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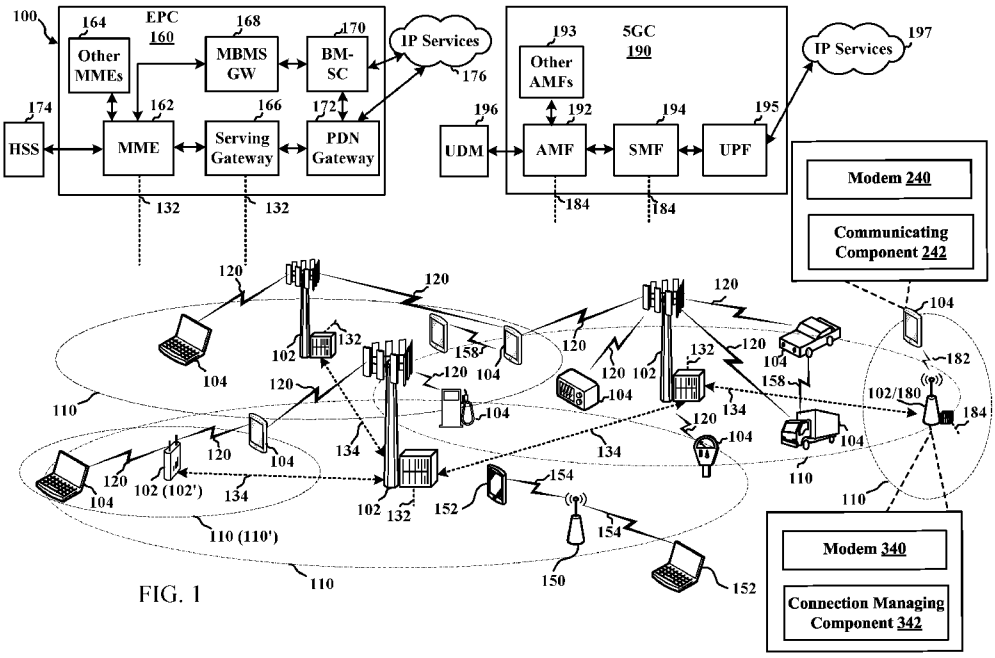

FIG. 1

(57) Abstract: Aspects described herein relate to transmitting, to a primary serving node, a measurement report of multiple neighboring cells, receiving, from the primary serving node and in response to the measurement report, a configuration message including configurations for multiple secondary nodes determined from the multiple neighboring cells and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith, detecting the condition for at least one of the multiple secondary nodes, and establishing, based on the detection of the condition, the connection with the at least one of the multiple secondary nodes as a secondary serving node.

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TECHNIQUES FOR SECONDARY NODE SWITCHING IN WIRELESS COMMUNICATIONS

FIELD OF THE DISCLOSURE

[0001] Aspects of the present disclosure relate generally to wireless communication systems, and more particularly, to techniques for secondary node switching in wireless communications.

DECRIPTION OF RELATED ART

[0002] Wireless communication systems are widely deployed to provide various types of communication content such as voice, video, packet data, messaging, broadcast, and so on. These systems may be multiple-access systems capable of supporting communication with multiple users by sharing the available system resources (e.g., time, frequency, and power). Examples of such multiple-access systems include code-division multiple access (CDMA) systems, time-division multiple access (TDMA) systems, frequency-division multiple access (FDMA) systems, and orthogonal frequency-division multiple access (OFDMA) systems, and single-carrier frequency division multiple access (SC-FDMA) systems.

[0003] These multiple access technologies have been adopted in various telecommunication standards to provide a common protocol that enables different wireless devices to communicate on a municipal, national, regional, and even global level. For example, a fifth generation (5G) wireless communications technology (which can be referred to as 5G new radio (5G NR)) is envisaged to expand and support diverse usage scenarios and applications with respect to current mobile network generations. In an aspect, 5G communications technology can include: enhanced mobile broadband addressing human-centric use cases for access to multimedia content, services and data; ultra-reliable-low latency communications (URLLC) with certain specifications for latency and reliability; and massive machine type communications, which can allow a very large number of connected devices and transmission of a relatively low volume of non-delay-sensitive information.

[0004] In some wireless communication technologies, a user equipment (UE) can use multiple-radio access technology (RAT) dual connectivity (MR-DC) to concurrently communicate with a primary (or master) serving node and a secondary (or slave) serving

node to increase data throughput, reliability, etc. In some examples, channel quality of secondary serving nodes may change frequently, which may be based on the RAT used to communicate with the secondary serving nodes, a number or deployment pattern of the secondary serving nodes as compared to the primary serving node, etc. The UE may be configured to switch secondary serving nodes, but the latency required for a change may cause significant throughput loss where the UE frequently changes secondary serving nodes.

SUMMARY

[0005] 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, and is intended to neither identify key or critical elements of all aspects nor delineate 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.

[0006] According to an example, a method of wireless communication is provided. The method includes transmitting, to a primary serving node, a measurement report of multiple neighboring cells, receiving, from the primary serving node and in response to the measurement report, a configuration message including configurations for multiple secondary nodes determined from the multiple neighboring cells and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith, detecting the condition for at least one of the multiple secondary nodes, and establishing, based on detecting the condition, the connection with the at least one of the multiple secondary nodes as a secondary serving node.

[0007] One or more of the above examples can further include wherein detecting the condition comprises detecting that a first signal power of a current secondary serving node is less than a first threshold, and detecting that a second signal power of the at least one of the multiple secondary nodes achieves a second threshold.

[0008] One or more of the above examples can further include wherein the configuration message indicates at least one of the first threshold or the second threshold.

[0009] One or more of the above examples can further include receiving a separate configuration specifying at least one of the first threshold or the second threshold.

[0010] One or more of the above examples can further include wherein detecting the condition comprises detecting that a first signal power of a current secondary serving node is less than a second signal power of the at least one of the multiple secondary nodes at least by a threshold difference.

[0011] One or more of the above examples can further include wherein the configuration message indicates the threshold difference.

[0012] One or more of the above examples can further include receiving a separate configuration specifying the threshold difference.

[0013] One or more of the above examples can further include wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

[0014] One or more of the above examples can further include monitoring signals received from each of the multiple secondary nodes over a period of time until the condition is detected for a signal received from the at least one of the multiple secondary nodes.

[0015] One or more of the above examples can further include transmitting, to the primary serving node and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

[0016] One or more of the above examples can further include declaring, to the primary serving node, radio link failure of another one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold.

[0017] One or more of the above examples can further include wherein establishing the connection with the at least one of the multiple secondary nodes as the secondary serving node comprises at least one of transmitting a switching indication to the primary serving node in an uplink shared channel or initiating a random access procedure towards the at least one of the multiple secondary nodes.

[0018] In another example, a method of wireless communication is provided that includes receiving, from a user equipment (UE), a measurement report of multiple neighboring cells, preparing, based on the measurement report, multiple secondary nodes, including two or more of the multiple neighboring cells, for serving the UE as a secondary serving node, generating a configuration message including configurations for the multiple secondary nodes and an indication of a condition, for the multiple secondary nodes, for

establishing a connection therewith, and transmitting, to the UE and in response to the measurement report, the configuration message.

[0019] One or more of the above examples can further include wherein the condition relates to a first signal power of a current secondary serving node being less than a first threshold, and a second signal power of at least one of the multiple secondary nodes achieving a second threshold.

[0020] One or more of the above examples can further include wherein the configuration message indicates at least one of the first threshold or the second threshold.

[0021] One or more of the above examples can further include transmitting, to the UE, a separate configuration specifying the first threshold and the second threshold.

[0022] One or more of the above examples can further include wherein the condition relates to a first signal power of a current secondary serving node being less than a second signal power of at least one of the multiple secondary nodes at least by a threshold difference.

[0023] One or more of the above examples can further include wherein the configuration message indicates the threshold difference.

[0024] One or more of the above examples can further include transmitting, to the UE, a separate configuration specifying the threshold difference.

[0025] One or more of the above examples can further include wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

[0026] One or more of the above examples can further include receiving, from the UE and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

[0027] One or more of the above examples can further include receiving, from the UE, an indication of radio link failure of one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold, and releasing, based on the indication, the one of the multiple secondary nodes as a SN.

[0028] One or more of the above examples can further include receiving, from the UE, a switching indication in an uplink shared channel to activate at least one of the multiple serving nodes as the secondary serving node, and sending, to the at least one of the multiple serving nodes, an activation request to activate the at least one of the multiple serving nodes as the secondary serving node for the UE.

[0029] In another example, an apparatus for wireless communication is provided that includes a transceiver, a memory configured to store instructions, and one or more processors communicatively coupled with the transceiver and the memory. The one or more processors are configured to transmit, to a primary serving node, a measurement report of multiple neighboring cells, receive, from the primary serving node and in response to the measurement report, a configuration message including configurations for multiple secondary nodes determined from the multiple neighboring cells and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith, detect the condition for at least one of the multiple secondary nodes, and establish, based on the detection of the condition, the connection with the at least one of the multiple secondary nodes as a secondary serving node.

[0030] One or more of the above examples can further include wherein the one or more processors are configured to detect the condition at least in part by detecting that a first signal power of a current secondary serving node is less than a first threshold, and detecting that a second signal power of the at least one of the multiple secondary nodes achieves a second threshold.

[0031] One or more of the above examples can further include wherein the configuration message indicates at least one of the first threshold or the second threshold.

[0032] One or more of the above examples can further include wherein the one or more processors are further configured to receive a separate configuration specifying at least one of the first threshold or the second threshold.

[0033] One or more of the above examples can further include wherein the one or more processors are configured to detect the condition at least in part by detecting that a first signal power of a current secondary serving node is less than a second signal power of the at least one of the multiple secondary nodes at least by a threshold difference.

[0034] One or more of the above examples can further include wherein the configuration message indicates the threshold difference.

[0035] One or more of the above examples can further include wherein the one or more processors are further configured to receive a separate configuration specifying the threshold difference.

[0036] One or more of the above examples can further include wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

[0037] One or more of the above examples can further include wherein the one or more processors are further configured to monitor signals received from each of the multiple secondary nodes over a period of time until the condition is detected for a signal received from the at least one of the multiple secondary nodes.

[0038] One or more of the above examples can further include wherein the one or more processors are further configured to transmit, to the primary serving node and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

[0039] One or more of the above examples can further include wherein the one or more processors are further configured to declare, to the primary serving node, radio link failure of another one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold.

[0040] One or more of the above examples can further include wherein the one or more processors are configured to establish the connection with the at least one of the multiple secondary nodes as the secondary serving node at least in part by at least one of transmitting a switching indication to the primary serving node in an uplink shared channel or initiating a random access procedure towards the at least one of the multiple secondary nodes.

[0041] In another example, an apparatus for wireless communication is provided that includes a transceiver, a memory configured to store instructions, and one or more processors communicatively coupled with the transceiver and the memory. The one or more processors are configured to receive, from a user equipment (UE), a measurement report of multiple neighboring cells, prepare, based on the measurement report, multiple secondary nodes, including two or more of the multiple neighboring cells, for serving the UE as a secondary serving node, generate a configuration message including configurations for the multiple secondary nodes and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith, and transmit, to the UE and in response to the measurement report, the configuration message.

[0042] One or more of the above examples can further include wherein the condition relates to a first signal power of a current secondary serving node being less than a first threshold, and a second signal power of at least one of the multiple secondary nodes achieving a second threshold.

[0043] One or more of the above examples can further include wherein the configuration message indicates at least one of the first threshold or the second threshold.

[0044] One or more of the above examples can further include wherein the one or more processors are further configured to transmit, to the UE, a separate configuration specifying the first threshold and the second threshold.

[0045] One or more of the above examples can further include wherein the condition relates to a first signal power of a current secondary serving node being less than a second signal power of at least one of the multiple secondary nodes at least by a threshold difference.

[0046] One or more of the above examples can further include wherein the configuration message indicates the threshold difference.

[0047] One or more of the above examples can further include wherein the one or more processors are further configured to transmit, to the UE, a separate configuration specifying the threshold difference.

[0048] One or more of the above examples can further include wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

[0049] One or more of the above examples can further include wherein the one or more processors are further configured to receive, from the UE and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

[0050] One or more of the above examples can further include wherein the one or more processors are further configured to receive, from the UE, an indication of radio link failure of one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold, and release, based on the indication, the one of the multiple secondary nodes as a SN.

[0051] One or more of the above examples can further include wherein the one or more processors are configured to receive, from the UE, a switching indication in an uplink shared channel to activate at least one of the multiple serving nodes as the secondary serving node, and send, to the at least one of the multiple serving nodes, an activation request to activate the at least one of the multiple serving nodes as the secondary serving node for the UE.

[0052] In another example, an apparatus of wireless communication is provided that includes means for transmitting, to a primary serving node, a measurement report of multiple neighboring cells, means for receiving, from the primary serving node and in response to the measurement report, a configuration message including configurations for multiple secondary nodes determined from the multiple neighboring cells and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith, means for detecting the condition for at least one of the multiple secondary nodes, and means for establishing, based on the detection of the condition, the connection with the at least one of the multiple secondary nodes as a secondary serving node.

[0053] One or more of the above examples can further include wherein the means for detecting the condition detects that a first signal power of a current secondary serving node is less than a first threshold, and detecting that a second signal power of the at least one of the multiple secondary nodes achieves a second threshold.

[0054] One or more of the above examples can further include wherein the configuration message indicates at least one of the first threshold or the second threshold.

[0055] One or more of the above examples can further include means for receiving a separate configuration specifying at least one of the first threshold or the second threshold.

[0056] One or more of the above examples can further include wherein the means for detecting the condition detects that a first signal power of a current secondary serving node is less than a second signal power of the at least one of the multiple secondary nodes at least by a threshold difference.

[0057] One or more of the above examples can further include wherein the configuration message indicates the threshold difference.

[0058] One or more of the above examples can further include means for receiving a separate configuration specifying the threshold difference.

[0059] One or more of the above examples can further include wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

[0060] One or more of the above examples can further include means for monitoring signals received from each of the multiple secondary nodes over a period of time until the condition is detected for a signal received from the at least one of the multiple secondary nodes.

[0061] One or more of the above examples can further include means for transmitting, to the primary serving node and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

[0062] One or more of the above examples can further include means for declaring, to the primary serving node, radio link failure of another one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold.

[0063] One or more of the above examples can further include wherein the means for establishing the connection establishes the connection with the at least one of the multiple secondary nodes as the secondary serving node at least in part by at least one of transmitting a switching indication to the primary serving node in an uplink shared channel or initiating a random access procedure towards the at least one of the multiple secondary nodes.

[0064] In another example, an apparatus of wireless communication is provided that includes means for receiving, from a user equipment (UE), a measurement report of multiple neighboring cells, means for preparing, based on the measurement report, multiple secondary nodes, including two or more of the multiple neighboring cells, for serving the UE as a secondary serving node, means for generating a configuration message including configurations for the multiple secondary nodes and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith, and means for transmitting, to the UE and in response to the measurement report, the configuration message.

[0065] One or more of the above examples can further include wherein the condition relates to a first signal power of a current secondary serving node being less than a first threshold, and a second signal power of at least one of the multiple secondary nodes achieving a second threshold.

[0066] One or more of the above examples can further include wherein the configuration message indicates at least one of the first threshold or the second threshold.

[0067] One or more of the above examples can further include means for transmitting, to the UE, a separate configuration specifying the first threshold and the second threshold.

[0068] One or more of the above examples can further include wherein the condition relates to a first signal power of a current secondary serving node being less than a second signal power of at least one of the multiple secondary nodes at least by a threshold difference.

[0069] One or more of the above examples can further include wherein the configuration message indicates the threshold difference.

[0070] One or more of the above examples can further include means for transmitting, to the UE, a separate configuration specifying the threshold difference.

[0071] One or more of the above examples can further include wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

[0072] One or more of the above examples can further include means for receiving, from the UE and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

[0073] One or more of the above examples can further include means for receiving, from the UE, an indication of radio link failure of one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold, and means for releasing, based on the indication, the one of the multiple secondary nodes as a SN.

[0074] One or more of the above examples can further include means for receiving, from the UE, a switching indication in an uplink shared channel to activate at least one of the multiple serving nodes as the secondary serving node, and means for sending, to the at least one of the multiple serving nodes, an activation request to activate the at least one of the multiple serving nodes as the secondary serving node for the UE.

[0075] In another example, a computer-readable medium, including code executable by one or more processors for wireless communications is provided. The code includes code for transmitting, to a primary serving node, a measurement report of multiple neighboring cells, receiving, from the primary serving node and in response to the measurement report, a configuration message including configurations for multiple secondary nodes determined from the multiple neighboring cells and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith, detecting the condition for at least one of the multiple secondary nodes, and establishing, based on the detection of the condition, the connection with the at least one of the multiple secondary nodes as a secondary serving node.

