



- (51) **International Patent Classification:**
H04W 76/02 (2009.01) *H04W 84/20* (2009.01)
- (21) **International Application Number:**
PCT/EP2015/057577
- (22) **International Filing Date:**
8 April 2015 (08.04.2015)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (71) **Applicant:** NOKIA SOLUTIONS AND NETWORKS OY [FI/FI]; Karaportti 3, FI-02610 Espoo (FI).
- (72) **Inventors:** LIU, Yang; RM-708, Building 8, Taiyueyuan Community, ZHichunlu Road, Haidian District, Beijing, Haidian 100191 (CN). DU, Lei; NSN Building A,14, Jiu Xian Qiao Road, Chaoyang District, Beijing, Chaoyang 100016 (CN). VIERING, Ingo; Kaspar-Spaet-Strasse 11, 81549 Munich (DE). MAKINEN, Jarmo Tapani; Harjutie 2 B, FI-02730 Espoo (FI). MAHR, Christian; Hans-Acker-Weg 3, 89081 Ulm (DE).

AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

- (81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

(54) **Title:** COORDINATION OF RADIO CONFIGURATION PARAMETERS FOR MULTI-CONNECTIVITY SESSION IN WIRELESS NETWORK

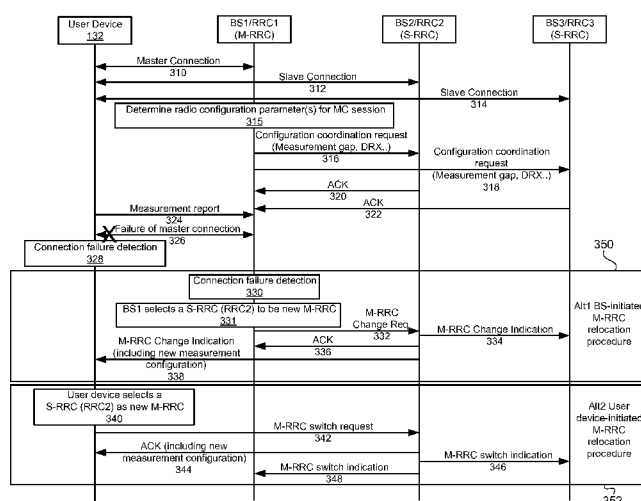


FIG. 3

(57) **Abstract:** An example technique includes establishing, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station that includes a master radio resource control (RRC) entity to control one or more radio configuration parameters for the multi-connectivity session, wherein the multi-connectivity session also includes a wireless connection between the user device and one or more additional base stations, each additional base station including a slave RRC entity, determining, by the master RRC entity, one or more radio configuration parameters to be used for the multi-connectivity session for the user device, and indicating, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used by the one or more slave RRC entities for the multi-connectivity session.

**COORDINATION OF RADIO CONFIGURATION PARAMETERS FOR MULTI-
CONNECTIVITY SESSION IN WIRELESS NETWORK**

TECHNICAL FIELD

5 **[0001]** This description relates to wireless networks.

BACKGROUND

10 **[0002]** A communication system may be a facility that enables communication between two or more nodes or devices, such as fixed or mobile communication devices. Signals can be carried on wired or wireless carriers.

15 **[0003]** An example of a cellular communication system is an architecture that is being standardized by the 3rd Generation Partnership Project (3GPP). A recent development in this field is often referred to as the long-term evolution (LTE) of the Universal Mobile Telecommunications System (UMTS) radio-access technology. E-UTRA (evolved UMTS Terrestrial Radio Access) is the air interface of 3GPP's Long Term Evolution (LTE) upgrade path for mobile networks. In LTE, base stations, which are referred to as evolved Node Bs (eNBs), provide wireless access within a coverage area or cell. In LTE, mobile devices, or mobile stations are referred to as a user equipment (UE). LTE has included a number of improvements or developments. 5G wireless networks are also being developed.

25 **[0004]** Dual Connectivity (DC) is a mode of operation in which a user equipment (UE) or mobile station is connected with two base stations, such as a master eNB (or MeNB or master base station) and a secondary eNB (SeNB or secondary base station). Dual connectivity may have several advantages, such as, for example, reducing the number of handover failures and/or increasing a user's throughput. Similarly, for 5G wireless networks, multi-connectivity

30

allows a UE or mobile station to be connected to multiple base stations or eNBs.

SUMMARY

5 **[0005]** According to an example implementation, a method may include establishing, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station including a radio resource control (RRC) entity, wherein the
10 multi-connectivity session also includes a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity; determining, by the first base station, one or more radio configuration parameters to be used by the first base
15 station and the one or more additional base stations for the multi-connectivity session for the user device; and indicating, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used for the multi-connectivity session for
20 the user device.

[0006] According to another example implementation, an apparatus may include at least one processor and at least one memory including computer instructions, when executed by the at least one processor, cause the apparatus to: establish,
25 as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station including a radio resource control (RRC) entity, wherein the multi-connectivity session also includes a wireless connection between the user device
30 and one or more additional base stations, each additional base station including a RRC entity; determine, by the first base station, one or more radio configuration parameters to be used by the first base station and the one or more

additional base stations for the multi-connectivity session for the user device; and indicate, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used for the multi-connectivity session for the user device.

[0007] According to another example implementation, an apparatus may include: means for establishing, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station including a radio resource control (RRC) entity, wherein the multi-connectivity session also includes a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity; means for determining, by the first base station, one or more radio configuration parameters to be used by the first base station and the one or more additional base stations for the multi-connectivity session for the user device; and means for indicating, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used for the multi-connectivity session for the user device.

[0008] According to another example implementation, a computer program product may include a non-transitory computer-readable storage medium and storing executable code that, when executed by at least one data processing apparatus, is configured to cause the at least one data processing apparatus to perform a method including: establishing, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station including a radio resource control (RRC) entity, wherein the multi-connectivity session also includes a wireless connection

between the user device and one or more additional base stations, each additional base station including a RRC entity; determining, by the first base station, one or more radio configuration parameters to be used by the first base station and the one or more additional base stations for the multi-connectivity session for the user device; and indicating, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used for the multi-connectivity session for the user device.

[0009] According to another example implementation, a method of coordinating radio configuration parameters for a multi-connectivity session for a user device may include: establishing, as part of a multi-connectivity session for a user device, a wireless connection between a user device and a first base station, the first base station including a radio resource control (RRC) entity, the first base station initially controlling one or more radio configuration parameters for the multi-connectivity session for the user device; establishing, as part of the multi-connectivity session for the user device, a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity; detecting, by the user device, a failure of the connection between the user device and the first base station; selecting, by the user device, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device; and sending, by the user device to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

[0010] An apparatus comprising at least one processor and at least one memory including computer instructions, when executed by the at least one processor, cause the apparatus to: establish, as part of a multi-connectivity session for a user device, a wireless connection between a user device and a first base station, the first base station including a radio resource control (RRC) entity, the first base station initially controlling one or more radio configuration parameters for the multi-connectivity session for the user device; establish, as part of the multi-connectivity session for the user device, a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity; detect, by the user device, a failure of the connection between the user device and the first base station; select, by the user device, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device; and send, by the user device to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

[0011] According to another example implementation, an apparatus may include: means for establishing, as part of a multi-connectivity session for a user device, a wireless connection between a user device and a first base station, the first base station including a radio resource control (RRC) entity, the first base station initially controlling one or more radio configuration parameters for the multi-connectivity session for the user device; means for establishing, as part of the multi-connectivity session for the user device, a wireless connection between the user

device and one or more additional base stations, each additional base station including a RRC entity; means for detecting, by the user device, a failure of the connection between the user device and the first base station; means for
5 selecting, by the user device, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device; and means for sending, by the user device to the selected base station, a control change
10 request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

[0012] According to another example implementation, a computer program product may include a non-transitory
15 computer-readable storage medium and storing executable code that, when executed by at least one data processing apparatus, is configured to cause the at least one data processing apparatus to perform a method including:
establishing, as part of a multi-connectivity session for a
20 user device, a wireless connection between a user device and a first base station, the first base station including a radio resource control (RRC) entity, the first base station initially controlling one or more radio configuration parameters for the multi-connectivity session for the user
25 device; establishing, as part of the multi-connectivity session for the user device, a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity;
detecting, by the user device, a failure of the connection
30 between the user device and the first base station;
selecting, by the user device, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity

session for the user device; and sending, by the user device to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

[0013] The details of one or more implementations are set forth in the accompanying drawings and the description below. Other features will be apparent from the description and drawings, and from the claims.

10

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a block diagram of a multi-connectivity wireless network according to an example implementation.

[0015] FIG. 2 is a block diagram illustrating a radio protocol stack according to an example implementation.

15

[0016] FIG. 3 is a diagram illustrating operation of a user device and base stations according to an example implementation.

[0017] FIG. 4 is a flow chart illustrating operation of a wireless network according to an example implementation.

20

[0018] FIG. 5 is a flow chart illustrating operation of a wireless network according to another example implementation.

[0019] FIG. 6 is a block diagram of a network node (e.g., BS or user device) according to an example implementation.

DETAILED DESCRIPTION

25

[0020] FIG. 1 is a block diagram of a multi-connectivity wireless network 130 according to an example implementation. In the wireless network 130 of FIG. 1, a plurality of network nodes are shown. Referring to FIG. 1, a user device 132, which may also be referred to as a user equipment (UE), may be connected (and in communication) with multiple base stations (BSs), which may also be referred to as evolved Node

30

Bs (eNBs). Therefore, according to an example implementation, a network node may include (or may be) a user device or UE, and/or a BS or eNB. At least part of the functionalities of a base station or (e)Node B (eNB) may be also be carried out by any node, server or host which may be operably coupled to a transceiver, such as a remote radio head.

[0021] Referring to FIG. 1, user device (or UE) 132 may be connected to (and in communication with) a plurality of BSs/cells as part of a multi-connectivity (or multiple-connection) session for user device 132. For example, user device 132 may be connected to a first BS 134 which provides wireless coverage within cell 136. The user device 132 may also be simultaneously connected to and/or in communication with BS 138, which provides wireless coverage within a cell 140.

[0022] Thus, with reference to FIG. 1, in an illustrative example implementation, user device 132 may receive wireless services via one or more cells/BSs as part of a multi-connectivity session. BS 134 is also connected to a core network 150 via a S1 (BS-core network) interface 151. BS 138 may also be connected to core network 150. BS 138 may be connected via an X2 (or BS-BS) interface 153 to BS 134. In this illustrative example, this multi-connectivity session for user device 132 includes only two BSs/cells, but any number of cells/BSs may be used for a multi-connectivity session.

