US 20250261008A1

(19) United States
(12) Patent Application Publication
MONDET et al.

(10) Pub. No.: US 2025/0261008 A1
(43) Pub. Date: Aug. 14, 2025

(54) ENHANCED RRM MEASUREMENTS FOR LATENCY-SENSITIVE TRAFFIC

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(21) Appl. No.: **18/439,230**

(22) Filed: **Feb. 12, 2024**

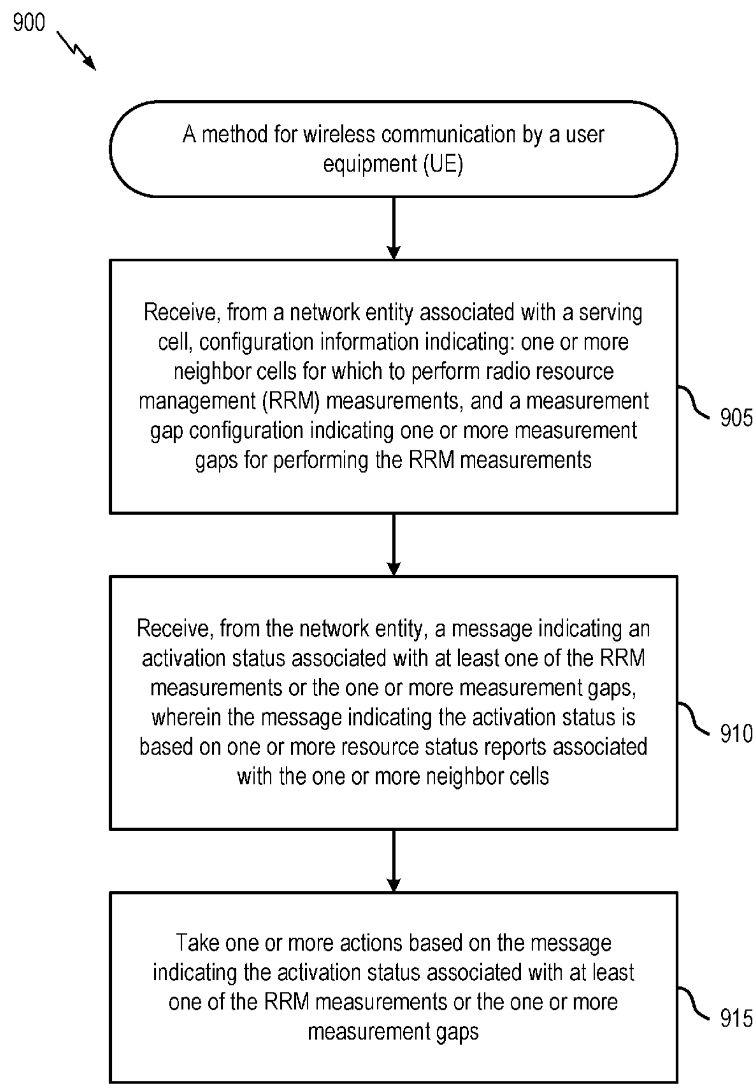
Publication Classification

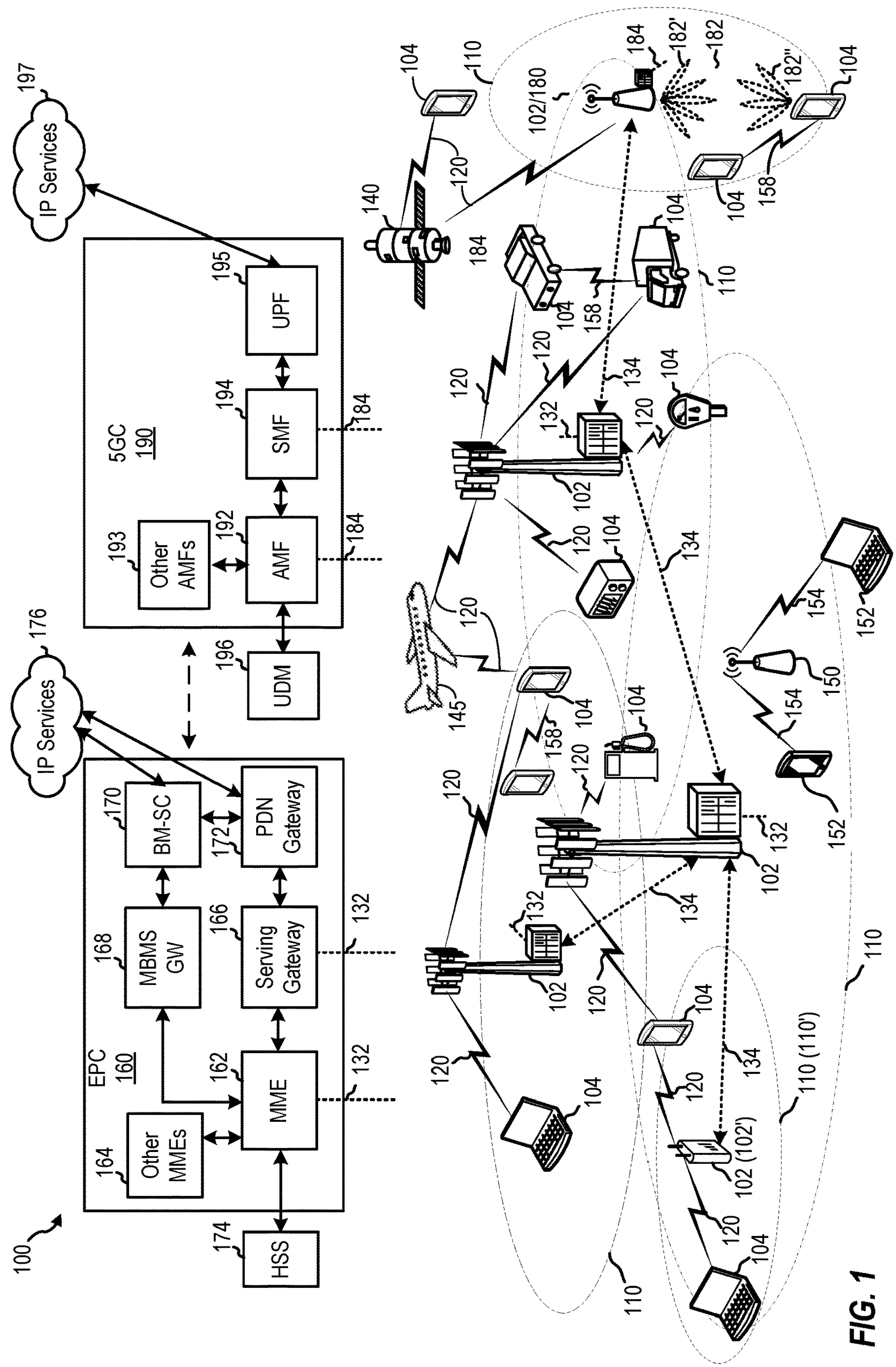
(51) **Int. Cl.**
H04W 24/08 (2009.01)
H04W 24/10 (2009.01)

(52) **U.S. Cl.**
CPC ***H04W 24/08*** (2013.01); ***H04W 24/10*** (2013.01)

(57) **ABSTRACT**

Certain aspects of the present disclosure provide techniques for enhanced radio resource management (RRM) measurements for latency-sensitive traffic. A method performed by a network entity may include transmitting, to a user equipment (UE), configuration information indicating: one or more neighbor cells for which to perform RRM measurements and a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements. The network entity may receive one or more resource status reports from the one or more neighbor cells, indicating an amount of resources being used at a respective neighbor cell of the one or more neighbor cells. The network entity may transmit, to the UE based on the one or more resource status reports received from the one or more neighbor cells, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps.





100
IP Services
197
IP Services
176
5GC
190
EPC
160
Other AMFs
193
AMF
192
SMF
194
UPF
195
UDM
196
Other MMEs
164
MME
162
MBMS GW
168
Serving Gateway
166
BM-SC
170
PDN Gateway
172
HSS
174
102/180
182'
182
182''
184
140
145
150
152
154
158
120
132
134
102
102 (102')
104
110
110 (110')

FIG. 1

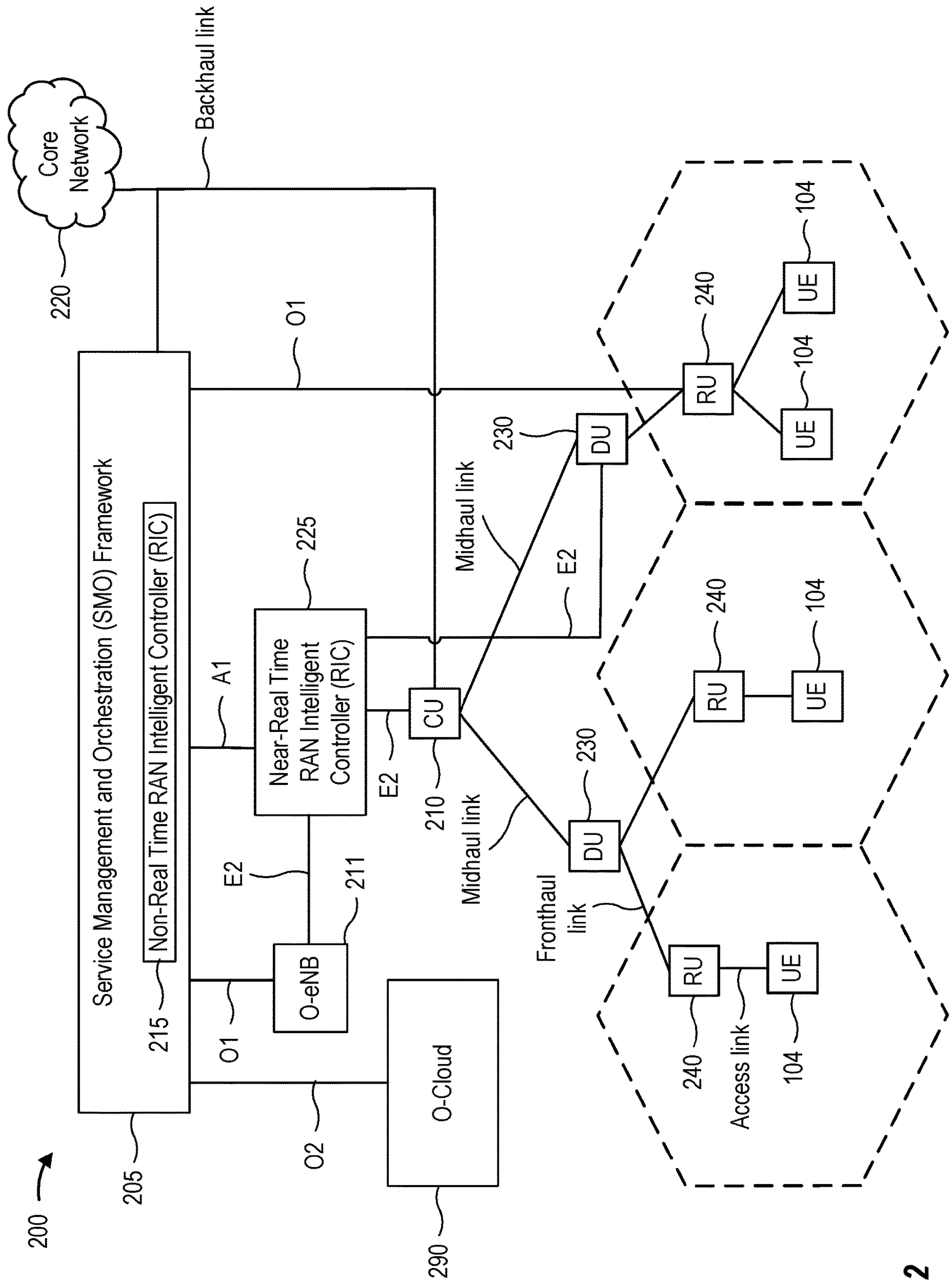

200
Service Management and Orchestration (SMO) Framework
Non-Real Time RAN Intelligent Controller (RIC)
205
215
Core Network
220
Backhaul link
O1
O1
O2
A1
E2
E2
E2
Near-Real Time RAN Intelligent Controller (RIC)
225
O-eNB
211
O-Cloud
290
CU
210
DU
DU
230
230
Midhaul link
Midhaul link
Fronthaul link
RU
RU
RU
240
240
240
UE
UE
UE
UE
104
104
104
104
Access link

FIG. 2

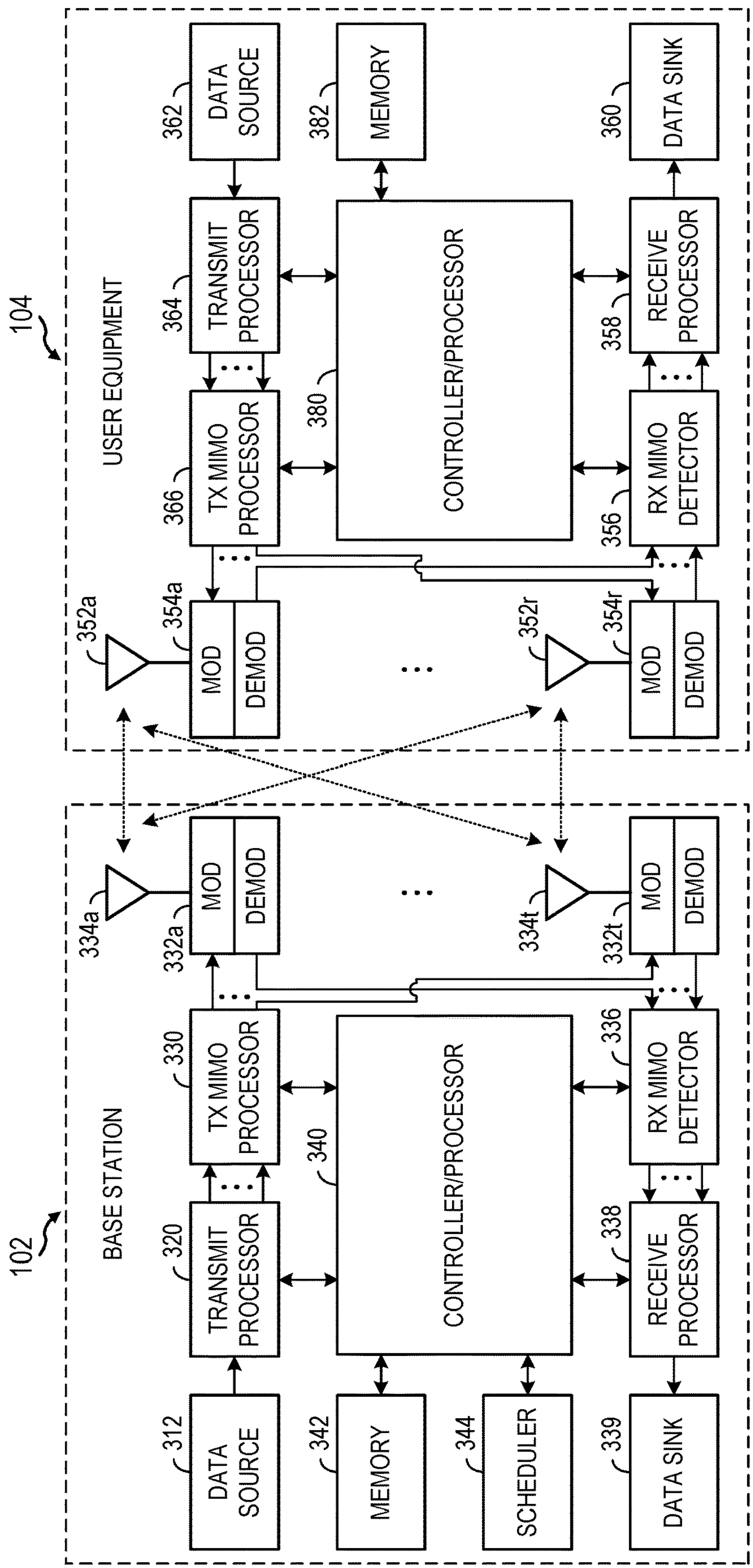

104
USER EQUIPMENT
362
DATA SOURCE
382
MEMORY
360
DATA SINK
364
TRANSMIT PROCESSOR
380
CONTROLLER/PROCESSOR
358
RECEIVE PROCESSOR
366
TX MIMO PROCESSOR
356
RX MIMO DETECTOR
352a
354a
MOD
DEMOD
352r
354r
MOD
DEMOD
102
BASE STATION
334a
332a
MOD
DEMOD
334t
332t
MOD
DEMOD
330
TX MIMO PROCESSOR
340
CONTROLLER/PROCESSOR
336
RX MIMO DETECTOR
320
TRANSMIT PROCESSOR
338
RECEIVE PROCESSOR
312
DATA SOURCE
342
MEMORY
344
SCHEDULER
339
DATA SINK