[0076] One or more of the above examples can further include wherein the code for detecting the condition detects that a first signal power of a current secondary serving node is less than a first threshold, and detecting that a second signal power of the at least one of the multiple secondary nodes achieves a second threshold.

[0077] One or more of the above examples can further include wherein the configuration message indicates at least one of the first threshold or the second threshold.

[0078] One or more of the above examples can further include code for receiving a separate configuration specifying at least one of the first threshold or the second threshold.

[0079] One or more of the above examples can further include wherein the code for detecting the condition detects that a first signal power of a current secondary serving node is less than a second signal power of the at least one of the multiple secondary nodes at least by a threshold difference.

[0080] One or more of the above examples can further include wherein the configuration message indicates the threshold difference.

[0081] One or more of the above examples can further include code for receiving a separate configuration specifying the threshold difference.

[0082] One or more of the above examples can further include wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

[0083] One or more of the above examples can further include code for monitoring signals received from each of the multiple secondary nodes over a period of time until the condition is detected for a signal received from the at least one of the multiple secondary nodes.

[0084] One or more of the above examples can further include code for transmitting, to the primary serving node and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

[0085] One or more of the above examples can further include code for declaring, to the primary serving node, radio link failure of another one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold.

[0086] One or more of the above examples can further include wherein the code for establishing the connection establishes the connection with the at least one of the multiple secondary nodes as the secondary serving node at least in part by at least one of transmitting a switching indication to the primary serving node in an uplink shared channel or initiating a random access procedure towards the at least one of the multiple secondary nodes.

[0087] In another example, a computer-readable medium, including code executable by one or more processors for wireless communications is provided. The code includes code

for receiving, from a user equipment (UE), a measurement report of multiple neighboring cells, preparing, based on the measurement report, multiple secondary nodes, including two or more of the multiple neighboring cells, for serving the UE as a secondary serving node, generating a configuration message including configurations for the multiple secondary nodes and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith, and transmitting, to the UE and in response to the measurement report, the configuration message.

[0088] One or more of the above examples can further include wherein the condition relates to a first signal power of a current secondary serving node being less than a first threshold, and a second signal power of at least one of the multiple secondary nodes achieving a second threshold.

[0089] One or more of the above examples can further include wherein the configuration message indicates at least one of the first threshold or the second threshold.

[0090] One or more of the above examples can further include code for transmitting, to the UE, a separate configuration specifying the first threshold and the second threshold.

[0091] One or more of the above examples can further include wherein the condition relates to a first signal power of a current secondary serving node being less than a second signal power of at least one of the multiple secondary nodes at least by a threshold difference.

[0092] One or more of the above examples can further include wherein the configuration message indicates the threshold difference.

[0093] One or more of the above examples can further include code for transmitting, to the UE, a separate configuration specifying the threshold difference.

[0094] One or more of the above examples can further include wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

[0095] One or more of the above examples can further include code for receiving, from the UE and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

[0096] One or more of the above examples can further include code for receiving, from the UE, an indication of radio link failure of one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold, and code for releasing, based on the indication, the one of the multiple secondary nodes as a SN.

[0097] One or more of the above examples can further include code for receiving, from the UE, a switching indication in an uplink shared channel to activate at least one of the multiple serving nodes as the secondary serving node, and code for sending, to the at least one of the multiple serving nodes, an activation request to activate the at least one of the multiple serving nodes as the secondary serving node for the UE.

[0098] To the accomplishment of the foregoing and related ends, the one or more aspects comprise the features hereinafter fully described and particularly pointed out in the claims. The following description and the annexed drawings set forth in detail certain illustrative features of the one or more aspects. These features are indicative, however, of but a few of the various ways in which the principles of various aspects may be employed, and this description is intended to include all such aspects and their equivalents.

BRIEF DESCRIPTION OF THE DRAWINGS

[0099] The disclosed aspects will hereinafter be described in conjunction with the appended drawings, provided to illustrate and not to limit the disclosed aspects, wherein like designations denote like elements, and in which:

[00100] FIG. 1 illustrates an example of a wireless communication system, in accordance with various aspects of the present disclosure;

[00101] FIG. 2 is a block diagram illustrating an example of a UE, in accordance with various aspects of the present disclosure;

[00102] FIG. 3 is a block diagram illustrating an example of a base station, in accordance with various aspects of the present disclosure;

[00103] FIG. 4 is a flow chart illustrating an example of a method for performing fast secondary node (SN) switching, in accordance with various aspects of the present disclosure;

[00104] FIG. 5 is a flow chart illustrating an example of a method for configuring a user equipment (UE) for performing fast SN switching, in accordance with various aspects of the present disclosure;

[00105] FIG. 6 illustrates an example of a system for configuring a UE for fast SN switching, in accordance with various aspects of the present disclosure;

[00106] FIG. 7 illustrates an example of a system for performing fast SN switching by indicating to a master node, in accordance with various aspects of the present disclosure;

[00107] FIG. 8 illustrates an example of a system for performing fast SN switching by initiating a random access procedure with the SN, in accordance with various aspects of the present disclosure; and

[00108] FIG. 9 is a block diagram illustrating an example of a MIMO communication system including a base station and a UE, in accordance with various aspects of the present disclosure.

DETAILED DESCRIPTION

[00109] Various aspects are now described with reference to the drawings. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of one or more aspects. It may be evident, however, that such aspect(s) may be practiced without these specific details.

[00110] The described features generally relate to providing fast secondary serving node switching in multiple connectivity wireless communications. For example, in multiple connectivity, a user equipment (UE) can concurrently communicate with a primary serving node and one or more secondary serving nodes. Multiple connectivity can more specifically include dual connectivity, and though concepts may be described herein with respect to dual connectivity, the concepts may similarly be applied to multiple connectivity. In one example, dual connectivity includes concurrently communicating with one primary serving node and one secondary serving node (where multiple connectivity can include multiple secondary serving nodes or secondary serving node groups). In addition, in multiple radio access technology (RAT) dual connectivity (MR-DC), the primary serving node and the secondary serving node may be of the same or different RAT (e.g., the primary serving node may be long term evolution (LTE) and the secondary serving node may be fifth generating (5G) new radio (NR)). In any case, though functionality may be described herein in terms of MR-DC, aspects described herein may be applied to substantially any multiple connectivity configuration of one or more primary serving nodes and one or more secondary serving nodes that may or may not be of different RATs.

[00111] In an example, the channel quality associated with secondary serving nodes (also referred to as "secondary nodes" or "SN") may change frequently over time, especially in frequency range 2 (FR2), also referred to as millimeter wave (mmW), deployments, such as in 5G NR. When a UE is to switch or add an SN, it can initiate a procedure of

SN addition or change with a primary serving node (also referred to as a "master node" or "MN"). In one example, the MN can request a measurement report from the UE, the UE can measure neighboring cells and can send a radio resource control (RRC) reconfiguration message, including the measurement report, to the MN, the MN can determine to activate a neighboring cell as a new SN indicated in the reconfiguration message, the MN can notify the UE of the addition and can prepare the new SN, and the UE can synchronize timing with the new SN and initiate a random access procedure to establish a connection with the new SN. These various steps have an associated latency that may have a significant impact on throughput when the UE switches SNs too often (e.g., due to frequent change in channel quality).

[00112] Accordingly, for example, the MN can prepare multiple SNs for the UE and the UE can initiate a fast SN switch to avoid throughput loss. For example, the MN can provide the UE with one or more conditions for the SN switch along with an indication of the SN (e.g., cell and/or beam strength threshold). The UE can continue to monitor the multiple SNs to determine whether the one or more conditions are satisfied. When the UE detects that the one or more conditions are satisfied, the UE can notify of the fast switch (e.g., notify the MN or perform the random access procedure with the candidate cell for the SN). In this example, when the notification is received, communications between at least one previous serving SN and the UE can be switched to the new serving SN. In these examples, much of the latency associated with switching SNs can be avoided by allowing the UE to determine when to switch SNs and the MN having information used to prepare the UE for switching.

[00113] The described features will be presented in more detail below with reference to FIGS. 1-9.

[00114] As used in this application, the terms "component," "module," "system" and the like are intended to include a computer-related entity, such as but not limited to hardware, software, a combination of hardware and software, or software in execution. For example, a component may be, but is not limited to being, a process running on a processor, a processor, an object, an executable, a thread of execution, a program, and/or a computer. By way of illustration, both an application running on a computing device and the computing device can be a component. One or more components can reside within a process and/or thread of execution and a component can be localized on one computer and/or distributed between two or more computers. In addition, these

components can execute from various computer readable media having various data structures stored thereon. The components can communicate by way of local and/or remote processes such as in accordance with a signal having one or more data packets, such as data from one component interacting with another component in a local system, distributed system, and/or across a network such as the Internet with other systems by way of the signal. Software shall be construed broadly to mean instructions, instruction sets, code, code segments, program code, programs, subprograms, software modules, applications, software applications, software packages, routines, subroutines, objects, executables, threads of execution, procedures, functions, etc., whether referred to as software, firmware, middleware, microcode, hardware description language, or otherwise.

[00115] Techniques described herein may be used for various wireless communication systems such as CDMA, TDMA, FDMA, OFDMA, SC-FDMA, and other systems. The terms "system" and "network" may often be used interchangeably. A CDMA system may implement a radio technology such as CDMA2000, Universal Terrestrial Radio Access (UTRA), etc. CDMA2000 covers IS-2000, IS-95, and IS-856 standards. IS-2000 Releases 0 and A are commonly referred to as CDMA2000 1X, 1X, etc. IS-856 (TIA-856) is commonly referred to as CDMA2000 1xEV-DO, High Rate Packet Data (HRPD), etc. UTRA includes Wideband CDMA (WCDMA) and other variants of CDMA. A TDMA system may implement a radio technology such as Global System for Mobile Communications (GSM). An OFDMA system may implement a radio technology such as Ultra Mobile Broadband (UMB), Evolved UTRA (E-UTRA), IEEE 802.11 (Wi-Fi), IEEE 802.16 (WiMAX), IEEE 802.20, Flash-OFDM™, etc. UTRA and E-UTRA are part of Universal Mobile Telecommunication System (UMTS). 3GPP Long Term Evolution (LTE) and LTE-Advanced (LTE-A) are new releases of UMTS that use E-UTRA. UTRA, E-UTRA, UMTS, LTE, LTE-A, and GSM are described in documents from an organization named "3rd Generation Partnership Project" (3GPP). CDMA2000 and UMB are described in documents from an organization named "3rd Generation Partnership Project 2" (3GPP2). The techniques described herein may be used for the systems and radio technologies mentioned above as well as other systems and radio technologies, including cellular (e.g., LTE) communications over a shared radio frequency spectrum band. The description below, however, describes an LTE/LTE-A system for purposes of example, and LTE terminology is used in much of the description

below, although the techniques are applicable beyond LTE/LTE-A applications (e.g., to fifth generation (5G) new radio (NR) networks or other next generation communication systems).

[00116] The following description provides examples, and is not limiting of the scope, applicability, or examples set forth in the claims. Changes may be made in the function and arrangement of elements discussed without departing from the scope of the disclosure. Various examples may omit, substitute, or add various procedures or components as appropriate. For instance, the methods described may be performed in an order different from that described, and various steps may be added, omitted, or combined. Also, features described with respect to some examples may be combined in other examples.

[00117] Various aspects or features will be presented in terms of systems that can include a number of devices, components, modules, and the like. It is to be understood and appreciated that the various systems can include additional devices, components, modules, etc. and/or may not include all of the devices, components, modules etc. discussed in connection with the figures. A combination of these approaches can also be used.

[00118] **FIG. 1** is a diagram illustrating an example of a wireless communications system and an access network 100. The wireless communications system (also referred to as a wireless wide area network (WWAN)) can include base stations 102, UEs 104, an Evolved Packet Core (EPC) 160, and/or a 5G Core (5GC) 190. The base stations 102 may include macro cells (high power cellular base station) and/or small cells (low power cellular base station). The macro cells can include base stations. The small cells can include femtocells, picocells, and microcells. In an example, the base stations 102 may also include gNBs 180, as described further herein. In one example, some nodes of the wireless communication system may have a modem 240 and communicating component 242 for measuring signals of neighboring cells, transmitting measurement reports, receiving configurations for fast SN switching, etc. In addition, some nodes may have a modem 340 and connection managing component 342 for managing multiple connectivity connections for one or more UEs, preparing neighboring cells to be SNs for the one or more UEs, configuring the one or more UEs for fast SN switching, etc., as described herein. Though a UE 104 is shown as having the modem 240 and communicating component 242 and a base station 102/gNB 180 is shown as having the

modem 340 and connection managing component 342, this is one illustrative example, and substantially any node or type of node may include a modem 240 and communicating component 242 and/or a modem 340 and connection managing component 342 for providing corresponding functionalities described herein.

[00119] The base stations 102 configured for 4G LTE (which can collectively be referred to as Evolved Universal Mobile Telecommunications System (UMTS) Terrestrial Radio Access Network (E-UTRAN)) may interface with the EPC 160 through backhaul links 132 (e.g., using an S1 interface). The base stations 102 configured for 5G NR (which can collectively be referred to as Next Generation RAN (NG-RAN)) may interface with 5GC 190 through backhaul links 184. In addition to other functions, the base stations 102 may perform one or more of the following functions: transfer of user data, radio channel ciphering and deciphering, integrity protection, header compression, mobility control functions (e.g., handover, dual connectivity), inter-cell interference coordination, connection setup and release, load balancing, distribution for non-access stratum (NAS) messages, NAS node selection, synchronization, radio access network (RAN) sharing, multimedia broadcast multicast service (MBMS), subscriber and equipment trace, RAN information management (RIM), paging, positioning, and delivery of warning messages. The base stations 102 may communicate directly or indirectly (e.g., through the EPC 160 or 5GC 190) with each other over backhaul links 134 (e.g., using an X2 interface). The backhaul links 134 may be wired or wireless.

[00120] The base stations 102 may wirelessly communicate with one or more UEs 104. Each of the base stations 102 may provide communication coverage for a respective geographic coverage area 110. There may be overlapping geographic coverage areas 110. For example, the small cell 102' may have a coverage area 110' that overlaps the coverage area 110 of one or more macro base stations 102. A network that includes both small cell and macro cells may be referred to as a heterogeneous network. A heterogeneous network may also include Home Evolved Node Bs (eNBs) (HeNBs), which may provide service to a restricted group, which can be referred to as a closed subscriber group (CSG). The communication links 120 between the base stations 102 and the UEs 104 may include uplink (UL) (also referred to as reverse link) transmissions from a UE 104 to a base station 102 and/or downlink (DL) (also referred to as forward link) transmissions from a base station 102 to a UE 104. The communication links 120 may use multiple-input and multiple-output (MIMO) antenna technology, including spatial multiplexing,

beamforming, and/or transmit diversity. The communication links may be through one or more carriers. The base stations 102 / UEs 104 may use spectrum up to Y MHz (e.g., 5, 10, 15, 20, 100, 400, etc. MHz) bandwidth per carrier allocated in a carrier aggregation of up to a total of Yx MHz (e.g., for x component carriers) used for transmission in the DL and/or the UL direction. The carriers may or may not be adjacent to each other. Allocation of carriers may be asymmetric with respect to DL and UL (e.g., more or less carriers may be allocated for DL than for UL). The component carriers may include a primary component carrier and one or more secondary component carriers. A primary component carrier may be referred to as a primary cell (PCell) and a secondary component carrier may be referred to as a secondary cell (SCell).

[00121] In another example, certain UEs 104 may communicate with each other using device-to-device (D2D) communication link 158. The D2D communication link 158 may use the DL/UL WWAN spectrum. The D2D communication link 158 may use one or more sidelink channels, such as a physical sidelink broadcast channel (PSBCH), a physical sidelink discovery channel (PSDCH), a physical sidelink shared channel (PSSCH), and a physical sidelink control channel (PSCCH). D2D communication may be through a variety of wireless D2D communications systems, such as for example, FlashLinQ, WiMedia, Bluetooth, ZigBee, Wi-Fi based on the IEEE 802.11 standard, LTE, or NR.

[00122] The wireless communications system may further include a Wi-Fi access point (AP) 150 in communication with Wi-Fi stations (STAs) 152 via communication links 154 in a 5 GHz unlicensed frequency spectrum. When communicating in an unlicensed frequency spectrum, the STAs 152 / AP 150 may perform a clear channel assessment (CCA) prior to communicating in order to determine whether the channel is available.

