices, etc., of varying configurations.

[0099] The description herein is provided to enable a person skilled in the art to practice the various aspects described herein. Various modifications to these aspects will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other aspects.

Thus, the claims are not limited to the aspects described herein, but are to be interpreted in view of the full scope of the present disclosure consistent with the language of the claims.

[00100] Reference to an element in the singular does not mean "one and only one" unless specifically stated, but rather "one or more." Terms such as "if," "when," and "while" do not imply an immediate temporal relationship or reaction. That is, these phrases, e.g., "when," do not imply an immediate action in response to or during the occurrence of an action, but simply imply that if a condition is met then an action will occur, but without requiring a specific or immediate time constraint for the action to occur. The terms "may", "might", and "can", as used in this disclosure, often carry certain connotations. For example, "may" refers to a permissible feature that may or may not occur, "might" refers to a feature that probably occurs, and "can" refers to a capability (e.g., capable of). The phrase "For example" often carries a similar connotation to "may" and, therefore, "may" is sometimes excluded from sentences that include "for example" or other similar phrases.

[00101] Unless specifically stated otherwise, the term "some" refers to one or more. Combinations such as "at least one of A, B, or C" or "one or more of A, B, or C" include any combination of A, B, and/or C, such as A and B, A and C, B and C, or A and B and C, and may include multiples of A, multiples of B, and/or multiples of C, or may include A only, B only, or C only. Sets should be interpreted as a set of elements where the elements number one or more. Moreover, the term "or" is intended to mean an inclusive "or" rather than an exclusive "or." That is, unless specified otherwise, or clear from the context, the phrase "X employs A or B" is intended to mean any of the natural inclusive permutations. That is, the phrase "X employs A or B" is satisfied by any of the following instances: X employs A; X employs B; or X employs both A and B. Terms or articles such as "a", "an", and/or "the" may refer to one of an item, feature, element, etc., that the term or article precedes, or may refer to more than one of said item, feature, element, etc. that the term or article precedes. For example, the recitation "a widget" does not preclude reference to multiples of said widget, as "multiple widgets" necessarily includes "a widget". Hence, the recitation "a widget" may be interpreted as "at least one widget" or, similarly, interpreted as "one or more widgets".

[00102] Unless otherwise specifically indicated, ordinal terms such as "first" and "second" do not necessarily imply an order in time, sequence, numerical value, etc., but are used to distinguish between different instances of a term or phrase that follows each ordinal term. Reference numbers, as used in the specification and figures, are sometimes cross-referenced among drawings to denote same or similar features. A feature that is exactly the same in multiple drawings may be labeled with the same reference number in the multiple drawings. A feature that

is similar among the multiple drawings, but not exactly the same, may be labeled with reference numbers that have different leading numbers, but have one or more of the same trailing numbers (e.g., 206, 306, 406, etc., may refer to similar features in the drawings). Sometimes an "X" is used to universally denote multiple variations of a feature. For instance, "X06" can universally refer to all reference numbers that end in "06" (e.g., 206, 306, 406, etc.).

[00103] Structural and functional equivalents to elements of the various aspects described throughout this disclosure that are known or later come to be known to those of ordinary skill in the art are expressly incorporated herein by reference and are encompassed by the claims. The words "module," "mechanism," "element," "device," and the like may not be a substitute for the word "means." As such, no claim element is to be construed as a means plus function unless the element is expressly recited using the phrase "means for." As used herein, the phrase "based on" shall not be construed as a reference to a closed set of information, one or more conditions, one or more factors, or the like. In other words, the phrase "based on A", where "A" may be information, a condition, a factor, or the like, shall be construed as "based at least on A" unless specifically recited differently.

[00104] The following examples are illustrative only and may be combined with other examples or teachings described herein, without limitation.

[00105] Example 1 is a method of wireless communication at a UE, including receiving, from a network entity, a configuration for LTM; receiving, from the network entity, an LTM reference signal based on the configuration; and receiving, from the network entity, a CSC indicating a target cell and a TCI state, QCL information is based on the TCI state and the LTM reference signal.

[00106] Example 2 may be combined with Example 1 and includes the LTM reference signal includes an LTM TRS; and the TCI state includes a joint TCI state or a downlink TCI state, the method further including determining the QCL information based on the LTM TRS and at least one of the joint TCI state or the downlink TCI state.

[00107] Example 3 may be combined with Example 2 and further includes receiving, from the network entity, a candidate cell configuration indicating resources associated with the LTM TRS; or receiving, from the network entity, a serving cell configuration indicating the resources associated with the LTM TRS.

[00108] Example 4 may be combined with any of Examples 1-3 and further includes the configuration includes at least one of: a candidate cell configuration; a CSI report configuration; an LTM reference signal set configuration; or an LTM TRS configuration.

[00109] Example 5 may be combined with any of Examples 1-4 and further includes the receiving the configuration includes at least one of: receiving a candidate cell configuration; receiving a CSI report configuration and an LTM reference signal set configuration; or receiving an LTM TRS configuration.

[00110] Example 6 may be combined with any of Examples 1-5 and further includes receiving, from the network entity, a request for the CSI report, the transmitting the CSI report includes transmitting the CSI report in response to the request.

[00111] Example 7 may be combined with any of Examples 1-6 and further includes the LTM reference signal includes an SSB, the method further including: measuring a RSRP of the SSB, the measurement information associated with the measuring includes the RSRP of the SSB and transmitting, to the network entity, a CSI report indicating the measurements associated with the LTM reference signal.

[00112] Example 8 may be combined with any of Examples 1-7 and further includes the LTM reference signal includes an LTM SSB, the method further including receiving at least one of: a PDSCH communication based on the TCI state using the LTM SSB as a source reference signal; or a PDCCH communication based on the TCI state using the LTM SSB as the source reference signal.

[00113] Example 9 may be combined with any of Examples 1-8 and further includes the LTM SSB is included in at least one of: an LTM SSB set including all SSBs associated with candidate cells; or an LTM CM set including a subset of the LTM SSB set.

[00114] Example 10 may be combined with any of Examples 1-9 and further includes the LTM reference signal includes an LTM TRS, the method further including: switching to the target cell based on the CSC; and tracking at least one of a time deviation or a frequency deviation based on the measurements associated with the LTM TRS.