FIG. 3

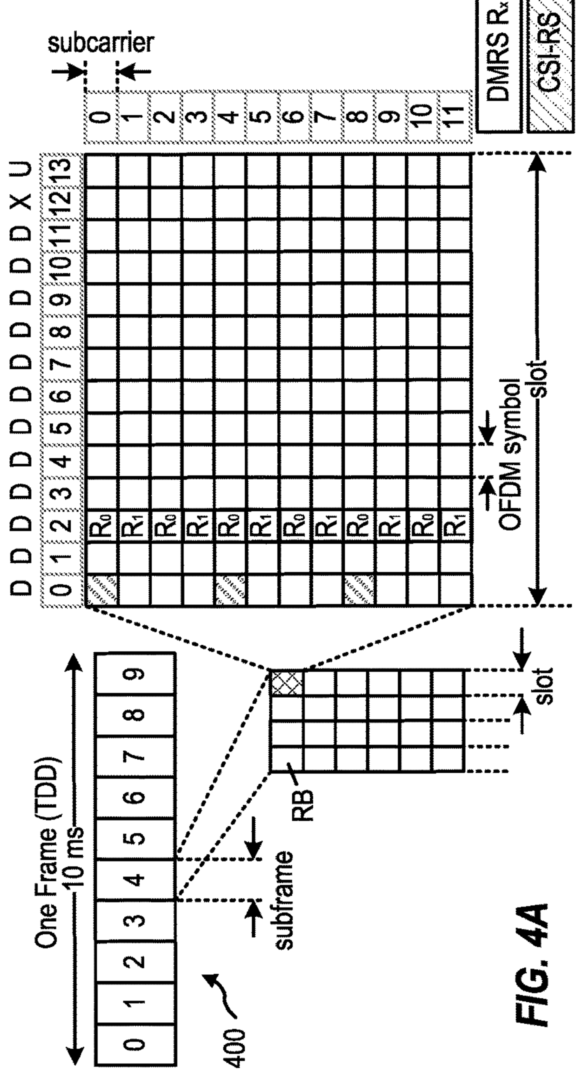


FIG. 4A

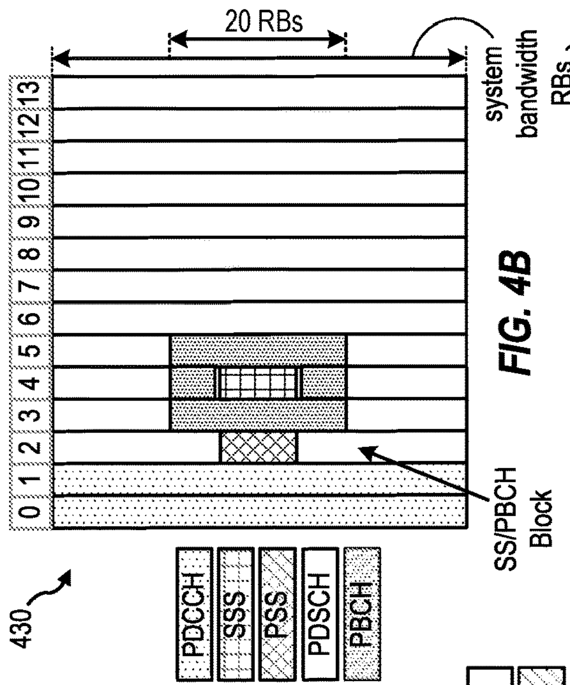


FIG. 4B

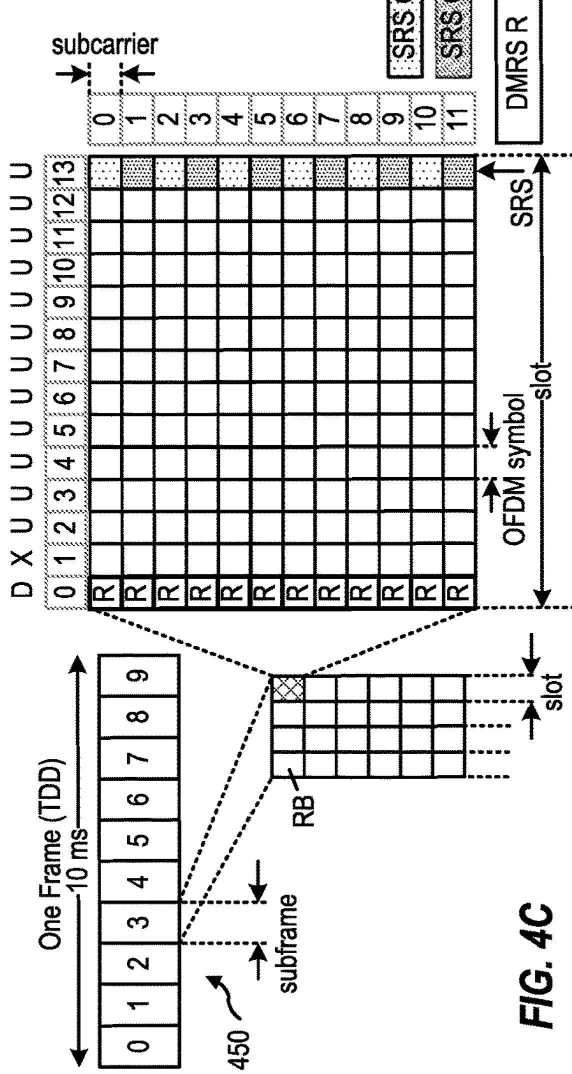


FIG. 4C

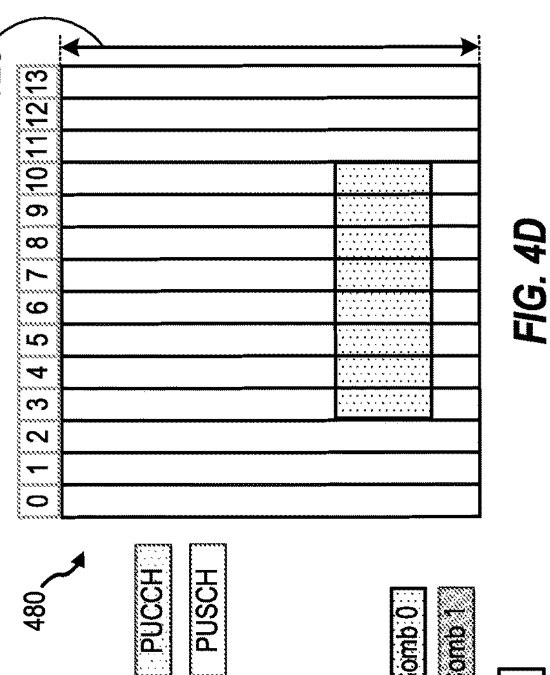


FIG. 4D

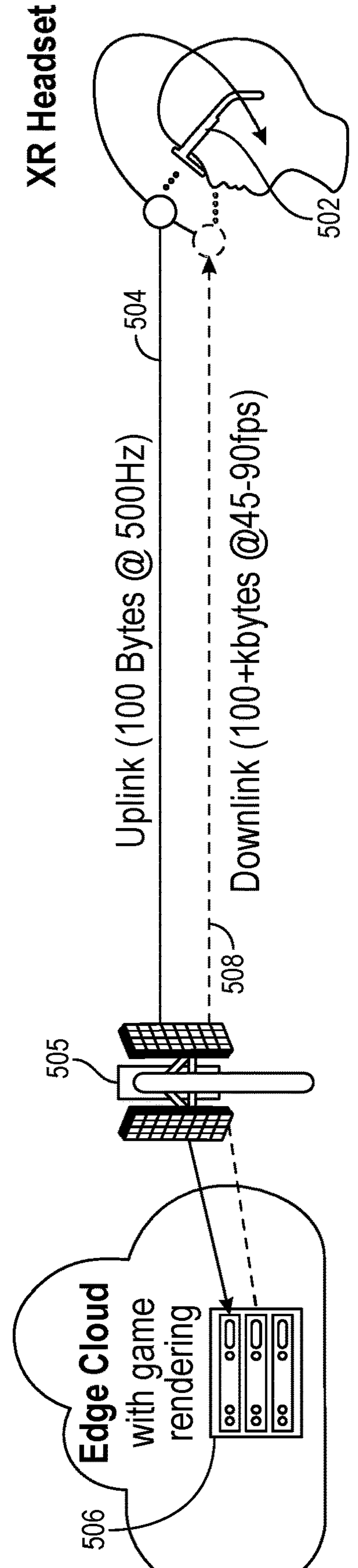

XR Headset
502
504
Uplink (100 Bytes @ 500Hz)
Downlink (100+kbytes @45-90fps)
508
505
Edge Cloud
with game
rendering
506

FIG. 5

```
MeasGapConfig ::= SEQUENCE {
   gapFR2                     SetupRelease { GapConfig } OPTIONAL, -- Need M
   gapFR1                     SetupRelease { GapConfig } OPTIONAL, -- Need M
   gapUE                      SetupRelease { GapConfig } OPTIONAL -- Need M
}
GapConfig ::= SEQUENCE {
   gapOffset                  INTEGER (0..159),
   mgl                        ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6},
   mgrp                       ENUMERATED {ms20, ms40, ms80, ms160},
   mgta                       ENUMERATED {ms0, ms0dot25, ms0dot5},
   refServCellIndicator       ENUMERATED {pCell, pSCell, mcg-FR2}
}
```

FIG. 6A

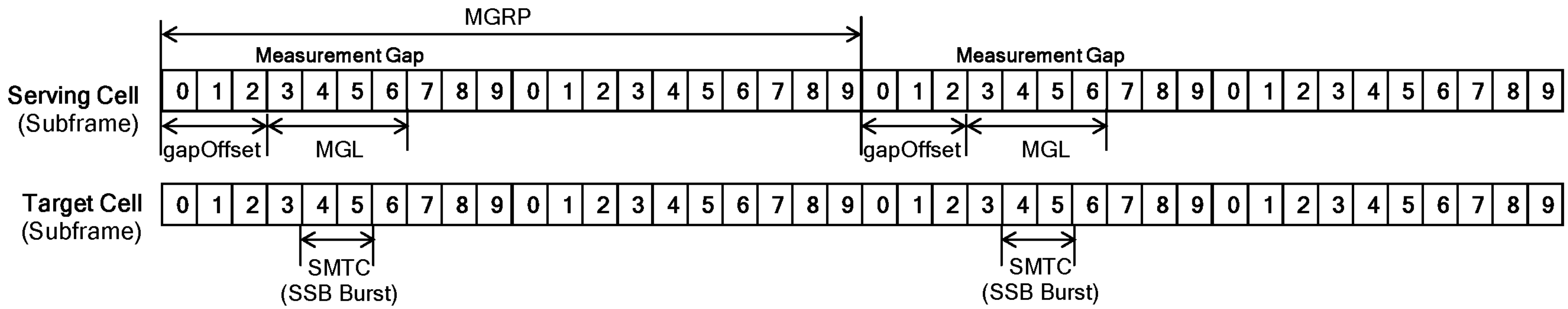
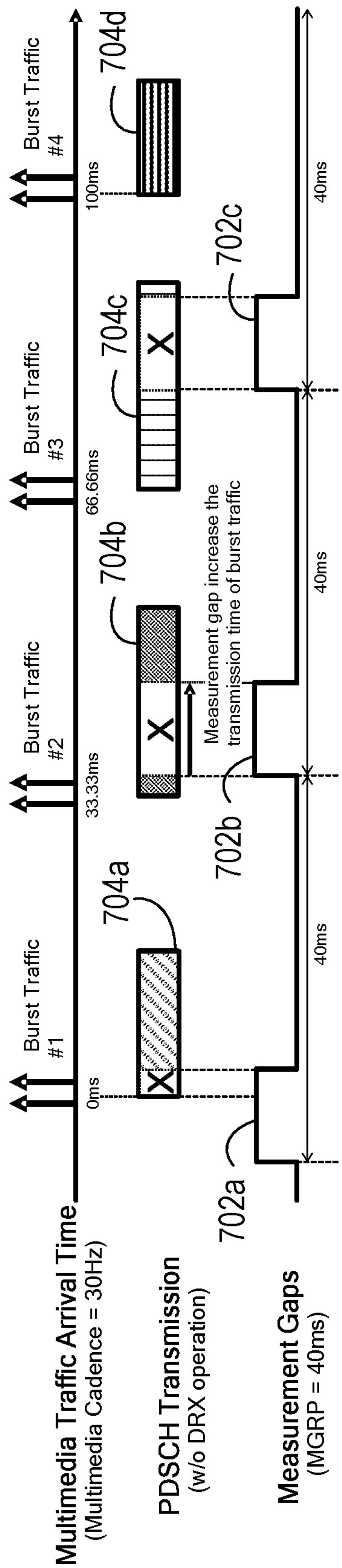
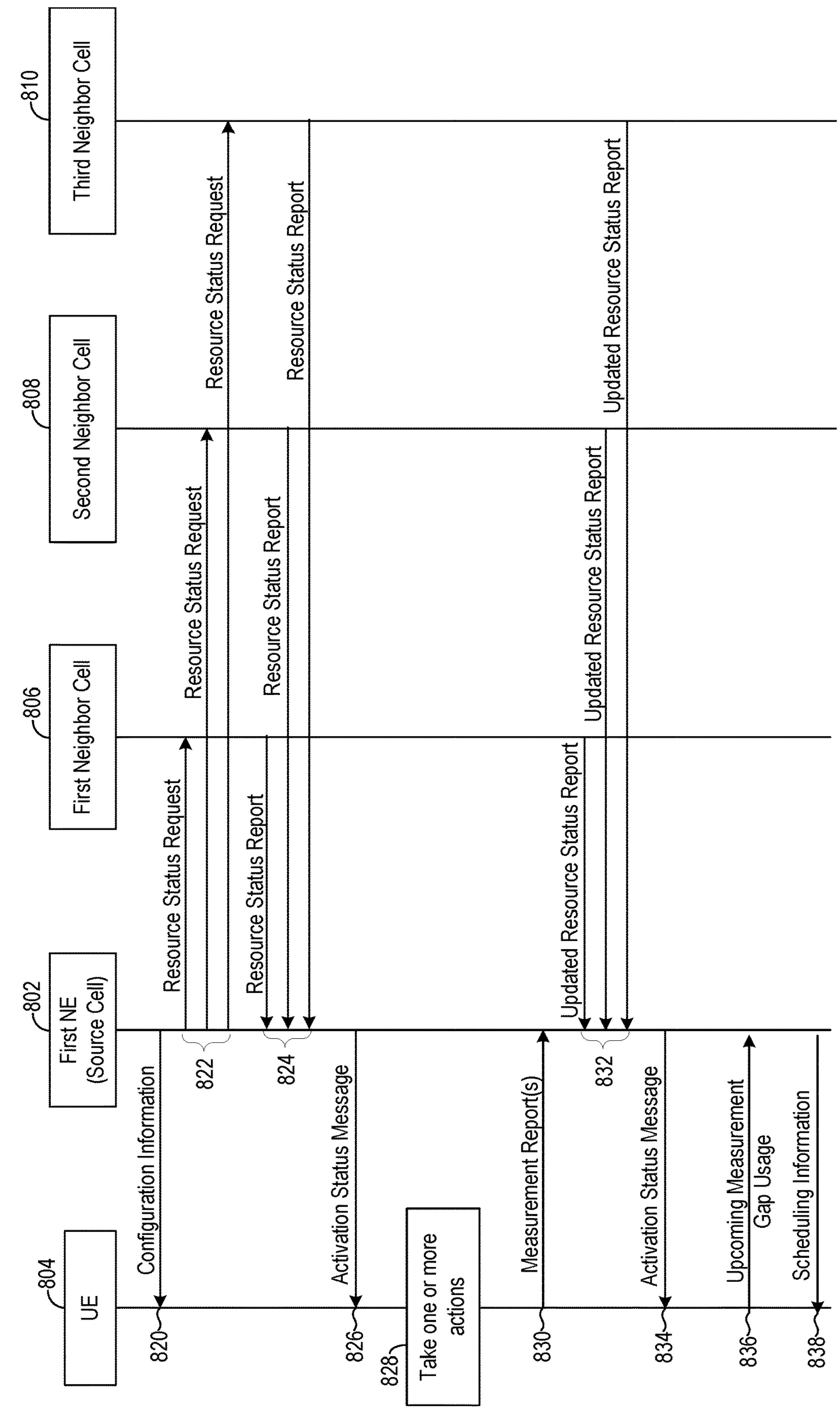


FIG. 6B



Multimedia Traffic Arrival Time
(Multimedia Cadence = 30Hz)
PDSCH Transmission
(w/o DRX operation)
Measurement Gaps
(MGRP = 40ms)
Burst Traffic #1
Burst Traffic #2
Burst Traffic #3
Burst Traffic #4
0ms
33.33ms
66.66ms
100ms
704a
704b
704c
704d
702a
702b
702c
X
X
X
Measurement gap increase the transmission time of burst traffic
40ms
40ms
40ms

FIG. 7



UE
804
First NE
(Source Cell)
802
First Neighbor Cell
806
Second Neighbor Cell
808
Third Neighbor Cell
810
Configuration Information
820
Resource Status Request
Resource Status Request
Resource Status Request
822
Resource Status Report
Resource Status Report
Resource Status Report
824
Activation Status Message
826
Take one or more actions
828
Measurement Report(s)
830
Updated Resource Status Report
Updated Resource Status Report
Updated Resource Status Report
832
Activation Status Message
834
Upcoming Measurement Gap Usage
836
Scheduling Information
838

FIG. 8

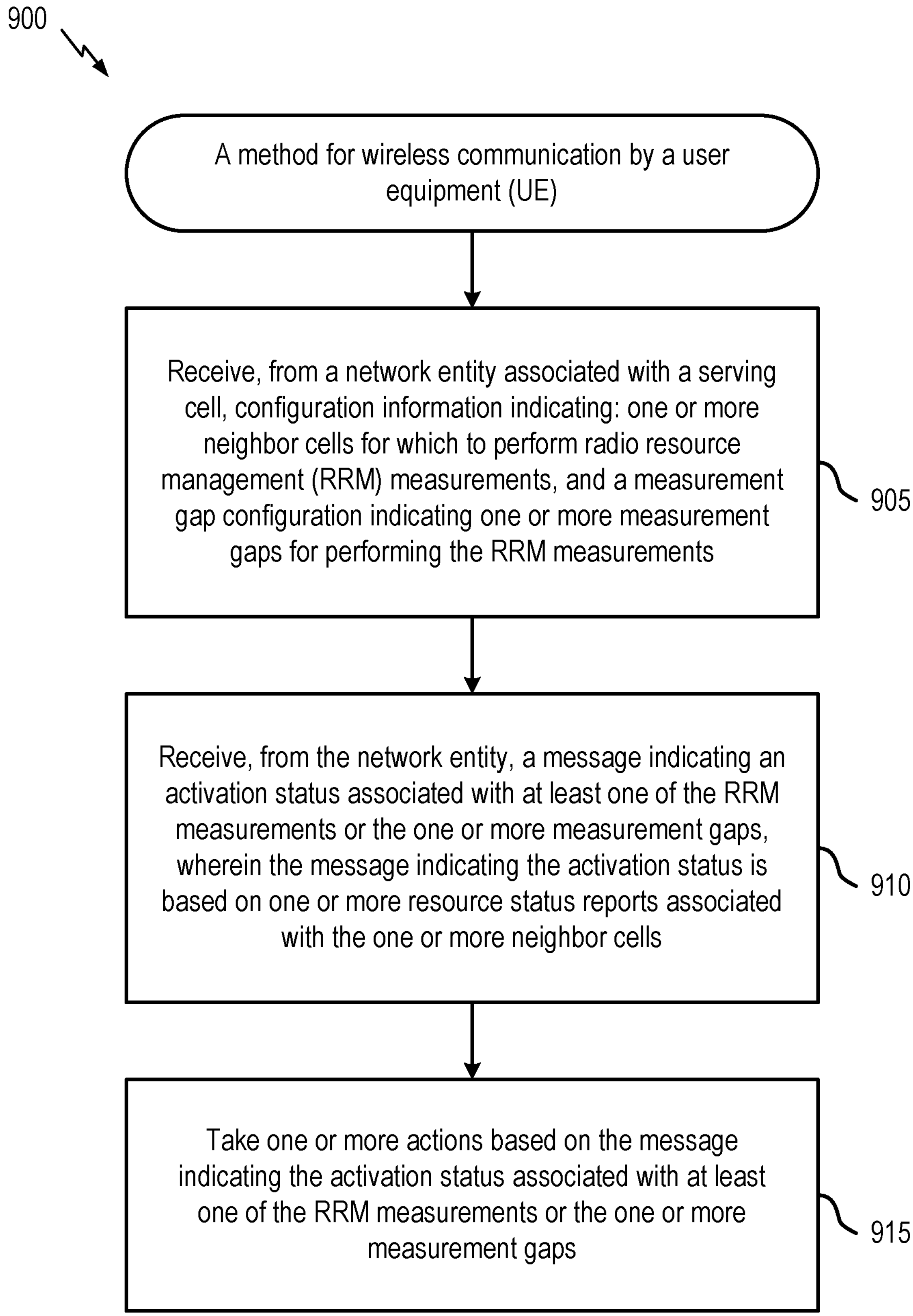

900
A method for wireless communication by a user equipment (UE)
Receive, from a network entity associated with a serving cell, configuration information indicating: one or more neighbor cells for which to perform radio resource management (RRM) measurements, and a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements
905
Receive, from the network entity, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps, wherein the message indicating the activation status is based on one or more resource status reports associated with the one or more neighbor cells
910
Take one or more actions based on the message indicating the activation status associated with at least one of the RRM measurements or the one or more measurement gaps
915