[00123] The small cell 102' may operate in a licensed and/or an unlicensed frequency spectrum. When operating in an unlicensed frequency spectrum, the small cell 102' may employ NR and use the same 5 GHz unlicensed frequency spectrum as used by the Wi-Fi AP 150. The small cell 102', employing NR in an unlicensed frequency spectrum, may boost coverage to and/or increase capacity of the access network.

[00124] A base station 102, whether a small cell 102' or a large cell (e.g., macro base station), may include an eNB, gNodeB (gNB), or other type of base station. Some base stations, such as gNB 180 may operate in a traditional sub 6 GHz spectrum, in millimeter wave (mmW) frequencies, and/or near mmW frequencies in communication with the UE

104. When the gNB 180 operates in mmW or near mmW frequencies, the gNB 180 may be referred to as an mmW base station. Extremely high frequency (EHF) is part of the RF in the electromagnetic spectrum. EHF has a range of 30 GHz to 300 GHz and a wavelength between 1 millimeter and 10 millimeters. Radio waves in the band may be referred to as a millimeter wave. Near mmW may extend down to a frequency of 3 GHz with a wavelength of 100 millimeters. The super high frequency (SHF) band extends between 3 GHz and 30 GHz, also referred to as centimeter wave. Communications using the mmW / near mmW radio frequency band has extremely high path loss and a short range. The mmW base station 180 may utilize beamforming 182 with the UE 104 to compensate for the extremely high path loss and short range. A base station 102 referred to herein can include a gNB 180.

[00125] The EPC 160 may include a Mobility Management Entity (MME) 162, other MMEs 164, a Serving Gateway 166, a Multimedia Broadcast Multicast Service (MBMS) Gateway 168, a Broadcast Multicast Service Center (BM-SC) 170, and a Packet Data Network (PDN) Gateway 172. The MME 162 may be in communication with a Home Subscriber Server (HSS) 174. The MME 162 is the control node that processes the signaling between the UEs 104 and the EPC 160. Generally, the MME 162 provides bearer and connection management. All user Internet protocol (IP) packets are transferred through the Serving Gateway 166, which itself is connected to the PDN Gateway 172. The PDN Gateway 172 provides UE IP address allocation as well as other functions. The PDN Gateway 172 and the BM-SC 170 are connected to the IP Services 176. The IP Services 176 may include the Internet, an intranet, an IP Multimedia Subsystem (IMS), a PS Streaming Service, and/or other IP services. The BM-SC 170 may provide functions for MBMS user service provisioning and delivery. The BM-SC 170 may serve as an entry point for content provider MBMS transmission, may be used to authorize and initiate MBMS Bearer Services within a public land mobile network (PLMN), and may be used to schedule MBMS transmissions. The MBMS Gateway 168 may be used to distribute MBMS traffic to the base stations 102 belonging to a Multicast Broadcast Single Frequency Network (MBSFN) area broadcasting a particular service, and may be responsible for session management (start/stop) and for collecting eMBMS related charging information.

[00126] The 5GC 190 may include an Access and Mobility Management Function (AMF) 192, other AMFs 193, a Session Management Function (SMF) 194, and a User Plane

Function (UPF) 195. The AMF 192 may be in communication with a Unified Data Management (UDM) 196. The AMF 192 can be a control node that processes the signaling between the UEs 104 and the 5GC 190. Generally, the AMF 192 can provide QoS flow and session management. User Internet protocol (IP) packets (e.g., from one or more UEs 104) can be transferred through the UPF 195. The UPF 195 can provide UE IP address allocation for one or more UEs, as well as other functions. The UPF 195 is connected to the IP Services 197. The IP Services 197 may include the Internet, an intranet, an IP Multimedia Subsystem (IMS), a PS Streaming Service, and/or other IP services.

[00127] The base station may also be referred to as a gNB, Node B, evolved Node B (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 transmit reception point (TRP), or some other suitable terminology. The base station 102 provides an access point to the EPC 160 or 5GC 190 for a UE 104. Examples of UEs 104 include a cellular phone, a smart phone, a session initiation protocol (SIP) phone, a laptop, a personal digital assistant (PDA), a satellite radio, a positioning system (e.g., satellite, terrestrial), a multimedia device, a video device, a digital audio player (e.g., MP3 player), a camera, a game console, a tablet, a smart device, robots, drones, an industrial/manufacturing device, a wearable device (e.g., a smart watch, smart clothing, smart glasses, virtual reality goggles, a smart wristband, smart jewelry (e.g., a smart ring, a smart bracelet)), a vehicle/a vehicular device, a meter (e.g., parking meter, electric meter, gas meter, water meter, flow meter), a gas pump, a large or small kitchen appliance, a medical/healthcare device, an implant, a sensor/actuator, a display, or any other similar functioning device. Some of the UEs 104 may be referred to as IoT devices (e.g., meters, pumps, monitors, cameras, industrial/manufacturing devices, appliances, vehicles, robots, drones, etc.). IoT UEs may include MTC/enhanced MTC (eMTC, also referred to as CAT-M, Cat M1) UEs, NB-IoT (also referred to as CAT NB1) UEs, as well as other types of UEs. In the present disclosure, eMTC and NB-IoT may refer to future technologies that may evolve from or may be based on these technologies. For example, eMTC may include FeMTC (further eMTC), eFeMTC (enhanced further eMTC), mMTC (massive MTC), etc., and NB-IoT may include eNB-IoT (enhanced NB-IoT), FeNB-IoT (further enhanced NB-IoT), etc. The UE 104 may also be referred to as a station, a mobile station, a subscriber station, a mobile unit, a subscriber unit, a wireless unit, a remote unit, a

mobile device, a wireless device, a wireless communications device, a remote device, a mobile subscriber station, an access terminal, a mobile terminal, a wireless terminal, a remote terminal, a handset, a user agent, a mobile client, a client, or some other suitable terminology.

[00128] In an example, a base station 102 with a connection managing component 342 can provide MN functionality for a UE 104 to managing connection with one or more SNs (e.g., other base station(s) providing a SN functionality) in multiple connectivity (or dual connectivity). The base stations may use different RATs in one example, as described. UE 104 can, via communicating component 242, measure neighboring base stations and/or related cells, and can send a measurement report to the base station 102. The base station 102 can, based on the measurement report, prepare one or more other base stations to provide SN functionality for the UE 104 and can configure the UE 104 to perform fast SN switching to the one or more other base stations based on detecting one or more conditions. The UE 104, upon detecting the one or more conditions, can perform the fast SN switching to a cell provided by the one or more other base stations to reduce latency typically associated with SN switching.

[00129] Turning now to **FIGS. 2-9**, aspects are depicted with reference to one or more components and one or more methods that may perform the actions or operations described herein, where aspects in dashed line may be optional. Although the operations described below in FIGS. 4-6 are presented in a particular order and/or as being performed by an example component, it should be understood that the ordering of the actions and the components performing the actions may be varied, depending on the implementation. Moreover, it should be understood that the following actions, functions, and/or described components may be performed by a specially-programmed processor, a processor executing specially-programmed software or computer-readable media, or by any other combination of a hardware component and/or a software component capable of performing the described actions or functions.

[00130] Referring to **FIG. 2**, one example of an implementation of UE 104 may include a variety of components, some of which have already been described above and are described further herein, including components such as one or more processors 212 and memory 216 and transceiver 202 in communication via one or more buses 244, which may operate in conjunction with modem 240 and/or communicating component 242 for performing one or more functions associated with fast SN switching, as described herein.

[00131] In an aspect, the one or more processors 212 can include a modem 240 and/or can be part of the modem 240 that uses one or more modem processors. Thus, the various functions related to communicating component 242 may be included in modem 240 and/or processors 212 and, in an aspect, can be executed by a single processor, while in other aspects, different ones of the functions may be executed by a combination of two or more different processors. For example, in an aspect, the one or more processors 212 may include any one or any combination of a modem processor, or a baseband processor, or a digital signal processor, or a transmit processor, or a receiver processor, or a transceiver processor associated with transceiver 202. In other aspects, some of the features of the one or more processors 212 and/or modem 240 associated with communicating component 242 may be performed by transceiver 202.

[00132] Also, memory 216 may be configured to store data used herein and/or local versions of applications 275 or communicating component 242 and/or one or more of its subcomponents being executed by at least one processor 212. Memory 216 can include any type of computer-readable medium usable by a computer or at least one processor 212, such as random access memory (RAM), read only memory (ROM), tapes, magnetic discs, optical discs, volatile memory, non-volatile memory, and any combination thereof. In an aspect, for example, memory 216 may be a non-transitory computer-readable storage medium that stores one or more computer-executable codes defining communicating component 242 and/or one or more of its subcomponents, and/or data associated therewith, when UE 104 is operating at least one processor 212 to execute communicating component 242 and/or one or more of its subcomponents.

[00133] Transceiver 202 may include at least one receiver 206 and at least one transmitter 208. Receiver 206 may include hardware and/or software executable by a processor for receiving data, the code comprising instructions and being stored in a memory (e.g., computer-readable medium). Receiver 206 may be, for example, a radio frequency (RF) receiver. In an aspect, receiver 206 may receive signals transmitted by at least one base station 102. Additionally, receiver 206 may process such received signals, and also may obtain measurements of the signals, such as, but not limited to, Ec/Io, signal-to-noise ratio (SNR), reference signal received power (RSRP), received signal strength indicator (RSSI), etc. Transmitter 208 may include hardware and/or software executable by a processor for transmitting data, the code comprising instructions and being stored in a

memory (e.g., computer-readable medium). A suitable example of transmitter 208 may including, but is not limited to, an RF transmitter.

[00134] Moreover, in an aspect, UE 104 may include RF front end 288, which may operate in communication with one or more antennas 265 and transceiver 202 for receiving and transmitting radio transmissions, for example, wireless communications transmitted by at least one base station 102 or wireless transmissions transmitted by UE 104. RF front end 288 may be connected to one or more antennas 265 and can include one or more low-noise amplifiers (LNAs) 290, one or more switches 292, one or more power amplifiers (PAs) 298, and one or more filters 296 for transmitting and receiving RF signals.

[00135] In an aspect, LNA 290 can amplify a received signal at a desired output level. In an aspect, each LNA 290 may have a specified minimum and maximum gain values. In an aspect, RF front end 288 may use one or more switches 292 to select a particular LNA 290 and its specified gain value based on a desired gain value for a particular application.

[00136] Further, for example, one or more PA(s) 298 may be used by RF front end 288 to amplify a signal for an RF output at a desired output power level. In an aspect, each PA 298 may have specified minimum and maximum gain values. In an aspect, RF front end 288 may use one or more switches 292 to select a particular PA 298 and its specified gain value based on a desired gain value for a particular application.

[00137] Also, for example, one or more filters 296 can be used by RF front end 288 to filter a received signal to obtain an input RF signal. Similarly, in an aspect, for example, a respective filter 296 can be used to filter an output from a respective PA 298 to produce an output signal for transmission. In an aspect, each filter 296 can be connected to a specific LNA 290 and/or PA 298. In an aspect, RF front end 288 can use one or more switches 292 to select a transmit or receive path using a specified filter 296, LNA 290, and/or PA 298, based on a configuration as specified by transceiver 202 and/or processor 212.

[00138] As such, transceiver 202 may be configured to transmit and receive wireless signals through one or more antennas 265 via RF front end 288. In an aspect, transceiver may be tuned to operate at specified frequencies such that UE 104 can communicate with, for example, one or more base stations 102 or one or more cells associated with one or more base stations 102. In an aspect, for example, modem 240 can configure transceiver 202 to operate at a specified frequency and power level based on the UE configuration of the UE 104 and the communication protocol used by modem 240.

[00139] In an aspect, modem 240 can be a multiband-multimode modem, which can process digital data and communicate with transceiver 202 such that the digital data is sent and received using transceiver 202. In an aspect, modem 240 can be multiband and be configured to support multiple frequency bands for a specific communications protocol. In an aspect, modem 240 can be multimode and be configured to support multiple operating networks and communications protocols. In an aspect, modem 240 can control one or more components of UE 104 (e.g., RF front end 288, transceiver 202) to enable transmission and/or reception of signals from the network based on a specified modem configuration. In an aspect, the modem configuration can be based on the mode of the modem and the frequency band in use. In another aspect, the modem configuration can be based on UE configuration information associated with UE 104 as provided by the network during cell selection and/or cell reselection.

[00140] In an aspect, communicating component 242 can optionally include a measuring component 252 for measuring signals received from neighboring cells and/or a fast switching component 254 for performing fast SN switching, as described herein.

[00141] In an aspect, the processor(s) 212 may correspond to one or more of the processors described in connection with the UE in FIG. 9. Similarly, the memory 216 may correspond to the memory described in connection with the UE in FIG. 9.

[00142] Referring to **FIG. 3**, one example of an implementation of base station 102 (e.g., a base station 102 and/or gNB 180, as described above) may include a variety of components, some of which have already been described above, but including components such as one or more processors 312 and memory 316 and transceiver 302 in communication via one or more buses 344, which may operate in conjunction with modem 340 and connection managing component 342 for managing multiple connections for a UE in multiple connectivity. For example, the base station 102 described in FIG. 3 and throughout can be a primary serving node (MN) and/or the secondary serving node described in the present disclosure.

[00143] The transceiver 302, receiver 306, transmitter 308, one or more processors 312, memory 316, applications 375, buses 344, RF front end 388, LNAs 390, switches 392, filters 396, PAs 398, and one or more antennas 365 may be the same as or similar to the corresponding components of UE 104, as described above, but configured or otherwise programmed for base station operations as opposed to UE operations.

[00144] In an aspect, connection managing component 342 can optionally include a preparing component 352 for preparing one or more base stations or related cells to provide an SN function to a UE in multiple connectivity and/or a configuring component 354 for configuring the UE to perform fast SN switching to the one or more base stations or related cells, as described herein.

[00145] In an aspect, the processor(s) 312 may correspond to one or more of the processors described in connection with the base station in FIG. 9. Similarly, the memory 316 may correspond to the memory described in connection with the base station in FIG. 9.

[00146] **FIG. 4** illustrates a flow chart of an example of a method 400 for performing fast SN switching in accordance with aspects described herein. **FIG. 5** illustrates a flow chart of an example of a method 500 for enabling fast SN switching in accordance with aspects described herein. Method 400 and 500 are described in conjunction with one another for ease of explanation, though the methods 400 and 500 are not required to be performed in conjunction. In one example, a UE 104 can perform the functions described in method 400 using one or more of the components described in FIGS. 1 and 2, and a base station 102 (e.g., as a primary serving node (MN)) can perform the functions described in method 500 using one or more of the components described in FIGS. 1 and 3. Moreover, in an example, a base station 102 performing the functions described in method 500 can be a base station providing MN functionality for a UE.

[00147] In method 400, at Block 402, a measurement report of multiple neighboring cells can be transmitted to an MN. In an aspect, measuring component 252, e.g., in conjunction with processor(s) 212, memory 216, transceiver 202, communicating component 242, etc., can transmit, to the MN, the measurement report of multiple neighboring cells. For example, communicating component 242 can perform measurement of signals received from the neighboring cells (e.g., cells other than or including a cell provided by the MN) at transceiver 202. The measurement may include measurements of signal strength or quality, such as received signal strength indicator (RSSI), reference signal received power (RSRP), reference signal received quality (RSRQ), signal-to-noise ratio (SNR), signal-to-interference-and-noise-ratio (SINR), etc. Measuring component 252 can generate a measurement report (e.g., similar to a report used to assess cells for handover) and can transmit the measurement report to the MN. In one example, measuring component 252 can generate and transmit the measurement report based on a periodic or aperiodic trigger,

based on detecting one or more conditions (e.g., signal strength of a SN below a threshold), based on a request from the MN, and/or the like.

[00148] In method 500, at Block 502, a measurement report of multiple neighboring cells can be received from a UE. In an aspect, connection managing component 342, e.g., in conjunction with processor(s) 312, memory 316, transceiver 302, etc., can receive, from the UE (e.g., UE 104), the measurement report of multiple neighboring cells. As described, the measurement report may include measurements of signals from the neighboring cells as received by the UE, which can be used to assess which of the neighboring cells may be candidates for providing SN functionality to the UE as a secondary serving node in multiple connectivity.