[0023] According to an example implementation, a user device (user terminal, user equipment (UE)) may refer to a portable computing device that includes wireless mobile communication devices operating with or without a subscriber identification module (SIM), including, but not limited to, the following types of devices: a mobile station (MS), a

mobile phone, a cell phone, a smartphone, a personal digital assistant (PDA), a handset, a device using a wireless modem (alarm or measurement device, etc.), a laptop and/or touch screen computer, a tablet, a phablet, a game console, a notebook, and a multimedia device, as examples. It should be appreciated that a user device may also be a nearly exclusive uplink only device, of which an example is a camera or video camera loading images or video clips to a network.

[0024] In LTE (as an illustrative example), the core network 150 may be referred to as Evolved Packet Core (EPC), which may include a mobility management entity (MME) which may handle or assist with mobility/handover of user devices between BSs, one or more gateways that may forward data and control signals between the BSs and packet data networks or the Internet, and other control functions or blocks.

[0025] According to an illustrative (and non-limiting) example implementation, a user device may establish a connection with a BS by performing a random access procedure with the BS via a random access channel (RACH), which may be referred to as a RACH procedure, for example. As part of an example RACH procedure, a user device may send a random access preamble to the BS to allow the BS to estimate transmission timing for the user device. The BS may then send a user device/UE identity for the user device to use in communicating with the BS or cell, and a timing advance offset (synchronization information) to allow the user device to transmit uplink signals to the BS. In one example implementation, by performing random access, the user device may transition from an idle (e.g., an RRC_idle) state with respect to the BS, to a connected (e.g., RRC_connected) state with respect to the BS, where RRC refers to radio resource control. Also, RACH-less procedures may also be used to establish a connection between a user device and a BS. A

connection may use one or more wireless links to communicate data between a user device and a BS.

[0026] Therefore, according to one example implementation, a multi-connectivity wireless network/session allows for a user device (such as user device 132) to be simultaneously connected to multiple base stations, and may have several advantages, such as, for example, decreasing a signaling load towards the core network, sharing traffic/packet processing among multiple base stations, as well as benefitting from flexible resource usage where one or more carriers may be used on a radio link between the user device and each BS, e.g., inter-site carrier aggregation.

[0027] According to an example implementation, each network node (user device or base station) may include a radio protocol stack that may include a plurality of protocol entities. According to an example implementation, a protocol stack may include logic, and/or computer instructions executed by a processor to perform the functions or operations for each entity of the protocol stack. FIG. 2 is a block diagram illustrating a radio protocol stack 210 according to an example implementation. Example protocol stack 210 may include, for example, a Packet Data Convergence Protocol (PDCP) entity 220, a Radio Link Control (RLC) entity 222, a Media Access Control (MAC) entity 224, a Physical layer (PHY) entity 226, and a Radio Resource Control (RRC) entity 228.

[0028] According to an example implementation, the PDCP entity 220 may perform ciphering (encryption and decryption of data) and header compression-decompression. The RLC entity 222 may perform segmentation/concatenation, error detection and correction, data retransmission, duplicate detection and in-sequence data delivery to higher layers. MAC entity 224 may perform multiplexing of logical channels (where there may

be one or more logical channel per radio bearer), hybrid ARQ (automatic repeat request) retransmissions, inserting of MAC control elements (MAC CEs) used for in-band control signaling, and other MAC-related functions. A BS MAC entity 224 may also perform uplink and downlink scheduling (located in MAC entity of each BS). The MAC entity 224 provides services to the RLC entities in the form of logical channels. The PHY entity 226 handles or performs coding/decoding, modulation/demodulation, multi-antenna mapping, and other physical layer functions. Multiple RLC entities within a BS may, for example, may share one MAC entity 224 and one PHY entity 226.

[0029] According to an example implementation, RRC entity 228 may be responsible for handling a number of functions or procedures related to a Radio Access Network (RAN) (e.g., shown in FIG. 1) including broadcast of system information necessary for the user device to be able to communicate with a cell or BS, transmission of paging messages originating from the core network to notify a user device about incoming connection requests, connection management including setting up bearers and mobility, mobility functions such as change of serving cells and handover, and other control related functions.

[0030] According to an example implementation, each BS that provides wireless services for a multi-connectivity session may include a protocol stack, including a Radio Resource Control (RRC) entity (or one or more RRC entities). For example, BS 134 may include a RRC entity 135, and BS 138 may include a RRC entity 139. Other BSs (not shown), which may also provide multi-connectivity wireless services to the user device 132, may similarly include a RRC entity (or one or more RRC entities). During a multi-connectivity session, each user device/UE may include one or more RRC entities.

Thus, although in FIG. 1, a user device is shown as having only one RRC entity, a user device/UE may include multiple RRC entities, e.g., a RRC entity may be provided at the UE to communicate with a peer RRC entity at each BS of the multi-connectivity session, for example. Thus, a user device/UE may include two RRC entities to communicate with a peer RRC entity at two BSs as part of a multi-connectivity session, for example.

[0031] According to an example implementation, one of the RRC entities, which, for example, may be referred to as a master RRC entity (or one of the base stations may be designated as a master BS). In an example implementation, the master RRC entity (or more generally a master BS) may be in charge of mobility management for the multi-connectivity session for the user device, including determining which connections to add and which connections to release from the multi-connectivity session. For example, a user device may perform signal measurements (e.g., measure signal quality and/or signal strength) for signals received from various neighboring BSs, and may report these signal measurements to the master RRC/master BS as part of a measurement report. The master RRC entity (or master BS) may then determine, based on the measurement report, which connections in the multi-connectivity session should be dropped or released from the multi-connectivity session (e.g., when a signal strength or signal quality is less than a first threshold), and which connections should be added to the multi-connectivity session (e.g., for a signal strength or a signal quality for the added BS that is greater than a second threshold), for example. The other RRC entities that are not the master RRC entity for the multi-connectivity session may, for example, be referred to as a slave RRC entity (or a slave BS). Thus, in the example shown in FIG. 1, RRC 135 may be a master RRC

entity, while RRC 139 may be a slave RRC entity, although this is merely an illustrative example. In addition, a master RRC entity (and/or a master BS) may also control or determine (or coordinate or propose) one or more radio configuration parameters for a multi-connectivity session, as
5 described in greater detail below.

[0032] According to an example implementation, for a multi-connectivity session for a user device, the user device may receive RRC messages from each RRC entity that is part of
10 the multi-connectivity session. Also, according to an example implementation, there is risk of a RRC configuration conflict at the user device for the multi-connectivity session if each RRC entity (or each BS generally) is allowed to independently manage its RRC connection (and its radio configuration
15 parameter(s)) independently. For example, there are a number of parameters that may, at least in some cases, conflict between RRC entities (or between BSs) of a multi-connectivity session. Therefore, according to an example implementation, techniques are described to coordinate one or more parameters
20 (e.g., radio configuration parameters) among multiple RRC entities (or among multiple BSs) of a multi-connectivity session, e.g., to reduce the likelihood of a possible conflict between RRC entities/BSs for the multi-connectivity session for these one or more parameters.

[0033] There are a number of parameters, e.g., radio configuration parameters, where it may be beneficial to coordinate the parameter (a value for the parameter) among the multiple RRCs/BSs of a multi-connectivity session, e.g., so that all RRC entities/BSs for a multi-connectivity session
30 may be using the same (or substantially the same) set of radio configuration parameters and/or to avoid a conflict for the parameter(s) for the multi-connectivity session among the RRCs/BSs.

[0034] Radio configuration parameters may include any parameter that may relate to the operation of the radio (or wireless communication) for the user device/UE. Some example radio configuration parameters that may be coordinated (or
5 agreed upon) by RRC entities/BSs of a multi-connectivity session may include one or more of the following: (these radio configuration parameters are provided as illustrative examples):

[0035] 1) one or more scheduling related parameters for
10 the user device, including, for example: a measurement gap; parameters related to when the user device transmits or receives signals, such as configuration of parameters related to discontinuous reception (DRX) and/or discontinuous transmission (DTX) for a user device, and/or parameters
15 related to semi-persistent scheduling (SPS) configuration, etc. For example, a measurement gap may include a subframe in which a BS promises/agrees not to schedule any transmissions to or from the user device, e.g., to allow the user device to move to another carrier frequency and measure
20 signals from another BS. However, without coordination, a conflict may arise between the measurement gaps identified by each RRC entity/BS of the multi-connectivity session. Such a measurement conflict may, for example, prevent the user device from measuring signals on other carrier frequencies
25 (e.g., a measurement gap of a first BS may overlap a scheduled transmission to the user device from a second BS), or multiple/different measurement gaps may be specified, which may be inefficient for the user device and the BSs. Other parameter conflicts within a multi-connectivity session
30 may create other problems or issues for a user device, such as decreasing the time periods when a user device can remain in a low power (or power saving) state.

[0036] 2) one or more parameters related to user device

capabilities, such as for example: a parameter that identifies a user device category, parameter(s) that identify radio capabilities, such as how many data radio bearers (DRBs), or how many signaling radio bearers (SRBs) the user device will support, etc.

[0037] 3) one or more parameters that may indicate transmission limitations for the user device, such as transmission limitations per connection or per radio link, such as a number of radio bearers, a maximum/allowed aggregated maximum bit rate (AMBR) for the user device, etc. For example, a conflict or disagreement among RRC entities/BSs of a multi-connectivity session related to a number of bearers that may be supported by the user device or a maximum bit rate for the user device may allow, at least in some cases, for a number of bearers or a total bit rate to be allocated to the user device cannot be supported by the user device, for example.

[0038] Due to the possibility of a conflict in one or more parameters, it may be advantageous for the RRC entities/BSs of a multi-connectivity session to coordinate (e.g., agree upon) one or more parameters. These are merely some illustrative example radio configuration parameters, and other parameters may be coordinated among RRC entities/BSs of a multi-connectivity session for a user device.

[0039] FIG. 3 is a diagram illustrating operation of a user device and base stations according to an example implementation. Referring to FIG. 3, a network includes user device 132, and several base stations, including BS1 (including radio resource control 1 entity (RRC1 entity)), BS2 (including RRC2 entity), and BS3 (including RRC3 entity). User device 132 may establish a master wireless connection (or master connection) 310 with BS1. In this illustrative example, because BS1 is the first base station connected to

the user device 132, the RRC1 entity included on BS1 may be initially designated as the master RRC entity (M-RRC) for the user device 132 (or for a multi-connectivity session for the user device 132), although other techniques may be used to
5 determine a master RRC entity for a user device/multi-connectivity session. The user device 132 may also establish a wireless connection (slave connection) 312 with BS2 and a wireless connection (slave connection) 314 with BS3, for example. RRC2 entity (on BS2) and RRC3 entity (on BS3) may
10 be designated as slave RRCs, for example, since RRC1 is the master RRC entity, and other RRC entities for the multi-connectivity session may be considered to be slave RRC entities. According to an example implementation, the master RRC entity (and/or master BS) for a multi-connectivity
15 session may handle one or more tasks, such as: perform mobility management for the multi-connectivity session (e.g., determine which connections to release, and which connections to add, to the multi-connectivity session based on measurement reports from the user device, and to control
20 (e.g., determine and/or propose to the slave RRC entities/slave BSs) one or more radio configuration parameters to be used by RRC entities/BSs of the multi-connectivity session for the user device.