FIG. 9

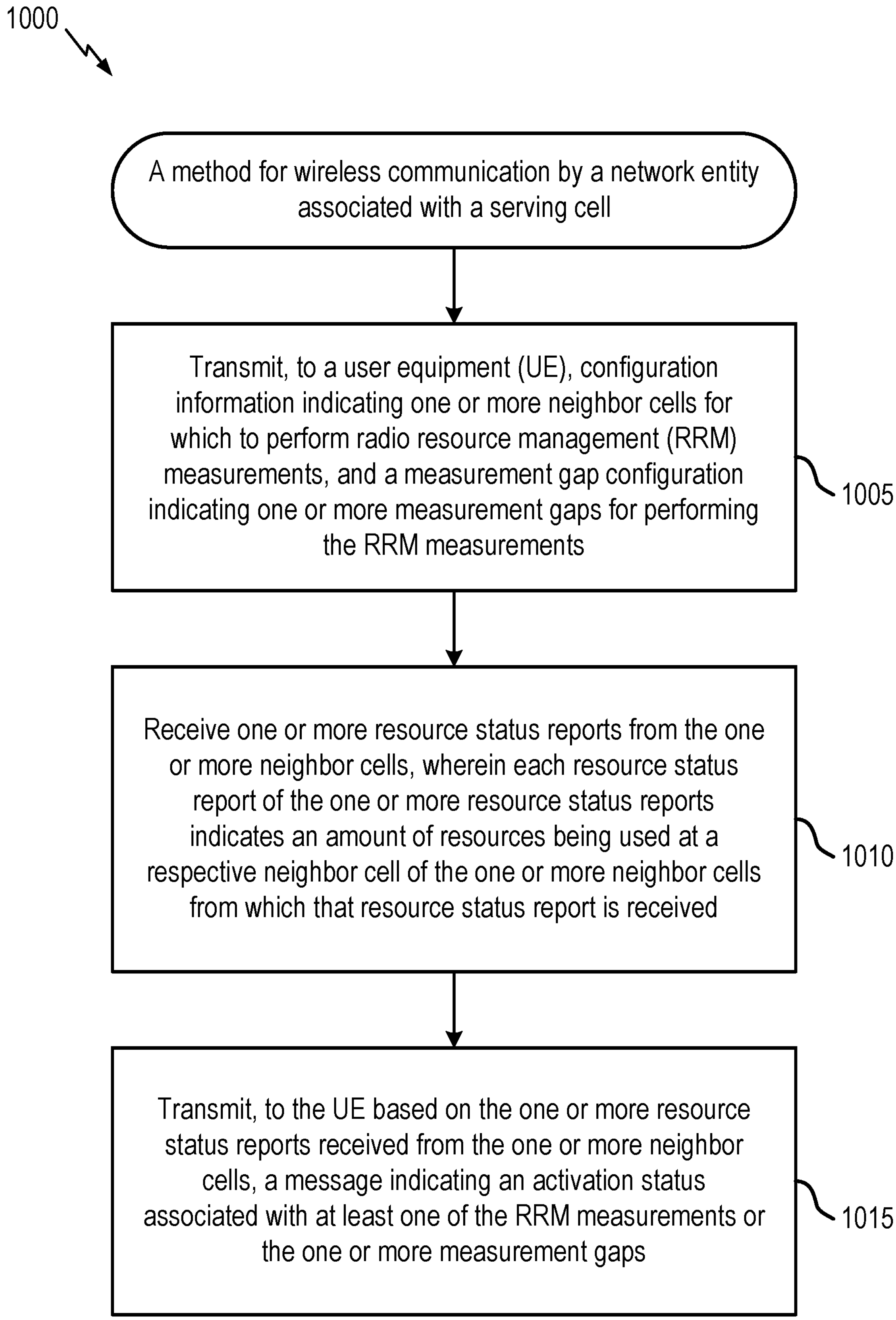

1000
A method for wireless communication by a network entity associated with a serving cell
Transmit, to a user equipment (UE), configuration information indicating one or more neighbor cells for which to perform radio resource management (RRM) measurements, and a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements
1005
Receive one or more resource status reports from the one or more neighbor cells, wherein each resource status report of the one or more resource status reports indicates an amount of resources being used at a respective neighbor cell of the one or more neighbor cells from which that resource status report is received
1010
Transmit, to the UE based on the one or more resource status reports received from the one or more neighbor cells, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps
1015

FIG. 10

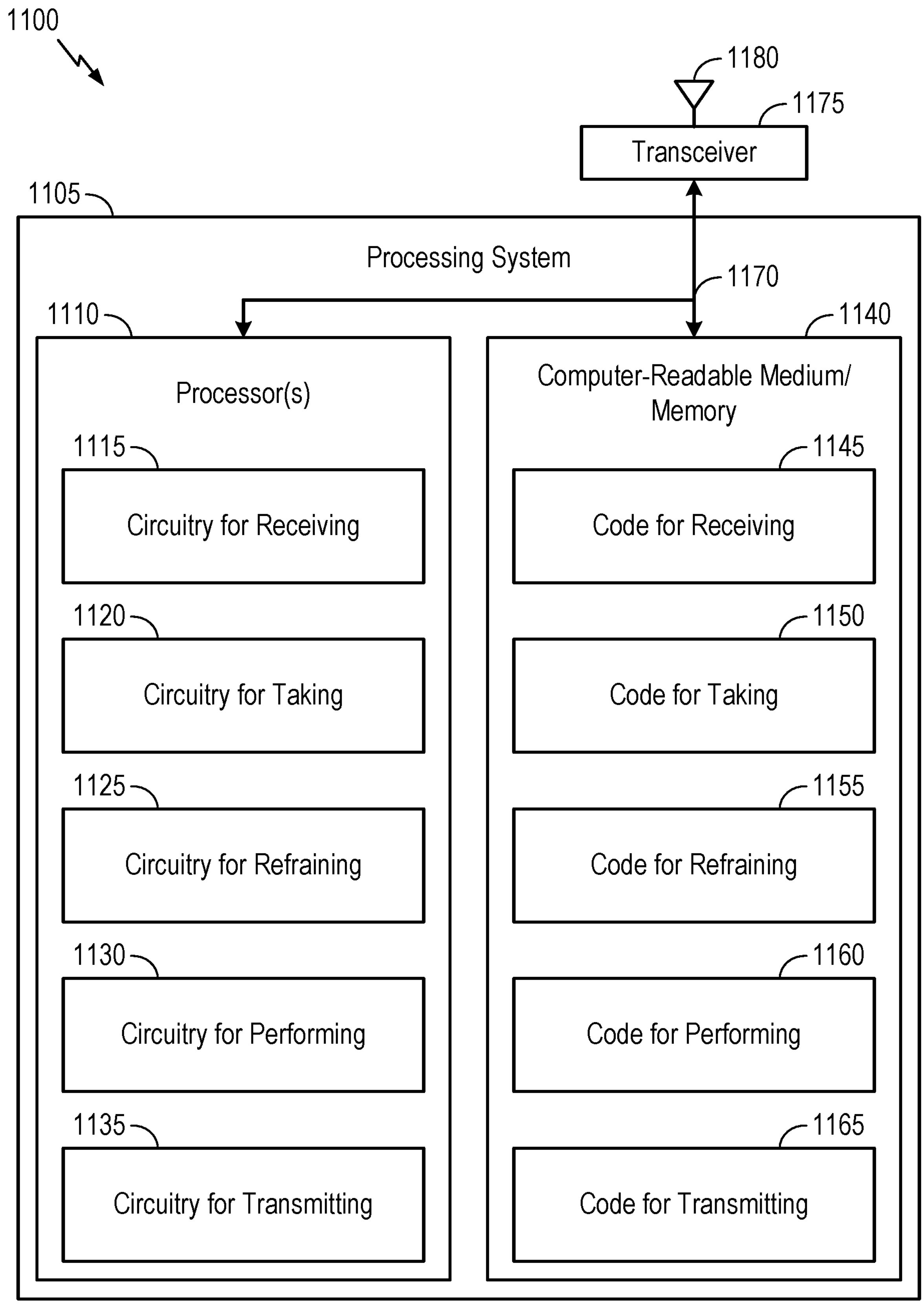

1100
1180
1175
Transceiver
1105
Processing System
1170
1110
1140
Processor(s)
Computer-Readable Medium/
Memory
1115
Circuitry for Receiving
1145
Code for Receiving
1120
Circuitry for Taking
1150
Code for Taking
1125
Circuitry for Refraining
1155
Code for Refraining
1130
Circuitry for Performing
1160
Code for Performing
1135
Circuitry for Transmitting
1165
Code for Transmitting

FIG. 11

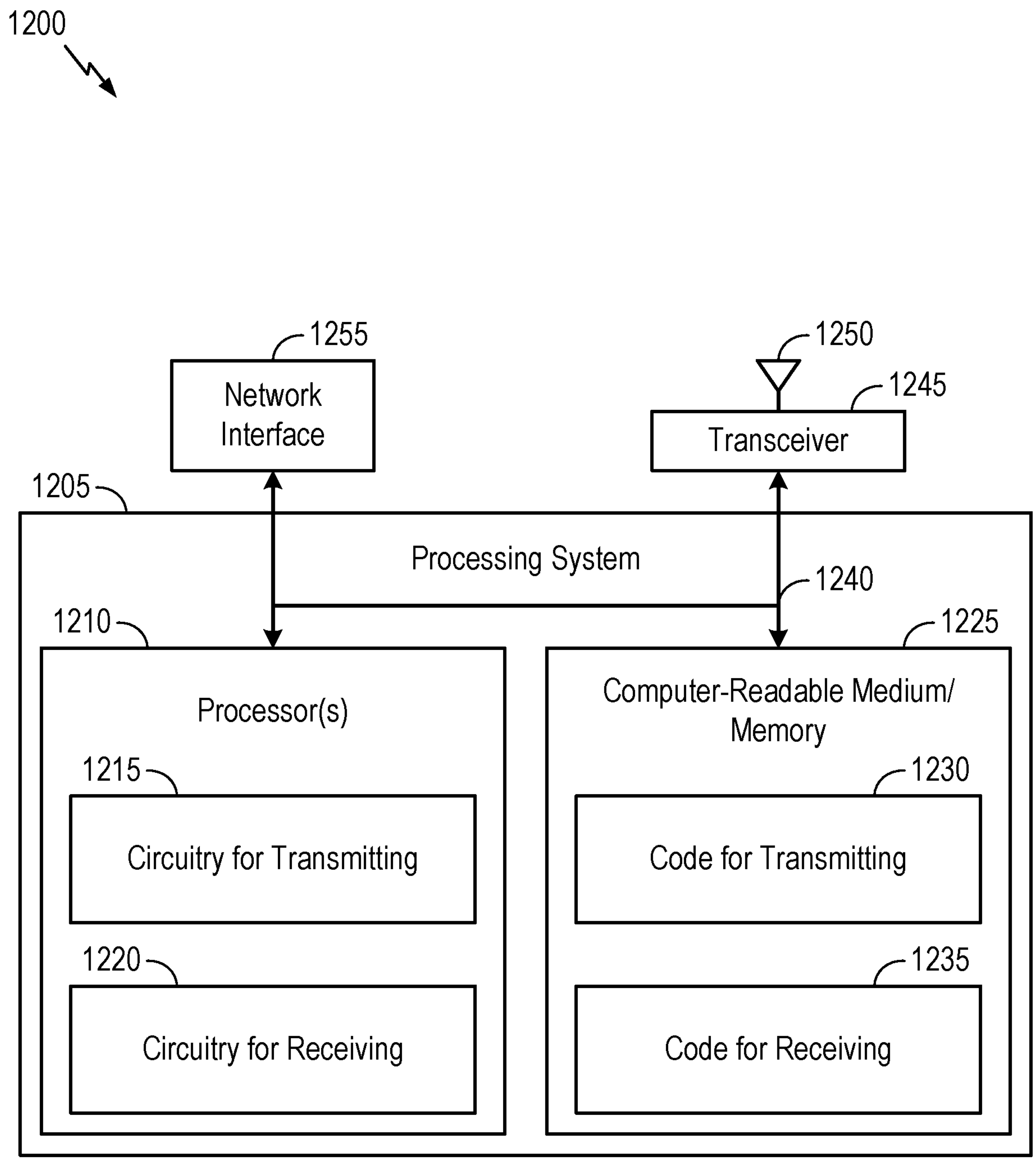

1200
1255
Network Interface
1250
1245
Transceiver
1205
Processing System
1240
1210
1225
Processor(s)
Computer-Readable Medium/ Memory
1215
Circuitry for Transmitting
1230
Code for Transmitting
1220
Circuitry for Receiving
1235
Code for Receiving

FIG. 12

ENHANCED RRM MEASUREMENTS FOR LATENCY-SENSITIVE TRAFFIC

BACKGROUND

Field of the Disclosure

[0001] Aspects of the present disclosure relate to wireless communications, and more particularly, to techniques for radio resource management (RRM) measurement enhancements for latency-sensitive traffic.

Description of Related Art

[0002] Wireless communications systems are widely deployed to provide various telecommunication services such as telephony, video, data, messaging, broadcasts, or other similar types of services. These wireless communications systems may employ multiple-access technologies capable of supporting communications with multiple users by sharing available wireless communications system resources with those users.

[0003] Although wireless communications systems have made great technological advancements over many years, challenges still exist. For example, complex and dynamic environments can still attenuate or block signals between wireless transmitters and wireless receivers. Accordingly, there is a continuous desire to improve the technical performance of wireless communications systems, including, for example: improving speed and data carrying capacity of communications, improving efficiency of the use of shared communications mediums, reducing power used by transmitters and receivers while performing communications, improving reliability of wireless communications, avoiding redundant transmissions and/or receptions and related processing, improving the coverage area of wireless communications, increasing the number and types of devices that can access wireless communications systems, increasing the ability for different types of devices to intercommunicate, increasing the number and type of wireless communications mediums available for use, and the like. Consequently, there exists a need for further improvements in wireless communications systems to overcome the aforementioned technical challenges and others.

SUMMARY

[0004] One aspect provides a method for wireless communication by a network entity associated with a serving cell. The method includes transmitting, to a user equipment (UE), configuration information indicating: one or more neighbor cells for which to perform radio resource management (RRM) measurements; and a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements; receiving one or more resource status reports from the one or more neighbor cells, wherein each resource status report of the one or more resource status reports indicates an amount of resources being used at a respective neighbor cell of the one or more neighbor cells from which that resource status report is received; and transmitting, to the UE based on the one or more resource status reports received from the one or more neighbor cells, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

[0005] Another aspect provides a method for wireless communication by a UE. The method includes receiving, from a network entity associated with a serving cell, configuration information indicating: one or more neighbor cells for which to perform RRM measurements; and a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements; receiving, from the network entity, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps, wherein the message indicating the activation status is based on one or more resource status reports associated with the one or more neighbor cells; and taking one or more actions based on the message indicating the activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

[0006] Other aspects provide: an apparatus operable, configured, or otherwise adapted to perform any one or more of the aforementioned methods and/or those described elsewhere herein; a non-transitory, computer-readable media comprising instructions that, when executed by one or more processors of an apparatus, cause the apparatus to perform the aforementioned methods as well as those described elsewhere herein; a computer program product embodied on a computer-readable storage medium comprising code for performing the aforementioned methods as well as those described elsewhere herein; and/or an apparatus comprising means for performing the aforementioned methods as well as those described elsewhere herein. By way of example, an apparatus may comprise a processing system, a device with a processing system, or processing systems cooperating over one or more networks.

[0007] The following description and the appended figures set forth certain features for purposes of illustration.

BRIEF DESCRIPTION OF DRAWINGS

[0008] The appended figures depict certain features of the various aspects described herein and are not to be considered limiting of the scope of this disclosure.

[0009] FIG. **1** depicts an example wireless communications network.

[0010] FIG. **2** depicts an example disaggregated base station architecture.

[0011] FIG. **3** depicts aspects of an example base station and an example user equipment.

[0012] FIGS. **4**A, **4**B, **4**C, and **4**D depict various example aspects of data structures for a wireless communications network.

[0013] FIG. **5** depicts an example extended reality (XR) scenario.

[0014] FIG. **6**A and FIG. **6**B depict example measurement gap configurations.

[0015] FIG. **7** depicts an example of the potential impact of measurement gaps on burst traffic.

[0016] FIG. **8** depicts a process flow for communications in a network between a first network entity associated with a source cell, a user equipment, and one or more neighbor cells.

[0017] FIG. **9** depicts a method for wireless communications.

[0018] FIG. **10** depicts a method for wireless communications.

[0019] FIG. **11** depicts aspects of an example communications device.

[0020] FIG. **12** depicts aspects of an example communications device.

DETAILED DESCRIPTION

[0021] Aspects of the present disclosure provide apparatuses, methods, processing systems, and computer-readable mediums for enhanced radio resource management (RRM) measurements for latency-sensitive traffic.

[0022] For example, in 5G NR systems, a UE operating in multi-frequency cellular networks is typically configured with measurement gaps, in which the UE intermittently suspends data transmission to perform radio resource management (RRM) measurements for neighboring cells. These RRM measurements may be provided to a serving cell of the UE and used to make handover decisions for the UE. In other words, the serving cell may use the RRM measurements to decide whether to hand the UE over to one of the neighboring cells that may be better suited to serve the UE.

[0023] In some cases, these measurement gaps may be problematic for certain types of traffic, such as latency sensitive multimedia data traffic (e.g., extended reality (XR), virtual reality (VR), augmented reality (AR), etc.), which are expected to be delivered within a certain packet delay budget (e.g., 10 ms). For example, because the measurement gap has a higher priority than the normal data traffic in current systems, the UE may be unable to receive or transmit any traffic data during a time period corresponding to the measurement gaps. As such, the measurement gaps may increase the transmission time for the latency sensitive multimedia data traffic, making it difficult to meet the PDB requirements for this traffic.

[0024] Additionally, while the RRM measurements and measurement gaps serve an important purpose (e.g., allowing the UE to be handed over to a neighbor cell that is better suited to serve the UE), there may be scenarios in which one or more neighbor cells that the UE is configured to perform the RRM measurements for is heavily loaded and unable to serve the UE. In such cases, since the one or more neighbor cells are unable to serve the UE, performing the RRM measurements during one or more measurement gaps for these neighbor cells would be counterproductive and would unnecessarily delay communication of the latency sensitive multimedia data traffic, leading to poor user experience.

[0025] Accordingly, aspects of the present disclosure provide techniques for improving RRM measurements for latency-sensitive multimedia data traffic described above. For example, in some cases, rather that forcing a UE to perform RRM measurements for every neighbor cell, performance of these RRM measurements may be based, for example, on resource status reports of the neighbor cells. More specifically, for example, a network entity of a serving cell of the UE may receive one or more resource status reports from one or more neighbor cells of the UE, which may indicate an amount of resources being used at a respective neighbor cell of the one or more neighbor cells from which the resource status reports are received. The network entity of the serving cell may then transmit, to the UE based on the one or more resource status reports received from the one or more neighbor cells, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

[0026] In some cases, the UE may be able to refrain from performing one or more RRM measurements when the activation status indicates that at least one of the RRM measurements or the one or more measurement gaps are deactivated. Deactivating certain RRM measurements and/or measurement gaps may reduce the impacts that the measurement gaps and RRM measurements have on the transmission time of the latency-sensitive multimedia data traffic and may, thus, improve user experience related to latency-sensitive services. For example, the fewer RRM measurements the UE has to perform, the less often the UE needs the measurement gaps, resulting in the latency-sensitive multimedia data traffic being subject to less interruption time.