[00149] In method 500, at Block 504, multiple SNs, including two or more of the multiple neighboring cells, can be prepared, based on the measurement report, for serving the UE as a secondary serving node. In an aspect, preparing component 352, e.g., in conjunction with processor(s) 312, memory 316, transceiver 302, connection managing component 342, etc., can prepare, based on the measurement report, the multiple SNs, including two or more of the multiple neighboring cells, for serving the UE as a secondary serving node. For example, preparing component 352 may prepare all cells indicated in the measurement report, cells determined to have a signal measurement that achieves a threshold, cells determined to have other properties consistent with providing multiple connectivity for the UE, etc. In preparing the multiple SNs, for example, preparing component 352 can transmit (e.g., over a backhaul link to a given cell in the multiple SNs) an addition request to allow the UE to connect to the cell as a SN in multiple connectivity. For example, preparing two or more of the multiple neighboring cells to be SNs based on the measurement report may include transmitting (e.g., over a backhaul link to a given cell in the multiple SNs) an addition request to allow the UE to connect to the cell as a secondary serving node in multiple connectivity. In addition, preparing component 352 may receive an acknowledgement of the request from the cell. Preparing component 352 can perform the preparation for multiple cells, as described.

[00150] In method 500, at Block 506, a configuration message can be generated including configurations for the multiple SNs and an indication of a condition, for the multiple SNs, for establishing connection therewith. In an aspect, configuring component 354, e.g., in conjunction with processor(s) 312, memory 316, transceiver 302, connection managing component 342, etc., can generate the configuration message including the configurations

for the multiple SNs and the indication of the condition, for the multiple SNs, for establishing the connection therewith. For example, configuring component 354 can generate the configuration message to include the configurations as RRC configurations for establishing a connection with each of the multiple SNs via RRC commands or messages. In addition, for example, configuring component 354 can generate the configuration message to include an identifier of each of the set of cells corresponding to the multiple SNs (e.g., or at least the set of cells that responded to the prepare request with an acknowledgment). In addition, configuring component 354 may indicate the condition for establishing connection with one or more of the multiple SNs as a secondary serving SN. In one example, configuring component 354 may indicate a separate condition for each SN and/or may indicate one or more separate parameters for detecting the condition.

[00151] In an example, the condition may include detecting that a first signal power of a current SN is less than a first threshold, and detecting that a second signal power of at least one of the multiple SNs achieves a second threshold. In another example, the condition may include detecting that a first signal power of a current secondary serving node (e.g., a current SN) is less than a second signal power of at least one of the multiple SNs at least by a threshold difference. The configuration message may indicate which of these conditions (or other conditions) is/are to be detected before performing the fast SN switching. In another example, the configuration message may indicate the thresholds and/or other related parameters. Moreover, as described, the configuration message may indicate conditions and/or parameters for all SNs and/or separately for one or more of the multiple SNs. In another example, configuring component 354 can generate a separate configuration indicating the thresholds described above, such as in a system information broadcast (SIB) message or other broadcast message, a radio resource control (RRC) message, a dedicated control message for the UE 104, and/or the like.

[00152] In any case, in method 500, at Block 508, the configuration message can be transmitted to the UE (e.g., in response to the measurement report). In an aspect, configuring component 354, e.g., in conjunction with processor(s) 312, memory 316, transceiver 302, connection managing component 342, etc., can transmit, to the UE and in response to the measurement report, the configuration message. For example, configuring component 354 can use a similar mechanism as used to transmit the measurement report for transmitting the configuration message. In a specific example, the UE can transmit the measurement report using an RRC reconfiguration message, and

the configuring component 354 can transmit the configuration message using an RRC reconfiguration message.

[00153] In method 400, at Block 404, a configuration message can be received from the MN, including configurations for multiple SNs determined from the multiple neighboring cells and an indication of a condition, for the multiple SNs, for establishing a connection therewith. In an aspect, fast switching component 254, e.g., in conjunction with processor(s) 212, memory 216, transceiver 202, communicating component 242, etc., can receive, from the MN (e.g., from base station 102 providing the MN functionality) and in response to the measurement report, the configuration message including the configurations for multiple SNs determined from the multiple neighboring cells and the indication of the condition, for the multiple SNs, for establishing the connection therewith. For example, the configuration message may indicate the configurations as RRC configurations for establishing a connection with each of the multiple SNs via RRC commands or messages. In addition, for example, the configuration message may indicate a type of condition to be detected for performing the fast switching, associated thresholds (e.g., signal measurement thresholds and/or threshold differences, etc., as described above), and/or the like. In addition, the configuration message may indicate such parameters for the multiple SNs and/or separately for each of multiple SNs.

[00154] In method 400, optionally at Block 406, signals received from each of the multiple SNs can be monitored and/or corresponding measurement reports can be reported over a period of time until the condition is detected. In an aspect, measuring component 252, e.g., in conjunction with processor(s) 212, memory 216, transceiver 202, communicating component 242, etc., can monitor signals received from each of the multiple SNs and/or report corresponding measurement reports over the period of time until the condition is detected. For example, measuring component 252 can monitor the signals to detect whether a first signal power of a current SN is less than a first threshold and whether a second signal power of at least one of the multiple SNs achieves a second threshold. In another example, measuring component 252 can monitor the signals to detect whether a first signal power of a current SN is less than a second signal power of at least one of the multiple SNs at least by a threshold difference. If the condition is detected for at least one of the multiple SNs, fast switching component 254 can perform fast switching of the at least one SN to establish a connection therewith, as described further herein.

[00155] In addition, measuring component 252 can continue to monitor the candidate SNs indicated in the configuration message, and can report subsequent signal measurements to the MN (e.g., as described in conjunction with Block 402 above). Based on the signal measurements, the MN may update the configuration message and remove one or more SNs that do not achieve a threshold signal measurement, etc. For other candidate SNs, the corresponding cell can work under dormant state until (and if) activated by the UE, as described below. For these cells (e.g., as primary secondary cells (PSCell), i.e., as primary cells in a secondary cell group, in multiple connectivity), there may be no active data transmission, e.g., no physical downlink control channel (PDCCH) monitoring. In addition, for these cells, relaxed radio resource management (RRM) may be configured and performed by the UE, and measurement results are reported to MN, as described. In addition, radio link monitoring (RLM) can be configured and performed by the UE for these cells (e.g., to be able to declare secondary cell group (SCG) radio link failure (S-RLF) if needed).

[00156] In this example, in monitoring the signals at Block 406, optionally at Block 408, RLF can be reported for one or more of the multiple SNs. In an aspect, measuring component 252, e.g., in conjunction with processor(s) 212, memory 216, transceiver 202, communicating component 242, etc., can report RLF for the one or more of the multiple SNs. For example, measuring component 252 can detect RLF when measuring the multiple SNs (as indicated in the configuration message) for consideration for fast SN switching, and upon detecting S-RLF, measuring component 252 can report the S-RLF and can refrain from performing RRM/RLM measurements of the one or more of the multiple SNs. The MN can release the one or more of the multiple SNs from being prepared for fast switching by the UE 104, as described further herein.

[00157] In an example, in method 500, optionally at Block 510, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells can be received from the UE and at least until the condition is detected. In an aspect, connection managing component 342, e.g., in conjunction with processor(s) 312, memory 316, transceiver 302, etc., can receive, from the UE and at least until the condition is detected, the one or more subsequent measurement reports of monitored signals of the multiple neighboring cells. Based on the updated measurements, for example, preparing component 352 may prepare additional neighboring cells as SNs for possibly providing SN functionality to the UE and/or may release one or more neighboring cells form

providing the SN functionality (e.g., where new cells are present in the report, where the signal measurement changes to achieve or fail to achieve a threshold, etc.).

[00158] In one example, in receiving the one or more subsequent measurement reports at Block 510, optionally at Block 512, an indication of RLF of one of the multiple SNs can be received from the UE. In an aspect, connection managing component 342, e.g., in conjunction with processor(s) 312, memory 316, transceiver 302, etc., can receive, from the UE, the indication of RLF of the one (or more) of the multiple SNs. Based on this indication and/or other detected conditions, optionally at Block 514, the one of the multiple SNs can be released as a SN (e.g., as a current SN or as a prepared SN candidate). In an aspect, connection managing component 342, e.g., in conjunction with processor(s) 312, memory 316, transceiver 302, etc., can release the one of the multiple SNs as a SN. This may include sending a message to the cell to remove information previously provided in preparing the cell as a possible SN, as described above.

[00159] As described, in method 400 based on monitoring the signals, optionally at Block 410, it can be detected that a first signal power of a current SN is less than a first threshold and that a second signal power of at least one of the multiple SNs achieves a second threshold. In another example, optionally at Block 412, it can be detected that a first signal power of a current SN is less than a second signal power of at least one of the multiple SNs by a threshold difference. For example, fast switching component 254, e.g., in conjunction with processor(s) 212, memory 216, transceiver 202, communicating component 242, etc., can detect one or more of these conditions, and the condition to be detected may be indicated by the configuration message (and/or may be SN-specific for one or more SNs such that fast switching component 254 can attempt to detect specific conditions for specific sets of one or more SNs). Moreover, as described, fast switching component 254 can attempt to detect one or more of these conditions based on thresholds that may be indicated in the configuration message or received in a separate configuration (e.g., in SIB or RRC signaling prior to receiving the configuration message).

[00160] In method 400, at Block 414, the connection can be established with at least one of the multiple SNs as a secondary serving node based on detecting the condition for the one of the set of cells. In an aspect, fast switching component 254, e.g., in conjunction with processor(s) 212, memory 216, transceiver 202, communicating component 242, etc., can establish, based on detecting the condition for one of the set of cells, the connection with at least one of the multiple SNs as a secondary serving node. For

example, fast switching component 254 can determine to establish the connection based on detecting the condition. In an example, fast switching component 254 can establish the connection with the at least one of the multiple SNs without necessarily requiring that the at least one of the multiple SNs be prepared for the switching, as required in conventional switching systems described above. Examples of fast switching are further described in the following Blocks and in FIGs. 7-8.

[00161] In establishing the connection at Block 414, optionally at Block 416, an indication can be transmitted to the MN in an uplink shared channel. In an aspect, fast switching component 254, e.g., in conjunction with processor(s) 212, memory 216, transceiver 202, communicating component 242, etc., can transmit the indication to the MN in the uplink shared channel (e.g., in physical uplink shared channel (PUSCH), such as in a media access control (MAC)-control element (CE)), where the indication indicates to fast switch to the SN. This indication can also be referred to as a switching indication. In this example, the MN can notify the one of the set of cells and/or can provide other parameters/indication that fast switching is occurring for the UE 104. The MN can additionally transmit a message to the UE 104 to confirm the fast SN switch (e.g., a layer 1 (L1), MAC-CE, RRC reconfiguration message, etc.), as described in connection with Block 420 below.

[00162] In an example, in method 500, optionally at Block 516, an indication to activate the at least one of the multiple SNs as the secondary serving node can be received from the UE or the at least one of the multiple SNs. In an aspect, connection managing component 342, e.g., in conjunction with processor(s) 312, memory 316, transceiver 302, etc., can receive, from the UE of the at least one of the multiple SNs, the indication to activate the at least one of the multiple SNs as the secondary serving node. As described, the UE can determine to activate the at least one of the multiple SNs based on detecting one or more configured conditions for the at least one of the multiple SNs. In addition, for example, connection managing component 342 may receive the indication from the UE over an uplink shared channel (e.g., over a PUSCH), such as in a MAC-CE.

[00163] In an example, in method 500, optionally at Block 518, an activation request can be sent to the at least one of the multiple SNs. In an aspect, preparing component 352, e.g., in conjunction with processor(s) 312, memory 316, transceiver 302, connection managing component 342, etc., can send, to the at least one of the multiple SNs, the activation request to cause the cell to be enabled as the secondary serving node for the

UE. Configuring component 354 may also send a message to the UE to confirm the fast SN switch, as described.

[00164] For example, in method 500, optionally at Block 520, a fast switching message can be sent to the UE. In an aspect, connection managing component 342, e.g., in conjunction with processor(s) 312, memory 316, transceiver 302, etc., can send, to the UE, the fast switching message. For example, the fast switching message can be sent to confirm the fast switching, that the SN is prepared for fast switching, and/or the like. Moreover, the fast switching message can include a L1 communication, MAC-CE, RRC reconfiguration message, etc.

[00165] In another example, in establishing the connection at Block 414, optionally at Block 418, a random access procedure can be initiated toward the at least one of the multiple SNs. In an aspect, fast switching component 254, e.g., in conjunction with processor(s) 212, memory 216, transceiver 202, communicating component 242, etc., can initiate a random access procedure toward the at least one of the multiple SNs to perform the fast SN switching. In this example, at Block 516, the indication to activate the at least one of the multiple SNs as the secondary serving node may be received from the at least one of the multiple SNs (e.g., based on the random access procedure being performed with the SN). In this example, connection managing component 342 can send an acknowledgement of the SN activation to the SN cell. In addition, as described optionally at Block 520, a fast switching message can be sent to the UE.

[00166] In any case, establishing the connection at Block 414 may optionally include, at Block 420, receiving, from the MN, the fast switching message. In an aspect, fast switching component 254, e.g., in conjunction with processor(s) 212, memory 216, transceiver 202, communicating component 242, etc., can receive, from the MN, the fast switching message (e.g., as a L1 communication, MAC-CE, RRC reconfiguration message, etc.) indicating that the fast switching to the SN has occurred or is otherwise successful. In this example, fast switching component 254 can receive the message and can accordingly expect to receive communications from the SN regarding resources over which communications can be transmitted or received as part of multiple connectivity with the SN and the MN.

[00167] **FIG. 6** illustrates a specific example of a system 600 for configuring a UE for fast SN switching in accordance with various aspects of the present disclosure. System 600 includes a UE 104, MN 602, and multiple SNs 604, 606, 608. In this example, UE 104

can transmit measurement reporting 610 to the MN 602, the measurement reporting 610 can be transmitted before the configuration of fast SN switching. The measurement reporting 610 can include measurement reports of signals from neighboring cells, as described, and may include measurements of cells operating using different RATs, etc. Based on the measurement reporting 610 received from the UE 104, MN 602 can prepare multiple SNs 604, 606, 608 for the UE 104 (e.g., to provide SN functionality for the UE 104). In this example, the MN 602 can prepare the multiple SNs 604, 606, 608 at least in part by transmitting (e.g., over a backhaul link) a secondary gNB (SgNB) addition request 612 to SN1 604 to add the corresponding cell as a SN. For example, the SgNB addition request 612 may include parameters for establishing a connection with the UE 104 and/or receiving communications therefrom should the UE 104 determine to add the SN 604, 606, 608 as a secondary serving node. MN 602 can receive an SgNB addition request acknowledgement (ACK) 614 from SN1 604 acknowledging receipt of the SgNB addition request 612 and/or acknowledging that SN1 604 is or will be setup to provide SN functionality for the UE 104. MN 602 can similarly transmit SgNB addition requests 616, 620 to SN2 606, SN3 608, respectively, and can receive corresponding SgNB addition request ACKs 618, 622. MN 602 can also transmit multiple SN/SCG configuration to the UE 104 (e.g., using RRCReconfiguration message 624) together with condition(s) for fast SN switch, as described above. For example, the condition(s) may include a single condition for all SNs, a different condition and/or associated parameters for different SNs, etc. In a specific example, the condition(s) may include a condition where the current SN's PSCell RSRP is determined to be worse than XdB while one candidate SN's RSRP is determined to be better than YdB, where X and Y can be configured as parameters of the condition. In another specific example, the condition(s) may include a condition where the current SN's PSCell RSRP is determined to be ZdB worse than one candidate SN' RSRP, where Z can be configured as a parameter for the condition. The UE 104 can transmit a RRCConfigurationComplete message 626 to the MN 602 to indicate that the UE 104 received the multiple configurations for fast SN switch.

[00168] FIG. 7 illustrates another specific example of a system 700 for preforming, by a UE, fast SN switching, in accordance with various aspects of the present disclosure. System 700 includes a UE 104, MN 602, and multiple SNs 604, 606, 608. In this example, configuration for fast SN switching can be performed as described in FIG. 6 above. For example, messages 610-626 in FIG. 7 can be similar to messages 610-626 described in

FIG. 6 above. Once the UE 104 is configured for fast SN switching, UE 104 can monitor and perform RRM and check condition(s) for multiple SNs, as received in the configuration, at 702. Based on detecting a condition for SN1 604, UE 104 can decide to select SN1 at Block 704. This may be in addition or alternatively to communicating with a current SN (not shown). In any case, UE 104 can send, to MN 602, an indication of SN switch to SN1 (e.g., in PUSCH MAC-CE). MN 602 can accordingly send a SgNB activation request 708 to selected SN1 604, and can receive a SgNB activation request ACK 710 from SN1 604. Based on receiving the ACK 710 (or concurrently with sending the activation request), MN 602 can use new signaling (L1, or MAC-CE, or RRCReconfiguration message) to perform fast SN switch 712. UE 104 can transmit RRCReconfigurationComplete message 714 to the MN 602 and then can perform a random access channel (RACH) procedure in SN1 604 at 716 to establish a connection with SN1 604 as a SN.