[00115] Example 11 may be combined with any of Examples 1-10 and further includes the LTM reference signal includes an LTM TRS and the TCI state indicates the LTM TRS as a source reference signal for a QCL type.

[00116] Example 12 may be combined with any of Examples 1-11 and further includes the LTM reference signal includes an LTM SSB and the TCI state indicates the SSB as a source reference signal for a QCL type.

[00117] Example 13 may be combined with any of Examples 1-12 and further includes the LTM reference signal includes an LTM SSB, the method further including: receiving, from the network entity, an LTM TRS using the LTM SSB as a QCL source reference signal.

[00118] Example 14 may be combined with any of Examples 1-13 and further includes the configuration indicates a set of LTM TRSs associated with a set of candidate cells.

[00119] Example 15 may be combined with any of Examples 1-14 and further includes the configuration indicates a set of LTM TRSs and a set of LTM SSBs associated with the target cell; and an amount of LTM TRSs in the set of LTM TRSs is a same amount of LTM SSBs in the set of LTM SSBs.

[00120] Example 16 may be combined with any of Examples 1-15 and further includes receiving a RRC configuration for an LTM TRS indicating whether the LTM TRS is for the QCL information or for time and frequency tracking; applying a QCL rule to the LTM TRS; and refraining from tracking at least one of a time deviation or a frequency deviation based on the LTM TRS.

[00121] Example 17 may be combined with any of Examples 1-16 and further includes rate matching a downlink communication with the LTM reference signal after the receiving the CSC.

[00122] Example 18 may be combined with any of Examples 1-17 and further includes transmitting, to the network entity, a UE capability report indicating support for the LTM.

[00123] Example 19 is a method of wireless communication at a network entity, the method including: transmitting, to a user equipment, a configuration for LTM; transmitting, to the UE, an LTM reference signal; and transmitting, to the UE, a CSC indicating a target cell and a TCI state, the QCL information is based on the TCI state and the LTM reference signal.

[00124] Example 20 may be combined with Examples 19 and further includes the LTM reference signal comprises an LTM TRS; and the TCI state comprises a joint TCI state or a downlink TCI state.

[00125] Example 21 may be combined with any of Examples 19-20 and further includes transmitting, to the UE, a candidate cell configuration indicating resources associated with the LTM TRS; or transmitting, to the UE, a serving cell configuration indicating the resources associated with the LTM TRS.

[00126] Example 22 may be combined with any of Examples 19-21 and further includes the configuration comprises at least one of: a candidate cell configuration; a CSI report configuration; an LTM reference signal set configuration; or an LTM TRS configuration.

[00127] Example 23 may be combined with any of Examples 19-22 and further includes the transmitting the configuration comprises at least one of: transmitting a candidate cell configuration; transmitting a CSI report configuration and an LTM reference signal set configuration; or transmitting an LTM TRS configuration.

[00128] Example 24 may be combined with any of Examples 19-23 and further includes transmitting to the UE, a request for the CSI report, the receiving the CSI report includes receiving the CSI report in response to the request.

[00129] Example 25 may be combined with any of Examples 19-24 and further includes receiving, from the UE, a CSI report indicating measurements associated with the LTM reference signal; the LTM reference signal includes an SSB; and the measurements comprise a RSRP of the SSB.

[00130] Example 26 may be combined with any of Examples 19-25 and further includes the LTM reference signal includes an LTM SSB, the method further including transmitting at least one of: PDSCH communication based on the TCI state using the LTM SSB as a source reference signal; or a PDCCH communication based on the TCI state using the LTM SSB as the source reference signal.

[00131] Example 27 may be combined with any of Examples 19-26 and further includes the LTM SSB is included in at least one of: an LTM SSB set including all SSBs associated with candidate cells; or an LTM CM set including a subset of the LTM SSB set.

[00132] Example 28 may be combined with any of Examples 19-27 and further includes the LTM reference signal includes an LTM TRS and the TCI state indicates the LTM TRS as a source reference signal for a QCL type.

[00133] Example 29 may be combined with any of Examples 19-28 and further includes the LTM reference signal includes an LTM SSB and the TCI state indicates the SSB as a source reference signal for a QCL type.

[00134] Example 30 may be combined with any of Examples 19-29 and further includes the LTM reference signal includes an LTM SSB, the method further including: transmitting, to the UE, an LTM TRS using the LTM SSB as a QCL source reference signal.

[00135] Example 31 may be combined with any of Examples 19-30 and further includes the configuration indicates a set of LTM TRSs associated with a set of candidate cells.

[00136] Example 32 may be combined with any of Examples 19-31 and further includes the configuration indicates a set of LTM TRSs and a set of LTM SSBs associated with the target cell; and an amount of LTM TRSs in the set of LTM TRS is a same amount of LTM SSBs in the set of LTM SSBs.

[00137] Example 33 may be combined with any of Examples 19-32 and further includes transmitting a RRC configuration for an LTM TRS indicating whether the LTM TRS is for the QCL information or for time and frequency tracking.

[00138] Example 34 may be combined with any of Examples 19-33 and further includes rate matching a downlink communication with the LTM reference signal after the transmitting the CSC.

[00139] Example 35 may be combined with any of Examples 19-34 and further includes receiving, from the UE, a UE capability report indicating support for LTM.

[00140] Example 36 is an apparatus for wireless communication for implementing a method as in any of Examples 1-35.

[00141] Example 37 is an apparatus for wireless communication including means for implementing a method as in any of Examples 1-35.

[00142] Example 38 is a non-transitory computer-readable medium storing computer executable code, the code when executed by a processor causes the processor to implement a method as in any of Examples 1-35.

CLAIMS

WHAT IS CLAIMED IS:

1. A method of wireless communication performed by a user equipment (UE) (102), the method comprising:

receiving (220), from a network entity (104), a configuration for layer 1/layer 2 triggered mobility (LTM);

receiving (245), from the network entity (104), an LTM reference signal based on the configuration; and

receiving (270), from the network entity (104), a cell switch command (CSC) indicating a target cell and a transmission configuration indicator (TCI) state, wherein quasi-colocation (QCL) information is based on the TCI state and the LTM reference signal.