Introduction to Wireless Communications Networks

[0027] The techniques and methods described herein may be used for various wireless communications networks. While aspects may be described herein using terminology commonly associated with 3G, 4G, and/or 5G wireless technologies, aspects of the present disclosure may likewise be applicable to other communications systems and standards not explicitly mentioned herein.

[0028] FIG. **1** depicts an example of a wireless communications network **100**, in which aspects described herein may be implemented.

[0029] Generally, wireless communications network **100** includes various network entities (alternatively, network elements or network nodes). A network entity is generally a communications device and/or a communications function performed by a communications device (e.g., a user equipment (UE), a base station (BS), a component of a BS, a server, etc.). For example, various functions of a network as well as various devices associated with and interacting with a network may be considered network entities. Further, wireless communications network **100** includes terrestrial aspects, such as ground-based network entities (e.g., BSs **102**), and non-terrestrial aspects, such as satellite **140** and aircraft **145**, which may include network entities on-board (e.g., one or more BSs) capable of communicating with other network elements (e.g., terrestrial BSs) and user equipments.

[0030] In the depicted example, wireless communications network **100** includes BSs **102**, UEs **104**, and one or more core networks, such as an Evolved Packet Core (EPC) 160 and 5G Core (5GC) network **190**, which interoperate to provide communications services over various communications links, including wired and wireless links.

[0031] FIG. **1** depicts various example UEs **104**, which may more generally include: a cellular phone, smart phone, session initiation protocol (SIP) phone, laptop, personal digital assistant (PDA), satellite radio, global positioning system, multimedia device, video device, digital audio player, camera, game console, tablet, smart device, wearable device, vehicle, electric meter, gas pump, large or small kitchen appliance, healthcare device, implant, sensor/actuator, display, internet of things (IoT) devices, always on (AON) devices, edge processing devices, or other similar devices. UEs **104** may also be referred to more generally as a mobile device, a wireless device, a wireless communications device, a station, a mobile station, a subscriber station, a mobile subscriber station, a mobile unit, a subscriber unit, a wireless unit, a remote unit, a remote device, an access terminal, a mobile terminal, a wireless terminal, a remote terminal, a handset, and others.

[0032] BSs **102** wirelessly communicate with (e.g., transmit signals to or receive signals from) UEs **104** via communications links **120**. The communications links **120** between BSs **102** and UEs **104** may include uplink (UL) (also referred to as reverse link) transmissions from a UE **104** to a BS **102** and/or downlink (DL) (also referred to as forward link) transmissions from a BS **102** to a UE **104**. The communications links **120** may use multiple-input and multiple-output (MIMO) antenna technology, including spatial multiplexing, beamforming, and/or transmit diversity in various aspects.

[0033] BSs **102** may generally include: a NodeB, enhanced NodeB (eNB), next generation enhanced NodeB (ng-eNB), next generation NodeB (gNB or gNodeB), access point, base transceiver station, radio base station, radio transceiver, transceiver function, transmission reception point, and/or others. Each of BSs **102** may provide communications coverage for a respective geographic coverage area **110**, which may sometimes be referred to as a cell, and which may overlap in some cases (e.g., small cell **102'** may have a coverage area **110'** that overlaps the coverage area **110** of a macro cell). A BS may, for example, provide communications coverage for a macro cell (covering relatively large geographic area), a pico cell (covering relatively smaller geographic area, such as a sports stadium), a femto cell (relatively smaller geographic area (e.g., a home)), and/or other types of cells.

[0034] While BSs **102** are depicted in various aspects as unitary communications devices, BSs **102** may be implemented in various configurations. For example, one or more components of a base station may be disaggregated, including a central unit (CU), one or more distributed units (DUs), one or more radio units (RUs), a Near-Real Time (Near-RT) RAN Intelligent Controller (RIC), or a Non-Real Time (Non-RT) RIC, to name a few examples. In another example, various aspects of a base station may be virtualized. More generally, a base station (e.g., BS **102**) may include components that are located at a single physical location or components located at various physical locations. In examples in which a base station includes components that are located at various physical locations, the various components may each perform functions such that, collectively, the various components achieve functionality that is similar to a base station that is located at a single physical location. In some aspects, a base station including components that are located at various physical locations may be referred to as a disaggregated radio access network architecture, such as an Open RAN (O-RAN) or Virtualized RAN (VRAN) architecture. FIG. **2** depicts and describes an example disaggregated base station architecture.

[0035] Different BSs **102** within wireless communications network **100** may also be configured to support different radio access technologies, such as 3G, 4G, and/or 5G. For example, BSs **102** configured for 4G LTE (collectively referred to as Evolved Universal Mobile Telecommunications System (UMTS) Terrestrial Radio Access Network (E-UTRAN)) may interface with the EPC **160** through first backhaul links **132** (e.g., an SI interface). BSs **102** configured for 5G (e.g., 5G NR or Next Generation RAN (NG-RAN)) may interface with 5GC **190** through second backhaul links **184**. BSs **102** may communicate directly or indirectly (e.g., through the EPC **160** or 5GC **190**) with each other over third backhaul links **134** (e.g., X2 interface), which may be wired or wireless.

[0036] Wireless communications network **100** may subdivide the electromagnetic spectrum into various classes, bands, channels, or other features. In some aspects, the subdivision is provided based on wavelength and frequency, where frequency may also be referred to as a carrier, a subcarrier, a frequency channel, a tone, or a subband. For example, 3GPP currently defines Frequency Range 1 (FR1) as including 410 MHz-7125 MHz, which is often referred to (interchangeably) as "Sub-6 GHz". Similarly, 3GPP currently defines Frequency Range 2 (FR2) as including 24,250 MHz-71,000 MHz, which is sometimes referred to (interchangeably) as a "millimeter wave" ("mmW" or "mm Wave"). In some cases, FR2 may be further defined in terms of sub-ranges, such as a first sub-range FR2-1 including 24,250 MHz-52,600 MHz and a second sub-range FR2-2 including 52,600 MHz-71,000 MHz. A base station configured to communicate using mm Wave/near mmWave radio frequency bands (e.g., a mmWave base station such as BS **180**) may utilize beamforming (e.g., **182**) with a UE (e.g., **104**) to improve path loss and range.

[0037] The communications links **120** between BSs **102** and, for example, UEs **104**, may be through one or more carriers, which may have different bandwidths (e.g., 5, 10, 15, 20, 100, 400, and/or other MHz), and which may be aggregated in various aspects. Carriers may or may not be adjacent to each other. Allocation of carriers may be asymmetric with respect to DL and UL (e.g., more or fewer carriers may be allocated for DL than for UL).

[0038] Communications using higher frequency bands may have higher path loss and a shorter range compared to lower frequency communications. Accordingly, certain base stations (e.g., **180** in FIG. **1**) may utilize beamforming **182** with a UE **104** to improve path loss and range. For example, BS **180** and the UE **104** may each include a plurality of antennas, such as antenna elements, antenna panels, and/or antenna arrays to facilitate the beamforming. In some cases, BS **180** may transmit a beamformed signal to UE **104** in one or more transmit directions **182'**. UE **104** may receive the beamformed signal from the BS **180** in one or more receive directions **182"**. UE **104** may also transmit a beamformed signal to the BS **180** in one or more transmit directions **182"**. BS **180** may also receive the beamformed signal from UE **104** in one or more receive directions **182'**. BS **180** and UE **104** may then perform beam training to determine the best receive and transmit directions for each of BS **180** and UE **104**. Notably, the transmit and receive directions for BS **180** may or may not be the same. Similarly, the transmit and receive directions for UE **104** may or may not be the same.

[0039] Wireless communications network **100** further includes a Wi-Fi AP **150** in communication with Wi-Fi stations (STAs) **152** via communications links **154** in, for example, a 2.4 GHz and/or 5 GHz unlicensed frequency spectrum.

[0040] Certain UEs **104** may communicate with each other using device-to-device (D2D) communications link **158**. D2D communications link **158** may use one or more sidelink channels, such as a physical sidelink broadcast channel (PSBCH), a physical sidelink discovery channel (PSDCH), a physical sidelink shared channel (PSSCH), a physical sidelink control channel (PSCCH), and/or a physical sidelink feedback channel (PSFCH).

[0041] EPC **160** may include various functional components, including: a Mobility Management Entity (MME) **162**, other MMEs **164**, a Serving Gateway **166**, a Multimedia Broadcast Multicast Service (MBMS) Gateway **168**, a Broadcast Multicast Service Center (BM-SC) **170**, and/or a

Packet Data Network (PDN) Gateway **172**, such as in the depicted example. MME **162** may be in communication with a Home Subscriber Server (HSS) **174**. MME **162** is the control node that processes the signaling between the UEs **104** and the EPC **160**. Generally, MME **162** provides bearer and connection management.

[0042] Generally, user Internet protocol (IP) packets are transferred through Serving Gateway **166**, which itself is connected to PDN Gateway **172**. PDN Gateway **172** provides UE IP address allocation as well as other functions. PDN Gateway **172** and the BM-SC **170** are connected to IP Services **176**, which may include, for example, the Internet, an intranet, an IP Multimedia Subsystem (IMS), a Packet Switched (PS) streaming service, and/or other IP services.

[0043] BM-SC **170** may provide functions for MBMS user service provisioning and delivery. BM-SC **170** may serve as an entry point for content provider MBMS transmission, may be used to authorize and initiate MBMS Bearer Services within a public land mobile network (PLMN), and/or may be used to schedule MBMS transmissions. MBMS Gateway **168** may be used to distribute MBMS traffic to the BSs **102** belonging to a Multicast Broadcast Single Frequency Network (MBSFN) area broadcasting a particular service, and/or may be responsible for session management (start/stop) and for collecting eMBMS related charging information.

[0044] 5GC **190** may include various functional components, including: an Access and Mobility Management Function (AMF) **192**, other AMFs **193**, a Session Management Function (SMF) **194**, and a User Plane Function (UPF) **195**. AMF **192** may be in communication with Unified Data Management (UDM) **196**.

[0045] AMF **192** is a control node that processes signaling between UEs **104** and 5GC **190**. AMF **192** provides, for example, quality of service (QoS) flow and session management.

[0046] Internet protocol (IP) packets are transferred through UPF **195**, which is connected to the IP Services **197**, and which provides UE IP address allocation as well as other functions for 5GC **190**. IP Services **197** may include, for example, the Internet, an intranet, an IMS, a PS streaming service, and/or other IP services.

[0047] In various aspects, a network entity or network node can be implemented as an aggregated base station, as a disaggregated base station, a component of a base station, an integrated access and backhaul (IAB) node, a relay node, a sidelink node, to name a few examples.

[0048] FIG. **2** depicts an example disaggregated base station **200** architecture. The disaggregated base station **200** architecture may include one or more central units (CUs) **210** that can communicate directly with a core network **220** via a backhaul link, or indirectly with the core network **220** through one or more disaggregated base station units (such as a Near-Real Time (Near-RT) RAN Intelligent Controller (RIC) **225** via an E2 link, or a Non-Real Time (Non-RT) RIC **215** associated with a Service Management and Orchestration (SMO) Framework **205**, or both). A CU **210** may communicate with one or more distributed units (DUs) **230** via respective midhaul links, such as an F1 interface. The DUs **230** may communicate with one or more radio units (RUs) **240** via respective fronthaul links. The RUs **240** may communicate with respective UEs **104** via one or more radio frequency (RF) access links. In some implementations, the UE **104** may be simultaneously served by multiple RUs **240**.

[0049] Each of the units, e.g., the CUS **210**, the DUs **230**, the RUs **240**, as well as the Near-RT RICs **225**, the Non-RT RICs **215** and the SMO Framework **205**, may include one or more interfaces or be coupled to one or more interfaces configured to receive or transmit signals, data, or information (collectively, signals) via a wired or wireless transmission medium. Each of the units, or an associated processor or controller providing instructions to the communications interfaces of the units, can be configured to communicate with one or more of the other units via the transmission medium. For example, the units can include a wired interface configured to receive or transmit signals over a wired transmission medium to one or more of the other units. Additionally or alternatively, the units can include a wireless interface, which may include a receiver, a transmitter or transceiver (such as a radio frequency (RF) transceiver), configured to receive or transmit signals, or both, over a wireless transmission medium to one or more of the other units.

[0050] In some aspects, the CU **210** may host one or more higher layer control functions. Such control functions can include radio resource control (RRC), packet data convergence protocol (PDCP), service data adaptation protocol (SDAP), or the like. Each control function can be implemented with an interface configured to communicate signals with other control functions hosted by the CU **210**. The CU **210** may be configured to handle user plane functionality (e.g., Central Unit-User Plane (CU-UP)), control plane functionality (e.g., Central Unit-Control Plane (CU-CP)), or a combination thereof. In some implementations, the CU **210** can be logically split into one or more CU-UP units and one or more CU-CP units. The CU-UP unit can communicate bidirectionally with the CU-CP unit via an interface, such as the E1 interface when implemented in an O-RAN configuration. The CU **210** can be implemented to communicate with the DU **230**, as necessary, for network control and signaling.

[0051] The DU **230** may correspond to a logical unit that includes one or more base station functions to control the operation of one or more RUs **240**. In some aspects, the DU **230** may host one or more of a radio link control (RLC) layer, a medium access control (MAC) layer, and one or more high physical (PHY) layers (such as modules for forward error correction (FEC) encoding and decoding, scrambling, modulation and demodulation, or the like) depending, at least in part, on a functional split, such as those defined by the 3rd Generation Partnership Project (3GPP). In some aspects, the DU **230** may further host one or more low PHY layers. Each layer (or module) can be implemented with an interface configured to communicate signals with other layers (and modules) hosted by the DU **230**, or with the control functions hosted by the CU **210**.

[0052] Lower-layer functionality can be implemented by one or more RUs **240**. In some deployments, an RU **240**, controlled by a DU **230**, may correspond to a logical node that hosts RF processing functions, or low-PHY layer functions (such as performing fast Fourier transform (FFT), inverse FFT (IFFT), digital beamforming, physical random access channel (PRACH) extraction and filtering, or the like), or both, based at least in part on the functional split, such as a lower layer functional split. In such an architecture, the RU(s) **240** can be implemented to handle over the air (OTA) communications with one or more UEs **104**. In some implementations, real-time and non-real-time aspects of control and user plane communications with the RU(s) **240** can be controlled by the corresponding DU **230**. In some scenarios, this configuration can enable the DU(s) **230** and the CU **210** to be implemented in a cloud-based RAN architecture, such as a vRAN architecture.

[0053] The SMO Framework **205** may be configured to support RAN deployment and provisioning of non-virtualized and virtualized network elements. For non-virtualized network elements, the SMO Framework **205** may be configured to support the deployment of dedicated physical resources for RAN coverage requirements which may be managed via an operations and maintenance interface (such as an O1 interface). For virtualized network elements, the SMO Framework **205** may be configured to interact with a cloud computing platform (such as an open cloud (O-Cloud) **290**) to perform network element life cycle management (such as to instantiate virtualized network elements) via a cloud computing platform interface (such as an O2 interface). Such virtualized network elements can include, but are not limited to, CUs **210**, DUs **230**, RUs **240** and Near-RT RICs **225**. In some implementations, the SMO Framework **205** can communicate with a hardware aspect of a 4G RAN, such as an open eNB (O-eNB) **211**, via an O1 interface. Additionally, in some implementations, the SMO Framework **205** can communicate directly with one or more RUs **240** via an O1 interface. The SMO Framework **205** also may include a Non-RT RIC **215** configured to support functionality of the SMO Framework **205**.

[0054] The Non-RT RIC **215** may be configured to include a logical function that enables non-real-time control and optimization of RAN elements and resources, Artificial Intelligence/Machine Learning (AI/ML) workflows including model training and updates, or policy-based guidance of applications/features in the Near-RT RIC **225**. The Non-RT RIC **215** may be coupled to or communicate with (such as via an A1 interface) the Near-RT RIC **225**. The Near-RT RIC **225** may be configured to include a logical function that enables near-real-time control and optimization of RAN elements and resources via data collection and actions over an interface (such as via an E2 interface) connecting one or more CUs **210**, one or more DUs **230**, or both, as well as an O-eNB, with the Near-RT RIC **225**.

[0055] In some implementations, to generate AI/ML models to be deployed in the Near-RT RIC **225**, the Non-RT RIC **215** may receive parameters or external enrichment information from external servers. Such information may be utilized by the Near-RT RIC **225** and may be received at the SMO Framework **205** or the Non-RT RIC **215** from non-network data sources or from network functions. In some examples, the Non-RT RIC **215** or the Near-RT RIC **225** may be configured to tune RAN behavior or performance. For example, the Non-RT RIC **215** may monitor long-term trends and patterns for performance and employ AI/ML models to perform corrective actions through the SMO Framework **205** (such as reconfiguration via O1) or via creation of RAN management policies (such as A1 policies).

[0056] FIG. **3** depicts aspects of an example BS **102** and a UE **104**.

[0057] Generally, BS **102** includes various processors (e.g., **320**, **330**, **338**, and **340**), antennas **334***a-t* (collectively **334**), transceivers **332***a-t* (collectively **332**), which include modulators and demodulators, and other aspects, which enable wireless transmission of data (e.g., data source **312**) and wireless reception of data (e.g., data sink **339**). For example, BS **102** may send and receive data between BS **102** and UE **104**. BS **102** includes controller/processor **340**, which may be configured to implement various functions described herein related to wireless communications.

[0058] Generally, UE **104** includes various processors (e.g., **358**, **364**, **366**, and **380**), antennas **352***a-r* (collectively **352**), transceivers **354***a-r* (collectively **354**), which include modulators and demodulators, and other aspects, which enable wireless transmission of data (e.g., retrieved from data source **362**) and wireless reception of data (e.g., provided to data sink **360**). UE **104** includes controller/processor **380**, which may be configured to implement various functions described herein related to wireless communications.

[0059] In regards to an example downlink transmission, BS **102** includes a transmit processor **320** that may receive data from a data source **312** and control information from a controller/processor **340**. The control information may be for the physical broadcast channel (PBCH), physical control format indicator channel (PCFICH), physical hybrid automatic repeat request (HARQ) indicator channel (PHICH), physical downlink control channel (PDCCH), group common PDCCH (GC PDCCH), and/or others. The data may be for the physical downlink shared channel (PDSCH), in some examples.

[0060] Transmit processor **320** may process (e.g., encode and symbol map) the data and control information to obtain data symbols and control symbols, respectively. Transmit processor **320** may also generate reference symbols, such as for the primary synchronization signal (PSS), secondary synchronization signal (SSS), PBCH demodulation reference signal (DMRS), and channel state information reference signal (CSI-RS).

[0061] Transmit (TX) multiple-input multiple-output (MIMO) processor **330** may perform spatial processing (e.g., precoding) on the data symbols, the control symbols, and/or the reference symbols, if applicable, and may provide output symbol streams to the modulators (MODs) in transceivers **332***a*-**332***t*. Each modulator in transceivers **332***a*-**332***t* may process a respective output symbol stream to obtain an output sample stream. Each modulator may further process (e.g., convert to analog, amplify, filter, and upconvert) the output sample stream to obtain a downlink signal. Downlink signals from the modulators in transceivers **332***a*-**332***t* may be transmitted via the antennas **334***a*-**334***t*, respectively.