[00169] FIG. 8 illustrates another specific example of a system 800 for preforming, by a UE, fast SN switching, in accordance with various aspects of the present disclosure. System 800 includes a UE 104, MN 602, and multiple SNs 604, 606, 608. In this example, configuration for fast SN switching can be performed as described in FIG. 6 above. For example, messages 610-626 in FIG. 8 can be similar to messages 610-626 described in FIG. 6 above. Once the UE 104 is configured for fast SN switching, UE 104 can monitor and perform RRM and check condition(s) for multiple SNs, as received in the configuration, at 802. Based on detecting a condition for SN1 604, UE 104 can decide to select SN1 at Block 804. This may be in addition or alternatively to communicating with a current SN (not shown). In any case, UE 104 can perform a RACH procedure in SN1 604 at 806 to establish a connection with SN1 604 as a SN. After RACH is successfully completed, the selected SN1 604 can accordingly send a SgNB activation request 808 to MN 602 to request activating SN1 604 as a SN for UE 104. MN 602, based on receiving the SgNB activation request 808, can transmit a SgNB activation request ACK 810 to the SN1 604 and can use new signaling (L1, or MAC-CE, or RRCReconfiguration message) to perform fast SN switch 812. UE 104 can transmit RRCReconfigurationComplete message 814 to the MN 602.

[00170] FIG. 9 is a block diagram of a MIMO communication system 900 including a base station 102 and a UE 104, in accordance with various aspects of the present disclosure. The MIMO communication system 900 may illustrate aspects of the wireless

communication access network 100 described with reference to FIG. 1. The base station 102 may be an example of aspects of the base station 102 described with reference to FIG. 1. The base station 102 may be equipped with antennas 934 and 935, and the UE 104 may be equipped with antennas 952 and 953. In the MIMO communication system 900, the base station 102 may be able to send data over multiple communication links at the same time. Each communication link may be called a "layer" and the "rank" of the communication link may indicate the number of layers used for communication. For example, in a 2x2 MIMO communication system where base station 102 transmits two "layers," the rank of the communication link between the base station 102 and the UE 104 is two.

[00171] At the base station 102, a transmit (Tx) processor 920 may receive data from a data source. The transmit processor 920 may process the data. The transmit processor 920 may also generate control symbols or reference symbols. A transmit MIMO processor 930 may perform spatial processing (e.g., precoding) on data symbols, control symbols, or reference symbols, if applicable, and may provide output symbol streams to the transmit modulator/demodulators 932 and 933. Each modulator/demodulator 932 through 933 may process a respective output symbol stream (e.g., for OFDM, etc.) to obtain an output sample stream. Each modulator/demodulator 932 through 933 may further process (e.g., convert to analog, amplify, filter, and upconvert) the output sample stream to obtain a DL signal. In one example, DL signals from modulator/demodulators 932 and 933 may be transmitted via the antennas 934 and 935, respectively.

[00172] The UE 104 may be an example of aspects of the UEs 104 described with reference to FIGS. 1-2. At the UE 104, the UE antennas 952 and 953 may receive the DL signals from the base station 102 and may provide the received signals to the modulator/demodulators 954 and 955, respectively. Each modulator/demodulator 954 through 955 may condition (e.g., filter, amplify, downconvert, and digitize) a respective received signal to obtain input samples. Each modulator/demodulator 954 through 955 may further process the input samples (e.g., for OFDM, etc.) to obtain received symbols. A MIMO detector 956 may obtain received symbols from the modulator/demodulators 954 and 955, perform MIMO detection on the received symbols, if applicable, and provide detected symbols. A receive (Rx) processor 958 may process (e.g., demodulate, deinterleave, and decode) the detected symbols, providing decoded data for the UE 104

to a data output, and provide decoded control information to a processor 980, or memory 982.

[00173] The processor 980 may in some cases execute stored instructions to instantiate a communicating component 242 (see e.g., FIGS. 1 and 2).

[00174] On the uplink (UL), at the UE 104, a transmit processor 964 may receive and process data from a data source. The transmit processor 964 may also generate reference symbols for a reference signal. The symbols from the transmit processor 964 may be precoded by a transmit MIMO processor 966 if applicable, further processed by the modulator/demodulators 954 and 955 (e.g., for SC-FDMA, etc.), and be transmitted to the base station 102 in accordance with the communication parameters received from the base station 102. At the base station 102, the UL signals from the UE 104 may be received by the antennas 934 and 935, processed by the modulator/demodulators 932 and 933, detected by a MIMO detector 936 if applicable, and further processed by a receive processor 938. The receive processor 938 may provide decoded data to a data output and to the processor 940 or memory 942.

[00175] The processor 940 may in some cases execute stored instructions to instantiate a connection managing component 342 (see e.g., FIGS. 1 and 3).

[00176] The components of the UE 104 may, individually or collectively, be implemented with one or more ASICs adapted to perform some or all of the applicable functions in hardware. Each of the noted modules may be a means for performing one or more functions related to operation of the MIMO communication system 900. Similarly, the components of the base station 102 may, individually or collectively, be implemented with one or more ASICs adapted to perform some or all of the applicable functions in hardware. Each of the noted components may be a means for performing one or more functions related to operation of the MIMO communication system 900.

[00177] The above detailed description set forth above in connection with the appended drawings describes examples and does not represent the only examples that may be implemented or that are within the scope of the claims. The term "example," when used in this description, means "serving as an example, instance, or illustration," and not "preferred" or "advantageous over other examples." The detailed description includes specific details for the purpose of providing an understanding of the described techniques. These techniques, however, may be practiced without these specific details. In some

instances, well-known structures and apparatuses are shown in block diagram form in order to avoid obscuring the concepts of the described examples.

[00178] Information and signals may be represented using any of a variety of different technologies and techniques. For example, data, instructions, commands, information, signals, bits, symbols, and chips that may be referenced throughout the above description may be represented by voltages, currents, electromagnetic waves, magnetic fields or particles, optical fields or particles, computer-executable code or instructions stored on a computer-readable medium, or any combination thereof.

[00179] The various illustrative blocks and components described in connection with the disclosure herein may be implemented or performed with a specially-programmed device, such as but not limited to a processor, a digital signal processor (DSP), an ASIC, a FPGA or other programmable logic device, a discrete gate or transistor logic, a discrete hardware component, or any combination thereof designed to perform the functions described herein. A specially-programmed processor may be a microprocessor, but in the alternative, the processor may be any conventional processor, controller, microcontroller, or state machine. A specially-programmed processor may also be implemented as a combination of computing devices, e.g., a combination of a DSP and a microprocessor, multiple microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration.

[00180] The functions described herein may be implemented in hardware, software, or any combination thereof. If implemented in software executed by a processor, the functions may be stored on or transmitted over as one or more instructions or code on a non-transitory computer-readable medium. Other examples and implementations are within the scope and spirit of the disclosure and appended claims. For example, due to the nature of software, functions described above can be implemented using software executed by a specially programmed processor, hardware, hardwiring, or combinations of any of these. Features implementing functions may also be physically located at various positions, including being distributed such that portions of functions are implemented at different physical locations. 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, for example, "X employs A or B" is intended to mean any of the natural inclusive permutations. That is, for example 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. Also,

as used herein, including in the claims, "or" as used in a list of items prefaced by "at least one of" indicates a disjunctive list such that, for example, a list of "at least one of A, B, or C" means A or B or C or AB or AC or BC or ABC (A and B and C).

[00181] Computer-readable media includes both computer storage media and communication media including any medium that facilitates transfer of a computer program from one place to another. A storage medium may be any available medium that can be accessed by a general purpose or special purpose computer. By way of example, and not limitation, computer-readable media can comprise RAM, ROM, EEPROM, CD-ROM or other optical disk storage, magnetic disk storage or other magnetic storage devices, or any other medium that can be used to carry or store desired program code means in the form of instructions or data structures and that can be accessed by a general-purpose or special-purpose computer, or a general-purpose or special-purpose processor. Also, any connection is properly termed a computer-readable medium. For example, if the software is transmitted from a website, server, or other remote source using a coaxial cable, fiber optic cable, twisted pair, digital subscriber line (DSL), or wireless technologies such as infrared, radio, and microwave, then the coaxial cable, fiber optic cable, twisted pair, DSL, or wireless technologies such as infrared, radio, and microwave are included in the definition of medium. Disk and disc, as used herein, include compact disc (CD), laser disc, optical disc, digital versatile disc (DVD), floppy disk and Blu-ray disc where disks usually reproduce data magnetically, while discs reproduce data optically with lasers. Combinations of the above are also included within the scope of computer-readable media.

[00182] The previous description of the disclosure is provided to enable a person skilled in the art to make or use the disclosure. Various modifications to the disclosure will be readily apparent to those skilled in the art, and the common principles defined herein may be applied to other variations without departing from the spirit or scope of the disclosure. Furthermore, although elements of the described aspects and/or embodiments may be described or claimed in the singular, the plural is contemplated unless limitation to the singular is explicitly stated. Additionally, all or a portion of any aspect and/or embodiment may be utilized with all or a portion of any other aspect and/or embodiment, unless stated otherwise. Thus, the disclosure is not to be limited to the examples and designs described herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

CLAIMS

WHAT IS CLAIMED IS:

1. A method of wireless communication, comprising:

transmitting, to a primary serving node, a measurement report of multiple neighboring cells;

receiving, from the primary serving node and in response to the measurement report, a configuration message including configurations for multiple secondary nodes determined from the multiple neighboring cells and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith;

detecting the condition for at least one of the multiple secondary nodes; and

establishing, based on the detection of the condition, the connection with the at least one of the multiple secondary nodes as a secondary serving node.

2. The method of claim 1, wherein detecting the condition comprises detecting that a first signal power of a current secondary serving node is less than a first threshold, and detecting that a second signal power of the at least one of the multiple secondary nodes achieves a second threshold.

3. The method of claim 2, wherein the configuration message indicates at least one of the first threshold or the second threshold.

4. The method of claim 2, further comprising receiving a separate configuration specifying at least one of the first threshold or the second threshold.

5. The method of claim 1, wherein detecting the condition comprises detecting that a first signal power of a current secondary serving node is less than a second signal power of the at least one of the multiple secondary nodes at least by a threshold difference.

6. The method of claim 5, wherein the configuration message indicates the threshold difference.

7. The method of claim 5, further comprising receiving a separate configuration specifying the threshold difference.

8. The method of claim 1, wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

9. The method of claim 1, further comprising monitoring signals received from each of the multiple secondary nodes over a period of time until the condition is detected for a signal received from the at least one of the multiple secondary nodes.

10. The method of claim 9, further comprising transmitting, to the primary serving node and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

11. The method of claim 10, further comprising declaring, to the primary serving node, radio link failure of another one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold.

12. The method of claim 1, wherein establishing the connection with the at least one of the multiple secondary nodes as the secondary serving node comprises at least one of transmitting a switching indication to the primary serving node in an uplink shared channel or initiating a random access procedure towards the at least one of the multiple secondary nodes.

13. A method of wireless communication, comprising:

receiving, from a user equipment (UE), a measurement report of multiple neighboring cells;

preparing, based on the measurement report, multiple secondary nodes, including two or more of the multiple neighboring cells, for serving the UE as a secondary serving node;

generating a configuration message including configurations for the multiple secondary nodes and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith; and

transmitting, to the UE and in response to the measurement report, the configuration message.

14. The method of claim 13, wherein the condition relates to a first signal power of a current secondary serving node being less than a first threshold, and a second signal power of at least one of the multiple secondary nodes achieving a second threshold.

15. The method of claim 14, wherein the configuration message indicates at least one of the first threshold or the second threshold.

16. The method of claim 14, further comprising transmitting, to the UE, a separate configuration specifying the first threshold and the second threshold.

17. The method of claim 13, wherein the condition relates to a first signal power of a current secondary serving node being less than a second signal power of at least one of the multiple secondary nodes at least by a threshold difference.

18. The method of claim 17, wherein the configuration message indicates the threshold difference.

19. The method of claim 17, further comprising transmitting, to the UE, a separate configuration specifying the threshold difference.

20. The method of claim 13, wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

21. The method of claim 13, further comprising receiving, from the UE and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

22. The method of claim 21, further comprising:

receiving, from the UE, an indication of radio link failure of one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold; and

releasing, based on the indication, the one of the multiple secondary nodes as a SN.

23. The method of claim 13, further comprising:

receiving, from the UE, a switching indication in an uplink shared channel to activate at least one of the multiple serving nodes as the secondary serving node; and

sending, to the at least one of the multiple serving nodes, an activation request to activate the at least one of the multiple serving nodes as the secondary serving node for the UE.

24. An apparatus for wireless communication, comprising:

a transceiver;

a memory configured to store instructions; and

one or more processors communicatively coupled with the transceiver and the memory, wherein the one or more processors are configured to:

transmit, to a primary serving node, a measurement report of multiple neighboring cells;

receive, from the primary serving node and in response to the measurement report, a configuration message including configurations for multiple secondary nodes determined from the multiple neighboring cells and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith;

detect the condition for at least one of the multiple secondary nodes; and

establish, based on the detection of the condition, the connection with the at least one of the multiple secondary nodes as a secondary serving node.

25. The apparatus of claim 24, wherein the one or more processors are configured to detect the condition at least in part by detecting that a first signal power of a current secondary serving node is less than a first threshold, and detecting that a second

signal power of the at least one of the multiple secondary nodes achieves a second threshold.

26. The apparatus of claim 25, wherein the configuration message indicates at least one of the first threshold or the second threshold.

27. The apparatus of claim 25, wherein the one or more processors are further configured to receive a separate configuration specifying at least one of the first threshold or the second threshold.

28. The apparatus of claim 24, wherein the one or more processors are configured to detect the condition at least in part by detecting that a first signal power of a current secondary serving node is less than a second signal power of the at least one of the multiple secondary nodes at least by a threshold difference.

29. The apparatus of claim 28, wherein the configuration message indicates the threshold difference.

30. The apparatus of claim 28, wherein the one or more processors are further configured to receive a separate configuration specifying the threshold difference.

31. The apparatus of claim 24, wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

32. The apparatus of claim 24, wherein the one or more processors are further configured to monitor signals received from each of the multiple secondary nodes over a period of time until the condition is detected for a signal received from the at least one of the multiple secondary nodes.

33. The apparatus of claim 32, wherein the one or more processors are further configured to transmit, to the primary serving node and at least until the condition is

detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

34. The apparatus of claim 33, wherein the one or more processors are further configured to declare, to the primary serving node, radio link failure of another one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold.

35. The apparatus of claim 24, wherein the one or more processors are configured to establish the connection with the at least one of the multiple secondary nodes as the secondary serving node at least in part by at least one of transmitting a switching indication to the primary serving node in an uplink shared channel or initiating a random access procedure towards the at least one of the multiple secondary nodes.

36. An apparatus for wireless communication, comprising:

a transceiver;

a memory configured to store instructions; and

one or more processors communicatively coupled with the transceiver and the memory, wherein the one or more processors are configured to:

receive, from a user equipment (UE), a measurement report of multiple neighboring cells;

prepare, based on the measurement report, multiple secondary nodes, including two or more of the multiple neighboring cells, for serving the UE as a secondary serving node;

generate a configuration message including configurations for the multiple secondary nodes and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith; and

transmit, to the UE and in response to the measurement report, the configuration message.

37. The apparatus of claim 36, wherein the condition relates to a first signal power of a current secondary serving node being less than a first threshold, and a second signal power of at least one of the multiple secondary nodes achieving a second threshold.

38. The apparatus of claim 37, wherein the configuration message indicates at least one of the first threshold or the second threshold.

39. The apparatus of claim 37, wherein the one or more processors are further configured to transmit, to the UE, a separate configuration specifying the first threshold and the second threshold.

40. The apparatus of claim 36, wherein the condition relates to a first signal power of a current secondary serving node being less than a second signal power of at least one of the multiple secondary nodes at least by a threshold difference.

41. The apparatus of claim 40, wherein the configuration message indicates the threshold difference.

42. The apparatus of claim 40, wherein the one or more processors are further configured to transmit, to the UE, a separate configuration specifying the threshold difference.

43. The apparatus of claim 36, wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

44. The apparatus of claim 36, wherein the one or more processors are further configured to receive, from the UE and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

45. The apparatus of claim 44, wherein the one or more processors are further configured to:

receive, from the UE, an indication of radio link failure of one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold; and

release, based on the indication, the one of the multiple secondary nodes as a SN.