2. The method of claim 1, wherein:

the LTM reference signal comprises an LTM tracking reference signal (TRS); and

the TCI state comprises a joint TCI state or a downlink TCI state, the method further comprising:

determining the QCL information based on the LTM TRS and at least one of the joint TCI state or the downlink TCI state.

3. The method of claim 2, wherein the receiving (220) the configuration further comprises receiving (220c) at least one of:

a candidate cell configuration indicating an LTM TRS configuration;

an LTM configuration for a plurality of candidate cells indicating the LTM TRS configuration; or

a serving cell configuration indicating the LTM TRS configuration.

4. The method of any of claims 1 to 3, wherein the receiving (220) the configuration comprises receiving (220) at least one of:

a candidate cell configuration;

a CSI report configuration;

an LTM reference signal set configuration; or

an LTM tracking reference signal (TRS) configuration.

5. The method of any of claims 1 to 4, wherein the LTM reference signal comprises a synchronization signal block (SSB) associated with the target cell, the method further comprising:

measuring (250) a reference signal received power (RSRP) of the SSB; and

transmitting (260), to the network entity (104), a channel state information (CSI) report indicating the RSRP of the SSB.

6. The method of claim 5, further comprising:

receiving (242), from the network entity (104), a request for the CSI report, wherein the transmitting (260) the CSI report comprises transmitting (260) the CSI report in response to the request.

7. The method of any of claims 1 to 6, wherein the LTM reference signal comprises an LTM synchronization signal block (SSB) included in at least one of:

an LTM SSB set comprising all SSBs associated with one or more candidate cells including the target cell; or

an LTM channel measurement (CM) set comprising a subset of the LTM SSB set, the method further comprising receiving at least one of:

a physical downlink shared channel (PDSCH) based on the TCI state using the LTM SSB as a source reference signal for the QCL information; or

a physical downlink control channel (PDCCH) based on the TCI state using the LTM SSB as the source reference signal for the QCL information.

8. The method of any of claims 1 to 7, wherein the LTM reference signal comprises at least one of:

an LTM tracking reference signal (TRS) and the TCI state indicates the LTM TRS as a source reference signal for a QCL type; or

an LTM synchronization signal block (SSB) and the TCI state indicates the LTM SSB as the source reference signal for the QCL type.

9. The method of any of claims 1 to 8, wherein the LTM reference signal comprises an LTM synchronization signal block (SSB), the method further comprising:

receiving (245), from the network entity (104), an LTM tracking reference signal (TRS) using the LTM SSB as a QCL source reference signal.

10. The method of any of claims 1 to 9, further comprising:

receiving (220c) a radio resource control (RRC) configuration for an LTM tracking reference signal (TRS) indicating whether the LTM TRS is for the QCL information or for time and frequency tracking;

applying a QCL rule to the LTM TRS; and

refraining from tracking at least one of a time deviation or a frequency deviation based on the LTM TRS.

11. The method of any of claims 1 to 10, further comprising:

transmitting (210), to the network entity (104), a UE (102) capability report indicating support for an LTM tracking reference signal (TRS).

12. A method of wireless communication performed by a network entity (104), the method comprising:

transmitting (220), to a user equipment (UE) (102), a configuration for layer 1/layer 2 triggered mobility (LTM);

transmitting (245), to the UE (102), an LTM reference signal based on the configuration; and

transmitting (270), to the UE (102), a cell switch command (CSC) indicating a target cell and a transmission configuration indicator (TCI) state, wherein quasi-colocation (QCL) information is based on the TCI state and the LTM reference signal.

13. The method of claim 12, wherein:

the LTM reference signal comprises an LTM tracking reference signal (TRS);

the TCI state comprises a joint TCI state or a downlink TCI state; and

the transmitting (220) the configuration further comprises transmitting (220c) at least one of:

a candidate cell configuration indicating an LTM TRS configuration;

an LTM configuration for a plurality of candidate cells indicating the LTM TRS configuration; or

a serving cell configuration indicating an LTM TRS configuration.

14. The method of any of claims 12 to 13, wherein the transmitting (220) the configuration comprises transmitting (220) at least one of:

a candidate cell configuration;

a CSI report configuration;

an LTM reference signal set configuration; or

an LTM tracking reference signal (TRS) configuration.

15. The method of any of claims 12 to 14, wherein the LTM reference signal comprises at least one of:

an LTM tracking reference signal (TRS) and the TCI state indicates the LTM TRS as a source reference signal for a QCL type: or

an LTM synchronization signal block (SSB) and the TCI state indicates the LTM SSB as a source reference signal for a QCL type.

16. The method of any of claims 12 to 15, further comprising:

transmitting (220c) a radio resource control (RRC) configuration for an LTM tracking reference signal (TRS) indicating whether the LTM TRS is for the QCL information or for time and frequency tracking.

17. An apparatus for wireless communication comprising a transceiver, a memory, and a processor coupled to the transceiver and the memory and configured to implement a method as in any of claims 1-16.