[0062] In order to receive the downlink transmission, UE **104** includes antennas **352***a*-**352***r* that may receive the downlink signals from the BS **102** and may provide received signals to the demodulators (DEMODs) in transceivers **354***a*-**354***r*, respectively. Each demodulator in transceivers **354***a*-**354***r* may condition (e.g., filter, amplify, downconvert, and digitize) a respective received signal to obtain input samples. Each demodulator may further process the input samples to obtain received symbols.

[0063] MIMO detector **356** may obtain received symbols from all the demodulators in transceivers **354***a*-**354***r*, perform MIMO detection on the received symbols if applicable, and provide detected symbols. Receive processor **358** may process (e.g., demodulate, deinterleave, and decode) the detected symbols, provide decoded data for the UE **104** to a data sink **360**, and provide decoded control information to a controller/processor **380**.

[0064] In regards to an example uplink transmission, UE **104** further includes a transmit processor **364** that may receive and process data (e.g., for the PUSCH) from a data source **362** and control information (e.g., for the physical uplink control channel (PUCCH)) from the controller/processor **380**. Transmit processor **364** may also generate reference symbols for a reference signal (e.g., for the sounding reference signal (SRS)). The symbols from the transmit processor **364** may be precoded by a TX MIMO processor **366** if applicable, further processed by the modulators in transceivers **354***a*-**354***r* (e.g., for SC-FDM), and transmitted to BS **102**.

[0065] At BS **102**, the uplink signals from UE **104** may be received by antennas **334***a-t*, processed by the demodulators in transceivers **332***a*-**332***t*, detected by a MIMO detector **336** if applicable, and further processed by a receive processor **338** to obtain decoded data and control information sent by UE **104**. Receive processor **338** may provide the decoded data to a data sink **339** and the decoded control information to the controller/processor **340**.

[0066] Memories **342** and **382** may store data and program codes for BS **102** and UE **104**, respectively.

[0067] Scheduler **344** may schedule UEs for data transmission on the downlink and/or uplink.

[0068] In various aspects, BS **102** may be described as transmitting and receiving various types of data associated with the methods described herein. In these contexts, "transmitting" may refer to various mechanisms of outputting data, such as outputting data from data source **312**, scheduler **344**, memory **342**, transmit processor **320**, controller/processor **340**, TX MIMO processor **330**, transceivers **332***a-t*, antenna **334***a-t*, and/or other aspects described herein. Similarly, "receiving" may refer to various mechanisms of obtaining data, such as obtaining data from antennas **334***a-t*, transceivers **332***a-t*, RX MIMO detector **336**, controller/processor **340**, receive processor **338**, scheduler **344**, memory **342**, and/or other aspects described herein.

[0069] In various aspects, UE **104** may likewise be described as transmitting and receiving various types of data associated with the methods described herein. In these contexts, "transmitting" may refer to various mechanisms of outputting data, such as outputting data from data source **362**, memory **382**, transmit processor **364**, controller/processor **380**, TX MIMO processor **366**, transceivers **354***a-t*, antenna **352***a-t*, and/or other aspects described herein. Similarly, "receiving" may refer to various mechanisms of obtaining data, such as obtaining data from antennas **352***a-t*, transceivers **354***a-t*, RX MIMO detector **356**, controller/processor **380**, receive processor **358**, memory **382**, and/or other aspects described herein.

[0070] In some aspects, one or more processors may be configured to perform various operations, such as those associated with the methods described herein, and transmit (output) to or receive (obtain) data from another interface that is configured to transmit or receive, respectively, the data.

[0071] FIGS. **4**A, **4**B, **4**C, and **4**D depict aspects of data structures for a wireless communications network, such as wireless communications network **100** of FIG. **1**.

[0072] In particular, FIG. **4**A is a diagram **400** illustrating an example of a first subframe within a 5G (e.g., 5G NR) frame structure, FIG. **4**B is a diagram **430** illustrating an example of DL channels within a 5G subframe, FIG. **4**C is a diagram **450** illustrating an example of a second subframe within a 5G frame structure, and FIG. **4**D is a diagram **480** illustrating an example of UL channels within a 5G subframe.

[0073] Wireless communications systems may utilize orthogonal frequency division multiplexing (OFDM) with a cyclic prefix (CP) on the uplink and downlink. Such systems may also support half-duplex operation using time division duplexing (TDD). OFDM and single-carrier frequency division multiplexing (SC-FDM) partition the system bandwidth (e.g., as depicted in FIGS. **4**B and **4**D) into multiple orthogonal subcarriers. Each subcarrier may be modulated with data. Modulation symbols may be sent in the frequency domain with OFDM and/or in the time domain with SC-FDM.

[0074] A wireless communications frame structure may be frequency division duplex (FDD), in which, for a particular set of subcarriers, subframes within the set of subcarriers are dedicated for either DL or UL. Wireless communications frame structures may also be time division duplex (TDD), in which, for a particular set of subcarriers, subframes within the set of subcarriers are dedicated for both DL and UL.

[0075] In FIGS. **4**A and **4**C, the wireless communications frame structure is TDD where Dis DL, U is UL, and X is flexible for use between DL/UL. UEs may be configured with a slot format through a received slot format indicator (SFI) (dynamically through DL control information (DCI), or semi-statically/statically through radio resource control (RRC) signaling). In the depicted examples, a 10 ms frame is divided into 10 equally sized 1 ms subframes. Each subframe may include one or more time slots. In some examples, each slot may include 7 or 14 symbols, depending on the slot format. Subframes may also include mini-slots, which generally have fewer symbols than an entire slot. Other wireless communications technologies may have a different frame structure and/or different channels.

[0076] In certain aspects, the number of slots within a subframe is based on a slot configuration and a numerology. For example, for slot configuration 0, different numerologies (μ) 0 to 6 allow for 1, 2, 4, 8, 16, 32, and 64 slots, respectively, per subframe. For slot configuration 1, different numerologies 0 to 2 allow for 2, 4, and 8 slots, respectively, per subframe. Accordingly, for slot configuration 0 and numerology μ, there are 14 symbols/slot and 2μ slots/subframe. The subcarrier spacing and symbol length/duration are a function of the numerology. The subcarrier spacing may be equal to $2^{\mu}\times 15$ kHz, where u is the numerology 0 to 6. As such, the numerology $\mu=0$ has a subcarrier spacing of 15 kHz and the numerology $\mu=6$ has a subcarrier spacing of 960 kHz. The symbol length/duration is inversely related to the subcarrier spacing. FIGS. **4**A, **4**B, **4**C, and **4**D provide an example of slot configuration 0 with 14 symbols per slot and numerology $\mu=2$ with 4 slots per subframe. The slot duration is 0.25 ms, the subcarrier spacing is 60 kHz, and the symbol duration is approximately 16.67 μs.

[0077] As depicted in FIGS. **4**A, **4**B, **4**C, and **4**D, a resource grid may be used to represent the frame structure. Each time slot includes a resource block (RB) (also referred to as physical RBs (PRBs)) that extends, for example, 12 consecutive subcarriers. The resource grid is divided into multiple resource elements (REs). The number of bits carried by each RE depends on the modulation scheme.

[0078] As illustrated in FIG. **4**A, some of the REs carry reference (pilot) signals (RS) for a UE (e.g., UE **104** of FIGS. **1** and **3**). The RS may include demodulation RS

(DMRS) and/or channel state information reference signals (CSI-RS) for channel estimation at the UE. The RS may also include beam measurement RS (BRS), beam refinement RS (BRRS), and/or phase tracking RS (PT-RS).

[0079] FIG. **4**B illustrates an example of various DL channels within a subframe of a frame. The physical downlink control channel (PDCCH) carries DCI within one or more control channel elements (CCEs), each CCE including, for example, nine RE groups (REGs), each REG including, for example, four consecutive REs in an OFDM symbol.

[0080] A primary synchronization signal (PSS) may be within symbol 2 of particular subframes of a frame. The PSS is used by a UE (e.g., **104** of FIGS. **1** and **3**) to determine subframe/symbol timing and a physical layer identity.

[0081] A secondary synchronization signal (SSS) may be within symbol 4 of particular subframes of a frame. The SSS is used by a UE to determine a physical layer cell identity group number and radio frame timing.

[0082] Based on the physical layer identity and the physical layer cell identity group number, the UE can determine a physical cell identifier (PCI). Based on the PCI, the UE can determine the locations of the aforementioned DMRS. The physical broadcast channel (PBCH), which carries a master information block (MIB), may be logically grouped with the PSS and SSS to form a synchronization signal (SS)/PBCH block. The MIB provides a number of RBs in the system bandwidth and a system frame number (SFN). The physical downlink shared channel (PDSCH) carries user data, broadcast system information not transmitted through the PBCH such as system information blocks (SIBs), and/or paging messages.

[0083] As illustrated in FIG. **4**C, some of the REs carry DMRS (indicated as R for one particular configuration, but other DMRS configurations are possible) for channel estimation at the base station. The UE may transmit DMRS for the PUCCH and DMRS for the PUSCH. The PUSCH DMRS may be transmitted, for example, in the first one or two symbols of the PUSCH. The PUCCH DMRS may be transmitted in different configurations depending on whether short or long PUCCHs are transmitted and depending on the particular PUCCH format used. UE **104** may transmit sounding reference signals (SRS). The SRS may be transmitted, for example, in the last symbol of a subframe. The SRS may have a comb structure, and a UE may transmit SRS on one of the combs. The SRS may be used by a base station for channel quality estimation to enable frequency-dependent scheduling on the UL.

[0084] FIG. **4**D illustrates an example of various UL channels within a subframe of a frame. The PUCCH may be located as indicated in one configuration. The PUCCH carries uplink control information (UCI), such as scheduling requests, a channel quality indicator (CQI), a precoding matrix indicator (PMI), a rank indicator (RI), and HARQ ACK/NACK feedback. The PUSCH carries data, and may additionally be used to carry a buffer status report (BSR), a power headroom report (PHR), and/or UCI.

Introduction to 5G Advanced Applications and Latency-Sensitive Traffic

[0085] 5G wireless technology provides high-speed, low-latency and high-reliability wireless connectivity which may enable latency-sensitive services like the immersive extended reality (XR) multimedia and cloud computing, such as augmented reality (AR) glasses, virtual reality (VR) Head-Mounted Displays (HMDs), cloud gaming, cloud AI, and other latency-sensitive services. In some cases, to ensure good user experience, these advanced applications may be required to meet strict system requirements including data rate, latency and power consumption. For example, to support low-latency and high-reliability, 99% of packets of XR traffic should be delivered within a packet delay budget (PDB) requirement, such as 10 milliseconds.

[0086] FIG. **5** illustrates an example split XR architecture **500** that may be used to support latency-sensitive services in a 5G NR wireless communications network. For example, as shown, an XR headset **502** may send tracking information in one or more uplink (UL) transmissions **504** to a gNodeB (gNB) **505** of the 5G NR wireless communications network, which may then be provided to cloud-based server **506**. As shown, the one or more UL transmissions **504** including the tracking information may include a relatively low throughput (e.g., 100 bytes) but may be transmitted relatively frequently (e.g., 500 hertz). In response to the uplink tracking in the one or more UL transmissions **504**, the cloud-based server **506** may render one or more video frames that may be provided to the gNB **505** and sent to the XR headset **502** in one or more downlink (DL) transmissions **508**. As shown, while the frequency of the one or more downlink transmissions **508** including the one or more video frames may be lower (e.g., 45-90 frames per second) than transmission of the tracking information in the one or more UL transmissions **504**, the throughput of the one or more DL transmissions **508** may be higher (e.g., 100 kilobytes or more).

[0087] In some cases, user experience is a function of the total round trip time (RTT) between the one or more UL transmissions **504** including the uplink tracking information and reception of the one or more DL transmissions **508** including the one or more video frames. In some cases, the RTT may need to be below 100 ms for good user experience, which may leave only about 20 ms uplink/downlink 5G portion of the RTT. For example, 100 ms is the total RTT between the XR headset **502** and the cloud-based server **506**. This total RTT includes (1) UL transmission from the XR headset **502** to the gNB **505** (including air interface), (2) transmission from gNB **505** to the cloud-based server **506**, (3) time for rendering the one or more video frames, (4) transmission from the cloud-based server **506** to gNB **505** of the one or more video frames, and (5) DL transmission from gNB **505** to the XR headset **502** (including air interface). The total time duration associated with steps 2, 3, and 4 is about 80 ms, which leaves only about 20 ms for steps 1 and 5 (e.g., the UL and DL transmission over the air interface).

Introduction to Measurement Gaps

[0088] In 5G NR systems, a UE operating in multi-frequency cellular networks is typically configured with measurement gaps, in which the UE intermittently suspends data transmission to perform radio resource management (RRM) measurements for neighboring cells. A measurement gap generally refers to a duration of time where a UE performs certain RRM measurement procedures.

[0089] For example, for an inter-cell measurement procedure, the UE may measure neighboring cells in a multi-cellular network during measurement gaps. In such cases, the UE should measure the neighboring cells and other carrier components using different frequencies. However, many UEs may include a single radio frequency (RF) module to reduce the manufacturing cost and form factor size. As a result, such UEs are unable to perform the inter-frequency measurement while maintaining the data traffic with serving cell.

[0090] Various scenarios may be addressed using measurement gaps. For example, measurement gaps may be used for inter-frequency handover (within a same radio access technology/RAT), as well as for inter-RAT handover. In such cases, a UE may measure a target frequency to perform the inter-frequency or inter-RAT handover. During the measurement gap, a UE may temporarily suspend its communication with the serving cell, and measure the inter-frequency. In some cases, measurement gaps may be used in certain operating frequency ranges (e.g., FR2) for a UE to perform a receive (Rx) beam search for intra-frequency handover. In such cases, an FR2 UE Rx beam may be directed towards the serving cell and, during the measurement gap, the UE can temporarily suspend its communication with the serving cell, and redirect its Rx beam towards a target cell. In some cases, a UE configured with an active bandwidth part (BWP) without intra-frequency SSBs may use measurement gaps to temporarily tune its transceiver to a different BWP to receive the intra-frequency SSB.

[0091] As illustrated in FIG. **6**A and FIG. **6**B, measurement gaps are typically configured with an offset (e.g., gapOffset), length (e.g., mgl), repetition period (e.g., mgrp), and timing advance (e.g., mgta). The measurement gap may be designed to include a target cell synchronization signal block (SSB) measurement timing configuration (SMTC) as illustrated in FIG. **6**B. As such, the measurement gap repetition periodicity must be a multiple of SSB burst periodicity. In the illustrated example, the UE is configured with a 20 ms measurement gap periodicity, 4 ms measurement gap length, which is sufficient to cover a 2 ms target cell SMTC.

[0092] In current systems, a measurement gap is typically given automatic priority over data traffic. In such systems, measurement gaps may be given a higher priority than physical downlink shared channel (PDSCH) or physical uplink shared channel (PUSCH) transmissions, except during an initial attach procedure (e.g., for Msg2/Msg3/Msg4 in a 4-step RACH procedure and/or MsgA/MsgB in a 2-step RACH procedure) because it functions to seek out better wireless signaling in a multi-frequency cellular network. For example, the measurement gaps may be given priority over transmissions carrying HARQ feedback, scheduling request (SRs), channel state information (CSI), sounding reference signals (SRSs), non-RACH-based PUSCH, non-RACH-based PDCCH, and non-RACH-based PDSCH. However, RACH-based PUSCH (e.g., for Msg3 and MsgA) and RACH-based PDCCH (e.g., for Msg2, Msg 4, and MsgB) may have priority over the measurement gaps.

[0093] As a result, when a measurement gap is configured, maximum UE peak throughput may be reduced according to the measurement gap length. Because of this, in some cases, measurement gaps may only be configured when channel quality of a primary cell becomes less than a certain threshold.

Aspects Related to Enhanced RRM Measurements for Latency-Sensitive Traffic

[0094] As noted above, configured measurement gaps can interrupt the communication (e.g., reception and/or transmission) of bursty data traffic, which may impact the ability to meet PDB requirements. For example, these measurement gaps may be problematic for certain types of traffic, such as multimedia data traffic, that is expected to be delivered within a certain PDB (e.g., 10 ms).

[0095] This issue is illustrated in FIG. **7**, which shows the potential impact when measurement gaps are placed within the transmission periods for burst traffic. For example, because the measurement gap has a higher priority than the normal data traffic in current systems, the UE may be unable to receive any traffic data (e.g., PDSCH) from the gNB during the measurement gap and its preparation time. Thus, the measurement gap increases the transmission time for burst traffic, making it difficult to meet the PDB requirements of multimedia traffic.

[0096] In the illustrated example, burst traffic, such as multimedia burst traffic #1-#4), may be transmitted by a network entity (e.g., gNB) in PDSCH transmission at a 30 Hz cadence (every 33.33 ms). For example, burst traffic #1 may be transmitted in PDSCH transmission **704***a*, burst traffic #2 may be transmitted in PDSCH transmission **704***b*, burst traffic #3 may be transmitted in PDSCH transmission **704***c*, and burst traffic #4 may be transmitted in PDSCH transmission **704***d*. Further, as shown, a number of measurement gaps (e.g., **702***a*, **702***b*, **702***c*, and **702***d*) are configured to occur periodically (e.g., every 40 ms) for the UE to perform RRM measurements. However, as shown, these measurement gaps are scheduled to overlap with the PDSCH transmissions (e.g., **704***a*, **704***b*, **704***c*, and **704***d*), resulting in an increase in transmission time of some of the burst traffic.

[0097] For example, measurement gap **702***a* overlaps with PDSCH transmission **704***a* used to transmit a first traffic burst, burst traffic #1. The overlap is indicated by the "X" and causes a delay in the start of the transmission of the burst traffic until after the end of the measurement gap **702***a*. Similarly, measurement gap **702***b* overlaps with a PDSCH transmission **704***b* (e.g., carrying burst traffic #2), while measurement gap **702***c* overlaps with a PDSCH transmission **704***c* (e.g., carrying burst traffic #3), causing an increase in transmission time of burst traffic #2 and #3. On the other hand, because PDSCH transmission **704***d* does not overlap with any measurement gap, it may have a shorter duration and delivery of burst traffic #4 may be more likely to stay within its PDB.

[0098] In general, a UE may be configured by a serving cell to perform RRM measurements for all neighbor cells to facilitate the UE being handed over to a cell that provides the best coverage for the UE. However, there may be some scenarios in which the UE is configured to measure neighbor cells that are not able to accept a handover of the UE, for example, due to being heavily loaded (e.g., an amount of resources being used at these neighbor cells is greater than a threshold and are not able to serve the UE). In these scenarios, RRM measurements performed by the UE on these neighbor cells would be useless (e.g., since these neighbor cells cannot accept a handover of the UE) and would unnecessarily lead to an increase in the transmission time of the multimedia burst traffic described above, causing this multimedia burst traffic to violate its PDB and leading to poor user experience.

