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(54) **TECHNIQUES FOR SKIPPING PUSCH OCCASIONS WITH MULTIPLE CODEWORDS**

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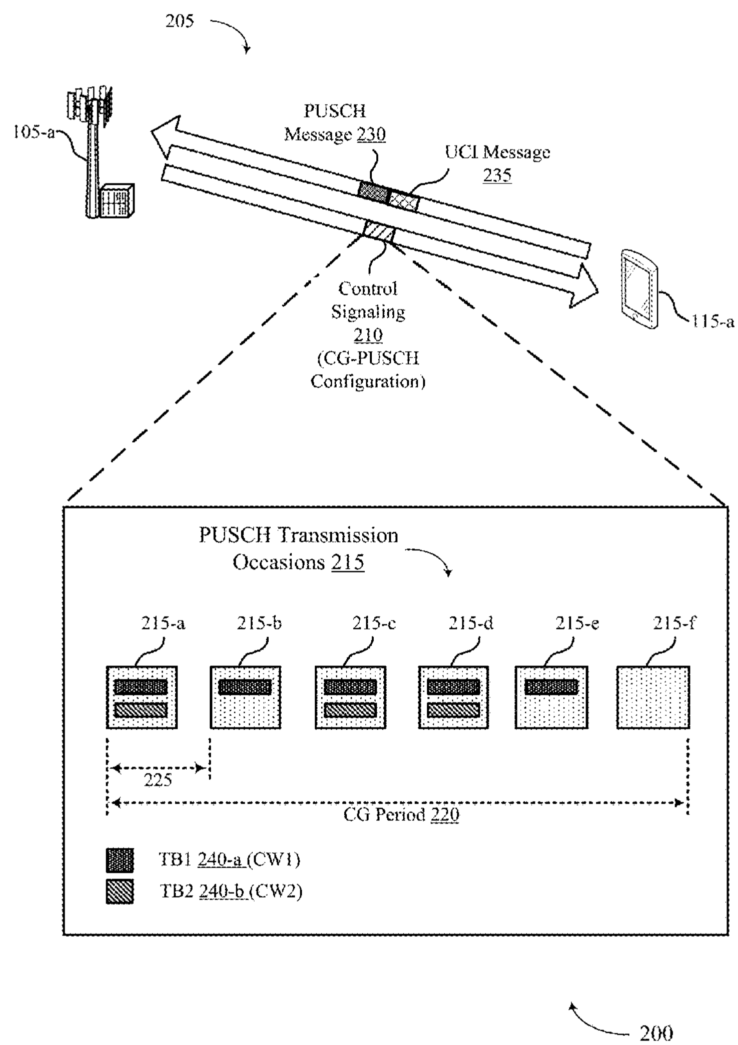
(57) **ABSTRACT**

Methods, systems, and devices for wireless communications are described. A user equipment (UE) may receive radio resource control (RRC) signaling that indicates (e.g., schedules, configures) resources for a set of physical uplink control channel (PUSCH) transmission occasions, each of the PUSCH transmission occasions configured with a capacity for transmission of a maximum quantity of transport blocks (TBs), the maximum quantity including two or more TBs. The UE may generate a PUSCH message in accordance with the RRC signaling, where the PUSCH message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs, and may transmit the PUSCH message within a PUSCH transmission occasion of the set of PUSCH transmission occasions.