[0040] Therefore, in this example shown in FIG. 3, a
25 multi-connectivity session has been established for user device 132 that includes connections to BS1, BS2 and BS3, with the RRC entity (RRC1 entity) included on BS1 as a master RRC entity, and the other RRC entities (RRC2 entity and RRC3 entity) as slave RRC entities, for example. Also, for
30 example, because BS1 includes the master RRC entity (RRC1 entity), BS1 may provide a termination (or communication) point to the core network. Thus, a S1 interface may be provided from BS1 to the core network for the multi-

connectivity session for the user device 132.

[0041] At 315, the master RRC entity (RRC1 entity) and/or the BS1 that includes the master RRC entity may determine one or more radio configuration parameters (e.g., values for
5 these parameters) to be used by the RRC entities/BSs of the multi-connectivity session for user device 132.

[0042] At 316 and 318, BS1 (which includes the master RRC entity (RRC1) for the multi-connectivity session) may send a configuration coordination request (including or specifying
10 values for one or more radio configuration parameters) to BS2 and BS3, respectively (or to RRC2 entity, RRC3 entity, respectively), e.g., to request that the BS2 and BS3 (or slave RRC entities, RRC2 entity and RRC3 entity) adopt (or agree to use) the radio configuration parameters for the
15 multi-connectivity session for user device 132.

[0043] At 320, 322, BS2 and BS3 (and/or RRC3 entity and RRC3 entity), respectively, send an acknowledgement (ACK) to BS1 (or RRC1 entity) to confirm (or acknowledge) that the BS2 and BS3, respectively (and/or RRC2 entity and RRC3 entity,
20 respectively) have agreed to use the radio configuration parameters provided in the configuration coordination request at 316 and 318. Also, according to an example implementation, e.g., if one of the slave RRC entities/slave BSs is unable to use one of the proposed radio configuration
25 parameters indicated in the configuration coordination request, the slave RRC entity/slave BS may send a suggestion/proposal for a different value of the radio configuration parameter. For example, the master RRC entity/master BS may agree to such a revised parameter or may
30 reject such proposed revised parameter. If accepted by the master RRC/master BS, the master BS (BS1) may send a revised configuration coordination request to the slave BSs/slave RRCs, e.g., including the revised/updated set of radio

configuration parameters (e.g., which may indicate revised/updated values for the radio configuration parameter(s)) to be used for the multi-connectivity session.

[0044] At 324, user device 132 may measure signals (e.g., signal quality and/or signal power) from one or more BSs or cells, including from the BSs (e.g., BS1, BS2, BS3, ...) of the multi-connectivity session, and possibly from other BSs/cells as well. User device 132 may then send a measurement report (e.g., indicating the measured signal(s) for each BS) to the BS1 (or to RRC1 entity, which is the master RRC entity), e.g., to allow the BS1/master RRC (RRC1 entity) to perform various mobility management functions, such as to allow BS1/RRC1 entity to determine which wireless connections to release and which wireless connections to add to the multi-connectivity session for user device 132.

[0045] At 326, a failure of the master connection 310 between BS1 (including the master RRC entity, RRC1 entity) and the user device 132 occurs. At 328 and/or 330, the user device 132 and/or the BS1 may detect the failure of the master connection 310 between master BS (BS1) and user device 132. There are a variety of techniques that the BS and/or user device 132 may use to detect a failure of a connection, such as, for example: failure to receive an expected signal (e.g., ACK) or message before a timer times out, inability to receive and/or decode one or more signals or messages, etc.

[0046] Because a failure of the master connection 310 has occurred, BS1/RRC1 entity are no longer part of the multi-connectivity session for user device 132. Thus, BS1/RRC1 entity are no longer capable of acting/operating as the master BS/master RRC entity for the multi-connectivity session. Therefore, a new master BS/master RRC entity should be selected for the multi-connectivity session (e.g., the master RRC entity should be relocated to another BS).

According to an example implementation, after a master connection failure, and before a new master BS/master RRC entity has been selected, no connections may typically be added or released (e.g., since master BS/master RRC entity may typically perform mobility management), and no changes may be performed to the radio configuration parameters for the multi-connectivity session. According to an example implementation, the last set of values for the radio configuration parameters indicated by the previous master BS/master RRC entity (e.g., BS1/RRC1 entity) may typically remain in effect after a master connection failure until a new master BS/master RRC entity has been determined/selected, and the new master BS/master RRC entity has determined and sent out a new set of radio configuration parameters for the multi-connectivity session.

[0047] As noted, after failure of a master connection and/or loss of a master BS/master RRC entity for a multi-connectivity session, a new master BS/master RRC entity should be determined/selected for the multi-connectivity session. Two example techniques are shown in FIG. 3, including: a master BS-initiated master RRC relocation procedure 350 in which the master BS (and/or master RRC entity) may initiate a relocation of the master RRC to another BS; and a user device-initiated master RRC relocation procedure 352 in which the user device may initiate a relocation of the master RRC to another BS.

[0048] In an illustrative example of the master BS-initiated master RRC relocation procedure 350, at 330, the master BS/master RRC entity (e.g., BS1/RRC1 entity) may detect/determine the failure of the master connection 310, e.g., based on the link quality detected over uplink and/or the channel reciprocity. At 331, the master BS/master RRC entity (e.g., BS1/RRC1 entity) may select, e.g., based on the

received measurement report at 324, one of the slave BSs/slave RRC entities for the multi-connectivity session to be the new master BS/master RRC entity for the multi-connectivity session. For example, if BS2/RRC2 entity had a
5 signal strength (as received/measured by user device 132 and reported via measurement report at 324) that was greater than the signal strength of the other slave BSs/slave RRC entities for the multi-connectivity session, the BS2/RRC2 entity may be selected as the new master BS/master RRC entity for the
10 multi-connectivity session.

[0049] At 332, the current master BS/master RRC entity (BS1/RRC1 entity) may then send a master RRC entity change request (e.g., identifying the user device and/or the multi-connectivity session) to the selected slave BS/slave RRC
15 entity (e.g., BS2/RRC2 entity) to request that the selected BS/RRC entity become the new master BS/master RRC entity for the multi-connectivity session. The selected BS/RRC entity that was selected to become the new master BS/master RRC entity (e.g., BS2/RRC2 entity) may send an acknowledgement
20 (ACK) at 336 to BS1/RRC1 entity to confirm or acknowledge that BS2/RRC2 entity has agreed to become the new master for the multi-connectivity session.

[0050] The current master BS/master RRC entity (BS1/RRC1 entity) may also send a master RRC entity change indication
25 (e.g., indicating that a new master BS/new master RRC entity has been selected for the multi-connectivity session, and possibly including the new configuration/one or more new radio configuration parameters) to the user device and to each of the one or more slave BSs/slave RRC entities of the
30 multi-connectivity session that were not selected to be master BS/master RRC entity. For example, at 338, the current master BS/master RRC entity (BS1/RRC1 entity) may send a master RRC entity change indication to user device

132, e.g., including the new set of radio configuration parameters that were determined by the new master BS/new master RRC entity (e.g., BS2/RRC2 entity). Also, at 334, the current master BS/master RRC entity (BS1/RRC1 entity) may
5 send a master RRC entity change indication to BS3/RRC3 entity, e.g., including the new set of radio configuration parameters that were determined by the new master BS/new master RRC entity (e.g., BS2/RRC2 entity). The user device 132 and one or more receiving slave BSs (e.g., BS3/RRC3
10 entity) may then send an ACK (acknowledgement) to the BS1/RRC1 entity in response to receiving the master RRC entity change indication.

[0051] In an illustrative example of the user device-initiated master RRC relocation procedure 352, at 328, the
15 user device 132 may detect/determine the failure of the master connection 310. At 340, the user device 132 may select, e.g., based on the user device's measurement of signals from one or more BSs at 324, one of the slave BSs/slave RRC entities for the multi-connectivity session to
20 be the new master BS/master RRC entity for the multi-connectivity session. At 342, the user device may send a master RRC entity change request (e.g., identifying the user device and/or the multi-connectivity session) to the selected slave BS/slave RRC entity (e.g., BS2/RRC2 entity) to request
25 that the selected BS/RRC entity become the new master BS/master RRC entity for the multi-connectivity session. At 344, the selected BS/RRC entity that was selected to become the new master BS/master RRC entity (e.g., BS2/RRC2 entity) may send an acknowledgement (ACK) to user device 132 entity
30 to confirm or acknowledge that BS2/RRC2 entity has agreed to become the new master for the multi-connectivity session. A new or updated set of radio configuration parameters, determined by the new master BS/master RRC entity (e.g., BS2,

RRC2 entity) may be included in the ACK at 344, or may be provided to the user device in a subsequent message sent to the user device.

[0052] According to an example implementation, at 346 and
5 348, the new master BS/master RRC entity (BS2/RRC2 entity) may also send a master RRC entity change indication (e.g., indicating that a new master BS/new master RRC entity has been selected for the multi-connectivity session, and possibly including the new configuration/one or more new
10 radio configuration parameters) to the other non-selected BSs/RRC entities (e.g., to BS3/RRC3 entity) at 346 and to user device 132 (at 348).

[0053] After relocation of the master RRC entity to a different BS, the S1 (BS-core network) interface, or
15 communication point (anchor point) to the core network for the multi-connectivity session may (at least in some example cases) remain unchanged, e.g., in such a way that a path switch (or change in bearers to support the new M-RRC location) may be avoided to reduce the core network impact.
20 Thus, this may provide a multi-hop (BS to core network) network among BSs. In this manner, as a user device changes locations, which may necessitate a change in M-RRC location for the multi-connectivity session, in some cases, the core network anchor point (or BS-core network interface point) for
25 the multi-connectivity session may remain the same, rather than frequently changing the bearers and anchor point and small cells are frequently added or dropped from the multi-connectivity session, for example. Such a change in anchor point between master BS/M-RRC and core network may be changed
30 later, or after a predetermined number of M-RRC relocation procedures have been performed, e.g., after 3 M-RRC relocations have been performed.