[0099] Accordingly, aspects of the present disclosure provide techniques for improving RRM measurements for latency-sensitive traffic, such as the bursty multimedia traffic described above. For example, in some cases, rather that forcing a UE to perform RRM measurements for every neighbor cell, performance of these RRM measurements may be based, for example, on resource status reports of the neighbor cells. More specifically, for example, a network entity of a serving cell may receive one or more resource status reports from one or more neighbor cells of the UE, which may indicate an amount of resources being used at a respective neighbor cell of the one or more neighbor cells from which the resource status reports are received. The network entity of the serving cell may then transmit, to the UE based on the one or more resource status reports received from the one or more neighbor cells, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

[0100] In some cases, the UE may be able to refrain from performing one or more RRM measurements when the activation status indicates that at least one of the RRM measurements or the one or more measurement gaps are deactivated. Deactivating certain RRM measurements and/or measurement gaps may reduce the impacts that the measurement gaps and RRM measurements have on the transmission time of the latency-sensitive bursty traffic and may, thus, improve user experience related to latency-sensitive services. For example, the fewer RRM measurements the UE has to perform, the less often the UE needs the measurement gaps, resulting in the latency-sensitive burst traffic being subject to less interruption time.

Example Operations of Entities in a Communications Network

[0101] FIG. **8** depicts a process flow including operations **800** for communications in a network between a serving cell **802**, a user equipment (UE) **804**, and one or more neighbor cells. For example, as shown, the one or more neighbor cells include first neighbor cell **806**, a second neighbor cell **808**, and a third neighbor cell **810**. It should be understood that, while FIG. **8** illustrates three neighbor cells, operations **800** may be used with any number of neighbor cells. In some cases, operations performed by the serving cell **802**, the first neighbor cell **806**, the second neighbor cell **808**, and the third neighbor cell **810** may be performed by one or more respective network entities. For example, operations performed by the serving cell **802** may be performed by a first network entity, operations performed by the first neighbor cell **806** may be performed by a second network entity, operations performed by the second neighbor cell **808** may be performed by a third network entity, operations performed by the third neighbor cell **810** may be performed by a fourth network entity.

[0102] In some aspects, the first network entity associated with the serving cell **802**, the second network entity associated with the first neighbor cell **806**, the third network entity associated with the second neighbor cell **808**, and the fourth network entity associated with the third neighbor cell **810** may be examples of the BS **102** depicted and described with respect to FIGS. **1** and **3** or a disaggregated base station depicted and described with respect to FIG. **2**. Similarly, the UE **804** may be an example of UE **104** depicted and described with respect to FIGS. **1** and **3**.

[0103] As shown, operations **800** begin at **820** with the first network entity associated with the serving cell **802** transmitting configuration information to the UE **804**. In some cases, the configuration information may be transmitted, for example, in a radio resource control (RRC) reconfiguration message using a connection previously established between the first network entity associated with the serving cell **802** and the UE **804**. In some cases, the configuration information may include a measurement configuration (e.g., MeasConfig) indicating one or more neighbor cells for which to perform radio resource management (RRM) measurements. For example, the measurement configuration may configure the UE **804** to perform RRM measurements for first neighbor cell **806**, the second neighbor cell **808**, and the third neighbor cell **810**. In some cases, the configuration information may also indicate a measurement gap configuration (e.g., MeasGap) indicating one or more measurement gaps for performing the RRM measurements.

[0104] At **822**, the first network entity associated with the serving cell **802** may transmit one or more resource status requests to the one or more neighbor cells, including the first neighbor cell **806**, the second neighbor cell **808**, and the third neighbor cell **810**. The one or more resource status requests may request that each of the one or more neighbor cells transmit a resource status report to the first network entity associated with the serving cell **802**.

[0105] Thereafter, as shown at **824**, the first network entity associated with the serving cell **802** receives one or more resource status reports from the one or more neighbor cells, including the first neighbor cell **806**, the second neighbor cell **808**, and the third neighbor cell **810**. In some cases, each resource status report of the one or more resource status reports indicates an amount of resources being used at a respective neighbor cell of the one or more neighbor cells from which that resource status report is received. For example, the resource status report received from the first neighbor cell **806** may indicate an amount of resources being used at the first neighbor cell **806**, the resource status report received from the second neighbor cell **808** may indicate an amount of resources being used at the second neighbor cell **808**, and so on. In some cases, the amount of resources may be indicated, for example, as at least one of a percentage of physical resource blocks (PRBs) being used in the DL and/or in the UL at the respective neighbor cell or a percentage of PDCCH control channel elements (CCEs) being used at the respective neighbor cell for scheduling in the DL or in the UL.

[0106] As shown at **826**, based on the one or more resource status reports received from the one or more neighbor cells, the first network entity associated with the serving cell **802** transmits, to the UE **804**, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps that were configured by the configuration information received at **820**. In some cases, the message

[0107] As shown at **828**, the UE **804** may take one or more actions based on the message indicating the activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

[0108] As shown at **830**, the UE **804** may transmit one or more measurement reports to the first network entity associated with the serving cell **802**. In some cases, the one or more measurement reports may include RRM measurements for the one or more neighbor cells having activated RRM measurements and/or measurement gaps as indicated by the activation status indicated in the message received by the UE **804** at **826**.

[0109] In some cases, the activation status associated with at least one of the RRM measurements or the one or more measurement gaps may be based on the amount of resources being used at each respective neighbor cell of the one or more neighbor cells indicated in the one or more resource status report. For example, if a particular neighbor cell transmits a resource status report that indicates an amount of resources being used that is above a threshold amount of resources, the first network entity associated with the serving cell **802** may decide to set activation status of the RRM measurements and/or the measurement gaps associated with that particular neighbor cell to "deactivated" in the message transmitted at **826** since that particular neighbor cell will unlikely be able to serve the UE **804** if the UE **804** were to be handed over to that particular neighbor cell and, thus, RRM measurements associated with that particular neighbor cell would be unnecessary. In such cases, when the RRM measurements or the measurement gaps associated with that particular neighbor cell are deactivated, the UE **804** may refrain from performing the RRM measurements at least for that particular neighbor cell.

[0110] In other cases, if the amount of resources being used at the particular neighbor cell is indicated as being less than or equal to the threshold amount of resources, the first network entity associated with the serving cell **802** may decide to set activation status of the RRM measurements and/or the measurement gaps associated with that particular neighbor cell to "activated" in the message transmitted at **826** since that particular neighbor cell has a sufficient amount of resources to serve the UE **804** should the UE **804** be handed over to that particular neighbor cell. In such cases, when the RRM measurements or the measurement gaps associated with that particular neighbor cell are activated, the UE **804** may perform the RRM measurements at least for that particular neighbor cell. Additional details regarding the activation or deactivation of the RRM measurements and/or measurement gaps is provided below.

[0111] For example, in some cases, the message received by the UE **804** at **826** may indicate the activation status for the RRM measurements that the UE **804** is configured to perform for the one or more neighbor cells. In some cases, the message indicating the activation status for the RRM measurements comprises one of a media access control-control element (MAC-CE) message or a downlink control information (DCI) message.

[0112] In such cases, the activation status for the RRM measurements comprises a different respective indication for each neighbor cell of the one or more neighbor cells indicating whether the RRM measurements associated with that neighbor cell are activated or deactivated. For example, in some cases, the message received at **826** may include a first indication for the first neighbor cell **806** indicating whether the RRM measurements associated with the first neighbor cell **806** are activated or deactivated. The message received at **826** may also include a second indication for the second neighbor cell **808** indicating whether the RRM measurements associated with the second neighbor cell **808** are activated or deactivated, and so on.

[0113] In some cases, the different respective indications for each neighbor cell of the one or more neighbor cells may be provided using a plurality of bits in the message received by the UE **804** at **826**. For example, each different bit of the plurality of bits may corresponds to a different neighbor cell of the one or more neighbor cells and may indicate the activation status (e.g., activated or deactivated) of the RRM measurements corresponding to that different neighbor cell. For example, a bit value of zero may indicate that the RRM measurements for a corresponding neighbor cell are deactivated while a bit value of one may indicate that the RRM measurements for the corresponding neighbor cell are activated, or vice versa.

[0114] As discussed above, in some cases, the different respective indication, corresponding to a particular neighbor cell of the one or more neighbor cells, may indicate (1) that the RRM measurements for that particular neighbor cell are deactivated when the amount of resources being used at that particular neighbor cell are above the threshold amount of resources and (2) that the RRM measurements for that particular neighbor cell are activated when the amount of resources being used at that particular neighbor cell are less than or equal to the threshold amount of resources.

[0115] For example, when the first neighbor cell **806** transmits a resource status report to the first network entity associated with the serving cell **802** that indicates that the amount of resources being used at the first neighbor cell **806** is greater than the threshold amount of resources, the message received by the UE **804** at **826** may indicate that the RRM measurements for the first neighbor cell **806** are deactivated. In such cases, taking the one or more actions at **828** may include the UE **804** refraining from performing the RRM measurements for the first neighbor cell **806** when the RRM measurements for the particular neighbor cell are indicated as deactivated.

[0116] Alternatively, when the first neighbor cell **806** transmits a resource status report to the first network entity associated with the serving cell **802** that indicates that the amount of resources being used at the first neighbor cell **806** is less than or equal to the threshold amount of resources, the message received by the UE **804** at **826** may indicate that the RRM measurements for the first neighbor cell **806** are activated. In such cases, taking the one or more actions at **828** may include the UE **804** performing the RRM measurements for the first neighbor cell **806** when the RRM measurements for the particular neighbor cell are indicated as activated.

[0117] In some cases, the activation status for the RRM measurements indicated in the message received by the UE **804** at **826** may comprise an indication indicating whether the RRM measurements are activated for a particular frequency band or deactivated for the particular frequency band. In such cases, taking the one or more actions at **828** may include the UE **804** performing the RRM measurements for the particular frequency band when the activation status indicates that the RRM measurements are activated for the particular frequency band. Additionally, taking the one or more actions at **828** may include the UE **804** refraining from performing the RRM measurements for the particular frequency band when the activation status indicates that the RRM measurements are deactivated for the particular frequency band.

[0118] In some cases, the message received by the UE **804** at **826** may indicate the activation status associated with the one or more measurement gaps that the UE **804** is configured to perform the RRM measurements in for the one or more neighbor cells. In some cases, the message indicating the activation status for the measurement gaps comprises one of a MAC-CE message or a DCI message.

[0119] In some cases, the activation status associated with the one or more measurement gaps may comprise a different respective indication for each measurement gap of the one or more measurement gaps indicating whether that measurement gap is activated or deactivated for the RRM measurements. For example, in some cases, the measurement gap configuration received by the UE **804** in the configuration information at **820** may configure the UE **804** with up to eight measurement gaps. In some cases, each measurement gap may be for either an FR1 frequency band, an FR2 frequency band, or per-UE. In such cases, the indicated activation status may include, for example, a first respective indication for a first measurement gap indicating whether the first measurement gap is activated or deactivated, a second respective indication for a second measurement gap indicating whether the second measurement gap is activated or deactivated, and so on.

[0120] In some cases, the different respective indications for each measurement gap may be provided using a plurality of bits in the message received by the UE **804** at **826**. For example, each different bit of the plurality of bits may corresponds to a different measurement gap of the one or more measurement gaps and may indicate the activation status (e.g., activated or deactivated) of that measurement gap. For example, a bit value of zero may indicate that a corresponding measurement gap is deactivated while a bit value of one may indicate that the corresponding measurement gap is activated, or vice versa.

[0121] In some cases, when the different respective indication, corresponding to a particular measurement gap, such as a first measurement gap, indicates that the first measurement gap is activated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap may be activated. In such cases, taking the one or more actions at **828** in FIG. **8** may include the UE **804** performing, during a time period corresponding to the first measurement gap, the RRM measurements for all of the neighbor cells that are associated with the first measurement gap when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is activated. For example, if the first neighbor cell **806**, the second neighbor cell **808**, and the third neighbor cell **810** are associated with the (activated) first measurement gap, then the UE **804** may be configured to perform the RRM measurements for each of the first neighbor cell **806**, the second neighbor cell **808**, and the third neighbor cell **810** during a time period corresponding to the first measurement gap.

[0122] In some cases, however, when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is deactivated, the RRM measurements for all of the neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap may be deactivated. In such cases, taking the one or more actions at **828** in FIG. **8** may include the UE **804** refraining from performing, during the time period corresponding to the first measurement gap, the RRM measurements for all of the neighbor cells that are associated with the first measurement gap when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is deactivated. For example, if the first neighbor cell **806** and the second neighbor cell **808** are associated with the (deactivated) first measurement gap, then the UE **804** may be configured to refrain from performing the RRM measurements for each of the first neighbor cell **806** and the second neighbor cell **808** during a time period corresponding to the first measurement gap. Further, if the third neighbor cell **810** is associated with a second measurement gap that is indicated as activated while the first measurement gap is deactivated, the UE **804** may still be configured to perform the RRM measurements for the third neighbor cell **810** during a time period corresponding to the second measurement gap.

[0123] In some cases, as shown at **832**, the first network entity associated with the serving cell **802** may receive one or more updated resource status reports from the one or more neighbor cells. In some cases, the one or more updated resource status reports may indicate an updated amount of resources being used at each of the one or more neighbor cells. Thereafter, as shown at **834**, the first network entity associated with the serving cell **802** may transmit, to the UE based on the one or more updated resource status reports received from the one or more neighbor cells, another message indicating an updated activation status associated with at least one of the RRM measurements or the one or more measurement gaps. The UE **804** may take one or more actions further based on the other message indicating the updated activation status.

[0124] For example, in some cases, the resource status report transmitted by the first neighbor cell **806** at **824** may have indicated that the amount of resources being used by the first neighbor cell **806** was above the threshold amount of resources, effectively deactivating the RRM measurements associated with the first neighbor cell **806** at the UE **804**. However, in some cases, the message transmitted by the first neighbor cell **806** at **832** may indicate that the amount of resources currently being used by the first neighbor cell **806** is less than or equal to the threshold amount of resources. In such cases, the message transmitted by the first neighbor cell **806** at **824** may update the activation status for the RRM measurements and/or measurement gaps, indicating that the RRM measurements and/or measurement gaps associated with the first neighbor cell **806** are activated. In such cases, the UE **804** may then take action to perform the RRM measurements associated with the first neighbor cell **806**. In other cases, if the activation status of the RRM measurements and/or measurement gaps associated with the first neighbor cell **806** is updated to be deactivated, then the UE **804** may take action to refrain from performing the RRM measurements for the first neighbor cell **806**.

[0125] In some cases, in addition to indicating the activation status associated with the RRM measurements and/or measurement gaps, the UE **804** may also provide signaling to the first network entity associated with the serving cell **802** indicating whether the UE **804** will be using one or more upcoming measurement gaps. This information may, in some cases, be used by the first network entity associated with the serving cell **802** to repurpose upcoming measurement gaps that the UE **804** will not be using for uplink or downlink transmissions, improving resource usage efficiency.

[0126] For example, as illustrated at **836** in FIG. **8**, the UE **804** transmits, to the network entity associated with the serving cell **802**, a message indicating whether the UE **804** will be using one or more upcoming measurement gaps of the one or more measurement gaps configured to be used by the UE **804** for the RRM measurements. In some cases, the message indicating whether the UE **804** will be using the one or more upcoming measurement gaps comprises one of a MAC-CE message or an uplink control information (UCI) message.

[0127] In some cases, the message transmitted by the UE at **836** indicating whether the UE will be using the one or more upcoming measurement gaps may include an indication of an identifier (ID) of the measurement gap configuration (e.g., measGapId). In such cases, the message indicating whether the UE will be using the one or more upcoming measurement gaps may include an indication of (1) which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will be using for the RRM measurements and (2) which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will not be using for the RRM measurements. For example, assuming that the indicated identifier is associated with a measurement gap configuration having three measurement gaps. As an example, in such cases, the message transmitted by the UE **804** at **836** may indicate that the UE **804** will be using a first and second measurement gap but will not be using a third measurement gap.

[0128] In some cases, the upcoming measurement gaps that the UE **804** will be using for the RRM measurements or will not be using for the RRM measurements may be indicated in different manners. For example, in some cases, the upcoming measurement gaps that the UE **804** will be using for the RRM measurements or will not be using for the RRM measurements may be indicated by an indication of a starting measurement gap and a number of consecutive measurement gaps thereafter. In other cases, the upcoming measurement gaps that the UE **804** will be using for the RRM measurements or will not be using for the RRM measurements may be indicated by a bitmap including a number of bits, each bit corresponding to a different upcoming measurement gaps and indicating whether the UE **804** will or will not be using that measurement gap for the RRM measurements.

[0129] Thereafter, as shown at **838**, the UE **804** may receive, from the network entity associated with the serving cell **802**, scheduling information scheduling uplink or downlink transmissions for the UE **804** during a time period corresponding to the upcoming measurement gaps that the UE will not be using for the RRM measurements. For example, continuing on with the example above, because the UE **804** will not be using the third measurement gap, the network entity associated with the serving cell **802** may decide to repurpose a time period corresponding to the third measurement gap for uplink or downlink signals for the UE **804**. Accordingly, in such cases, the UE **804** may receive scheduling information from the first network entity associated with the serving cell **802** that schedules the uplink and/or downlink transmissions for the UE **804** during the timer period corresponding to the third measurement gap.

Example Operations of a User Equipment

[0130] FIG. **9** shows an example of a method **900** of wireless communication by a user equipment (UE), such as a UE **104** of FIGS. **1** and **3**.

[0131] Method **900** begins at step **905** with receiving, from a network entity associated with a serving cell, configuration information indicating: one or more neighbor cells for which to perform radio resource management (RRM) measurements, and a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements. In some cases, the operations of this step refer to, or may be performed by, circuitry for receiving and/or code for receiving as described with reference to FIG. **11**.

[0132] Method **900** then proceeds to step **910** with receiving, from the network entity, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps, wherein the message indicating the activation status is based on one or more resource status reports associated with the one or more neighbor cells. In some cases, the operations of this step refer to, or may be performed by, circuitry for receiving and/or code for receiving as described with reference to FIG. **11**.

[0133] Method **900** then proceeds to step **915** with taking one or more actions based on the message indicating the activation status associated with at least one of the RRM measurements or the one or more measurement gaps. In some cases, the operations of this step refer to, or may be performed by, circuitry for taking and/or code for taking as described with reference to FIG. **11**.

[0134] In some aspects, the activation status associated with at least one of the RRM measurements or the one or more measurement gaps is based on an amount of resources being used at each respective neighbor cell of the one or more neighbor cells.

[0135] In some aspects, the message indicates the activation status for the RRM measurements.

[0136] In some aspects, the activation status associated with the RRM measurements comprises a different respective indication for each neighbor cell of the one or more neighbor cells indicating whether the RRM measurements associated with that neighbor cell are activated or deactivated.

[0137] In some aspects, the different respective indication, corresponding to a particular neighbor cell of the one or more neighbor cells, indicates: the RRM measurements for that particular neighbor cell are deactivated when the amount of resources being used at that particular neighbor cell are above a threshold; and the RRM measurements for that particular neighbor cell are activated when the amount of resources being used at that particular neighbor cell are less than or equal to the threshold.

[0138] In some aspects, taking the one or more actions comprises: refraining from performing the RRM measurements for the particular neighbor cell when the RRM measurements for the particular neighbor cell are indicated as deactivated; and performing the RRM measurements for the particular neighbor cell when the RRM measurements for the particular neighbor cell are indicated as activated.

[0139] In some aspects, the activation status associated with the RRM measurements comprises and indication indicating whether the RRM measurements are activated for a particular frequency band or deactivated for the particular frequency band; and taking the one or more actions comprises: performing the RRM measurements for the particular frequency band when the activation status indicates that the RRM measurements are activated for the particular frequency band; and refraining from performing the RRM measurements for the particular frequency band when the activation status indicates that the RRM measurements are deactivated for the particular frequency band.