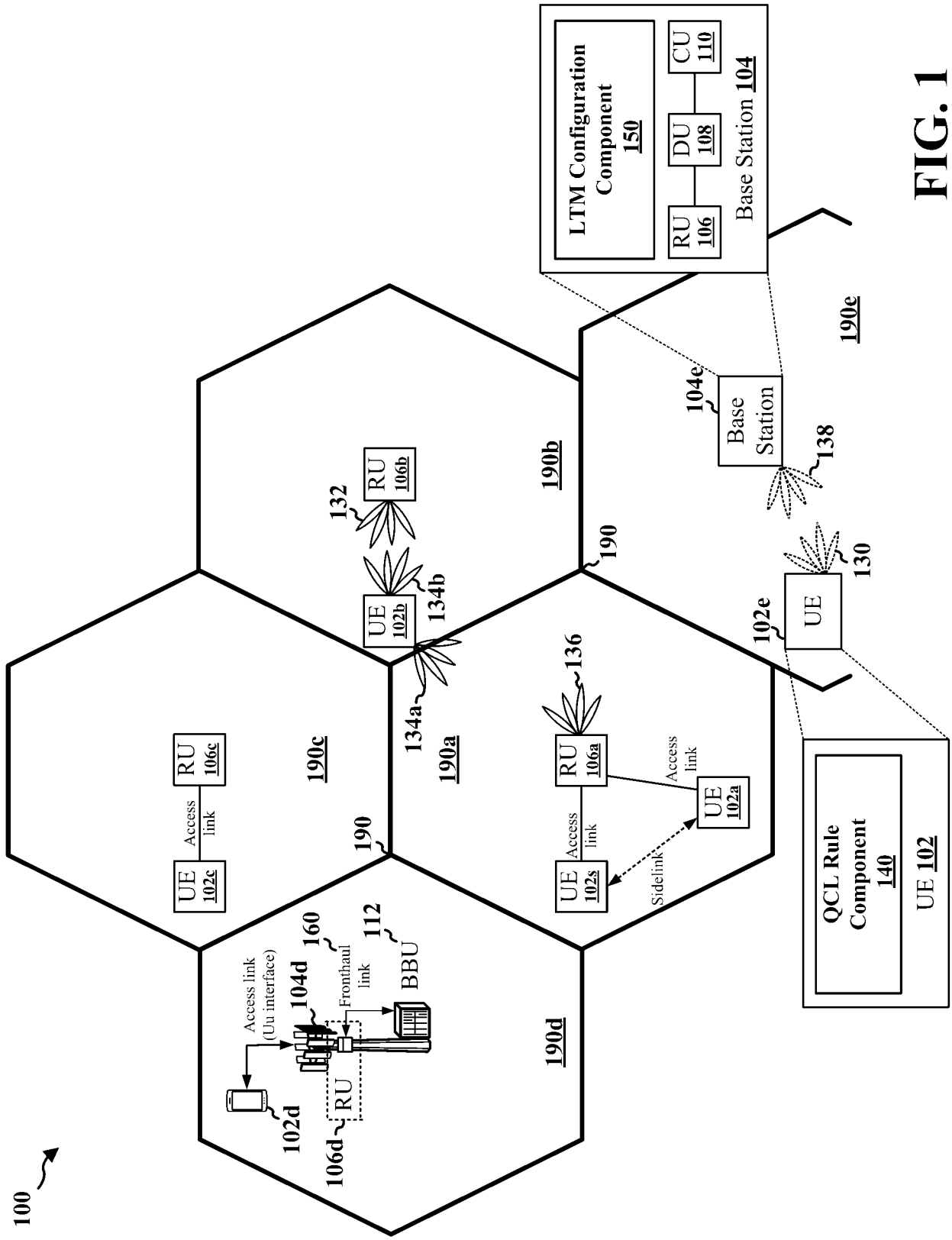
100
LTM Configuration Component 150
RU 106
DU 108
CU 110
Base Station 104
190b
190e
104e
Base Station
138
132
RU 106b
UE 102b
134b
134a
190
190c
190a
190d
136
RU 106a
Access link
UE 102a
Sidelink
UE 102s
RU 106c
UE 102c
Access link
190
Access link (Uu interface)
104d
160
Fronthaul link
112
BBU
RU
106d
102d
102e
UE
130
QCL Rule Component 140
UE 102

FIG. 1

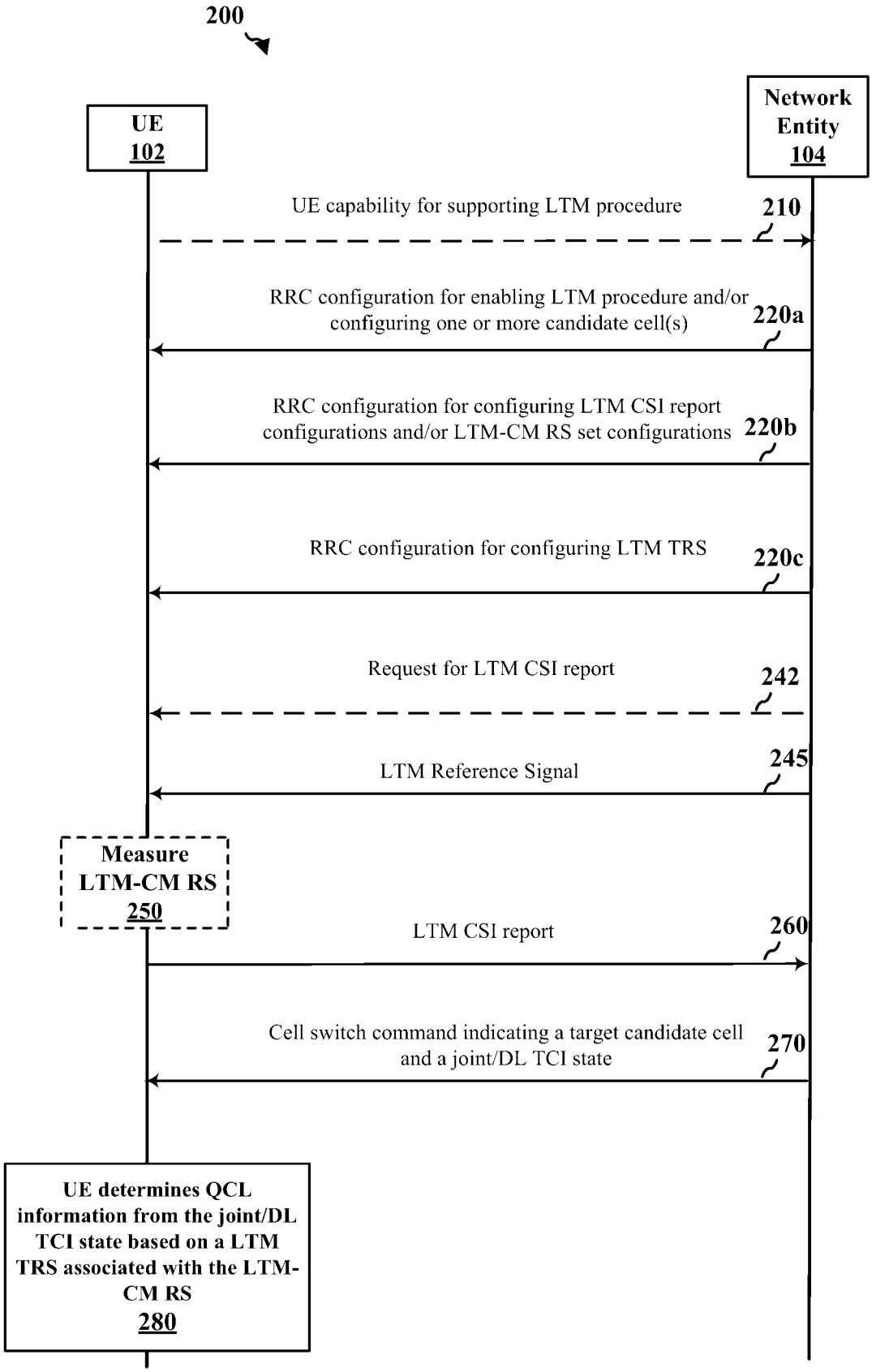
200
UE
102
Network
Entity
104
UE capability for supporting LTM procedure
210
RRC configuration for enabling LTM procedure and/or configuring one or more candidate cell(s)
220a
RRC configuration for configuring LTM CSI report configurations and/or LTM-CM RS set configurations
220b
RRC configuration for configuring LTM TRS
220c
Request for LTM CSI report
242
LTM Reference Signal
245
Measure LTM-CM RS
250
LTM CSI report
260
Cell switch command indicating a target candidate cell and a joint/DL TCI state
270
UE determines QCL information from the joint/DL TCI state based on a LTM TRS associated with the LTM-CM RS
280