46. The apparatus of claim 36, wherein the one or more processors are configured to:

receive, from the UE, a switching indication in an uplink shared channel to activate at least one of the multiple serving nodes as the secondary serving node; and

send, to the at least one of the multiple serving nodes, an activation request to activate the at least one of the multiple serving nodes as the secondary serving node for the UE.

47. An apparatus of wireless communication, comprising:

means for transmitting, to a primary serving node, a measurement report of multiple neighboring cells;

means for receiving, from the primary serving node and in response to the measurement report, a configuration message including configurations for multiple secondary nodes determined from the multiple neighboring cells and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith;

means for detecting the condition for at least one of the multiple secondary nodes; and

means for establishing, based on the detection of the condition, the connection with the at least one of the multiple secondary nodes as a secondary serving node.

48. The apparatus of claim 47, wherein the means for detecting the condition detects that a first signal power of a current secondary serving node is less than a first threshold, and detecting that a second signal power of the at least one of the multiple secondary nodes achieves a second threshold.

49. The apparatus of claim 48, wherein the configuration message indicates at least one of the first threshold or the second threshold.

50. The apparatus of claim 48, further comprising means for receiving a separate configuration specifying at least one of the first threshold or the second threshold.

51. The apparatus of claim 47, wherein the means for detecting the condition detects that a first signal power of a current secondary serving node is less than a second

signal power of the at least one of the multiple secondary nodes at least by a threshold difference.

52. The apparatus of claim 51, wherein the configuration message indicates the threshold difference.

53. The apparatus of claim 51, further comprising means for receiving a separate configuration specifying the threshold difference.

54. The apparatus of claim 47, wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

55. The apparatus of claim 47, further comprising means for monitoring signals received from each of the multiple secondary nodes over a period of time until the condition is detected for a signal received from the at least one of the multiple secondary nodes.

56. The apparatus of claim 55, further comprising means for transmitting, to the primary serving node and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

57. The apparatus of claim 56, further comprising means for declaring, to the primary serving node, radio link failure of another one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold.

58. The apparatus of claim 47, wherein the means for establishing the connection establishes the connection with the at least one of the multiple secondary nodes as the secondary serving node at least in part by at least one of transmitting a switching indication to the primary serving node in an uplink shared channel or initiating a random access procedure towards the at least one of the multiple secondary nodes.

59. An apparatus of wireless communication, comprising:

means for receiving, from a user equipment (UE), a measurement report of multiple neighboring cells;

means for preparing, based on the measurement report, multiple secondary nodes, including two or more of the multiple neighboring cells, for serving the UE as a secondary serving node;

means for generating a configuration message including configurations for the multiple secondary nodes and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith; and

means for transmitting, to the UE and in response to the measurement report, the configuration message.

60. The apparatus of claim 59, wherein the condition relates to a first signal power of a current secondary serving node being less than a first threshold, and a second signal power of at least one of the multiple secondary nodes achieving a second threshold.

61. The apparatus of claim 60, wherein the configuration message indicates at least one of the first threshold or the second threshold.

62. The apparatus of claim 60, further comprising means for transmitting, to the UE, a separate configuration specifying the first threshold and the second threshold.

63. The apparatus of claim 59, wherein the condition relates to a first signal power of a current secondary serving node being less than a second signal power of at least one of the multiple secondary nodes at least by a threshold difference.

64. The apparatus of claim 63, wherein the configuration message indicates the threshold difference.

65. The apparatus of claim 63, further comprising means for transmitting, to the UE, a separate configuration specifying the threshold difference.

66. The apparatus of claim 59, wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

67. The apparatus of claim 59, further comprising means for receiving, from the UE and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

68. The apparatus of claim 67, further comprising:

means for receiving, from the UE, an indication of radio link failure of one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold; and

means for releasing, based on the indication, the one of the multiple secondary nodes as a SN.

69. The apparatus of claim 59, further comprising:

means for receiving, from the UE, a switching indication in an uplink shared channel to activate at least one of the multiple serving nodes as the secondary serving node; and

means for sending, to the at least one of the multiple serving nodes, an activation request to activate the at least one of the multiple serving nodes as the secondary serving node for the UE.

70. A computer-readable medium, comprising code executable by one or more processors for wireless communications, the code comprising code for:

transmitting, to a primary serving node, a measurement report of multiple neighboring cells;

receiving, from the primary serving node and in response to the measurement report, a configuration message including configurations for multiple secondary nodes determined from the multiple neighboring cells and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith;

detecting the condition for at least one of the multiple secondary nodes; and

establishing, based on the detection of the condition, the connection with the at least one of the multiple secondary nodes as a secondary serving node.

71. The computer-readable medium of claim 70, wherein the code for detecting the condition detects that a first signal power of a current secondary serving node is less than a first threshold, and detecting that a second signal power of the at least one of the multiple secondary nodes achieves a second threshold.

72. The computer-readable medium of claim 71, wherein the configuration message indicates at least one of the first threshold or the second threshold.

73. The computer-readable medium of claim 71, further comprising code for receiving a separate configuration specifying at least one of the first threshold or the second threshold.

74. The computer-readable medium of claim 70, wherein the code for detecting the condition detects that a first signal power of a current secondary serving node is less than a second signal power of the at least one of the multiple secondary nodes at least by a threshold difference.

75. The computer-readable medium of claim 74, wherein the configuration message indicates the threshold difference.

76. The computer-readable medium of claim 74, further comprising code for receiving a separate configuration specifying the threshold difference.

77. The computer-readable medium of claim 70, wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

78. The computer-readable medium of claim 70, further comprising code for monitoring signals received from each of the multiple secondary nodes over a period of

time until the condition is detected for a signal received from the at least one of the multiple secondary nodes.

79. The computer-readable medium of claim 78, further comprising code for transmitting, to the primary serving node and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

80. The computer-readable medium of claim 79, further comprising code for declaring, to the primary serving node, radio link failure of another one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold.

81. The computer-readable medium of claim 70, wherein the code for establishing the connection establishes the connection with the at least one of the multiple secondary nodes as the secondary serving node at least in part by at least one of transmitting a switching indication to the primary serving node in an uplink shared channel or initiating a random access procedure towards the at least one of the multiple secondary nodes.

82. A computer-readable medium, comprising code executable by one or more processors for wireless communications, the code comprising code for:

receiving, from a user equipment (UE), a measurement report of multiple neighboring cells;

preparing, based on the measurement report, multiple secondary nodes, including two or more of the multiple neighboring cells, for serving the UE as a secondary serving node;

generating a configuration message including configurations for the multiple secondary nodes and an indication of a condition, for the multiple secondary nodes, for establishing a connection therewith; and

transmitting, to the UE and in response to the measurement report, the configuration message.

83. The computer-readable medium of claim 82, wherein the condition relates to a first signal power of a current secondary serving node being less than a first threshold, and a second signal power of at least one of the multiple secondary nodes achieving a second threshold.

84. The computer-readable medium of claim 83, wherein the configuration message indicates at least one of the first threshold or the second threshold.

85. The computer-readable medium of claim 83, further comprising code for transmitting, to the UE, a separate configuration specifying the first threshold and the second threshold.

86. The computer-readable medium of claim 82, wherein the condition relates to a first signal power of a current secondary serving node being less than a second signal power of at least one of the multiple secondary nodes at least by a threshold difference.

87. The computer-readable medium of claim 86, wherein the configuration message indicates the threshold difference.

88. The computer-readable medium of claim 86, further comprising code for transmitting, to the UE, a separate configuration specifying the threshold difference.

89. The computer-readable medium of claim 82, wherein the indication of the condition includes respective indications of conditions for establishing connection with each of the multiple secondary nodes.

90. The computer-readable medium of claim 82, further comprising code for receiving, from the UE and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells.

91. The computer-readable medium of claim 90, further comprising:

code for receiving, from the UE, an indication of radio link failure of one of the multiple secondary nodes where a measurement of the monitored signals is below a threshold; and

code for releasing, based on the indication, the one of the multiple secondary nodes as a SN.

92. The computer-readable medium of claim 82, further comprising:

code for receiving, from the UE, a switching indication in an uplink shared channel to activate at least one of the multiple serving nodes as the secondary serving node; and

code for sending, to the at least one of the multiple serving nodes, an activation request to activate the at least one of the multiple serving nodes as the secondary serving node for the UE.

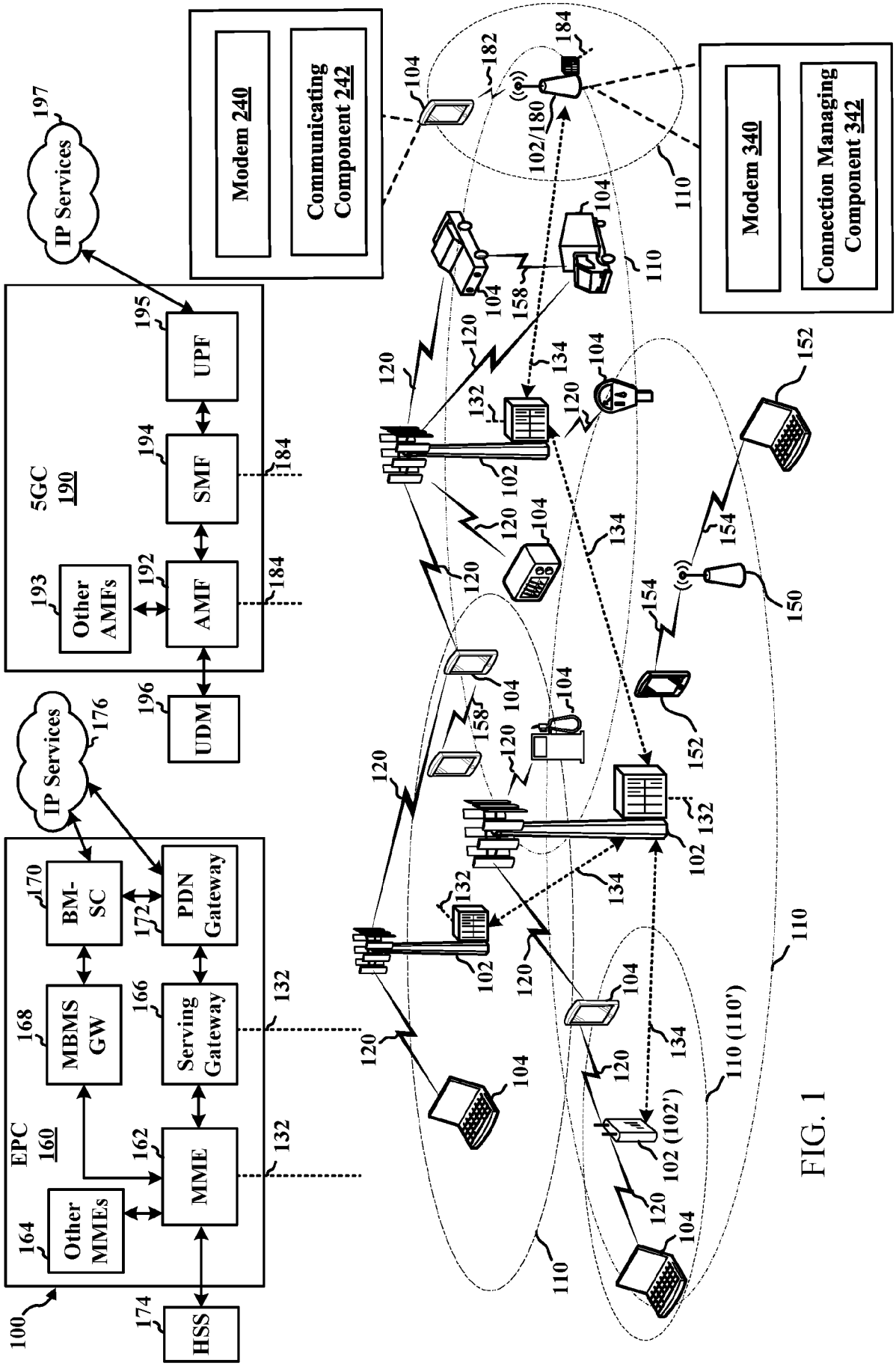
100
EPC 160
Other MMEs 164
MME 162
HSS 174
MBMS GW 168
Serving Gateway 166
BM-SC 170
PDN Gateway 172
IP Services 176
132
5GC 190
Other AMFs 193
AMF 192
SMF 194
UPF 195
UDM 196
IP Services 197
184
Modem 240
Communicating Component 242
Modem 340
Connection Managing Component 342
102
102 (102')
104
110
110 (110')
120
132
134
150
152
154
158
182
184
102/180

FIG. 1

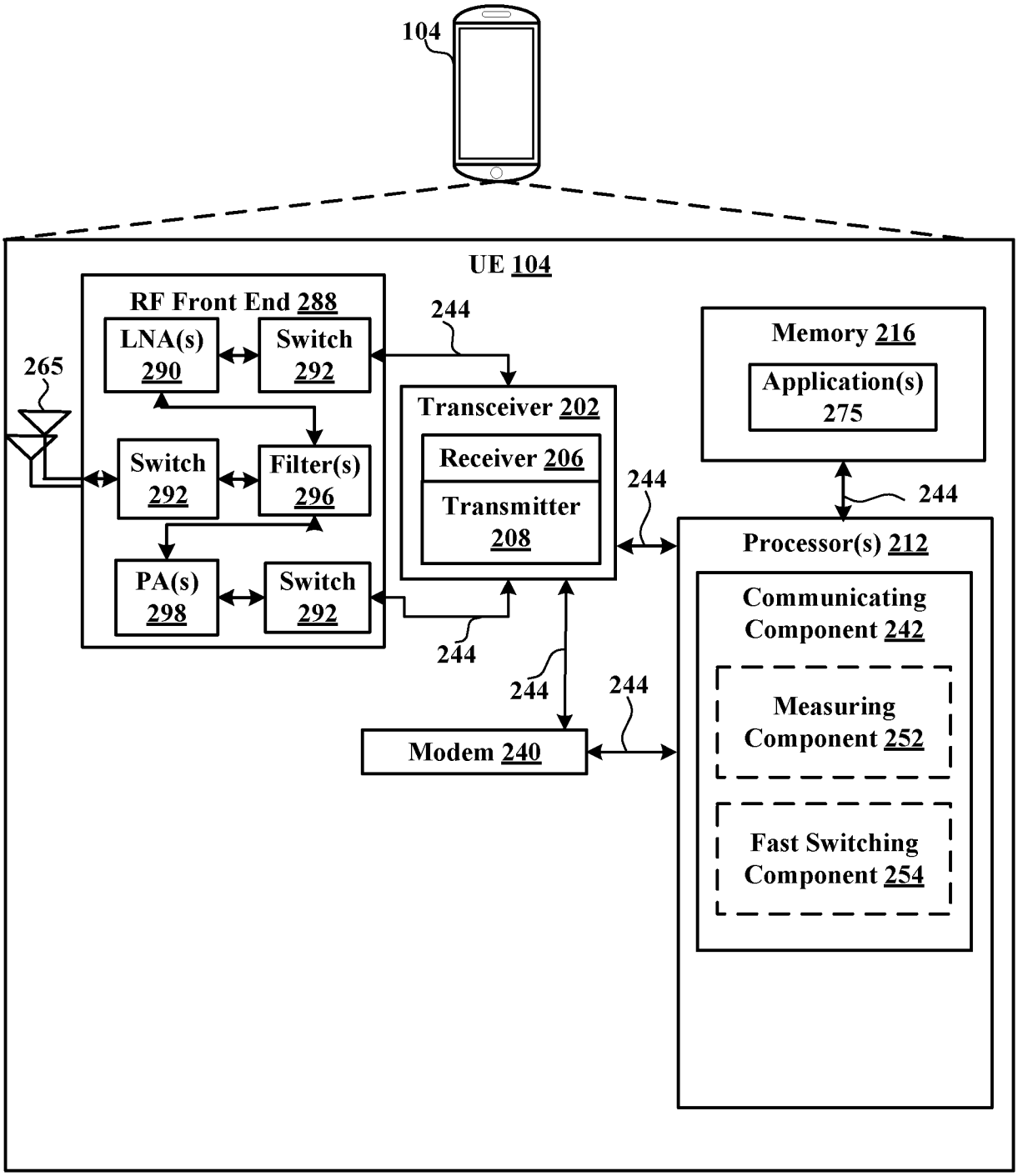
104
UE 104
RF Front End 288
LNA(s) 290
Switch 292
265
Switch 292
Filter(s) 296
PA(s) 298
Switch 292
244
Transceiver 202
Receiver 206
Transmitter 208
244
244
244
Modem 240
244
Memory 216
Application(s) 275
244
Processor(s) 212
Communicating Component 242
Measuring Component 252
Fast Switching Component 254