[0140] In some aspects, the message indicating the activation status for the RRM measurements comprises one of a media access control-control element (MAC-CE) message or a downlink control information (DCI) message.

[0141] In some aspects, the message indicates the activation status associated with the one or more measurement gaps.

[0142] In some aspects, the activation status associated with the one or more measurement gaps comprises a different respective indication for each measurement gap of the one or more measurement gaps indicating whether that measurement gap is activated or deactivated for the RRM measurements.

[0143] In some aspects, when the different respective indication, corresponding to a first measurement gap, indicates that the first measurement gap is activated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap are activated; and when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is deactivated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap are deactivated.

[0144] In some aspects, taking the one or more actions comprises: performing, during a time period corresponding to the first measurement gap, the RRM measurements for all of the neighbor cells that are associated with the first measurement gap when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is activated; and refraining from performing, during the time period corresponding to the first measurement gap, the RRM measurements for all of the neighbor cells that are associated with the first measurement gap when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is deactivated.

[0145] In some aspects, the message indicating the activation status associated with the one or more measurement gaps comprises one of a media access control-control element (MAC-CE) message or a downlink control information (DCI) message.

[0146] In some aspects, the method **900** further includes transmitting, to the network entity, a message indicating whether the UE will be using one or more upcoming measurement gaps of the one or more measurement gaps. In some cases, the operations of this step refer to, or may be performed by, circuitry for transmitting and/or code for transmitting as described with reference to FIG. **11**.

[0147] In some aspects, the message indicating whether the UE will be using the one or more upcoming measurement gaps comprises one of a media access control-control element (MAC-CE) message or an uplink control information (UCI) message.

[0148] In some aspects, the message indicating whether the UE will be using the one or more upcoming measurement gaps further comprises an indication of an identifier (ID) of the measurement gap configuration.

[0149] In some aspects, the message indicating whether the UE will be using the one or more upcoming measurement gaps further comprises an indication of: which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will be using for the RRM measurements; and which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will not be using for the RRM measurements.

[0150] In some aspects, the upcoming measurement gaps that the UE will be using for the RRM measurements or will not be using for the RRM measurements are indicated by one of: an indication of a starting measurement gap and a number of consecutive measurement gaps thereafter; or a bitmap including a number of bits, each bit corresponding to a different upcoming measurement gaps and indicating whether the UE will or will not be using that measurement gap for the RRM measurements.

[0151] In some aspects, the method **900** further includes receiving, from the network entity, scheduling information scheduling uplink or downlink transmissions for the UE during a time period corresponding to the upcoming measurement gaps that the UE will not be using for the RRM measurements. In some cases, the operations of this step refer to, or may be performed by, circuitry for receiving and/or code for receiving as described with reference to FIG. **11**.

[0152] In some aspects, the method **900** further includes receiving, from the network entity, another message indicating an updated activation status associated with at least one of the RRM measurements or the one or more measurement gaps, wherein the other message is based on one or more updated resource status reports associated with the one or more neighbor cells, wherein taking the one or more actions is further based on the other message indicating the updated activation status. In some cases, the operations of this step refer to, or may be performed by, circuitry for receiving and/or code for receiving as described with reference to FIG. **11**.

[0153] In one aspect, method **900**, or any aspect related to it, may be performed by an apparatus, such as communications device **1100** of FIG. **11**, which includes various components operable, configured, or adapted to perform the method **900**. Communications device **1100** is described below in further detail.

[0154] Note that FIG. **9** is just one example of a method, and other methods including fewer, additional, or alternative steps are possible consistent with this disclosure.

Example Operations of a Network Entity

[0155] FIG. **10** shows an example of a method **1000** of wireless communication by a network entity associated with a serving cell, such as a BS **102** of FIGS. **1** and **3**, or a disaggregated base station as discussed with respect to FIG. **2**.

[0156] Method **1000** begins at step **1005** with transmitting, to a user equipment (UE), configuration information indicating one or more neighbor cells for which to perform radio resource management (RRM) measurements, and a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements. In some cases, the operations of this step refer to, or may be performed by, circuitry for transmitting and/or code for transmitting as described with reference to FIG. **12**.

[0157] Method **1000** then proceeds to step **1010** with receiving one or more resource status reports from the one or more neighbor cells, wherein each resource status report of the one or more resource status reports indicates an amount of resources being used at a respective neighbor cell of the one or more neighbor cells from which that resource status report is received. In some cases, the operations of this step refer to, or may be performed by, circuitry for receiving and/or code for receiving as described with reference to FIG. **12**.

[0158] Method **1000** then proceeds to step **1015** with transmitting, to the UE based on the one or more resource status reports received from the one or more neighbor cells, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps. In some cases, the operations of this step refer to, or may be performed by, circuitry for transmitting and/or code for transmitting as described with reference to FIG. **12**.

[0159] In some aspects, the activation status associated with at least one of the RRM measurements or the one or more measurement gaps is based on an amount of resources being used at each respective neighbor cell of the one or more neighbor cells indicated in the one or more resource status reports.

[0160] In some aspects, the message indicates the activation status for the RRM measurements.

[0161] In some aspects, the activation status associated with the RRM measurements comprises a different respective indication for each neighbor cell of the one or more neighbor cells indicating whether the RRM measurements associated with that neighbor cell are activated or deactivated.

[0162] In some aspects, the different respective indication, corresponding to a particular neighbor cell of the one or more neighbor cells, indicates: the RRM measurements for that particular neighbor cell are deactivated when the amount of resources being used at that particular neighbor cell are above a threshold; and the RRM measurements for that particular neighbor cell are activated when the amount of resources being used at that particular neighbor cell are less than or equal to the threshold.

[0163] In some aspects, the activation status associated with the RRM measurements comprises an indication indicating whether the RRM measurements are activated for a particular frequency band or deactivated for the particular frequency band.

[0164] In some aspects, the message indicating the activation status for the RRM measurements comprises one of a media access control-control element (MAC-CE) message or a downlink control information (DCI) message.

[0165] In some aspects, the message indicates the activation status associated with the one or more measurement gaps.

[0166] In some aspects, the activation status associated with the one or more measurement gaps comprises a different respective indication for each measurement gap of the one or more measurement gaps indicating whether that measurement gap is activated or deactivated for the RRM measurements.

[0167] In some aspects, when the different respective indication, corresponding to a first measurement gap, indicates that the first measurement gap is activated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap are activated; and when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is deactivated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap are deactivated.

[0168] In some aspects, the message indicating the activation status associated with the one or more measurement gaps comprises one of a media access control-control element (MAC-CE) message or a downlink control information (DCI) message.

[0169] In some aspects, the method **1000** further includes receiving, from the UE, a message indicating whether the UE will be using one or more upcoming measurement gaps of the one or more measurement gaps. In some cases, the operations of this step refer to, or may be performed by, circuitry for receiving and/or code for receiving as described with reference to FIG. **12**.

[0170] In some aspects, the message indicating whether the UE will be using the one or more upcoming measurement gaps comprises one of a media access control-control element (MAC-CE) message or an uplink control information (UCI) message.

[0171] In some aspects, the message indicating whether the UE will be using the one or more upcoming measurement gaps further comprises an indication of an identifier (ID) of the measurement gap configuration.

[0172] In some aspects, the message indicating whether the UE will be using the one or more upcoming measurement gaps further comprises an indication of: which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will be using for the RRM measurements; and which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will not be using for the RRM measurements.

[0173] In some aspects, the upcoming measurement gaps that the UE will be using for the RRM measurements or will not be using for the RRM measurements are indicated by one of: an indication of a starting measurement gap and a number of consecutive measurement gaps thereafter; or a bitmap including a number of bits, each bit corresponding to a different upcoming measurement gaps and indicating whether the UE will or will not be using that measurement gap for the RRM measurements.

[0174] In some aspects, the method **1000** further includes transmitting, to the UE, scheduling information scheduling uplink or downlink transmissions for the UE during a time period corresponding to the upcoming measurement gaps that the UE will not be using for the RRM measurements. In some cases, the operations of this step refer to, or may be performed by, circuitry for transmitting and/or code for transmitting as described with reference to FIG. **12**.

[0175] In some aspects, the method **1000** further includes receiving one or more updated resource status reports from the one or more neighbor cells. In some cases, the operations of this step refer to, or may be performed by, circuitry for receiving and/or code for receiving as described with reference to FIG. **12**.

[0176] In some aspects, the method **1000** further includes transmitting, to the UE based on the one or more updated resource status reports received from the one or more neighbor cells, another message indicating an updated activation status associated with at least one of the RRM measurements or the one or more measurement gaps. In some cases, the operations of this step refer to, or may be performed by, circuitry for transmitting and/or code for transmitting as described with reference to FIG. **12**.

[0177] In one aspect, method **1000**, or any aspect related to it, may be performed by an apparatus, such as communications device **1200** of FIG. **12**, which includes various components operable, configured, or adapted to perform the method **1000**. Communications device **1200** is described below in further detail.

[0178] Note that FIG. **10** is just one example of a method, and other methods including fewer, additional, or alternative steps are possible consistent with this disclosure.

Example Communications Devices

[0179] FIG. **11** depicts aspects of an example communications device **1100**. In some aspects, communications device **1100** is a user equipment, such as UE **104** described above with respect to FIGS. **1** and **3**.

[0180] The communications device **1100** includes a processing system **1105** coupled to the transceiver **1175** (e.g., a transmitter and/or a receiver). The transceiver **1175** is configured to transmit and receive signals for the communications device **1100** via the antenna **1180**, such as the various signals as described herein. The processing system **1105** may be configured to perform processing functions for the communications device **1100**, including processing signals received and/or to be transmitted by the communications device **1100**.

[0181] The processing system **1105** includes one or more processors **1110**. In various aspects, the one or more processors **1110** may be representative of one or more of receive processor **358**, transmit processor **364**, TX MIMO processor **366**, and/or controller/processor **380**, as described with respect to FIG. **3**. The one or more processors **1110** are coupled to a computer-readable medium/memory **1140** via a bus **1170**. In certain aspects, the computer-readable medium/memory **1140** is configured to store instructions (e.g., computer-executable code) that when executed by the one or more processors **1110**, cause the one or more processors **1110** to perform the method **900** described with respect to FIG. **9**, or any aspect related to it. Note that reference to a processor performing a function of communications device **1100** may include one or more processors **1110** performing that function of communications device **1100**.

[0182] In the depicted example, computer-readable medium/memory **1140** stores code (e.g., executable instructions), such as code for receiving **1145**, code for taking **1150**, code for refraining **1155**, code for performing **1160**, and code for transmitting **1165**. Processing of the code for receiving **1145**, code for taking **1150**, code for refraining **1155**, code for performing **1160**, and code for transmitting **1165** may cause the communications device **1100** to perform the method **900** described with respect to FIG. **9**, or any aspect related to it.

[0183] The one or more processors **1110** include circuitry configured to implement (e.g., execute) the code stored in the computer-readable medium/memory **1140**, including circuitry such as circuitry for receiving **1115**, circuitry for taking **1120**, circuitry for refraining **1125**, circuitry for performing **1130**, and circuitry for transmitting **1135**. Processing with circuitry for receiving **1115**, circuitry for taking **1120**, circuitry for refraining **1125**, circuitry for performing **1130**, and circuitry for transmitting **1135** may cause the communications device **1100** to perform the method **900** described with respect to FIG. **9**, or any aspect related to it.

[0184] Various components of the communications device **1100** may provide means for performing the method **900** described with respect to FIG. **9**, or any aspect related to it. For example, means for transmitting, sending or outputting for transmission may include transceivers **354** and/or antenna(s) **352** of the UE **104** illustrated in FIG. **3** and/or the transceiver **1175** and the antenna **1180** of the communications device **1100** in FIG. **11**. Means for receiving or obtaining may include transceivers **354** and/or antenna(s) **352** of the UE **104** illustrated in FIG. **3** and/or the transceiver **1175** and the antenna **1180** of the communications device **1100** in FIG. **11**.

[0185] FIG. **12** depicts aspects of an example communications device **1200**. In some aspects, communications device **1200** is a network entity, such as BS **102** of FIGS. **1** and **3**, or a disaggregated base station as discussed with respect to FIG. **2**.

[0186] The communications device **1200** includes a processing system **1205** coupled to the transceiver **1245** (e.g., a transmitter and/or a receiver) and/or a network interface **1255**. The transceiver **1245** is configured to transmit and receive signals for the communications device **1200** via the antenna **1250**, such as the various signals as described herein. The network interface **1255** is configured to obtain and send signals for the communications device **1200** via communication link(s), such as a backhaul link, midhaul link, and/or fronthaul link as described herein, such as with respect to FIG. **2**. The processing system **1205** may be configured to perform processing functions for the communications device **1200**, including processing signals received and/or to be transmitted by the communications device **1200**.

[0187] The processing system **1205** includes one or more processors **1210**. In various aspects, one or more processors **1210** may be representative of one or more of receive processor **338**, transmit processor **320**, TX MIMO processor **330**, and/or controller/processor **340**, as described with respect to FIG. **3**. The one or more processors **1210** are coupled to a computer-readable medium/memory **1225** via a bus **1240**. In certain aspects, the computer-readable medium/memory **1225** is configured to store instructions (e.g., computer-executable code) that when executed by the one or more processors **1210**, cause the one or more processors **1210** to perform the method **1000** described with respect to FIG. **10**, or any aspect related to it. Note that reference to a processor of communications device **1200** performing a function may include one or more processors **1210** of communications device **1200** performing that function.

[0188] In the depicted example, the computer-readable medium/memory **1225** stores code (e.g., executable instructions), such as code for transmitting **1230** and code for receiving **1235**. Processing of the code for transmitting **1230** and code for receiving **1235** may cause the communications device **1200** to perform the method **1000** described with respect to FIG. **10**, or any aspect related to it.

[0189] The one or more processors **1210** include circuitry configured to implement (e.g., execute) the code stored in the computer-readable medium/memory **1225**, including circuitry such as circuitry for transmitting **1215** and circuitry for receiving **1220**. Processing with circuitry for transmitting **1215** and circuitry for receiving **1220** may cause the communications device **1200** to perform the method **1000** described with respect to FIG. **10**, or any aspect related to it.

[0190] Various components of the communications device **1200** may provide means for performing the method **1000** described with respect to FIG. **10**, or any aspect related to it. Means for transmitting, sending or outputting for transmission may include transceivers **332** and/or antenna(s) **334** of the BS **102** illustrated in FIG. **3** and/or the transceiver **1245** and the antenna **1250** of the communications device **1200** in FIG. **12**. Means for receiving or obtaining may include transceivers **332** and/or antenna(s) **334** of the BS **102** illustrated in FIG. **3** and/or the transceiver **1245** and the antenna **1250** of the communications device **1200** in FIG. **12**.

EXAMPLE CLAUSES

[0191] Implementation examples are described in the following numbered clauses:

[0192] Clause 1: A method for wireless communication by a network entity associated with a serving cell, comprising: transmitting, to a user equipment (UE), configuration information indicating one or more neighbor cells for which to perform radio resource management (RRM) measurements, and a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements; receiving one or more resource status reports from the one or more neighbor cells, wherein each resource status report of the one or more resource status reports indicates an amount of resources being used at a respective neighbor cell of the one or more neighbor cells from which that resource status report is received; and transmitting, to the UE based on the one or more resource status reports received from the one or more neighbor cells, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

[0193] Clause 2: The method of Clause 1, wherein the activation status associated with at least one of the RRM measurements or the one or more measurement gaps is based on an amount of resources being used at each respective neighbor cell of the one or more neighbor cells indicated in the one or more resource status reports.

[0194] Clause 3: The method of Clause 2, wherein the message indicates the activation status for the RRM measurements.

[0195] Clause 4: The method of Clause 3, wherein the activation status associated with the RRM measurements comprises a different respective indication for each neighbor cell of the one or more neighbor cells indicating whether the RRM measurements associated with that neighbor cell are activated or deactivated.

[0196] Clause 5: The method of Clause 4, wherein the different respective indication, corresponding to a particular neighbor cell of the one or more neighbor cells, indicates: the RRM measurements for that particular neighbor cell are deactivated when the amount of resources being used at that particular neighbor cell are above a threshold; and the RRM measurements for that particular neighbor cell are activated when the amount of resources being used at that particular neighbor cell are less than or equal to the threshold.

[0197] Clause 6: The method of Clause 3, wherein the activation status associated with the RRM measurements comprises an indication indicating whether the RRM measurements are activated for a particular frequency band or deactivated for the particular frequency band.

[0198] Clause 7: The method of Clause 3, wherein the message indicating the activation status for the RRM measurements comprises one of a media access control-control element (MAC-CE) message or a downlink control information (DCI) message.

[0199] Clause 8: The method of any one of Clauses 1-7, wherein the message indicates the activation status associated with the one or more measurement gaps.

[0200] Clause 9: The method of Clause 8, wherein the activation status associated with the one or more measurement gaps comprises a different respective indication for each measurement gap of the one or more measurement gaps indicating whether that measurement gap is activated or deactivated for the RRM measurements.

[0201] Clause 10: The method of Clause 9, wherein: when the different respective indication, corresponding to a first measurement gap, indicates that the first measurement gap is activated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap are activated; and when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is deactivated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap are deactivated.

[0202] Clause 11: The method of Clause 9, wherein the message indicating the activation status associated with the one or more measurement gaps comprises one of a media access control-control element (MAC-CE) message or a downlink control information (DCI) message.

[0203] Clause 12: The method of any one of Clauses 1-11, further comprising receiving, from the UE, a message indicating whether the UE will be using one or more upcoming measurement gaps of the one or more measurement gaps.

[0204] Clause 13: The method of Clause 12, wherein the message indicating whether the UE will be using the one or more upcoming measurement gaps comprises one of a media access control-control element (MAC-CE) message or an uplink control information (UCI) message.

[0205] Clause 14: The method of Clause 12, wherein the message indicating whether the UE will be using the one or more upcoming measurement gaps further comprises an indication of an identifier (ID) of the measurement gap configuration.

[0206] Clause 15: The method of Clause 12, wherein the message indicating whether the UE will be using the one or more upcoming measurement gaps further comprises an indication of: which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will be using for the RRM measurements; and which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will not be using for the RRM measurements.

[0207] Clause 16: The method of Clause 15, wherein the upcoming measurement gaps that the UE will be using for the RRM measurements or will not be using for the RRM measurements are indicated by one of: an indication of a starting measurement gap and a number of consecutive measurement gaps thereafter; or a bitmap including a number of bits, each bit corresponding to a different upcoming measurement gaps and indicating whether the UE will or will not be using that measurement gap for the RRM measurements.

[0208] Clause 17: The method of Clause 15, further comprising transmitting, to the UE, scheduling information scheduling uplink or downlink transmissions for the UE during a time period corresponding to the upcoming measurement gaps that the UE will not be using for the RRM measurements.

[0209] Clause 18: The method of any one of Clauses 1-17, further comprising: receiving one or more updated resource status reports from the one or more neighbor cells; and transmitting, to the UE based on the one or more updated resource status reports received from the one or more neighbor cells, another message indicating an updated activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

[0210] Clause 19: A method for wireless communication by a user equipment (UE), comprising: receiving, from a network entity associated with a serving cell, configuration information indicating: one or more neighbor cells for which to perform radio resource management (RRM) measurements, and a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements; receiving, from the network entity, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps, wherein the message indicating the activation status is based on one or more resource status reports associated with the one or more neighbor cells; and taking one or more actions based on the message indicating the activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

[0211] Clause 20: The method of Clause 19, wherein the activation status associated with at least one of the RRM measurements or the one or more measurement gaps is based on an amount of resources being used at each respective neighbor cell of the one or more neighbor cells.