FIG. 2

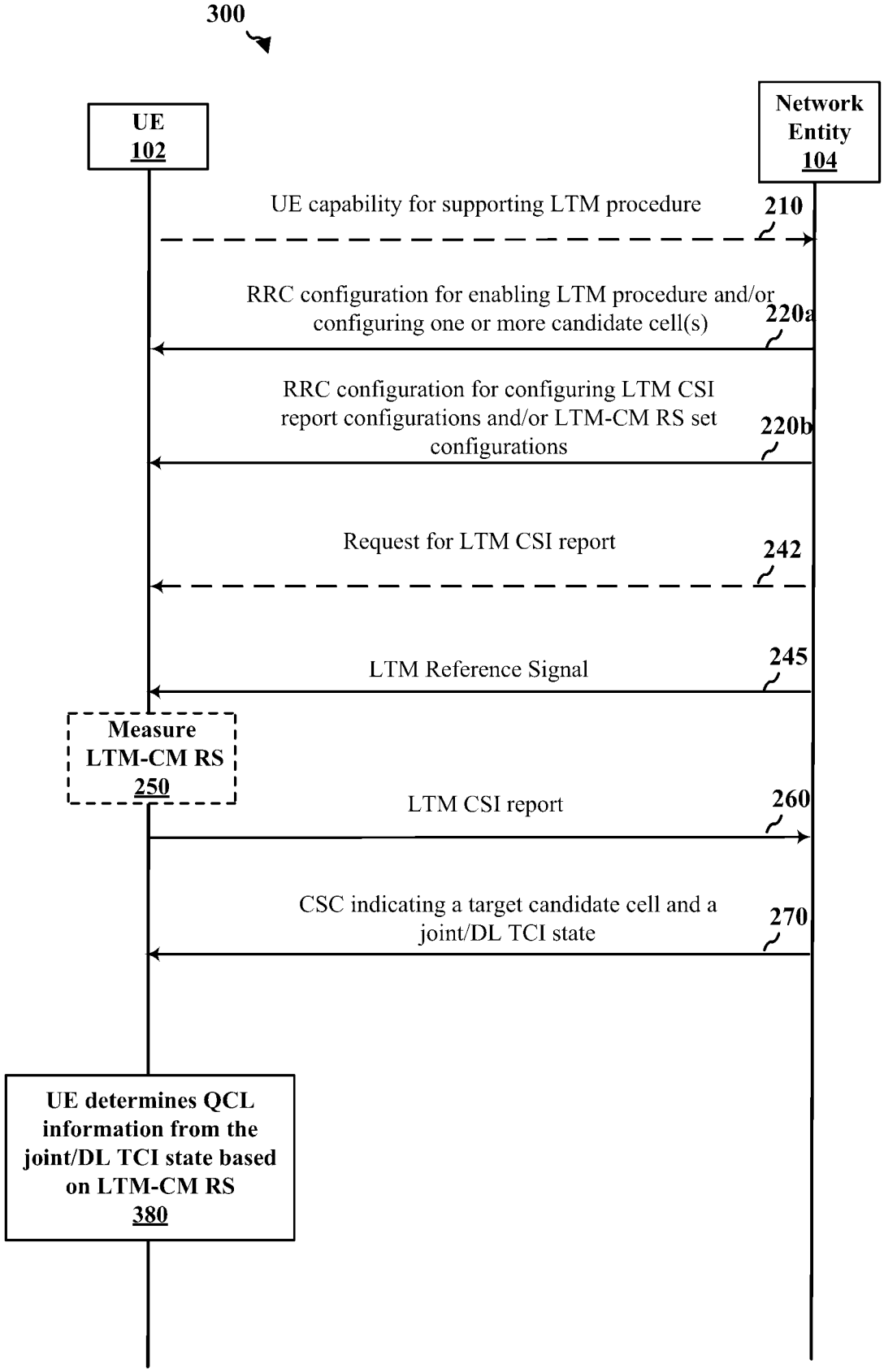
300
UE
102
Network
Entity
104
UE capability for supporting LTM procedure
210
RRC configuration for enabling LTM procedure and/or configuring one or more candidate cell(s)
220a
RRC configuration for configuring LTM CSI report configurations and/or LTM-CM RS set configurations
220b
Request for LTM CSI report
242
LTM Reference Signal
245
Measure LTM-CM RS
250
LTM CSI report
260
CSC indicating a target candidate cell and a joint/DL TCI state
270
UE determines QCL information from the joint/DL TCI state based on LTM-CM RS
380