[0054] FIG. 4 is a flow chart illustrating operation of a

wireless network according to an example implementation. For example, the method illustrated in FIG. 4 may illustrate a method of coordinating radio configuration parameters for a multi-connectivity session for a user device. Operation 410
5 may include establishing, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station including a radio resource control (RRC) entity, wherein the multi-connectivity session also includes a wireless
10 connection between the user device and one or more additional base stations, each additional base station including a RRC entity. Operation 420 may include determining, by the first base station, one or more radio configuration parameters to be used by the first base station and the one or more
15 additional base stations for the multi-connectivity session for the user device. According to an example implementation, standard or conventional techniques may be used to determine the one or more radio configuration parameters. Operation 430 may include indicating, by the first base station to the one
20 or more additional base stations, the one or more radio configuration parameters to be used for the multi-connectivity session for the user device.

[0055] According to an example implementation, the method of FIG. 4 may further include sending, by the first base
25 station to another base station, a connection addition request that requests a connection between the user device and the another base station be added to the multi-connectivity session for the user device, the connection addition request indicating the one or more radio
30 configuration parameters to be used by the another base station for the multi-connectivity session for the user device.

[0056] According to an example implementation, the method

of FIG. 4 may further include receiving, by the first base station from the user device, a measurement report indicating a signal measurement by the user device for at least the one or more additional base stations; detecting, by the first
5 base station, a failure of a connection between the first base station and the user device; selecting, based on the measurement report, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session
10 for the user device; and sending, by the first base station to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

15 **[0057]** According to an example implementation, the method of FIG. 4 may further include sending, by the first base station to one or more of the additional base stations that were not selected, a control change indication that indicates that the selected base station has been selected to control
20 the one or more radio configuration parameters for the multi-connectivity session.

[0058] According to an example implementation, in the method of FIG. 4, the one or more radio configuration parameters may include one or more of the following: one or
25 more scheduling related parameters for the user device; one or more parameters related to radio capabilities for the user device; and one or more parameters for transmission limitations for the user device.

[0059] According to an example implementation of the
30 method of FIG. 4, the establishing may include establishing, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station including a master radio

resource control (RRC) entity to control one or more radio configuration parameters for the multi-connectivity session, wherein the multi-connectivity session also includes a wireless connection between the user device and one or more additional base stations, each additional base station including a slave RRC entity; the determining may include determining, by the master RRC entity, one or more radio configuration parameters to be used by the master RRC entity and the one or more slave RRC entities for the multi-connectivity session for the user device; and the indicating may include indicating, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used by the one or more slave RRC entities for the multi-connectivity session for the user device.

[0060] According to an example implementation, the method of FIG. 4 may further include receiving, by the first base station from the user device, a measurement report indicating a signal measurement by the user device for at least the one or more additional base stations; detecting, by the first base station, a failure of a connection between the first base station and the user device; selecting, based on the measurement report, a slave RRC entity at a base station of the one or more additional base stations to be a new master RRC entity to control one or more radio configuration parameters for the multi-connectivity session for the user device; and sending, by the first base station to the base station that includes the selected slave RRC entity, a master RRC entity change request that requests the selected slave RRC entity to be the new master RRC entity for the multi-connectivity session for the user device.

[0061] According to an example implementation, the method of FIG. 4 may further include sending, by the first base

station to one or more of the additional base stations that have an RRC entity that was not selected, a master RRC entity change indication that indicates that the selected slave RRC entity has been selected to be the new master RRC entity for the multi-connectivity session.

[0062] An apparatus may include at least one processor and at least one memory including computer instructions, when executed by the at least one processor, cause the apparatus to: establish, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station including a radio resource control (RRC) entity, wherein the multi-connectivity session also includes a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity; determine, by the first base station, one or more radio configuration parameters to be used by the first base station and the one or more additional base stations for the multi-connectivity session for the user device; and indicate, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used for the multi-connectivity session for the user device.

[0063] According to an example implementation of the apparatus, the apparatus may be further caused to: send, by the first base station to another base station, a connection addition request that requests a connection between the user device and the another base station be added to the multi-connectivity session for the user device, the connection addition request indicating the one or more radio configuration parameters to be used by the another base station for the multi-connectivity session for the user device.

[0064] According to an example implementation of the apparatus, the apparatus may be further caused to: receive, by the first base station from the user device, a measurement report indicating a signal measurement by the user device for at least the one or more additional base stations; detect, by the first base station, a failure of a connection between the first base station and the user device; select, based on the measurement report, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device; and send, by the first base station to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

[0065] According to an example implementation of the apparatus, the apparatus may be further caused to: send, by the first base station to one or more of the additional base stations that were not selected, a control change indication that indicates that the selected base station has been selected to control the one or more radio configuration parameters for the multi-connectivity session.

[0066] According to an example implementation of the apparatus: the causing the apparatus to establish may include causing the apparatus to establish, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station including a master radio resource control (RRC) entity to control one or more radio configuration parameters for the multi-connectivity session, wherein the multi-connectivity session also includes a wireless connection between the user device and one or more additional base stations, each additional base station including a slave RRC

entity; the causing the apparatus to determine may include causing the apparatus to determine, by the master RRC entity, one or more radio configuration parameters to be used by the master RRC entity and the one or more slave RRC entities for the multi-connectivity session for the user device; and causing the apparatus to indicate may include causing the apparatus to indicate, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used by the one or more slave RRC entities for the multi-connectivity session for the user device.

[0067] According to an example implementation, an apparatus may include means (602A/602B and/or 604, FIG. 6; 410) for establishing, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station including a radio resource control (RRC) entity, wherein the multi-connectivity session also includes a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity, means (602A/602B and/or 604, FIG. 6; 420) for determining, by the first base station, one or more radio configuration parameters to be used by the first base station and the one or more additional base stations for the multi-connectivity session for the user device, and means (602A/602B and/or 604, FIG. 6; 430) for indicating, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used for the multi-connectivity session for the user device.

[0068] According to an example implementation, apparatus may further include means (602A/602B and/or 604, FIG. 6) for sending, by the first base station to another base station, a

connection addition request that requests a connection between the user device and the another base station be added to the multi-connectivity session for the user device, the connection addition request indicating the one or more radio configuration parameters to be used by the another base station for the multi-connectivity session for the user device.

[0069] According to an example implementation, the apparatus may further include means (602A/602B and/or 604, FIG. 6) for receiving, by the first base station from the user device, a measurement report indicating a signal measurement by the user device for at least the one or more additional base stations; means (602A/602B and/or 604, FIG. 6) for detecting, by the first base station, a failure of a connection between the first base station and the user device; means (602A/602B and/or 604, FIG. 6) for selecting, based on the measurement report, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device; and means (602A/602B and/or 604, FIG. 6) for sending, by the first base station to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

[0070] According to an example implementation, the apparatus may further include means (602A/602B and/or 604, FIG. 6) for sending, by the first base station to one or more of the additional base stations that were not selected, a control change indication that indicates that the selected base station has been selected to control the one or more radio configuration parameters for the multi-connectivity session.

[0071] According to an example implementation, in the apparatus, the one or more radio configuration parameters may include one or more of the following: one or more scheduling related parameters for the user device; one or more
5 parameters related to radio capabilities for the user device; and one or more parameters for transmission limitations for the user device.

[0072] According to an example implementation of the apparatus, the means for establishing may include means
10 (602A/602B and/or 604, FIG. 6) for establishing, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station including a master radio resource control (RRC) entity to control one or more radio
15 configuration parameters for the multi-connectivity session, wherein the multi-connectivity session also includes a wireless connection between the user device and one or more additional base stations, each additional base station including a slave RRC entity; the means for determining may
20 include means (602A/602B and/or 604, FIG. 6) for determining, by the master RRC entity, one or more radio configuration parameters to be used by the master RRC entity and the one or more slave RRC entities for the multi-connectivity session for the user device; and the means (602A/602B and/or 604,
25 FIG. 6) for indicating may include means (602A/602B and/or 604, FIG. 6) for indicating, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used by the one or more slave RRC entities for the multi-connectivity session for the user
30 device.

[0073] According to an example implementation, the apparatus may further include means (602A/602B and/or 604, FIG. 6) for receiving, by the first base station from the

user device, a measurement report indicating a signal measurement by the user device for at least the one or more additional base stations; means (602A/602B and/or 604, FIG. 6) for detecting, by the first base station, a failure of a connection between the first base station and the user device; means (602A/602B and/or 604, FIG. 6) for selecting, based on the measurement report, a slave RRC entity at a base station of the one or more additional base stations to be a new master RRC entity to control one or more radio configuration parameters for the multi-connectivity session for the user device; and means (602A/602B and/or 604, FIG. 6) for sending, by the first base station to the base station that includes the selected slave RRC entity, a master RRC entity change request that requests the selected slave RRC entity to be the new master RRC entity for the multi-connectivity session for the user device.

[0074] According to an example implementation, the apparatus may further include means (602A/602B and/or 604, FIG. 6) for sending, by the first base station to one or more of the additional base stations that have an RRC entity that was not selected, a master RRC entity change indication that indicates that the selected slave RRC entity has been selected to be the new master RRC entity for the multi-connectivity session.

[0075] FIG. 5 is a flow chart illustrating operation of a wireless network according to an example implementation. The method of FIG. 5 may include coordinating radio configuration parameters for a multi-connectivity session for a user device. Operation 510 may include establishing, as part of a multi-connectivity session for a user device, a wireless connection between a user device and a first base station, the first base station including a radio resource control (RRC) entity, the first base station initially controlling

one or more radio configuration parameters for the multi-connectivity session for the user device. Operation 520 may include establishing, as part of the multi-connectivity session for the user device, a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity. Operation 530 may include detecting, by the user device, a failure of the connection between the user device and the first base station. Operation 540 may include selecting, by the user device, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device. Operation 550 may include sending, by the user device to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

[0076] According to an example implementation of the method of FIG. 5, the selecting may include: measuring, by the user device, a signal from the one or more additional base stations; and selecting, by the user device based on a signal quality or a signal strength of a signal received from the one or more additional base stations, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

[0077] According to an example implementation of the method of FIG. 5: the first base station includes a master radio resource control (RRC) entity to control one or more radio configuration parameters for the multi-connectivity session, and each additional base station includes a slave RRC entity; the selecting may include selecting a slave RRC entity at a base station of the one or more additional base

stations to be a new master RRC entity for the multi-connectivity session for the user device; and the sending may include sending, by the user device to the base station that includes the selected slave RRC entity, a master RRC entity change request that requests the selected slave RRC entity to be the new master RRC entity for the multi-connectivity session for the user device.