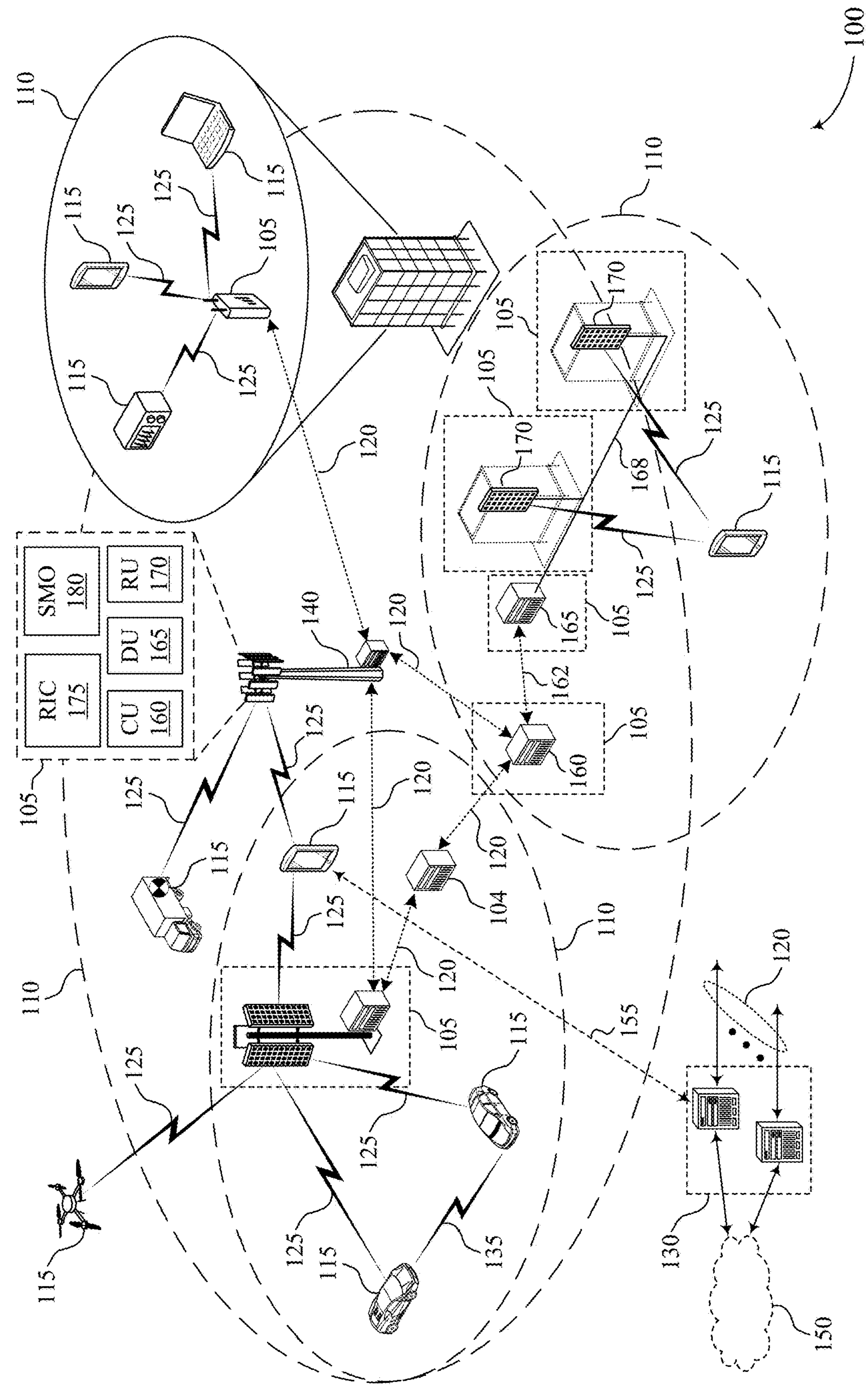

100
110
115
125
105
120
140
RIC 175
CU 160
SMO 180
DU 165
RU 170
170
168
162
165
160
104
155
135
130
150

FIG. 1

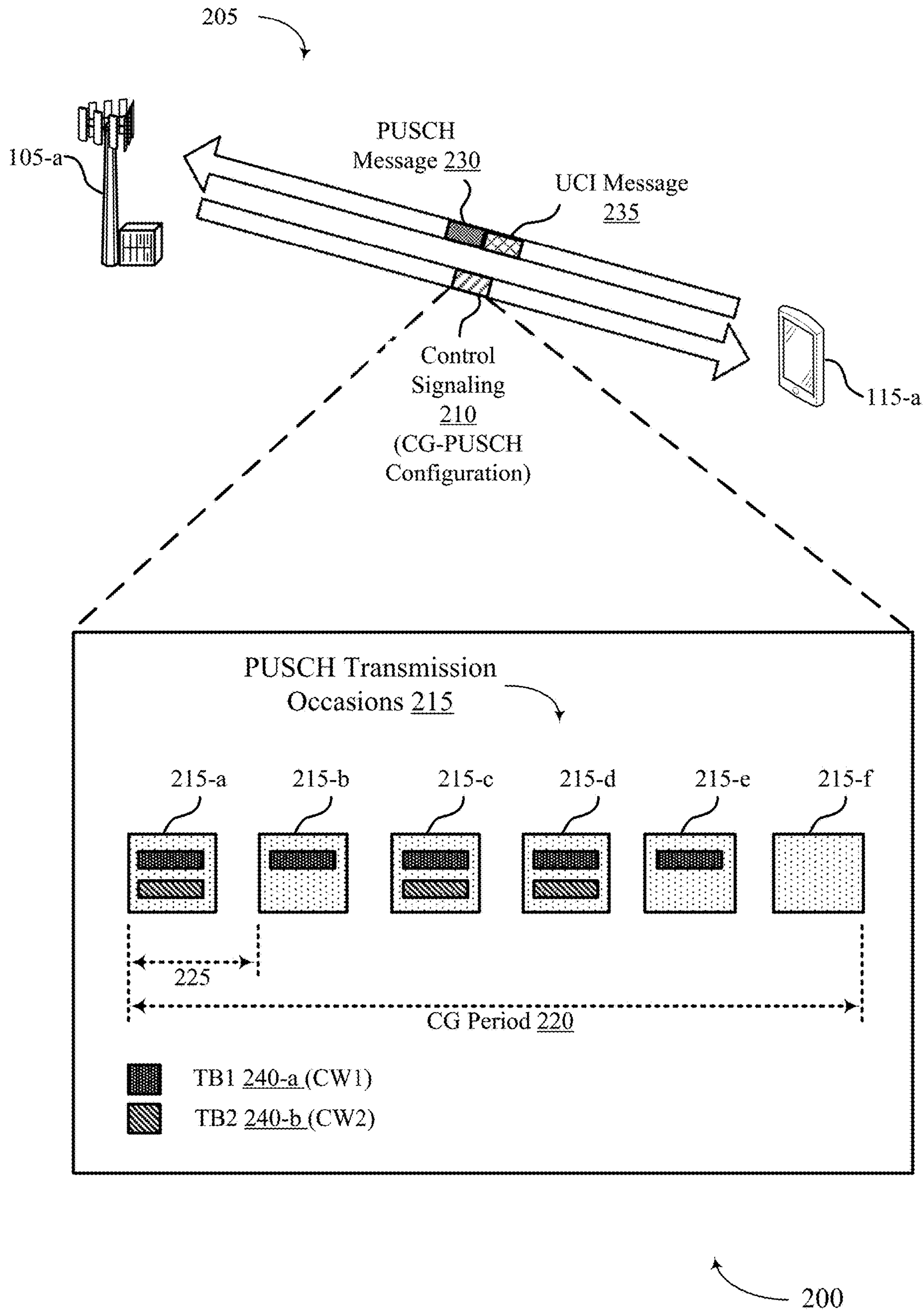

205
105-a
PUSCH
Message 230
UCI Message
235
Control
Signaling
210
(CG-PUSCH
Configuration)
115-a
PUSCH Transmission
Occasions 215
215-a
215-b
215-c
215-d
215-e
215-f
225
CG Period 220
TB1 240-a (CW1)
TB2 240-b (CW2)
200