FIG. 3

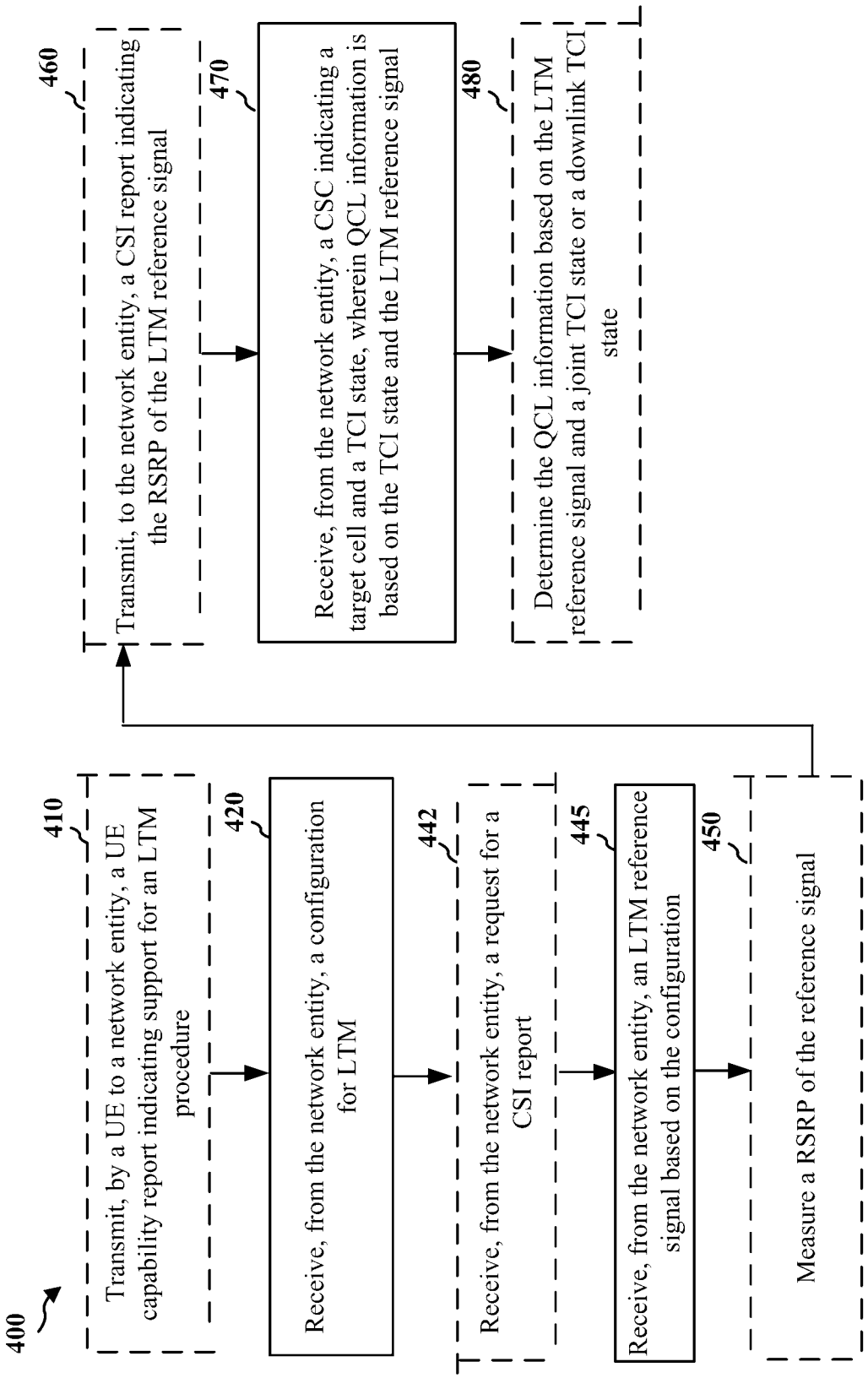
400
410
Transmit, by a UE to a network entity, a UE capability report indicating support for an LTM procedure
420
Receive, from the network entity, a configuration for LTM
442
Receive, from the network entity, a request for a CSI report
445
Receive, from the network entity, an LTM reference signal based on the configuration
450
Measure a RSRP of the reference signal
460
Transmit, to the network entity, a CSI report indicating the RSRP of the LTM reference signal
470
Receive, from the network entity, a CSC indicating a target cell and a TCI state, wherein QCL information is based on the TCI state and the LTM reference signal
480
Determine the QCL information based on the LTM reference signal and a joint TCI state or a downlink TCI state