[0078] According to another example implementation, an apparatus may include at least one processor and at least one memory including computer instructions, when executed by the at least one processor, cause the apparatus to: establish, as part of a multi-connectivity session for a user device, a wireless connection between a user device and a first base station, the first base station including a radio resource control (RRC) entity, the first base station initially controlling one or more radio configuration parameters for the multi-connectivity session for the user device; establish, as part of the multi-connectivity session for the user device, a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity; detect, by the user device, a failure of the connection between the user device and the first base station; select, by the user device, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device; and send, by the user device to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

[0079] According to an example implementation of the apparatus, the apparatus may be further caused to: measure, by the user device, a signal from the one or more additional

base stations; and select, by the user device based on a signal quality or a signal strength of a signal received from the one or more additional base stations, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

[0080] According to an example implementation of the apparatus, the one or more radio configuration parameters may include one or more of the following: one or more scheduling related parameters for the user device; one or more parameters related to radio capabilities for the user device; and one or more parameters for transmission limitations for the user device.

[0081] According to an example implementation of the apparatus: the first base station includes a master radio resource control (RRC) entity to control one or more radio configuration parameters for the multi-connectivity session, and each additional base station includes a slave RRC entity; the causing the apparatus to select may include causing the apparatus to select a slave RRC entity at a base station of the one or more additional base stations to be a new master RRC entity for the multi-connectivity session for the user device; and the causing the apparatus to send may include causing the apparatus to send, by the user device to the base station that includes the selected slave RRC entity, a master RRC entity change request that requests the selected slave RRC entity to be the new master RRC entity for the multi-connectivity session for the user device.

[0082] According to another example implementation, an apparatus may include means (602A/602B and/or 604, FIG. 6, 510) for establishing, as part of a multi-connectivity session for a user device, a wireless connection between a user device and a first base station, the first base station

including a radio resource control (RRC) entity, the first base station initially controlling one or more radio configuration parameters for the multi-connectivity session for the user device, means (602A/602B and/or 604, FIG. 6; 520) for establishing, as part of the multi-connectivity session for the user device, a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity, means (602A/602B and/or 604, FIG. 6; 530) for detecting, by the user device, a failure of the connection between the user device and the first base station, means (602A/602B and/or 604, FIG. 6; 540) for selecting, by the user device, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device, and means (602A/602B and/or 604, FIG. 6; 550) for sending, by the user device to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

[0083] According to an example implementation of the apparatus, the means for selecting may include: means (602A/602B and/or 604, FIG. 6) for measuring, by the user device, a signal from the one or more additional base stations; and means (602A/602B and/or 604, FIG. 6) for selecting, by the user device based on a signal quality or a signal strength of a signal received from the one or more additional base stations, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

[0084] According to an example implementation of the apparatus: the first base station includes a master radio

resource control (RRC) entity to control one or more radio configuration parameters for the multi-connectivity session, and each additional base station includes a slave RRC entity; the means for selecting may include means (602A/602B and/or
5 604, FIG. 6) for selecting a slave RRC entity at a base station of the one or more additional base stations to be a new master RRC entity for the multi-connectivity session for the user device; and the means for sending may include means (602A/602B and/or 604, FIG. 6) for sending, by the user
10 device to the base station that includes the selected slave RRC entity, a master RRC entity change request that requests the selected slave RRC entity to be the new master RRC entity for the multi-connectivity session for the user device.

[0085] FIG. 6 is a block diagram of a network node (e.g.,
15 BS or user device) 600 according to an example implementation. The network node (or wireless station) 600 may include, for example, two RF (radio frequency) or wireless transceivers 602A, 602B, where each wireless transceiver includes a transmitter to transmit signals and a
20 receiver to receive signals. The wireless station also includes a processor 604 to execute instructions or software and control transmission and receptions of signals, and a memory 606 to store data and/or instructions.

[0086] Processor 604 may also make decisions or
25 determinations, generate frames, packets or messages for transmission, decode received frames or messages for further processing, and other tasks or functions described herein. Processor 604, which may be a baseband processor, for example, may generate messages, packets, frames or other
30 signals for transmission via wireless transceiver 602. Processor 604 may control transmission of signals or messages over a wireless network, and may receive signals or messages, etc., via a wireless network (e.g., after being down-

converted by wireless transceiver 602, for example).

Processor 604 may be programmable and capable of executing software or other instructions stored in memory or on other computer media to perform the various tasks and functions described above, such as one or more of the tasks or methods described above. Processor 604 may be (or may include), for example, hardware, programmable logic, a programmable processor that executes software or firmware, and/or any combination of these. Using other terminology, processor 604 and transceiver 602 together may be considered as a wireless transmitter/receiver system, for example.

[0087] In addition, referring to FIG. 6, a controller (or processor) 608 may execute software and instructions, and may provide overall control for the network node 600, and may provide control for other systems not shown in FIG. 6, such as controlling input/output devices (e.g., display, keypad), and/or may execute software for one or more applications that may be provided on network node 600, such as, for example, an email program, audio/video applications, a word processor, a Voice over IP application, or other application or software.

[0088] In addition, a storage medium may be provided that includes stored instructions, which when executed by a controller or processor may result in the processor 604, or other controller or processor, performing one or more of the functions or tasks described above.

[0089] The embodiments are not, however, restricted to the system that is given as an example, but a person skilled in the art may apply the solution to other communication systems. Another example of a suitable communications system is the 5G concept. It is assumed that network architecture in 5G will be quite similar to that of the LTE-advanced. 5G is likely to use multiple input - multiple output (MIMO) antennas, many more base stations or nodes than the LTE (a

so-called small cell concept), including macro sites operating in co-operation with smaller stations and perhaps also employing a variety of radio technologies for better coverage and enhanced data rates.

5 **[0090]** It should be appreciated that future networks will most probably utilise network functions virtualization (NFV) which is a network architecture concept that proposes virtualizing network node functions into "building blocks" or entities that may be operationally connected or linked
10 together to provide services. A virtualized network function (VNF) may comprise one or more virtual machines running computer program codes using standard or general type servers instead of customized hardware. Cloud computing or data storage may also be utilized. In radio communications this
15 may mean node operations may be carried out, at least partly, in a server, host or node operationally coupled to a remote radio head. It is also possible that node operations will be distributed among a plurality of servers, nodes or hosts. It should also be understood that the distribution of labour
20 between core network operations and base station operations may differ from that of the LTE or even be non-existent.

[0091] Implementations of the various techniques described herein may be implemented in digital electronic circuitry, or in computer hardware, firmware, software, or in combinations
25 of them. Implementations may implemented as a computer program product, i.e., a computer program tangibly embodied in an information carrier, e.g., in a machine-readable storage device or in a propagated signal, for execution by, or to control the operation of, a data processing apparatus,
30 e.g., a programmable processor, a computer, or multiple computers. Implementations may also be provided on a computer readable medium or computer readable storage medium, which may be a non-transitory medium. Implementations of the

various techniques may also include implementations provided via transitory signals or media, and/or programs and/or software implementations that are downloadable via the Internet or other network(s), either wired networks and/or wireless networks. In addition, implementations may be provided via machine type communications (MTC), and also via an Internet of Things (IOT).

[0092] The computer program may be in source code form, object code form, or in some intermediate form, and it may be stored in some sort of carrier, distribution medium, or computer readable medium, which may be any entity or device capable of carrying the program. Such carriers include a record medium, computer memory, read-only memory, photoelectrical and/or electrical carrier signal, telecommunications signal, and software distribution package, for example. Depending on the processing power needed, the computer program may be executed in a single electronic digital computer or it may be distributed amongst a number of computers.

[0093] Furthermore, implementations of the various techniques described herein may use a cyber-physical system (CPS) (a system of collaborating computational elements controlling physical entities). CPS may enable the implementation and exploitation of massive amounts of interconnected ICT devices (sensors, actuators, processors microcontrollers,...) embedded in physical objects at different locations. Mobile cyber physical systems, in which the physical system in question has inherent mobility, are a subcategory of cyber-physical systems. Examples of mobile physical systems include mobile robotics and electronics transported by humans or animals. The rise in popularity of smartphones has increased interest in the area of mobile cyber-physical systems. Therefore, various implementations

of techniques described herein may be provided via one or more of these technologies.

[0094] A computer program, such as the computer program(s) described above, can be written in any form of programming language, including compiled or interpreted languages, and can be deployed in any form, including as a stand-alone program or as a module, component, subroutine, or other unit or part of it suitable for use in a computing environment. A computer program can be deployed to be executed on one computer or on multiple computers at one site or distributed across multiple sites and interconnected by a communication network.

[0095] Method steps may be performed by one or more programmable processors executing a computer program or computer program portions to perform functions by operating on input data and generating output. Method steps also may be performed by, and an apparatus may be implemented as, special purpose logic circuitry, e.g., an FPGA (field programmable gate array) or an ASIC (application-specific integrated circuit).

[0096] Processors suitable for the execution of a computer program include, by way of example, both general and special purpose microprocessors, and any one or more processors of any kind of digital computer, chip or chipset. Generally, a processor will receive instructions and data from a read-only memory or a random access memory or both. Elements of a computer may include at least one processor for executing instructions and one or more memory devices for storing instructions and data. Generally, a computer also may include, or be operatively coupled to receive data from or transfer data to, or both, one or more mass storage devices for storing data, e.g., magnetic, magneto-optical disks, or optical disks. Information carriers suitable for embodying

computer program instructions and data include all forms of non-volatile memory, including by way of example semiconductor memory devices, e.g., EPROM, EEPROM, and flash memory devices; magnetic disks, e.g., internal hard disks or removable disks; magneto-optical disks; and CD-ROM and DVD-ROM disks. The processor and the memory may be supplemented by, or incorporated in, special purpose logic circuitry.

[0097] To provide for interaction with a user, implementations may be implemented on a computer having a display device, e.g., a cathode ray tube (CRT) or liquid crystal display (LCD) monitor, for displaying information to the user and a user interface, such as a keyboard and a pointing device, e.g., a mouse or a trackball, by which the user can provide input to the computer. Other kinds of devices can be used to provide for interaction with a user as well; for example, feedback provided to the user can be any form of sensory feedback, e.g., visual feedback, auditory feedback, or tactile feedback; and input from the user can be received in any form, including acoustic, speech, or tactile input.

[0098] Implementations may be implemented in a computing system that includes a back-end component, e.g., as a data server, or that includes a middleware component, e.g., an application server, or that includes a front-end component, e.g., a client computer having a graphical user interface or a Web browser through which a user can interact with an implementation, or any combination of such back-end, middleware, or front-end components. Components may be interconnected by any form or medium of digital data communication, e.g., a communication network. Examples of communication networks include a local area network (LAN) and a wide area network (WAN), e.g., the Internet.