FIG. 2

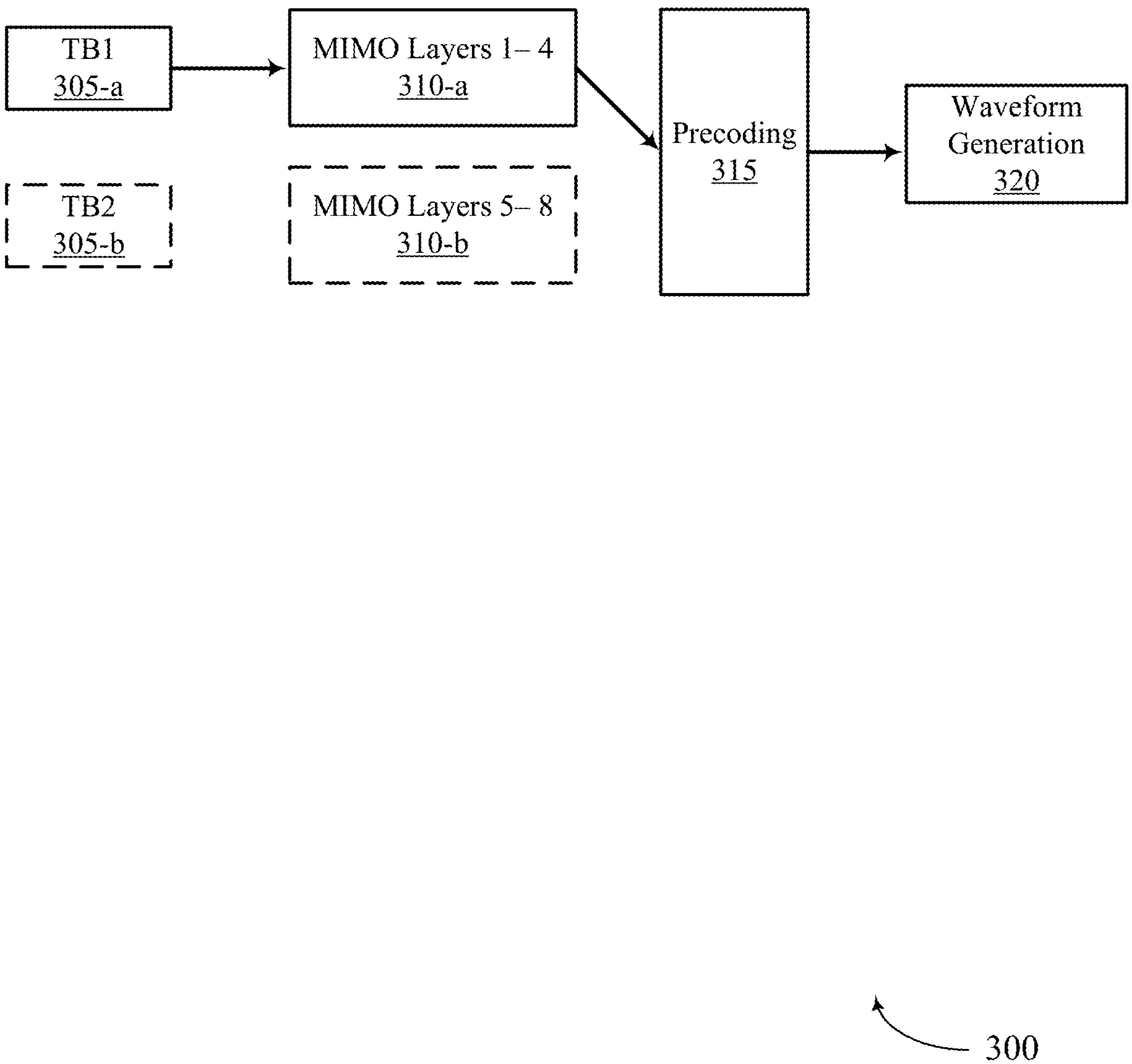

TB1
305-a
TB2
305-b
MIMO Layers 1– 4
310-a
MIMO Layers 5– 8
310-b
Precoding
315
Waveform Generation
320
300