[0212] Clause 21: The method of Clause 20, wherein the message indicates the activation status for the RRM measurements.

[0213] Clause 22: The method of Clause 21, wherein the activation status associated with the RRM measurements comprises a different respective indication for each neighbor cell of the one or more neighbor cells indicating whether the RRM measurements associated with that neighbor cell are activated or deactivated.

[0214] Clause 23: The method of Clause 22, wherein the different respective indication, corresponding to a particular neighbor cell of the one or more neighbor cells, indicates: the RRM measurements for that particular neighbor cell are deactivated when the amount of resources being used at that particular neighbor cell are above a threshold; and the RRM measurements for that particular neighbor cell are activated when the amount of resources being used at that particular neighbor cell are less than or equal to the threshold.

[0215] Clause 24: The method of Clause 23, wherein taking the one or more actions comprises: refraining from performing the RRM measurements for the particular neighbor cell when the RRM measurements for the particular neighbor cell are indicated as deactivated; and performing the RRM measurements for the particular neighbor cell when the RRM measurements for the particular neighbor cell are indicated as activated.

[0216] Clause 25: The method of Clause 21, wherein: the activation status associated with the RRM measurements comprises and indication indicating whether the RRM measurements are activated for a particular frequency band or deactivated for the particular frequency band; and taking the one or more actions comprises: performing the RRM measurements for the particular frequency band when the activation status indicates that the RRM measurements are activated for the particular frequency band; and refraining from performing the RRM measurements for the particular frequency band when the activation status indicates that the RRM measurements are deactivated for the particular frequency band.

[0217] Clause 26: The method of Clause 21, wherein the message indicating the activation status for the RRM measurements comprises one of a media access control-control element (MAC-CE) message or a downlink control information (DCI) message.

[0218] Clause 27: The method of any one of Clauses 19-26, wherein the message indicates the activation status associated with the one or more measurement gaps.

[0219] Clause 28: The method of Clause 27, wherein the activation status associated with the one or more measurement gaps comprises a different respective indication for each measurement gap of the one or more measurement gaps indicating whether that measurement gap is activated or deactivated for the RRM measurements.

[0220] Clause 29: The method of Clause 28, wherein: when the different respective indication, corresponding to a first measurement gap, indicates that the first measurement gap is activated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap are activated; and when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is deactivated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap are deactivated.

[0221] Clause 30: The method of Clause 29, wherein taking the one or more actions comprises: performing, during a time period corresponding to the first measurement gap, the RRM measurements for all of the neighbor cells that are associated with the first measurement gap when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is activated; and refraining from performing, during the time period corresponding to the first measurement gap, the RRM measurements for all of the neighbor cells that are associated with the first measurement gap when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is deactivated.

[0222] Clause 31: The method of Clause 28, wherein the message indicating the activation status associated with the one or more measurement gaps comprises one of a media access control-control element (MAC-CE) message or a downlink control information (DCI) message.

[0223] Clause 32: The method of any one of Clauses 19-31, further comprising transmitting, to the network entity, a message indicating whether the UE will be using one or more upcoming measurement gaps of the one or more measurement gaps.

[0224] Clause 33: The method of Clause 32, wherein the message indicating whether the UE will be using the one or more upcoming measurement gaps comprises one of a media access control-control element (MAC-CE) message or an uplink control information (UCI) message.

[0225] Clause 34: The method of Clause 32, wherein the message indicating whether the UE will be using the one or more upcoming measurement gaps further comprises an indication of an identifier (ID) of the measurement gap configuration.

[0226] Clause 35: The method of Clause 32, wherein the message indicating whether the UE will be using the one or more upcoming measurement gaps further comprises an indication of: which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will be using for the RRM measurements; and which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will not be using for the RRM measurements.

[0227] Clause 36: The method of Clause 35, wherein the upcoming measurement gaps that the UE will be using for the RRM measurements or will not be using for the RRM measurements are indicated by one of: an indication of a starting measurement gap and a number of consecutive measurement gaps thereafter; or a bitmap including a number of bits, each bit corresponding to a different upcoming measurement gaps and indicating whether the UE will or will not be using that measurement gap for the RRM measurements.

[0228] Clause 37: The method of Clause 35, further comprising receiving, from the network entity, scheduling information scheduling uplink or downlink transmissions for the UE during a time period corresponding to the upcoming measurement gaps that the UE will not be using for the RRM measurements.

[0229] Clause 38: The method of any one of Clauses 19-37, further comprising receiving, from the network entity, another message indicating an updated activation status associated with at least one of the RRM measurements or the one or more measurement gaps, wherein the other message is based on one or more updated resource status reports associated with the one or more neighbor cells, wherein taking the one or more actions is further based on the other message indicating the updated activation status.

[0230] Clause 39: An apparatus, comprising: at least one memory comprising executable instructions; and at least one processor configured to execute the executable instructions and cause the apparatus to perform a method in accordance with any one of Clauses 1-38.

[0231] Clause 40: An apparatus, comprising means for performing a method in accordance with any one of Clauses 1-38.

[0232] Clause 41: A non-transitory computer-readable medium comprising executable instructions that, when executed by at least one processor of an apparatus, cause the apparatus to perform a method in accordance with any one of Clauses 1-38.

[0233] Clause 42: A computer program product embodied on a computer-readable storage medium comprising code for performing a method in accordance with any one of Clauses 1-38.

ADDITIONAL CONSIDERATIONS

[0234] The preceding description is provided to enable any person skilled in the art to practice the various aspects described herein. The examples discussed herein are not limiting of the scope, applicability, or aspects set forth in the claims. Various modifications to these aspects will be readily apparent to those skilled in the art, and the general principles defined herein may be applied to other aspects. For example, changes may be made in the function and arrangement of elements discussed without departing from the scope of the disclosure. Various examples may omit, substitute, or add various procedures or components as appropriate. For instance, the methods described may be performed in an order different from that described, and various actions may be added, omitted, or combined. Also, features described with respect to some examples may be combined in some other examples. For example, an apparatus may be implemented or a method may be practiced using any number of the aspects set forth herein. In addition, the scope of the disclosure is intended to cover such an apparatus or method that is practiced using other structure, functionality, or structure and functionality in addition to, or other than, the various aspects of the disclosure set forth herein. It should be understood that any aspect of the disclosure disclosed herein may be embodied by one or more elements of a claim.

[0235] The various illustrative logical blocks, modules and circuits described in connection with the present disclosure may be implemented or performed with a general purpose processor, a digital signal processor (DSP), an ASIC, a field programmable gate array (FPGA) or other programmable logic device (PLD), discrete gate or transistor logic, discrete hardware components, or any combination thereof designed to perform the functions described herein. A general-purpose processor may be a microprocessor, but in the alternative, the processor may be any commercially available processor, controller, microcontroller, or state machine. A processor may also be implemented as a combination of computing devices, e.g., a combination of a DSP and a microprocessor, a plurality of microprocessors, one or more microprocessors in conjunction with a DSP core, a system on a chip (SoC), or any other such configuration.

[0236] As used herein, "a processor," "at least one processor" or "one or more processors" generally refers to a single processor configured to perform one or multiple operations or multiple processors configured to collectively perform one or more operations. In the case of multiple processors, performance of the one or more operations could be divided amongst different processors, though one processor may perform multiple operations, and multiple processors could collectively perform a single operation. Similarly, "a memory," "at least one memory" or "one or more memories" generally refers to a single memory configured to store data and/or instructions, multiple memories configured to collectively store data and/or instructions.

[0237] As used herein, a phrase referring to "at least one of" a list of items refers to any combination of those items, including single members. As an example, "at least one of: a, b, or c" is intended to cover a, b, c, a-b, a-c, b-c, and a-b-c, as well as any combination with multiples of the same element (e.g., a-a, a-a-a, a-a-b, a-a-c, a-b-b, a-c-c, b-b, b-b-b, b-b-c, c-c, and c-c-c or any other ordering of a, b, and c).

[0238] As used herein, the term "determining" encompasses a wide variety of actions. For example, "determining" may include calculating, computing, processing, deriving, investigating, looking up (e.g., looking up in a table, a database or another data structure), ascertaining and the like. Also, "determining" may include receiving (e.g., receiving information), accessing (e.g., accessing data in a memory) and the like. Also, "determining" may include resolving, selecting, choosing, establishing and the like.

[0239] The methods disclosed herein comprise one or more actions for achieving the methods. The method actions may be interchanged with one another without departing from the scope of the claims. In other words, unless a specific order of actions is specified, the order and/or use of specific actions may be modified without departing from the scope of the claims. Further, the various operations of methods described above may be performed by any suitable means capable of performing the corresponding functions. The means may include various hardware and/or software component(s) and/or module(s), including, but not limited to a circuit, an application specific integrated circuit (ASIC), or processor.

[0240] The following claims are not intended to be limited to the aspects shown herein, but are to be accorded the full scope consistent with the language of the claims. Within a claim, reference to an element in the singular is not intended to mean "one and only one" unless specifically so stated, but rather "one or more." Unless specifically stated otherwise, the term "some" refers to one or more. No claim element is to be construed under the provisions of 35 U.S.C. § 112(f) unless the element is expressly recited using the phrase "means for". All structural and functional equivalents to the elements of the various aspects described throughout this disclosure that are known or later come to be known to those of ordinary skill in the art are expressly incorporated herein by reference and are intended to be encompassed by the claims. Moreover, nothing disclosed herein is intended to be dedicated to the public regardless of whether such disclosure is explicitly recited in the claims.

What is claimed is:

1. An apparatus for wireless communication by a network entity associated with a serving cell, comprising:

one or more processors configured to execute instructions stored on one or more memories and to cause the network entity to:

transmit, to a user equipment (UE), configuration information indicating:

one or more neighbor cells for which to perform radio resource management (RRM) measurements; and

a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements;

receive one or more resource status reports from the one or more neighbor cells, wherein each resource status report of the one or more resource status reports indicates an amount of resources being used at a respective neighbor cell of the one or more neighbor cells from which that resource status report is received; and

transmit, to the UE based on the one or more resource status reports received from the one or more neighbor cells, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

2. The apparatus of claim **1**, wherein the activation status associated with at least one of the RRM measurements or the one or more measurement gaps is based on an amount of resources being used at each respective neighbor cell of the one or more neighbor cells indicated in the one or more resource status reports.

3. The apparatus of claim **2**, wherein the message indicates the activation status for the RRM measurements.

4. The apparatus of claim **3**, wherein the activation status for the RRM measurements comprises a different respective indication for each neighbor cell of the one or more neighbor cells indicating whether the RRM measurements associated with that neighbor cell are activated or deactivated.

5. The apparatus of claim **4**, wherein the different respective indication, corresponding to a particular neighbor cell of the one or more neighbor cells, indicates:

the RRM measurements for that particular neighbor cell are deactivated when the amount of resources being used at that particular neighbor cell are above a threshold; and

the RRM measurements for that particular neighbor cell are activated when the amount of resources being used at that particular neighbor cell are less than or equal to the threshold.

6. The apparatus of claim **3**, wherein the activation status for the RRM measurements comprises an indication indicating whether the RRM measurements are activated for a particular frequency band or deactivated for the particular frequency band.

7. The apparatus of claim **1**, wherein:

the message indicates the activation status associated with the one or more measurement gaps; and

the activation status associated with the one or more measurement gaps comprises a different respective indication for each measurement gap of the one or more measurement gaps indicating whether that measurement gap is activated or deactivated for the RRM measurements.

8. The apparatus of claim **7**, wherein:

when the different respective indication, corresponding to a first measurement gap, indicates that the first measurement gap is activated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap are activated; and

when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is deactivated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap are deactivated.

9. The apparatus of claim **1**, wherein the one or more processors are further configured to cause the network entity to:

receive, from the UE, a message indicating whether the UE will be using one or more upcoming measurement gaps of the one or more measurement gaps, wherein the message indicating whether the UE will be using the one or more upcoming measurement gaps further comprises an indication of an identifier (ID) of the measurement gap configuration.

10. The apparatus of claim **9**, wherein the message indicating whether the UE will be using the one or more upcoming measurement gaps further comprises an indication of:

which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will be using for the RRM measurements; and

which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will not be using for the RRM measurements.

11. The apparatus of claim **10**, wherein the upcoming measurement gaps that the UE will be using for the RRM measurements or will not be using for the RRM measurements are indicated by one of:

an indication of a starting measurement gap and a number of consecutive measurement gaps thereafter; or

a bitmap including a number of bits, each bit corresponding to a different upcoming measurement gaps and indicating whether the UE will or will not be using that measurement gap for the RRM measurements.

12. The apparatus of claim **10**, wherein the one or more processors are further configured to cause the network entity to transmit, to the UE, scheduling information scheduling uplink or downlink transmissions for the UE during a time period corresponding to the upcoming measurement gaps that the UE will not be using for the RRM measurements.

13. The apparatus of claim **1**, wherein the one or more processors are further configured to cause the network entity to:

receive one or more updated resource status reports from the one or more neighbor cells; and

transmit, to the UE based on the one or more updated resource status reports received from the one or more neighbor cells, another message indicating an updated activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

14. An apparatus for wireless communication by a user equipment (UE), comprising:

one or more processors configured to execute instructions stored on one or more memories and to cause the UE to:

receive, from a network entity associated with a serving cell, configuration information indicating:

one or more neighbor cells for which to perform radio resource management (RRM) measurements; and

a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements;

receive, from the network entity, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps, wherein the message indicating the activation status is based on one or more resource status reports associated with the one or more neighbor cells; and

take one or more actions based on the message indicating the activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

15. The apparatus of claim **14**, wherein the activation status associated with at least one of the RRM measurements or the one or more measurement gaps is based on an amount of resources being used at each respective neighbor cell of the one or more neighbor cells.

16. The apparatus of claim **15**, wherein the message indicates the activation status for the RRM measurements.

17. The apparatus of claim **16**, wherein the activation status for the RRM measurements comprises a different respective indication for each neighbor cell of the one or more neighbor cells indicating whether the RRM measurements associated with that neighbor cell are activated or deactivated.

18. The apparatus of claim **17**, wherein the different respective indication, corresponding to a particular neighbor cell of the one or more neighbor cells, indicates:

the RRM measurements for that particular neighbor cell are deactivated when the amount of resources being used at that particular neighbor cell are above a threshold; and

the RRM measurements for that particular neighbor cell are activated when the amount of resources being used at that particular neighbor cell are less than or equal to the threshold.

19. The apparatus of claim **18**, wherein, in order to take the one or more actions, the one or more processors are configured to cause the UE to:

refrain from performing the RRM measurements for the particular neighbor cell when the RRM measurements for the particular neighbor cell are indicated as deactivated; and

perform the RRM measurements for the particular neighbor cell when the RRM measurements for the particular neighbor cell are indicated as activated.

20. The apparatus of claim **16**, wherein:

the activation status for the RRM measurements comprises an indication indicating whether the RRM measurements are activated for a particular frequency band or deactivated for the particular frequency band; and

in order to take the one or more actions, the one or more processors are configured to cause the UE to:

perform the RRM measurements for the particular frequency band when the activation status indicates that the RRM measurements are activated for the particular frequency band; and

refrain from performing the RRM measurements for the particular frequency band when the activation status indicates that the RRM measurements are deactivated for the particular frequency band.

21. The apparatus of claim **14**, wherein:

the message indicates the activation status associated with the one or more measurement gaps; and

the activation status associated with the one or more measurement gaps comprises a different respective indication for each measurement gap of the one or more measurement gaps indicating whether that measurement gap is activated or deactivated for the RRM measurements.

22. The apparatus of claim **21**, wherein:

when the different respective indication, corresponding to a first measurement gap, indicates that the first measurement gap is activated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap are activated; and

when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is deactivated, the RRM measurements for all neighbor cells, of the one or more neighbor cells, that are associated with the first measurement gap are deactivated.

23. The apparatus of claim **22**, wherein, in order to take the one or more actions, the one or more processors are configured to cause the UE to:

perform, during a time period corresponding to the first measurement gap, the RRM measurements for all of the neighbor cells that are associated with the first measurement gap when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is activated; and

refrain from performing, during the time period corresponding to the first measurement gap, the RRM measurements for all of the neighbor cells that are associated with the first measurement gap when the different respective indication, corresponding to the first measurement gap, indicates that the first measurement gap is deactivated.

24. The apparatus of claim **14**, wherein the one or more processors are further configured to cause the UE to transmit, to the network entity, a message indicating whether the UE will be using one or more upcoming measurement gaps of the one or more measurement gaps, wherein the message indicating whether the UE will be using the one or more upcoming measurement gaps further comprises an indication of an identifier (ID) of the measurement gap configuration.

25. The apparatus of claim **24**, wherein the message indicating whether the UE will be using the one or more upcoming measurement gaps further comprises an indication of:

which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will be using for the RRM measurements; and

which upcoming measurement gaps of the measurement gap configuration, corresponding to the indicated ID, that the UE will not be using for the RRM measurements.

26. The apparatus of claim **25**, wherein the upcoming measurement gaps that the UE will be using for the RRM measurements or will not be using for the RRM measurements are indicated by one of:

an indication of a starting measurement gap and a number of consecutive measurement gaps thereafter; or

a bitmap including a number of bits, each bit corresponding to a different upcoming measurement gaps and indicating whether the UE will or will not be using that measurement gap for the RRM measurements.

27. The apparatus of claim **25**, wherein the one or more processors are further configured to cause the UE to receive, from the network entity, scheduling information scheduling uplink or downlink transmissions for the UE during a time period corresponding to the upcoming measurement gaps that the UE will not be using for the RRM measurements.

28. The apparatus of claim **14**, wherein:

the one or more processors are further configured to cause the UE to receive, from the network entity, another message indicating an updated activation status associated with at least one of the RRM measurements or the one or more measurement gaps;

the other message is based on one or more updated resource status reports associated with the one or more neighbor cells; and

the one or more processors are configured to cause the UE to take the one or more actions further based on the other message indicating the updated activation status.

29. A method for wireless communication by a network entity associated with a serving cell, comprising:

transmitting, to a user equipment (UE), configuration information indicating:

one or more neighbor cells for which to perform radio resource management (RRM) measurements; and

a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements;

receiving one or more resource status reports from the one or more neighbor cells, wherein each resource status report of the one or more resource status reports indicates an amount of resources being used at a respective neighbor cell of the one or more neighbor cells from which that resource status report is received; and

transmitting, to the UE based on the one or more resource status reports received from the one or more neighbor cells, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

30. A method for wireless communication by a user equipment (UE), comprising:

receiving, from a network entity associated with a serving cell, configuration information indicating:

one or more neighbor cells for which to perform radio resource management (RRM) measurements; and

a measurement gap configuration indicating one or more measurement gaps for performing the RRM measurements;

receiving, from the network entity, a message indicating an activation status associated with at least one of the RRM measurements or the one or more measurement gaps, wherein the message indicating the activation status is based on one or more resource status reports associated with the one or more neighbor cells; and

taking one or more actions based on the message indicating the activation status associated with at least one of the RRM measurements or the one or more measurement gaps.

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