[0099] While certain features of the described

implementations have been illustrated as described herein,
many modifications, substitutions, changes and equivalents
will now occur to those skilled in the art. It is,
therefore, to be understood that the appended claims are
5 intended to cover all such modifications and changes as fall
within the true spirit of the various embodiments.

WHAT IS CLAIMED IS:

1. A method of coordinating radio configuration parameters for a multi-connectivity session for a user device, the method comprising:

5 establishing, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station including a radio resource control (RRC) entity, wherein the multi-

10 connectivity session also includes a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity;

determining, by the first base station, one or more radio configuration parameters to be used by the first base station and the one or more additional base stations for the multi-

15 connectivity session for the user device; and

indicating, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used for the multi-connectivity session for the user device.

20

2. The method of claim 1 and further comprising:

sending, by the first base station to another base station, a connection addition request that requests a connection

25 between the user device and the another base station be added to the multi-connectivity session for the user device, the connection addition request indicating the one or more radio configuration parameters to be used by the another base

30 station for the multi-connectivity session for the user device.

3. The method of any of claims 1-2 and further comprising:

35 receiving, by the first base station from the user device, a measurement report indicating a signal measurement by the

user device for at least the one or more additional base stations;

detecting, by the first base station, a failure of a connection between the first base station and the user device;

selecting, based on the measurement report, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device; and

sending, by the first base station to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

4. The method of claim 3 and further comprising:
sending, by the first base station to one or more of the additional base stations that were not selected, a control change indication that indicates that the selected base station has been selected to control the one or more radio configuration parameters for the multi-connectivity session.

5. The method of any of claims 1-4 wherein the one or more radio configuration parameters comprises one or more of the following:

one or more scheduling related parameters for the user device;

one or more parameters related to radio capabilities for the user device; and

one or more parameters for transmission limitations for the user device.

6. The method of any of claims 1-5:

wherein the establishing comprises establishing, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station,

the first base station including a master radio resource control (RRC) entity to control one or more radio configuration parameters for the multi-connectivity session, wherein the multi-connectivity session also includes a
5 wireless connection between the user device and one or more additional base stations, each additional base station including a slave RRC entity;

wherein the determining comprises determining, by the master RRC entity, one or more radio configuration parameters to be
10 used by the master RRC entity and the one or more slave RRC entities for the multi-connectivity session for the user device; and

wherein the indicating comprises indicating, by the first base station to the one or more additional base stations, the
15 one or more radio configuration parameters to be used by the one or more slave RRC entities for the multi-connectivity session for the user device.

7. The method of claim 6 and further comprising:
20 receiving, by the first base station from the user device, a measurement report indicating a signal measurement by the user device for at least the one or more additional base stations;
detecting, by the first base station, a failure of a
25 connection between the first base station and the user device;
selecting, based on the measurement report, a slave RRC entity at a base station of the one or more additional base stations to be a new master RRC entity to control one or more
30 radio configuration parameters for the multi-connectivity session for the user device; and
sending, by the first base station to the base station that includes the selected slave RRC entity, a master RRC entity change request that requests the selected slave RRC entity to
35 be the new master RRC entity for the multi-connectivity session for the user device.

8. The method of any of claims 6-7 and further comprising:

5 sending, by the first base station to one or more of the additional base stations that have an RRC entity that was not selected, a master RRC entity change indication that indicates that the selected slave RRC entity has been selected to be the new master RRC entity for the multi-connectivity session.

10 9. An apparatus comprising at least one processor and at least one memory including computer instructions, when executed by the at least one processor, cause the apparatus to:

15 establish, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station including a radio resource control (RRC) entity, wherein the multi-connectivity session also includes a wireless connection between the user device and one or more additional base stations, each
20 additional base station including a RRC entity;

determine, by the first base station, one or more radio configuration parameters to be used by the first base station and the one or more additional base stations for the multi-connectivity session for the user device; and
25 indicate, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used for the multi-connectivity session for the user device.

30 10. The apparatus of claim 9 wherein the apparatus is further caused to:

send, by the first base station to another base station, a connection addition request that requests a connection between the user device and the another base station be added
35 to the multi-connectivity session for the user device, the connection addition request indicating the one or more radio configuration parameters to be used by the another base

station for the multi-connectivity session for the user device.

11. The apparatus of any of claims 9-10 wherein the
5 apparatus is further caused to:
- receive, by the first base station from the user device, a measurement report indicating a signal measurement by the user device for at least the one or more additional base stations;
- 10 detect, by the first base station, a failure of a connection between the first base station and the user device;
- select, based on the measurement report, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-
15 connectivity session for the user device; and
- send, by the first base station to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user
20 device.

12. The apparatus of claim 11 wherein the apparatus is further caused to:
- send, by the first base station to one or more of the
25 additional base stations that were not selected, a control change indication that indicates that the selected base station has been selected to control the one or more radio configuration parameters for the multi-connectivity session.

13. The apparatus of any of claims 9-12:
- wherein causing the apparatus to establish comprises causing the apparatus to establish, as part of a multi-connectivity session for a user device, a wireless connection between the user device and a first base station, the first base station
35 including a master radio resource control (RRC) entity to control one or more radio configuration parameters for the multi-connectivity session, wherein the multi-connectivity

session also includes a wireless connection between the user device and one or more additional base stations, each additional base station including a slave RRC entity;

5 wherein causing the apparatus to determine comprises causing the apparatus to determine, by the master RRC entity, one or more radio configuration parameters to be used by the master RRC entity and the one or more slave RRC entities for the multi-connectivity session for the user device; and

10 wherein causing the apparatus to indicate comprises causing the apparatus to indicate, by the first base station to the one or more additional base stations, the one or more radio configuration parameters to be used by the one or more slave RRC entities for the multi-connectivity session for the user device.

15

14. A method of coordinating radio configuration parameters for a multi-connectivity session for a user device, the method comprising:

20 establishing, as part of a multi-connectivity session for a user device, a wireless connection between a user device and a first base station, the first base station including a radio resource control (RRC) entity, the first base station initially controlling one or more radio configuration parameters for the multi-connectivity session for the user device;

25

establishing, as part of the multi-connectivity session for the user device, a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity;

30 detecting, by the user device, a failure of the connection between the user device and the first base station;

selecting, by the user device, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device; and

35

sending, by the user device to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration

parameters for the multi-connectivity session for the user device.

15 15. The method of claim 14, wherein the selecting
5 comprises:
measuring, by the user device, a signal from the one or more
additional base stations; and

10 selecting, by the user device based on a signal quality or
a signal strength of a signal received from the one or more
additional base stations, a base station of the one or more
additional base stations to control the one or more radio
configuration parameters for the multi-connectivity session
for the user device.

15 16. The method of any of claims 14-15, wherein:
the first base station includes a master radio resource
control (RRC) entity to control one or more radio
configuration parameters for the multi-connectivity session,
and each additional base station includes a slave RRC entity;
20 wherein the selecting comprises selecting a slave RRC entity
at a base station of the one or more additional base stations
to be a new master RRC entity for the multi-connectivity
session for the user device; and

25 wherein the sending comprises sending, by the user device to
the base station that includes the selected slave RRC entity,
a master RRC entity change request that requests the selected
slave RRC entity to be the new master RRC entity for the
multi-connectivity session for the user device.

30 17. An apparatus comprising at least one processor and
at least one memory including computer instructions, when
executed by the at least one processor, cause the apparatus
to:
establish, as part of a multi-connectivity session for a user
35 device, a wireless connection between a user device and a
first base station, the first base station including a radio

resource control (RRC) entity, the first base station initially controlling one or more radio configuration parameters for the multi-connectivity session for the user device;

5 establish, as part of the multi-connectivity session for the user device, a wireless connection between the user device and one or more additional base stations, each additional base station including a RRC entity;

10 detect, by the user device, a failure of the connection between the user device and the first base station;

select, by the user device, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device; and

15 send, by the user device to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

20

18. The apparatus of claim 17 wherein being caused to select comprises the apparatus being caused to:

measure, by the user device, a signal from the one or more additional base stations; and

25 select, by the user device based on a signal quality or a signal strength of a signal received from the one or more additional base stations, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session
30 for the user device.

19. The apparatus of any of claims 17-18 wherein the one or more radio configuration parameters comprises one or more of the following:

35 one or more scheduling related parameters for the user device;

one or more parameters related to radio capabilities for the user device; and

one or more parameters for transmission limitations for the user device.

5

20. The apparatus of any of claims 17-19, wherein:
the first base station includes a master radio resource
control (RRC) entity to control one or more radio
configuration parameters for the multi-connectivity session,
10 and each additional base station includes a slave RRC entity;

wherein causing the apparatus to select comprises causing the
apparatus to select a slave RRC entity at a base station of
the one or more additional base stations to be a new master
RRC entity for the multi-connectivity session for the user
15 device; and

wherein causing the apparatus to send comprises causing the
apparatus to send, by the user device to the base station
that includes the selected slave RRC entity, a master RRC
entity change request that requests the selected slave RRC
20 entity to be the new master RRC entity for the multi-
connectivity session for the user device.

21. A computer program product, the computer program
product comprising a non-transitory computer-readable storage
25 medium and storing executable code that, when executed by at
least one data processing apparatus, is configured to cause
the at least one data processing apparatus to perform a
method comprising:

establishing, as part of a multi-connectivity session for a
30 user device, a wireless connection between a user device and
a first base station, the first base station including a
radio resource control (RRC) entity, the first base station
initially controlling one or more radio configuration
parameters for the multi-connectivity session for the user
35 device;