FIG. 2

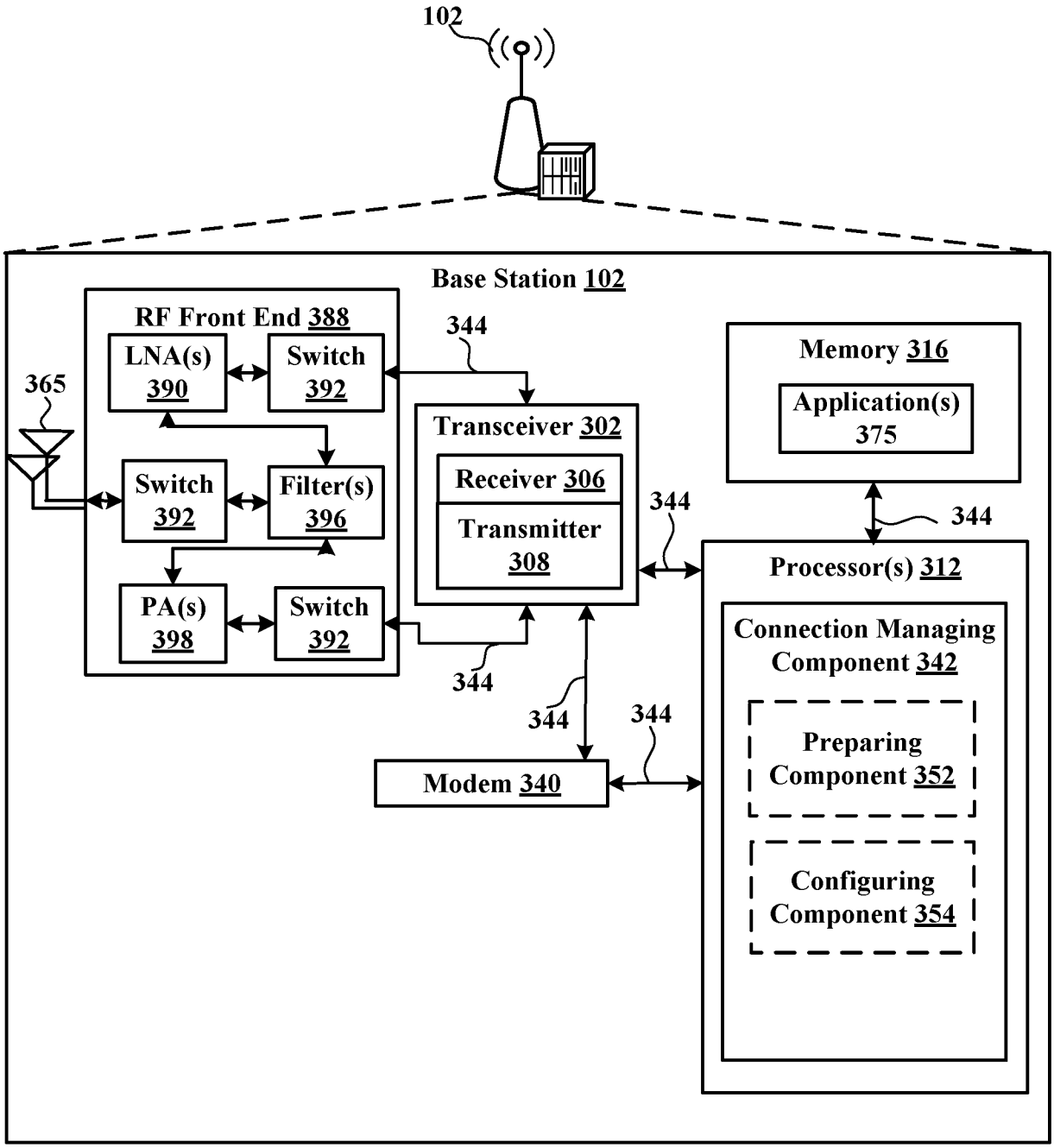
102
Base Station 102
RF Front End 388
LNA(s) 390
Switch 392
Switch 392
Filter(s) 396
PA(s) 398
Switch 392
365
344
Transceiver 302
Receiver 306
Transmitter 308
344
344
344
344
Modem 340
Memory 316
Application(s) 375
344
Processor(s) 312
Connection Managing Component 342
Preparing Component 352
Configuring Component 354

FIG. 3

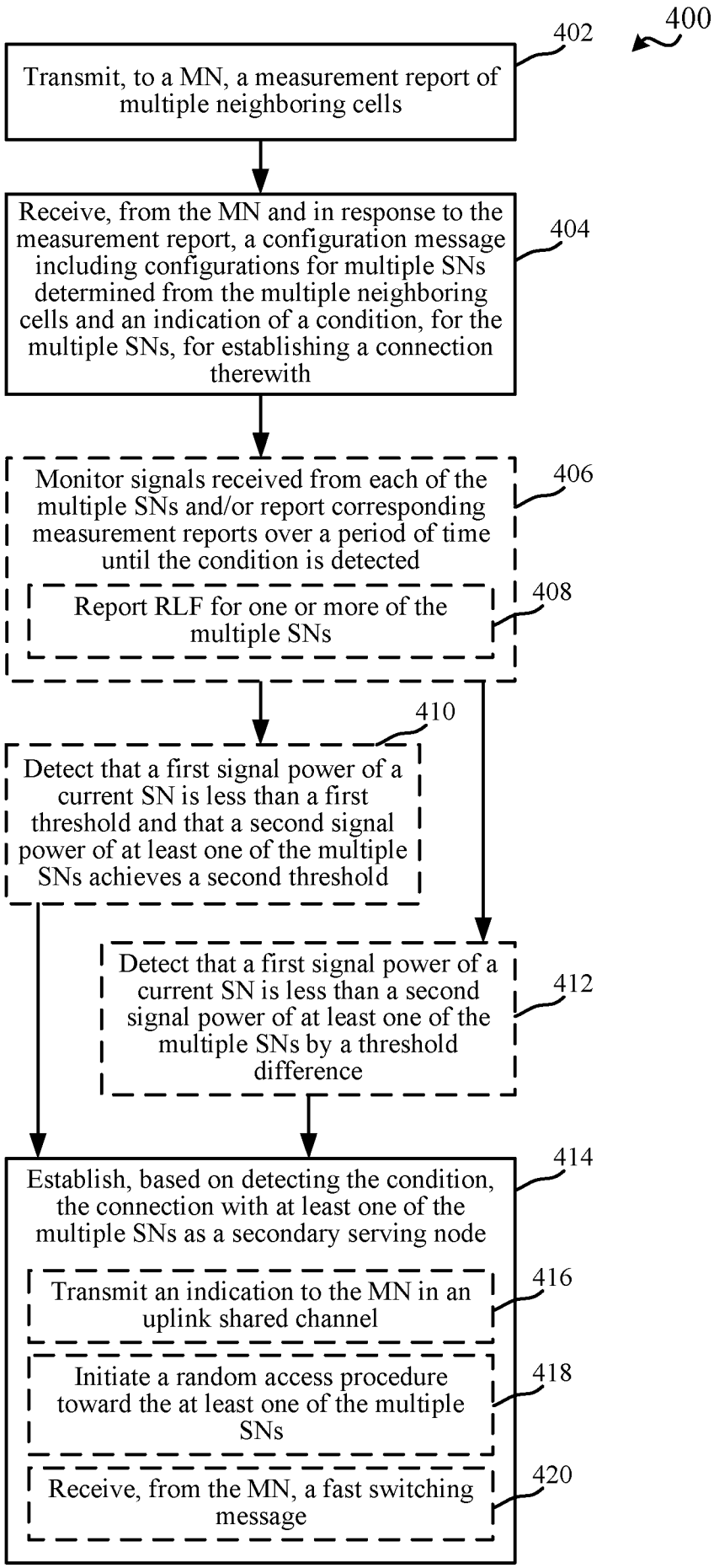
400
402
Transmit, to a MN, a measurement report of multiple neighboring cells
Receive, from the MN and in response to the measurement report, a configuration message including configurations for multiple SNs determined from the multiple neighboring cells and an indication of a condition, for the multiple SNs, for establishing a connection therewith
404
Monitor signals received from each of the multiple SNs and/or report corresponding measurement reports over a period of time until the condition is detected
406
Report RLF for one or more of the multiple SNs
408
410
Detect that a first signal power of a current SN is less than a first threshold and that a second signal power of at least one of the multiple SNs achieves a second threshold
Detect that a first signal power of a current SN is less than a second signal power of at least one of the multiple SNs by a threshold difference
412
Establish, based on detecting the condition, the connection with at least one of the multiple SNs as a secondary serving node
414
Transmit an indication to the MN in an uplink shared channel
416
Initiate a random access procedure toward the at least one of the multiple SNs
418
Receive, from the MN, a fast switching message
420

FIG. 4

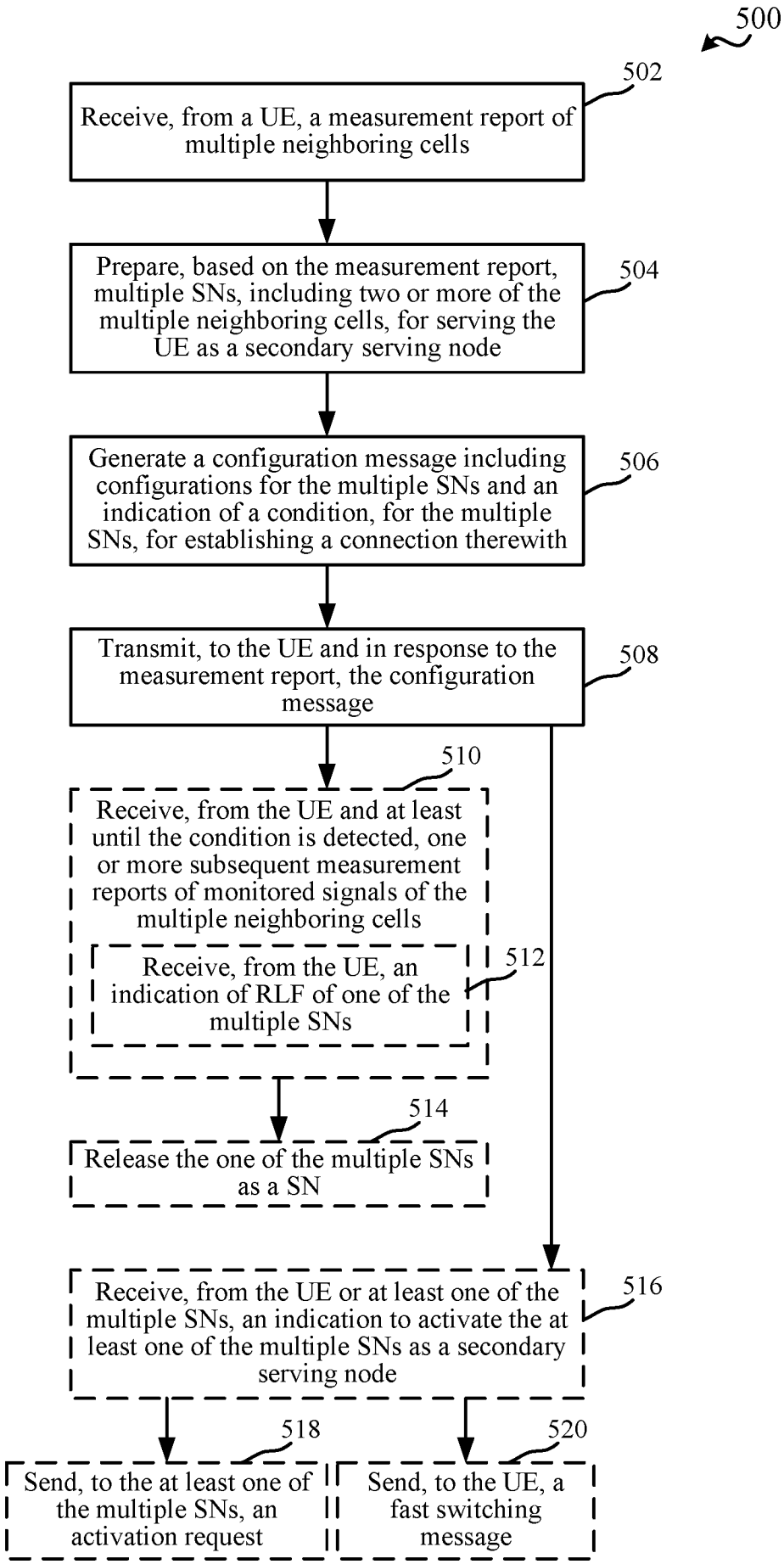
500
502
Receive, from a UE, a measurement report of multiple neighboring cells
504
Prepare, based on the measurement report, multiple SNs, including two or more of the multiple neighboring cells, for serving the UE as a secondary serving node
506
Generate a configuration message including configurations for the multiple SNs and an indication of a condition, for the multiple SNs, for establishing a connection therewith
508
Transmit, to the UE and in response to the measurement report, the configuration message
510
Receive, from the UE and at least until the condition is detected, one or more subsequent measurement reports of monitored signals of the multiple neighboring cells
512
Receive, from the UE, an indication of RLF of one of the multiple SNs
514
Release the one of the multiple SNs as a SN
516
Receive, from the UE or at least one of the multiple SNs, an indication to activate the at least one of the multiple SNs as a secondary serving node
518
Send, to the at least one of the multiple SNs, an activation request
520
Send, to the UE, a fast switching message

FIG. 5

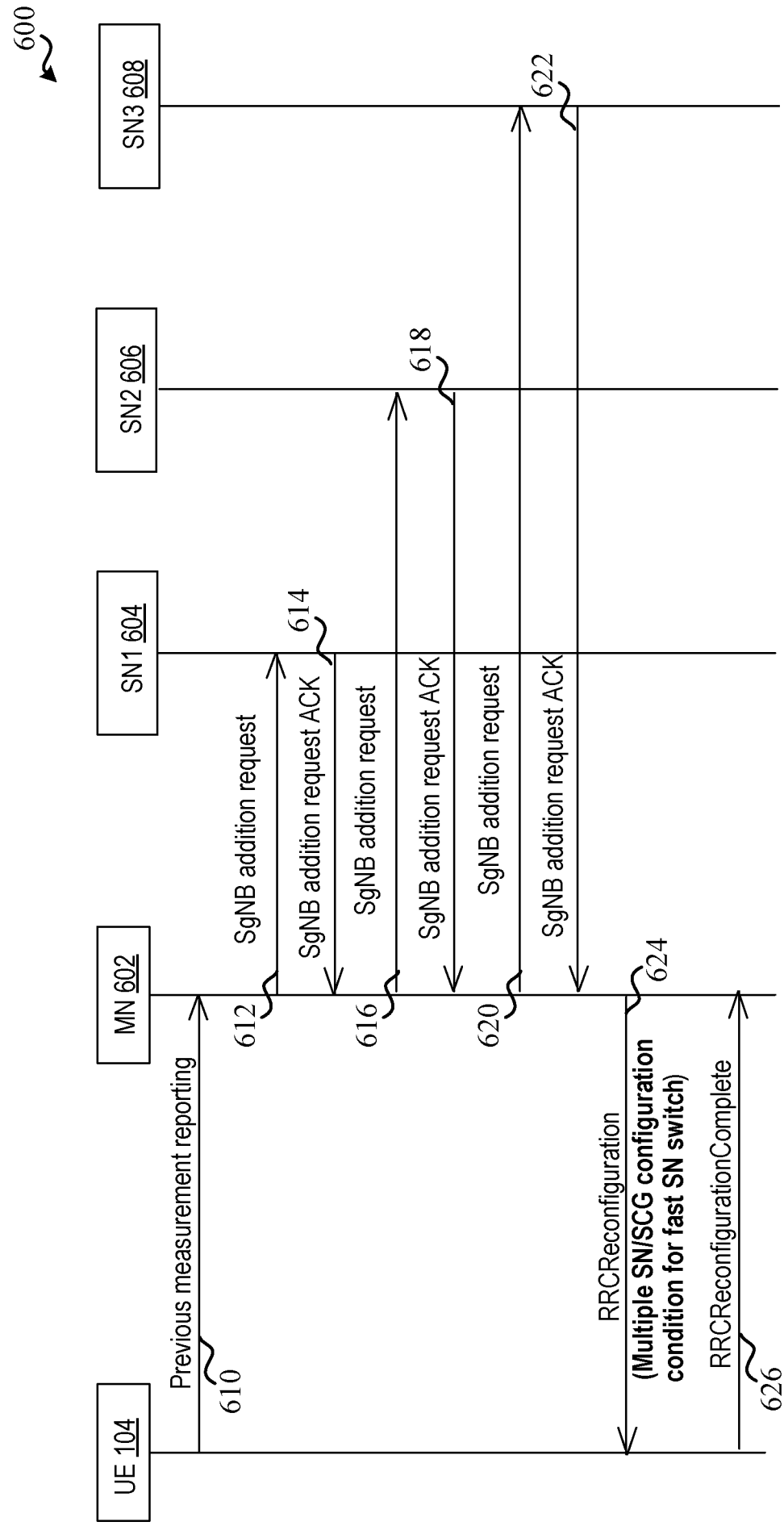
600
UE 104
MN 602
SN1 604
SN2 606
SN3 608
Previous measurement reporting
610
SgNB addition request
612
SgNB addition request ACK
614
SgNB addition request
616
SgNB addition request ACK
618
SgNB addition request
620
SgNB addition request ACK
622
RRCReconfiguration
(Multiple SN/SCG configuration condition for fast SN switch)
624
RRCReconfigurationComplete
626