FIG. 3

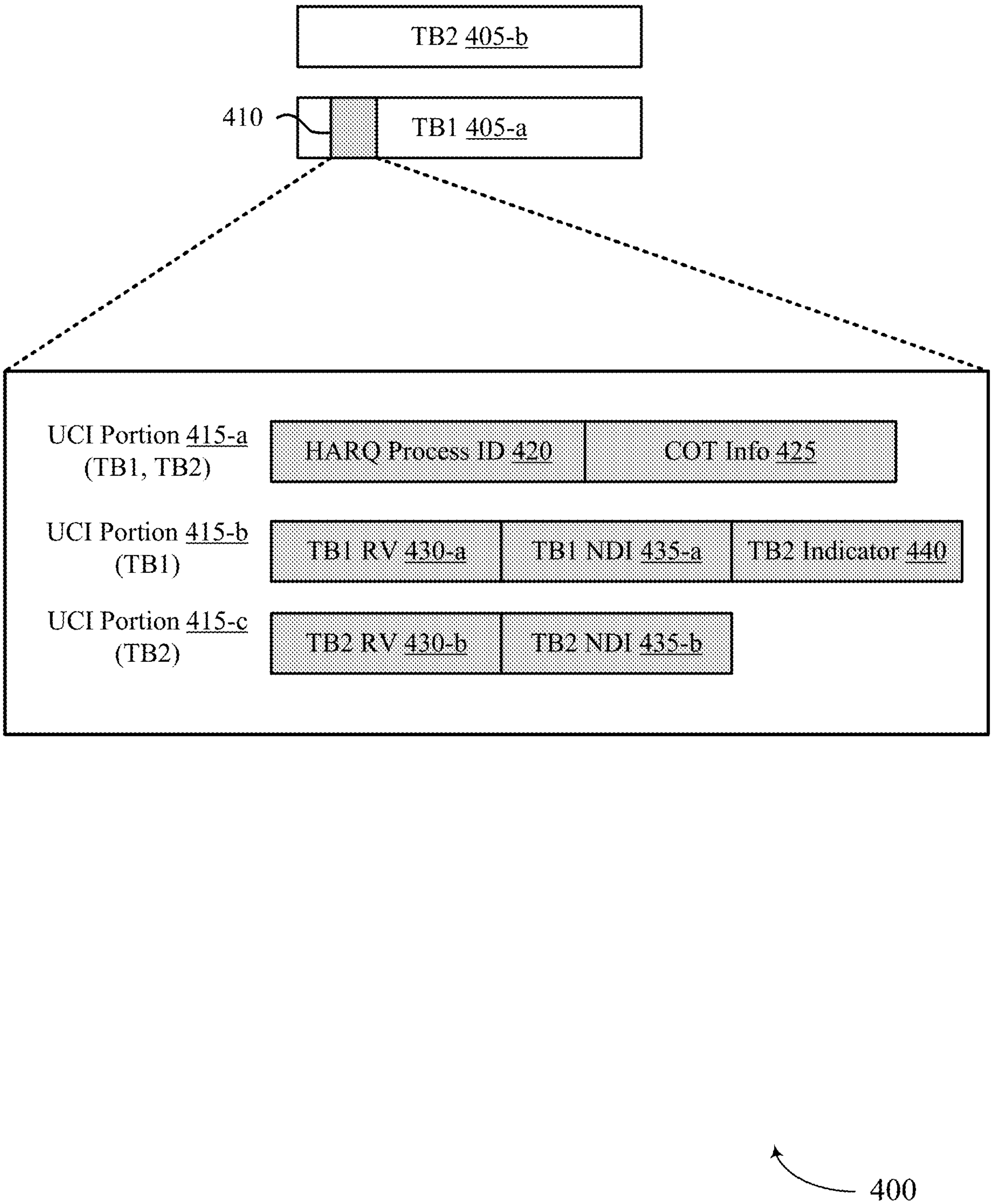

TB2 405-b
410
TB1 405-a
UCI Portion 415-a (TB1, TB2)
HARQ Process ID 420
COT Info 425
UCI Portion 415-b (TB1)
TB1 RV 430-a