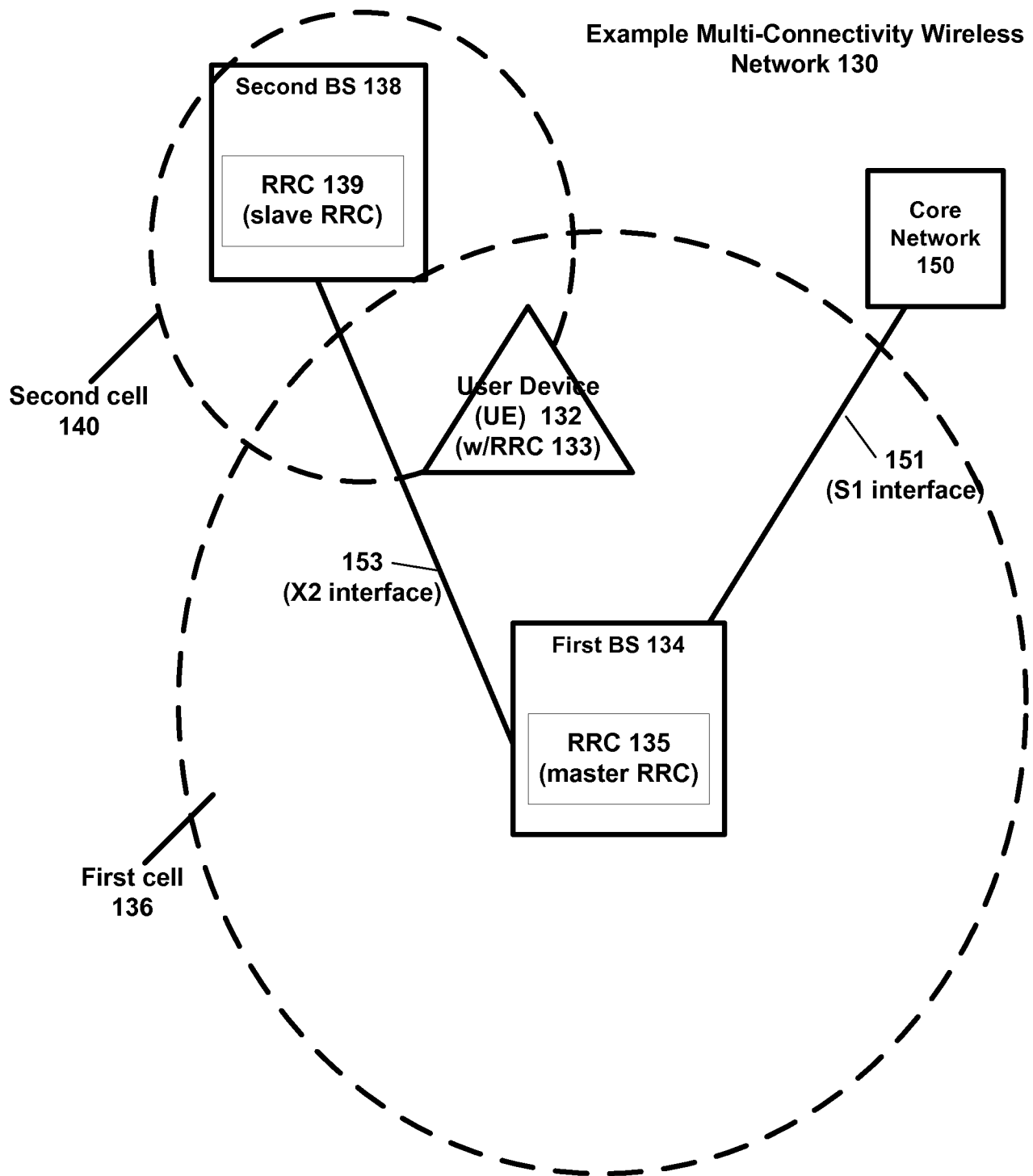
establishing, as part of the multi-connectivity session for
the user device, a wireless connection between the user

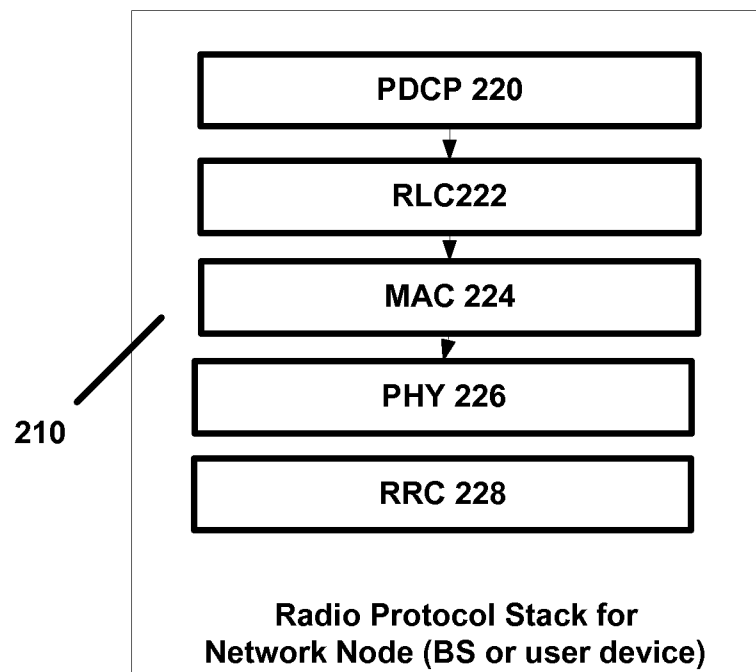
device and one or more additional base stations, each additional base station including a RRC entity;

detecting, by the user device, a failure of the connection between the user device and the first base station;

5 selecting, by the user device, a base station of the one or more additional base stations to control the one or more radio configuration parameters for the multi-connectivity session for the user device; and

10 sending, by the user device to the selected base station, a control change request that requests the selected base station to control the one or more radio configuration parameters for the multi-connectivity session for the user device.