FIG. 4

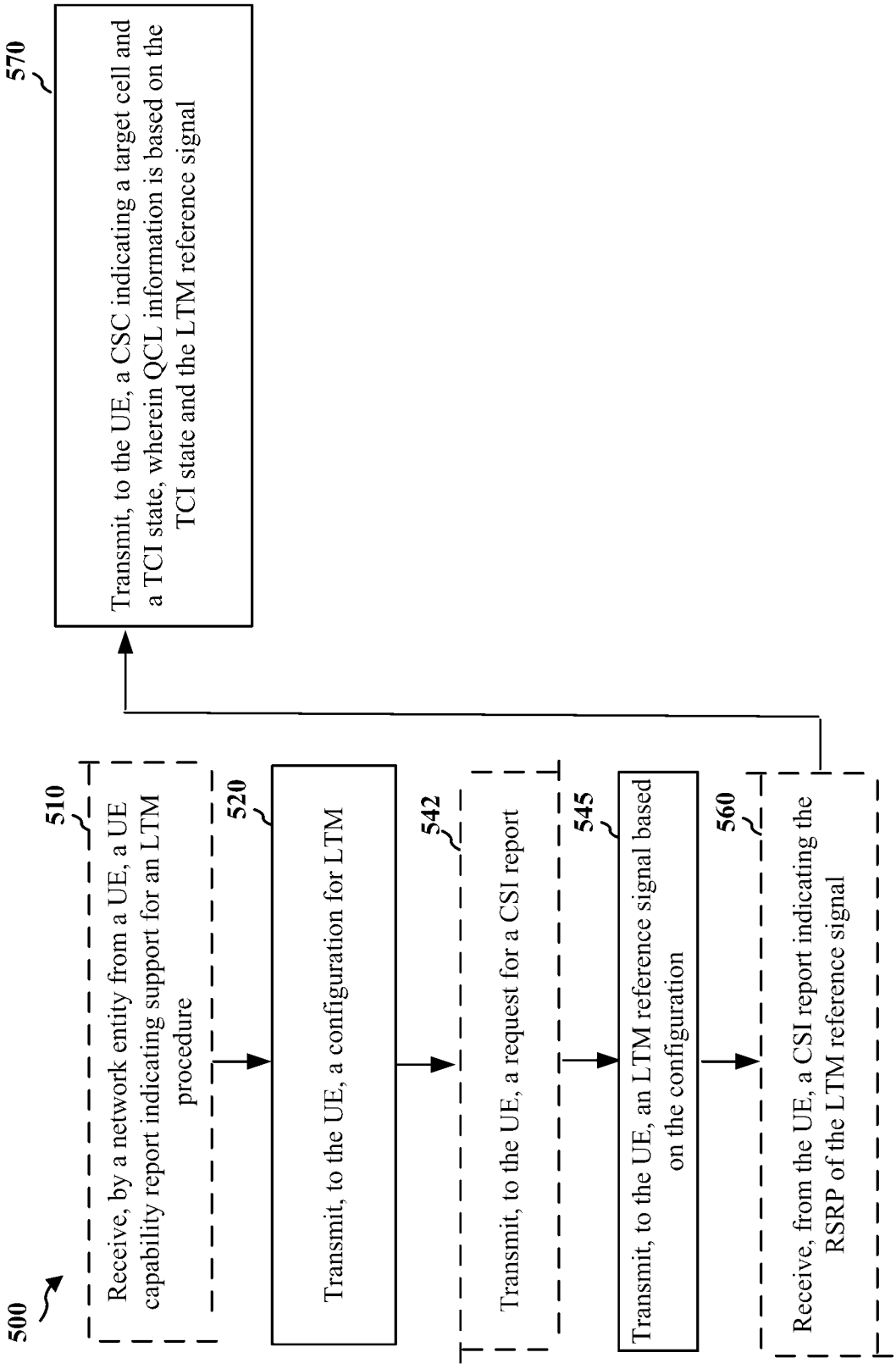
500
510
Receive, by a network entity from a UE, a UE capability report indicating support for an LTM procedure
520
Transmit, to the UE, a configuration for LTM
542
Transmit, to the UE, a request for a CSI report
545
Transmit, to the UE, an LTM reference signal based on the configuration
560
Receive, from the UE, a CSI report indicating the RSRP of the LTM reference signal
570
Transmit, to the UE, a CSC indicating a target cell and a TCI state, wherein QCL information is based on the TCI state and the LTM reference signal

FIG. 5

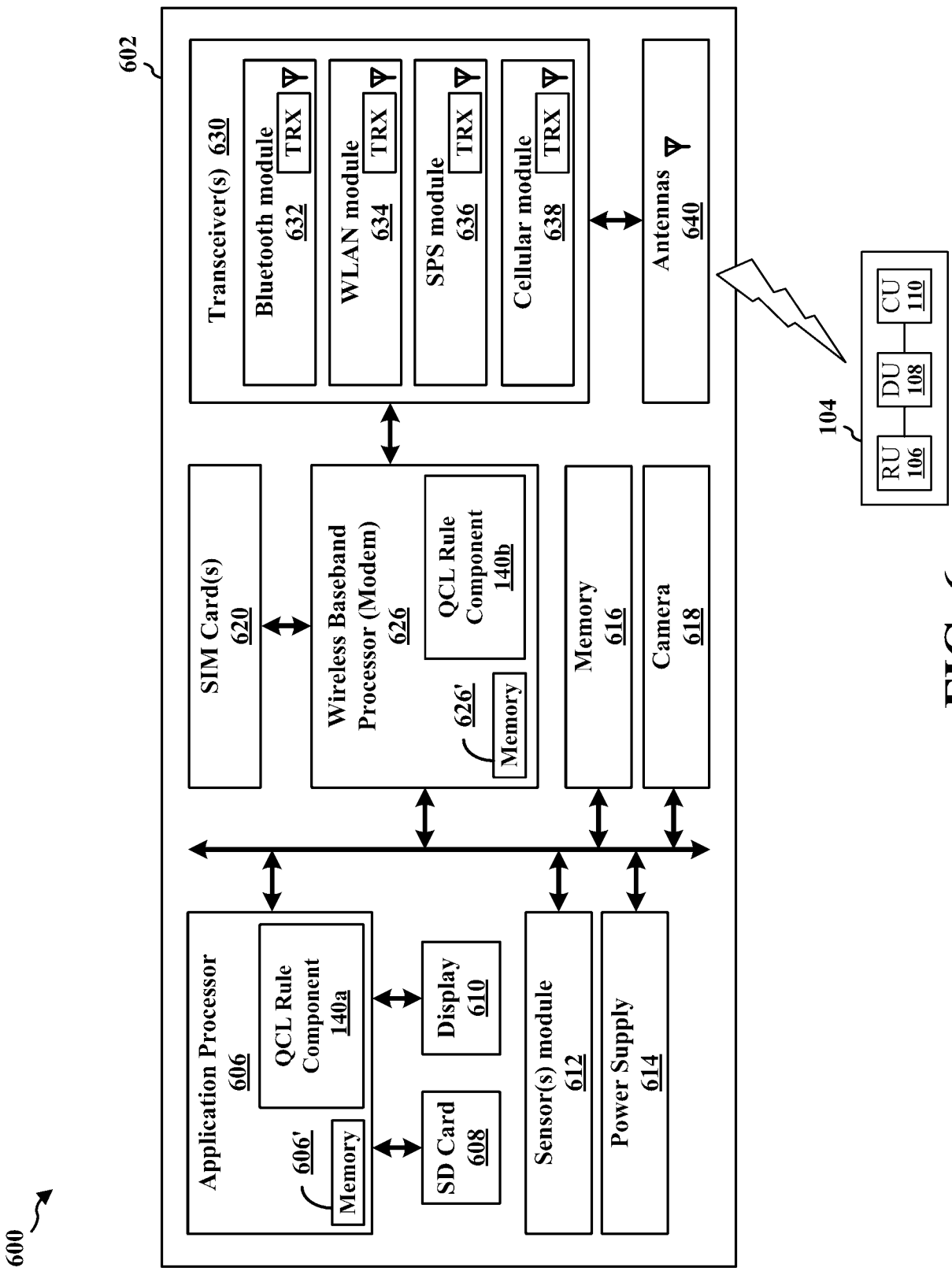
600
602
Application Processor 606
606' Memory
QCL Rule Component 140a
SD Card 608
Display 610
Sensor(s) module 612
Power Supply 614
SIM Card(s) 620
Wireless Baseband Processor (Modem) 626
626' Memory
QCL Rule Component 140b
Memory 616
Camera 618
Transceiver(s) 630
Bluetooth module 632
TRX
WLAN module 634
TRX
SPS module 636
TRX
Cellular module 638
TRX
Antennas 640
104
RU 106
DU 108
CU 110