TB1 NDI 435-a
TB2 Indicator 440
UCI Portion 415-c (TB2)
TB2 RV 430-b
TB2 NDI 435-b
400

FIG. 4

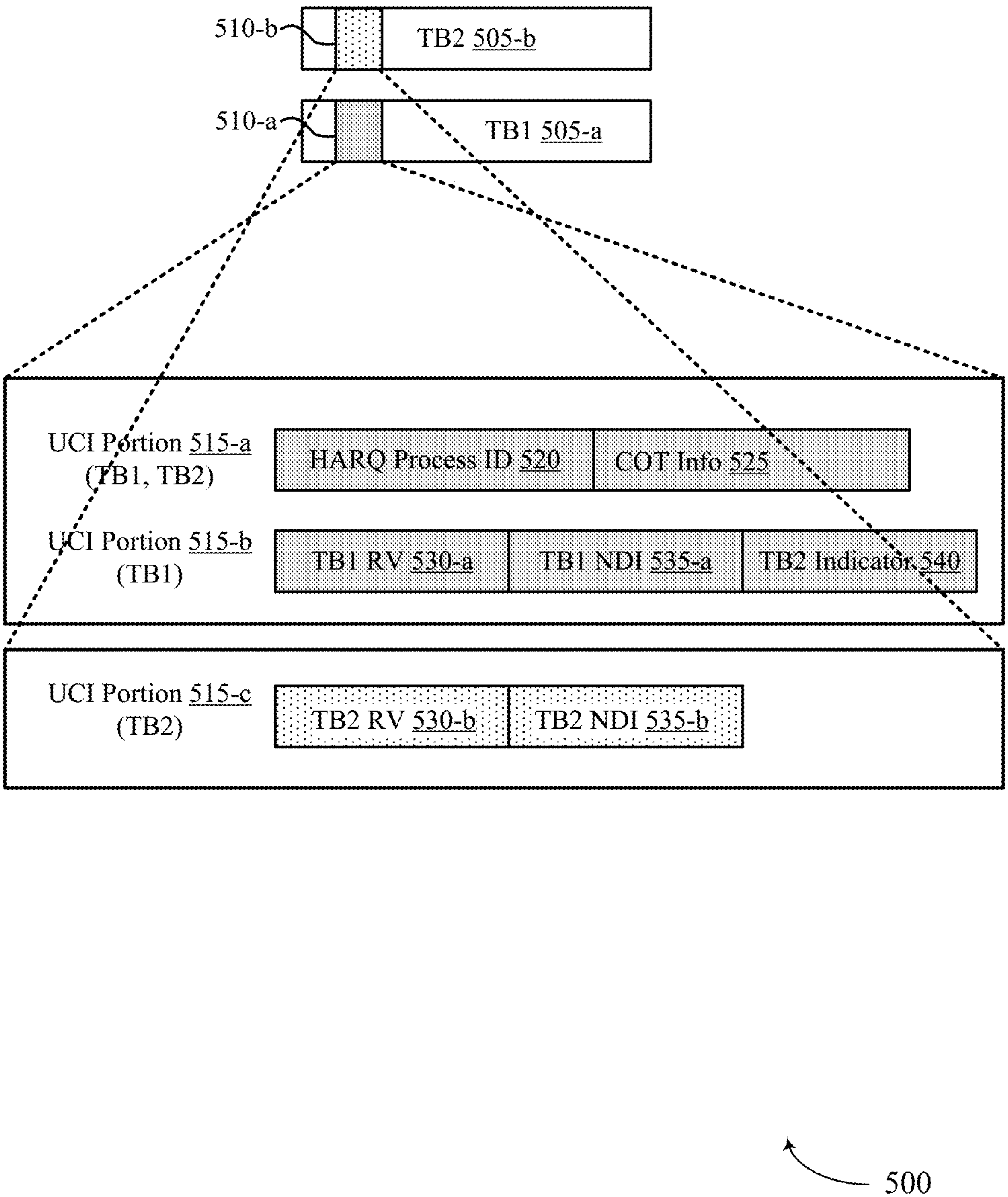
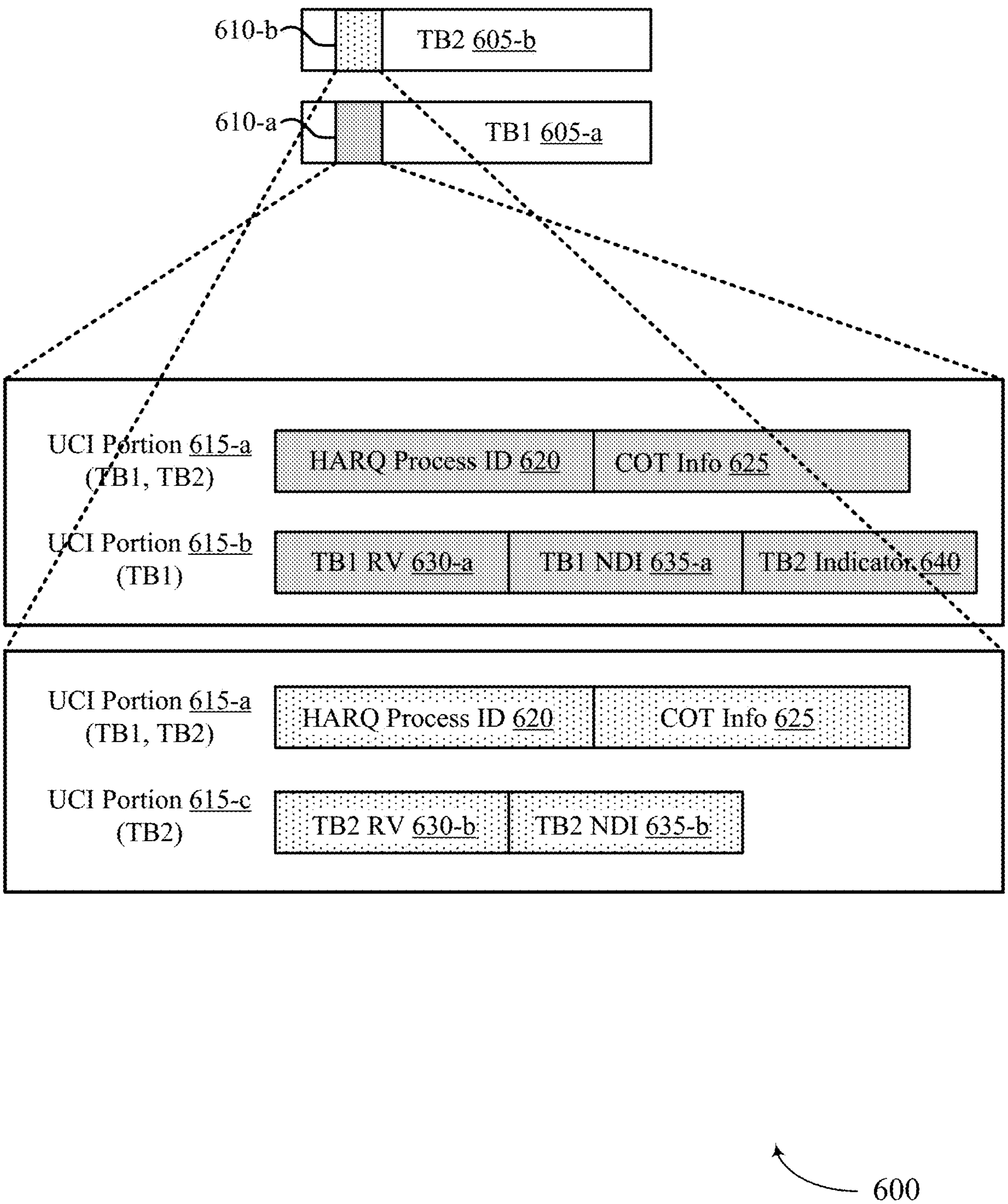