**FIG. 1**

**FIG. 2**

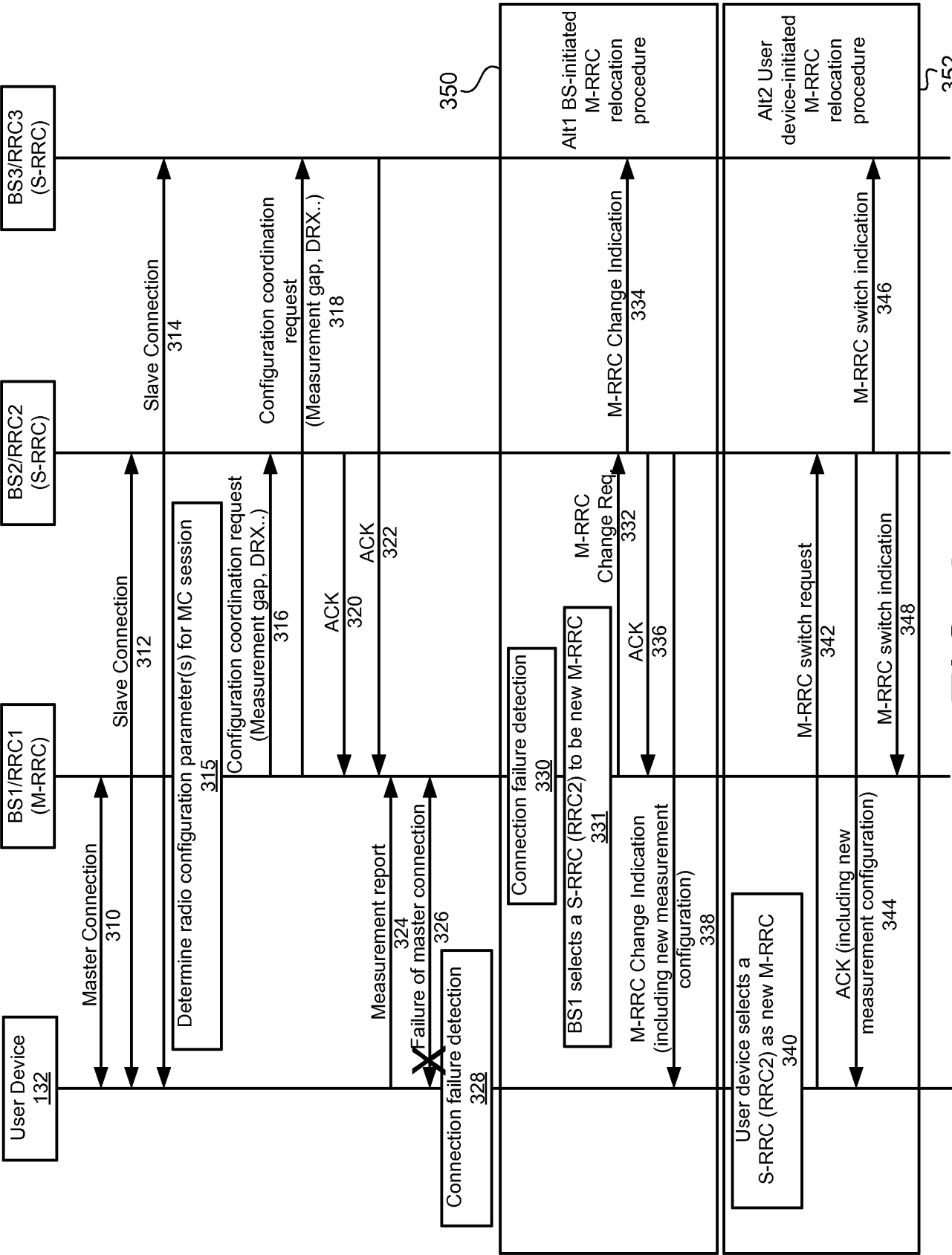
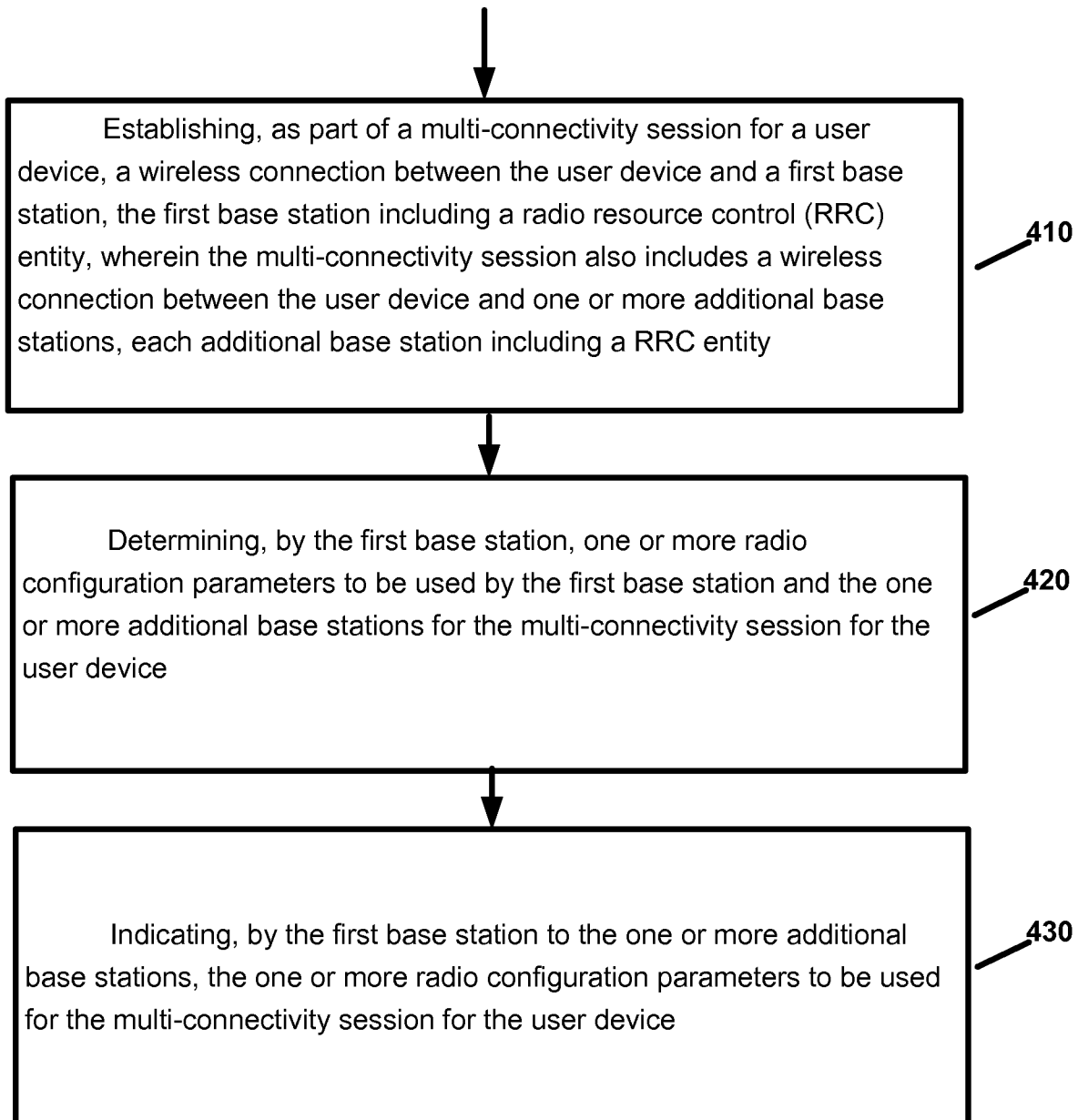
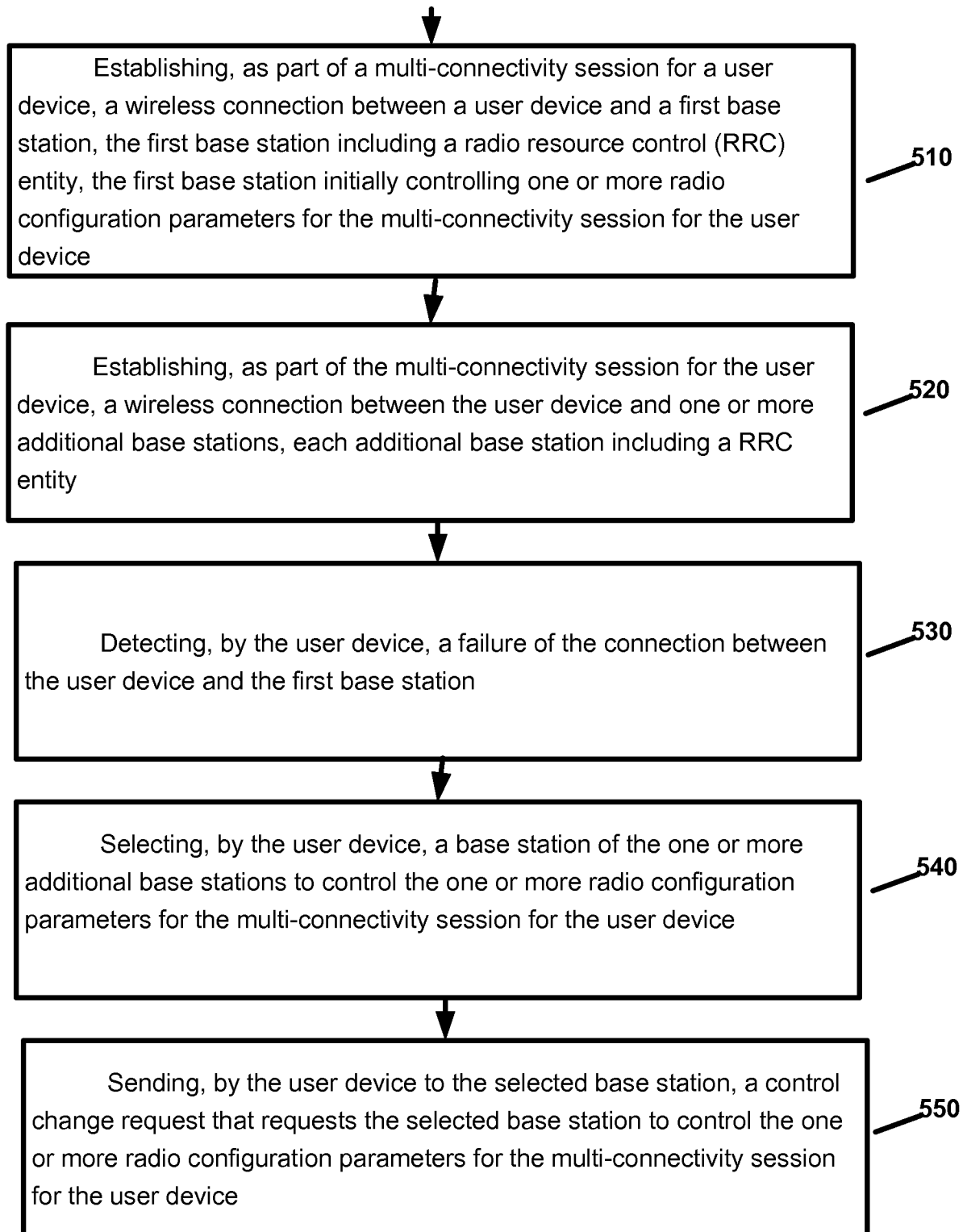
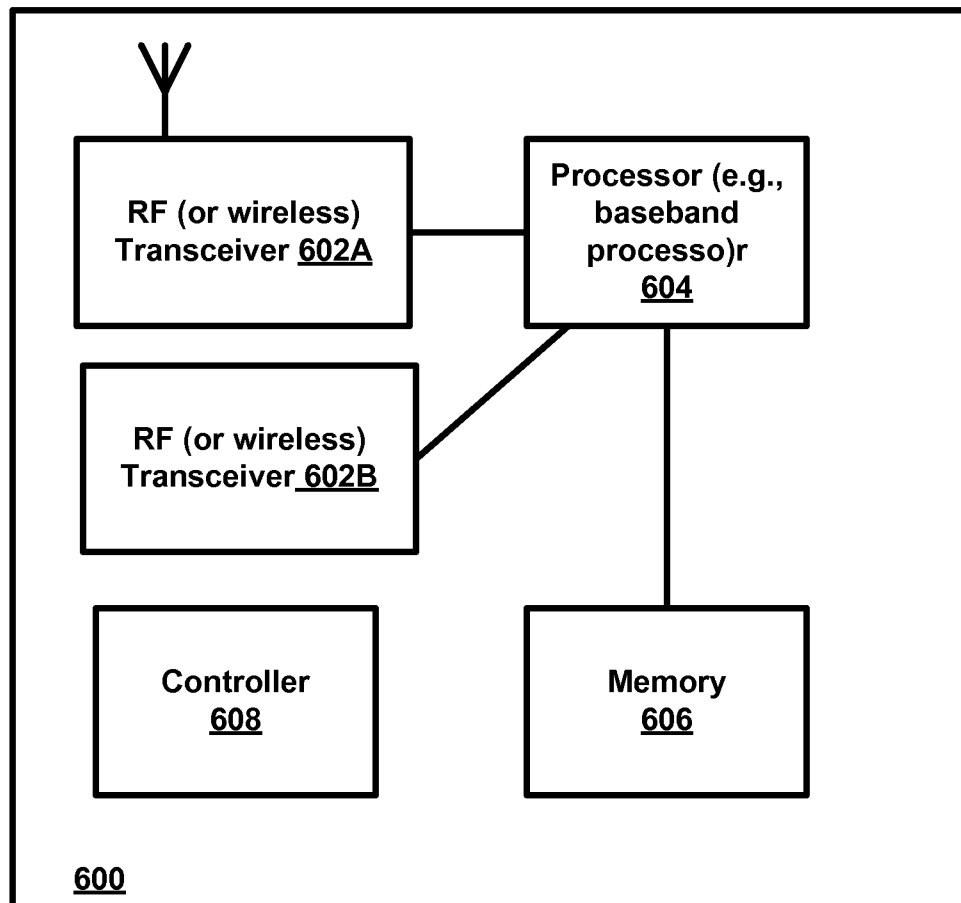


FIG. 3

**FIG. 4**

**FIG. 5**

**FIG. 6**

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2015/057577

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/057577

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04W76/02 H04W84/20
ADD.

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

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 2014/209204 A1 (ERICSSON TELEFON AB L M [SE]) 31 December 2014 (2014-12-31) page 18, line 10 - line 26 page 21, line 1 - page 22, line 9; figure 13 ----- -/--	1,5,6,9, 13 2-4,7,8, 10-12



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

19 February 2016

Date of mailing of the international search report

29/02/2016

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Andrés Muñoz, E

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2015/057577

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	INTEL CORPORATION: "RAN3 impacts of dual connectivity", 3GPP DRAFT; R3-132224 SCE CP V2, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE , vol. RAN WG3, no. San Francisco, USA; 20131111 - 20131115 13 November 2013 (2013-11-13), XP050738403, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/Meetings_3GPP_SYNC/RAN/RAN3/Docs/ [retrieved on 2013-11-13]	2,10
A	page 1, line 10 - line 16	1,3-9, 11-13
A	----- "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Study on Small Cell Enhancements for E-UTRA and E-UTRAN - Higher layer aspects (Release", 3GPP DRAFT; R2-134626 36842-100, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE , 15 May 2014 (2014-05-15), XP050816214, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/R2_TSS_TRs_early_versions/History/TR36.842_Small_cell_enh/v1.0.0/ [retrieved on 2014-05-15] 7.1.3 RRC diversity 8.1 Architecture and protocol enhancements for Dual connectivity	1-13
X	----- WO 2014/111027 A1 (MEDIATEK INC [CN]) 24 July 2014 (2014-07-24)	1,9, 14-21
Y	figure 8	3,4,7,8, 11,12
A	page 6, line 32 - page 7, line 22 page 10, line 19 - line 23 page 12, line 19 - page 13, line 1; figure 4 -----	2,5,6, 10,13

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2015/057577

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014209204	A1	31-12-2014	NONE

WO 2014111027	A1	24-07-2014	EP 2805538 A1 26-11-2014
			US 2015181479 A1 25-06-2015
			WO 2014110813 A1 24-07-2014
			WO 2014111027 A1 24-07-2014

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-13

Configuring radio parameters in a multi-connectivity session.

2. claims: 14-21

Switching to a new MeNB after connection failure between MeNB and UE.