FIG. 6

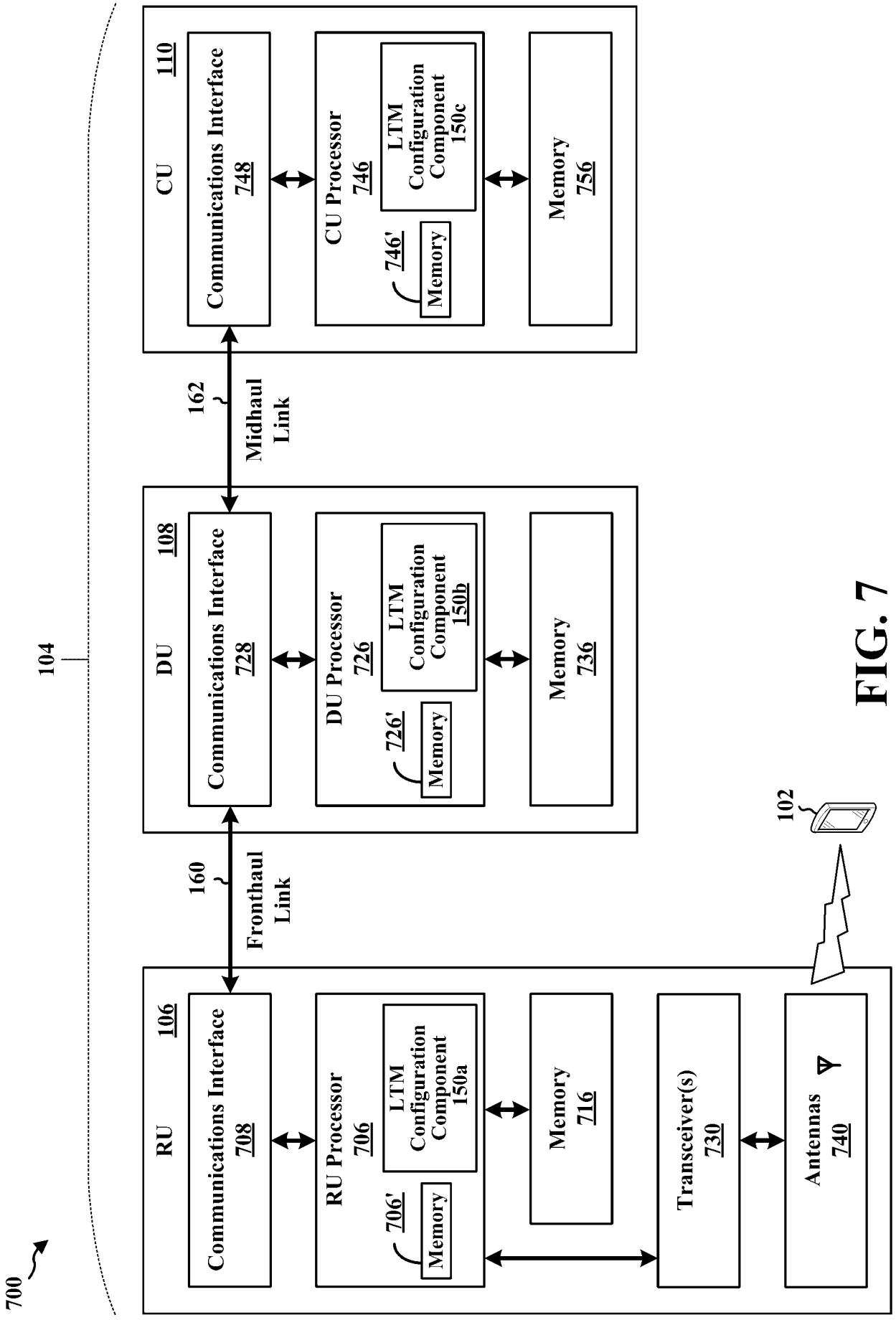
700
104
RU 106
Communications Interface 708
RU Processor 706
LTM Configuration Component 150a
706'
Memory
Memory 716
Transceiver(s) 730
Antennas 740
160
Fronthaul Link
DU 108
Communications Interface 728
DU Processor 726
LTM Configuration Component 150b
726'
Memory
Memory 736
162
Midhaul Link
CU 110
Communications Interface 748
CU Processor 746
LTM Configuration Component 150c
746'
Memory
Memory 756
102

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/CN2023/112519

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04W36/00
ADD. H04L5/00 H04W8/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04W H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2023/128726 A1 (KT CORP [KR]) 6 July 2023 (2023-07-06) the whole document	1-17
A	KR 2023 0105312 A (KT CORP [KR]) 11 July 2023 (2023-07-11) paragraphs [0240] - [0242]	1-17
A	KR 2023 0027060 A (LG ELECTRONICS INC [KR]) 27 February 2023 (2023-02-27) the whole document	1-17
L	& US 2023/318687 A1 (KIM KYUSEOK [KR] ET AL) 5 October 2023 (2023-10-05) paragraph [0009]	1-17
A	WO 2022/123539 A2 (ERICSSON TELEFON AB L M [SE]) 16 June 2022 (2022-06-16) paragraphs [0010] - [0013]	1-17

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance;; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 January 2024	13/02/2024

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Pasini, Enrico

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/CN2023/112519

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2023128726 A1	06-07-2023	NONE	
KR 20230105312 A	11-07-2023	NONE	
KR 20230027060 A	27-02-2023	KR 20230027060 A	27-02-2023
		US 2023318687 A1	05-10-2023
		WO 2021261877 A1	30-12-2021
WO 2022123539 A2	16-06-2022	EP 4260608 A2	18-10-2023
		US 2024007169 A1	04-01-2024
		WO 2022123539 A2	16-06-2022