510-b
TB2 505-b
510-a
TB1 505-a
UCI Portion 515-a
(TB1, TB2)
HARQ Process ID 520
COT Info 525
UCI Portion 515-b
(TB1)
TB1 RV 530-a
TB1 NDI 535-a
TB2 Indicator 540
UCI Portion 515-c
(TB2)
TB2 RV 530-b
TB2 NDI 535-b
500

FIG. 5



610-b
TB2 605-b
610-a
TB1 605-a
UCI Portion 615-a (TB1, TB2)
HARQ Process ID 620
COT Info 625
UCI Portion 615-b (TB1)
TB1 RV 630-a
TB1 NDI 635-a
TB2 Indicator 640
UCI Portion 615-a (TB1, TB2)
HARQ Process ID 620
COT Info 625
UCI Portion 615-c (TB2)
TB2 RV 630-b
TB2 NDI 635-b
600

FIG. 6

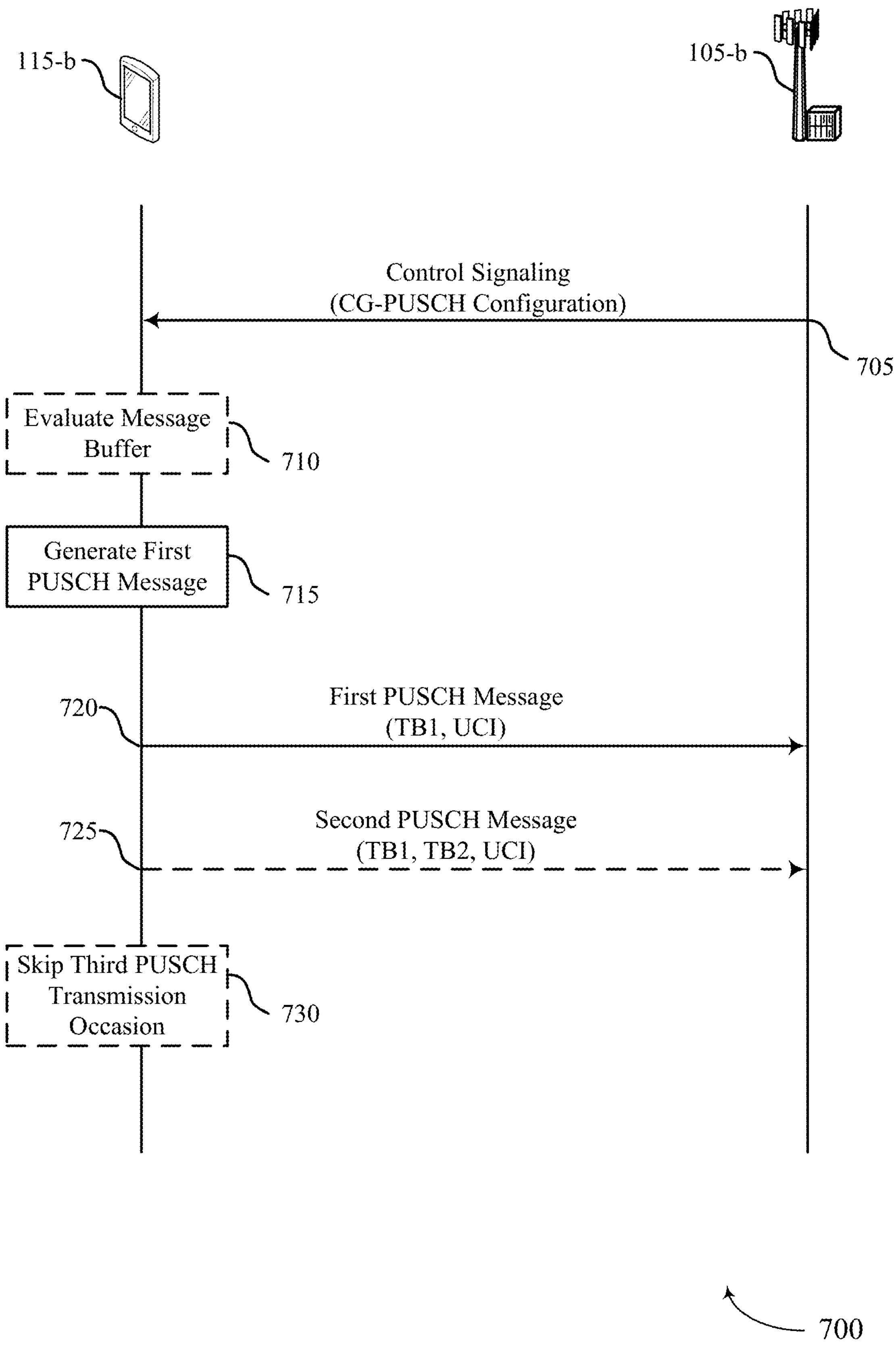

115-b
105-b
Control Signaling
(CG-PUSCH Configuration)
705
Evaluate Message Buffer
710
Generate First PUSCH Message
715
720
First PUSCH Message
(TB1, UCI)
725
Second PUSCH Message
(TB1, TB2, UCI)
Skip Third PUSCH Transmission Occasion
730
700