FIG. 6

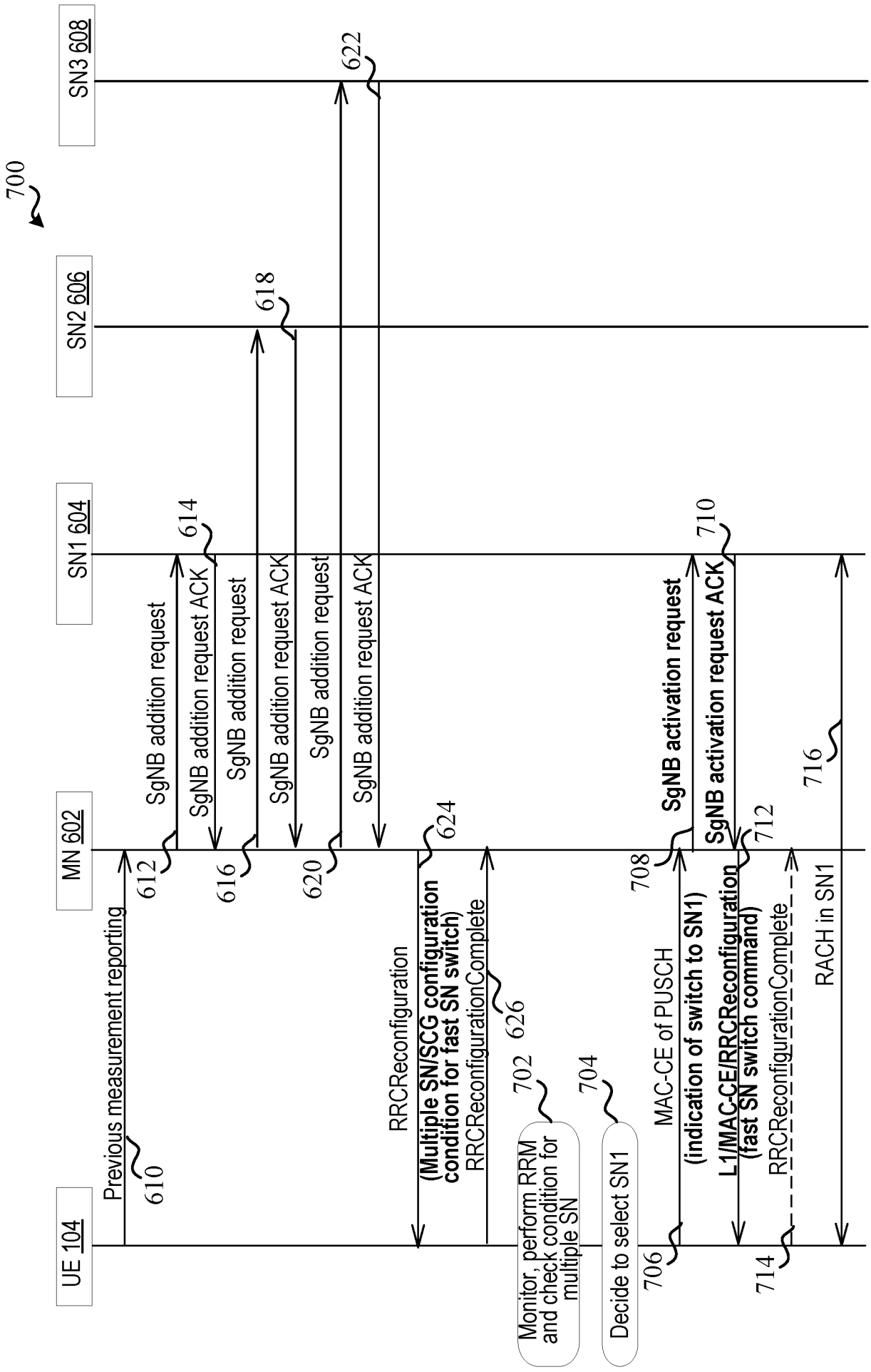
700
UE 104
MN 602
SN1 604
SN2 606
SN3 608
Previous measurement reporting
610
SgNB addition request
612
SgNB addition request ACK
614
SgNB addition request
616
SgNB addition request ACK
618
SgNB addition request
620
SgNB addition request ACK
622
RRCReconfiguration
(Multiple SN/SCG configuration condition for fast SN switch)
624
RRCReconfigurationComplete
626
Monitor, perform RRM and check condition for multiple SN
702
Decide to select SN1
704
MAC-CE of PUSCH
(indication of switch to SN1)
706
SgNB activation request
708
SgNB activation request ACK
710
L1/MAC-CE/RRCReconfiguration
(fast SN switch command)
712
RRCReconfigurationComplete
714
RACH in SN1
716

FIG. 7

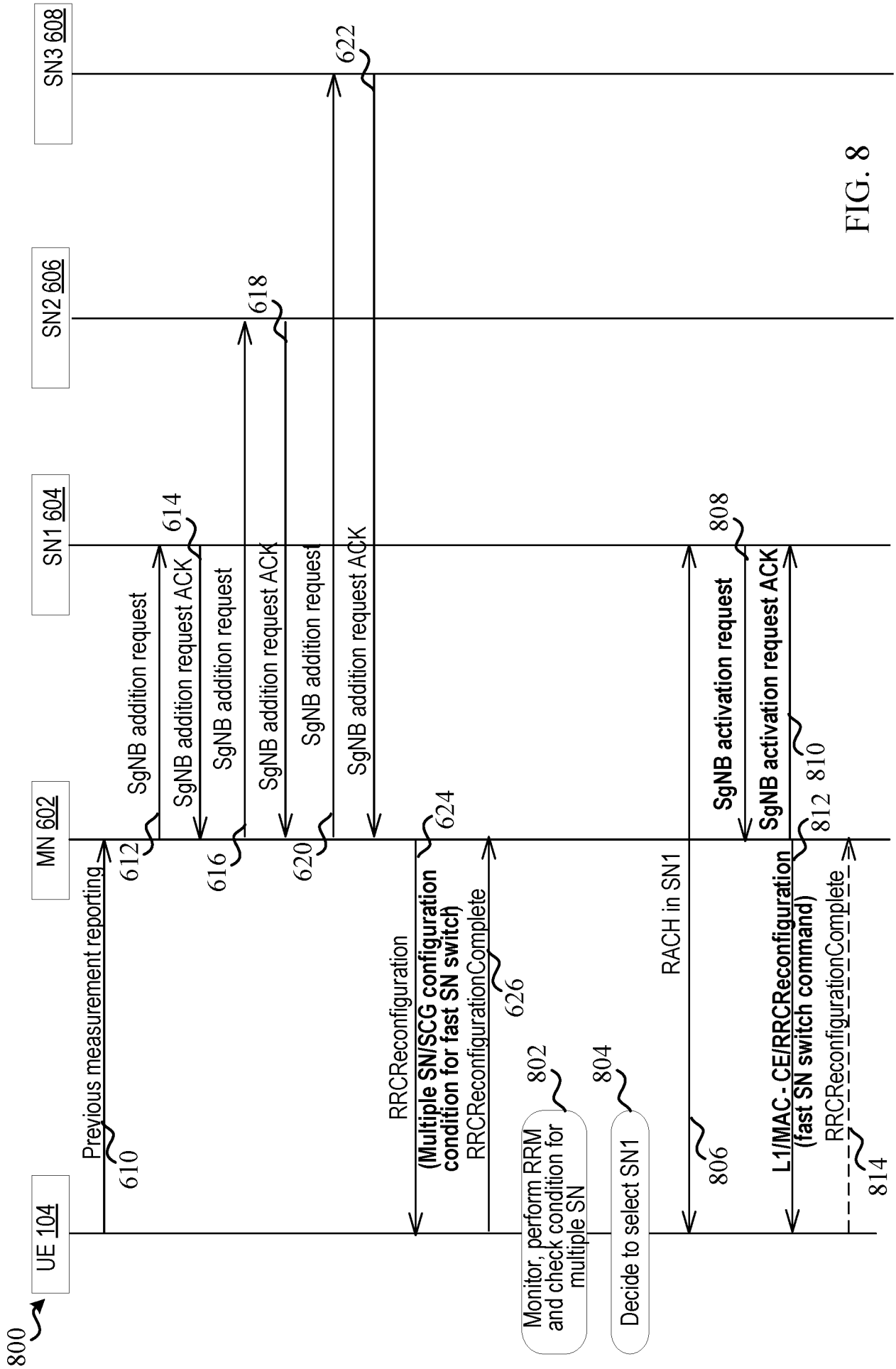
800
UE 104
MN 602
SN1 604
SN2 606
SN3 608
Previous measurement reporting
610
SgNB addition request
612
SgNB addition request ACK
614
SgNB addition request
616
SgNB addition request ACK
618
SgNB addition request
620
SgNB addition request ACK
622
RRCReconfiguration
(Multiple SN/SCG configuration condition for fast SN switch)
624
RRCReconfigurationComplete
626
Monitor, perform RRM and check condition for multiple SN
802
Decide to select SN1
804
RACH in SN1
806
SgNB activation request
808
SgNB activation request ACK
810
L1/MAC - CE/RRCReconfiguration
(fast SN switch command)
812
RRCReconfigurationComplete
814

FIG. 8

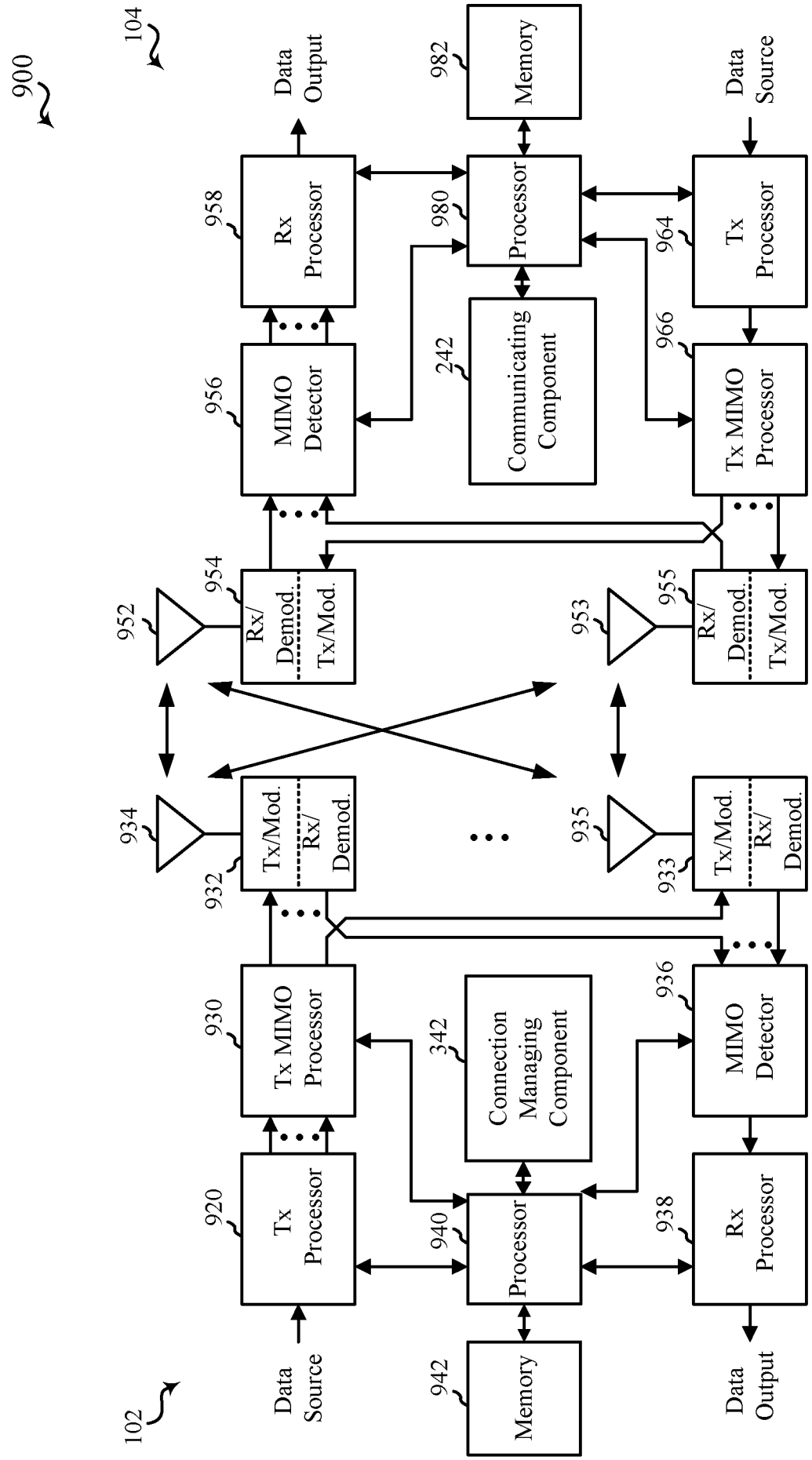
900
104
102
Data Source
Data Output
Memory
Tx Processor
Rx Processor
Processor
Tx MIMO Processor
MIMO Detector
Communicating Component
Connection Managing Component
Tx/Mod.
Rx/ Demod.
920
930
932
934
936
938
940
942
952
953
954
955
956
958
964
966
980
982
242
342

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/091667

A. CLASSIFICATION OF SUBJECT MATTER

H04W 72/12(2009.01)i; H04W 36/08(2009.01)i

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; H04Q

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)

CNPAT, CNKI, WPI, EPODOC, 3GPP: master, primary, secondary, node, multiple, fast, switch, measurement report

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2018049214 A1 (QUALCOMM INCORPORATED) 15 February 2018 (2018-02-15) description, paragraphs [0097]-[0106], [0241], figures 7, 22	1-92
X	CN 109246834 A (SPREADTRUM COMMUNICATIONS SHANGHAI INCORPORATED) 18 January 2019 (2019-01-18) description, paragraphs [0042]-[0064]	1-92
A	CN 108990116 A (ZTE CORPORATION) 11 December 2018 (2018-12-11) the whole document	1-92
A	WO 2019072902 A1 (TELEFONAKTIEBOLAGET LM ERICSSON PUBL) 18 April 2019 (2019-04-18) the whole document	1-92
A	HUAWEI. "(TP for NR BL CR for TS 37.340) Data Volume Reporting in 5GC, R3-186963" *3GPP TSG-RAN3 Meeting #102*, 16 November 2018 (2018-11-16), sections 10.5.2, 10.7.2, 10.8.2	1-92

☐ 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
26 February 2020	**18 March 2020**
Name and mailing address of the ISA/CN **National Intellectual Property Administration, PRC** **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer **FENG,Ji** Telephone No. **86-(10)-53961610**

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2019/091667

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
US	2018049214	A1	15 February 2018	WO	2018034998	A1	22 February 2018
				AU	2017312883	A1	24 January 2019
				SG	11201811756Y	A	27 February 2019
				CN	109565727	A	02 April 2019
				US	2018049083	A1	15 February 2018
				BR	112019002600	A2	28 May 2019
				EP	3498040	A1	19 June 2019
				CN	109565726	A	02 April 2019
				EP	3498039	A1	19 June 2019
				WO	2018034997	A1	22 February 2018
CN	109246834	A	18 January 2019		None		
CN	108990116	A	11 December 2018	WO	2018219039	A1	06 December 2018
WO	2019072902	A1	18 April 2019	EP	3533259	A1	04 September 2019
				US	2019357095	A1	21 November 2019