FIG. 7

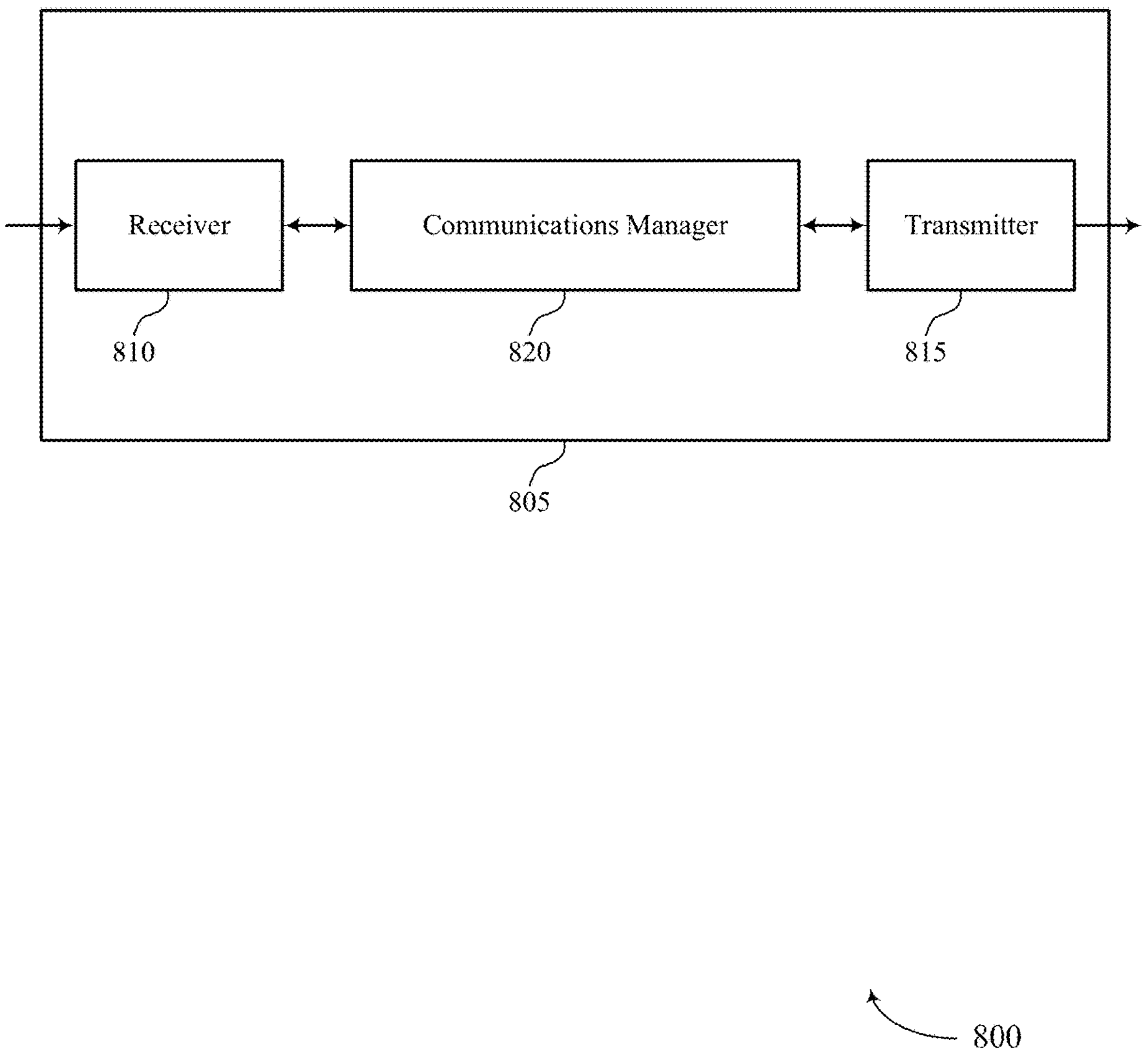

Receiver
Communications Manager
Transmitter
810
820
815
805
800

FIG. 8

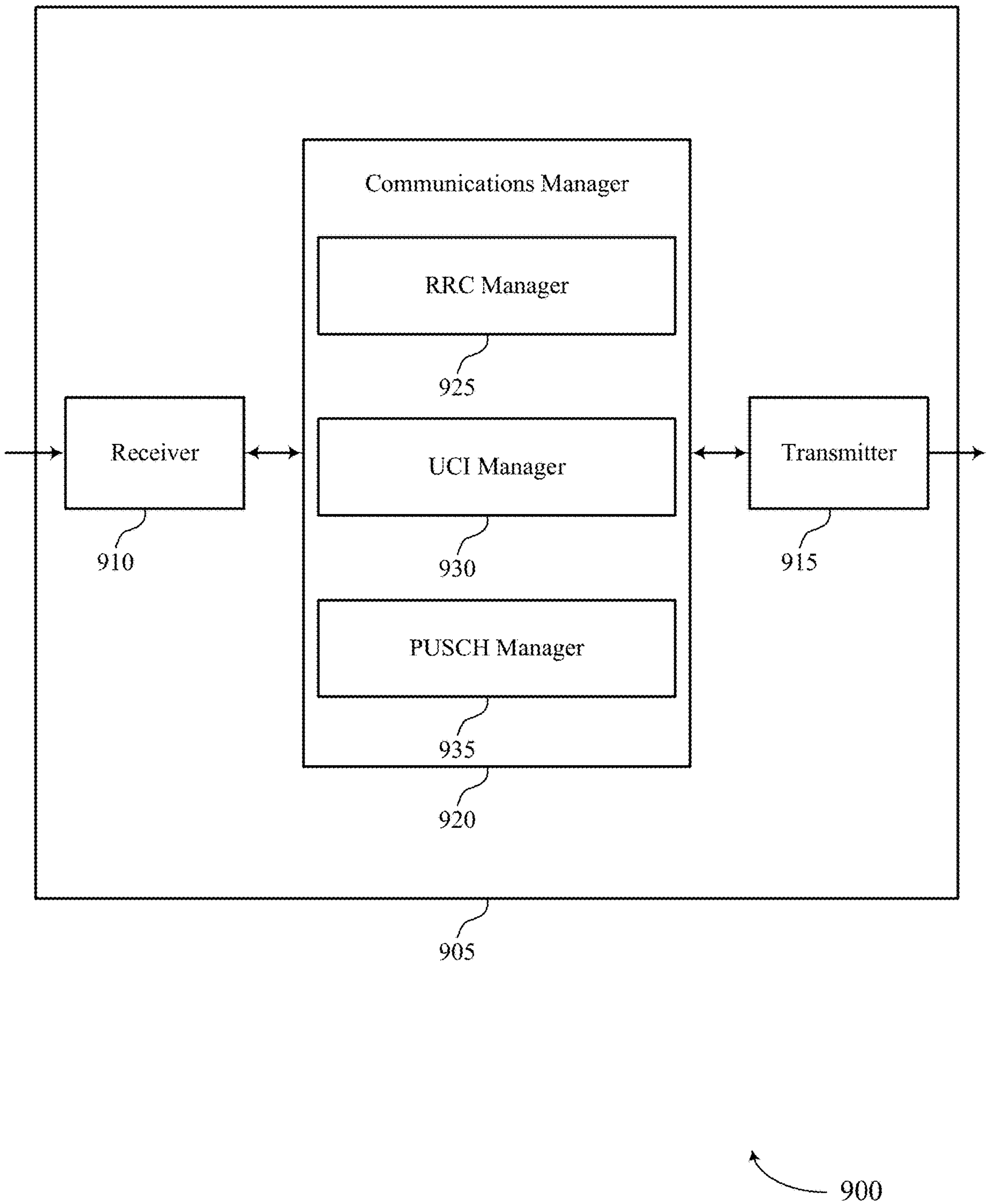

Communications Manager
RRC Manager
925
Receiver
UCI Manager
Transmitter
910
930
915
PUSCH Manager
935
920
905
900

FIG. 9

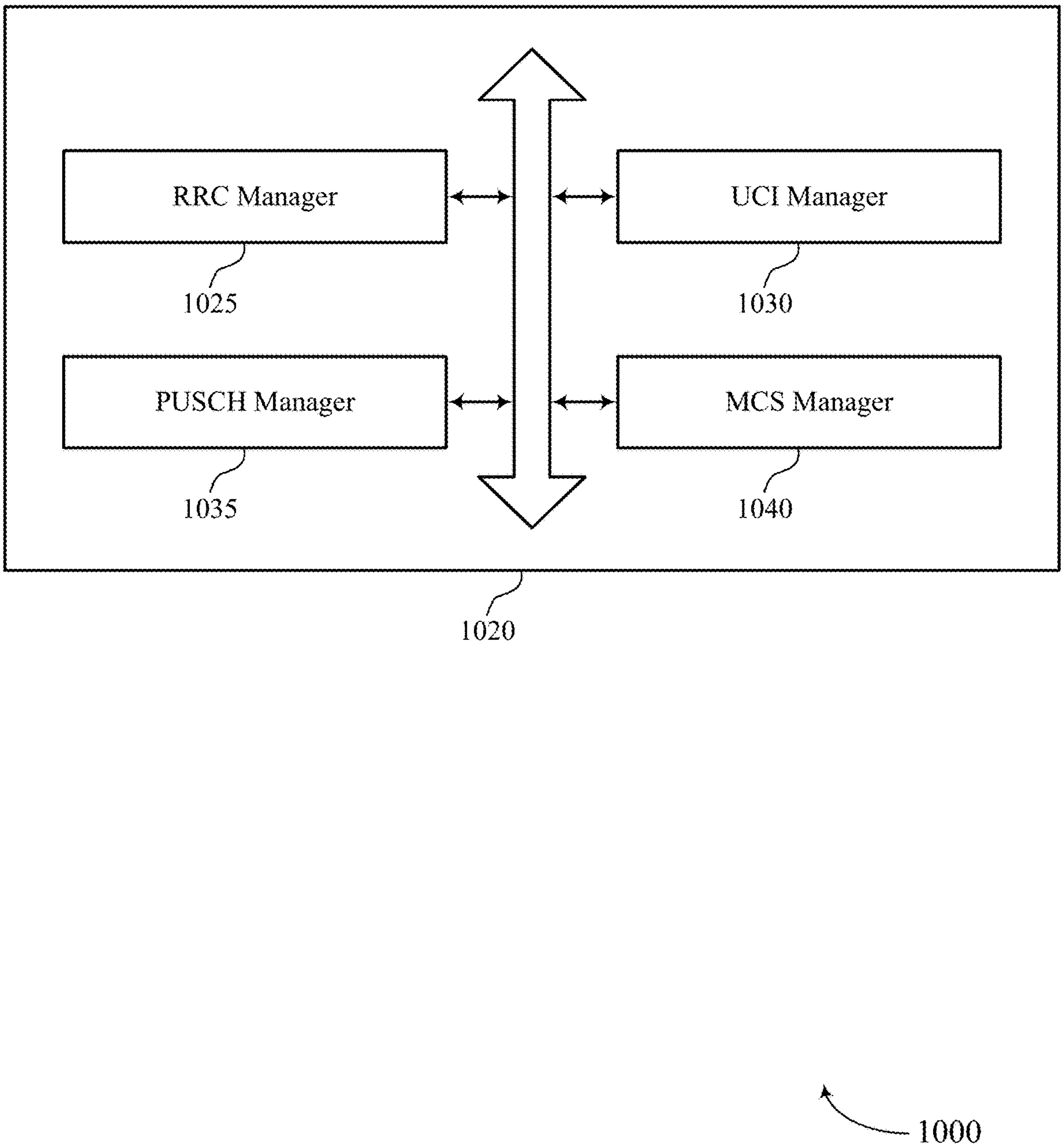

RRC Manager
1025
UCI Manager
1030
PUSCH Manager
1035
MCS Manager
1040
1020
1000

FIG. 10

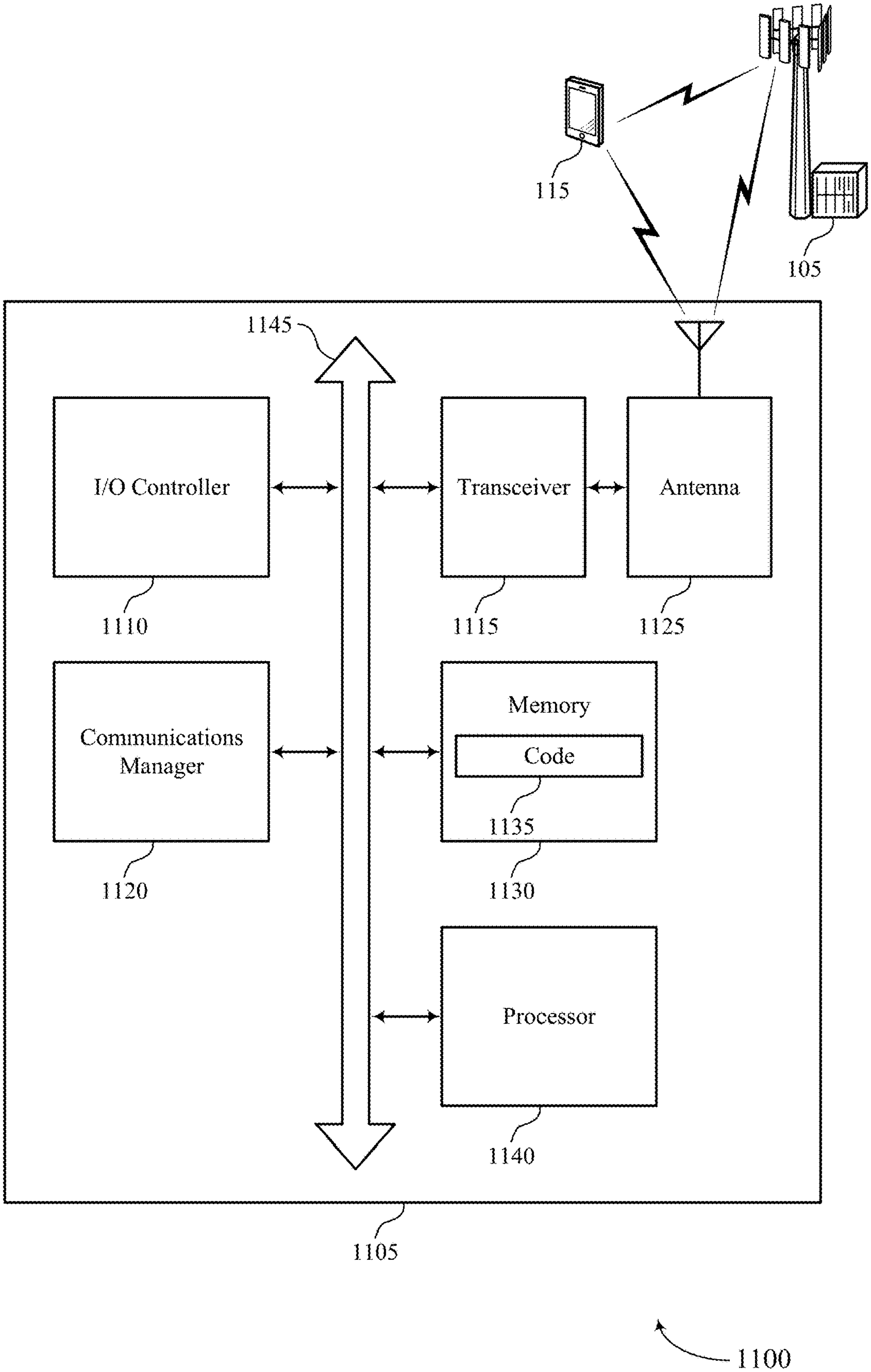

115
105
1145
I/O Controller
Transceiver
Antenna
1110
1115
1125
Communications Manager
Memory
Code
1135
1120
1130
Processor
1140
1105
1100

FIG. 11

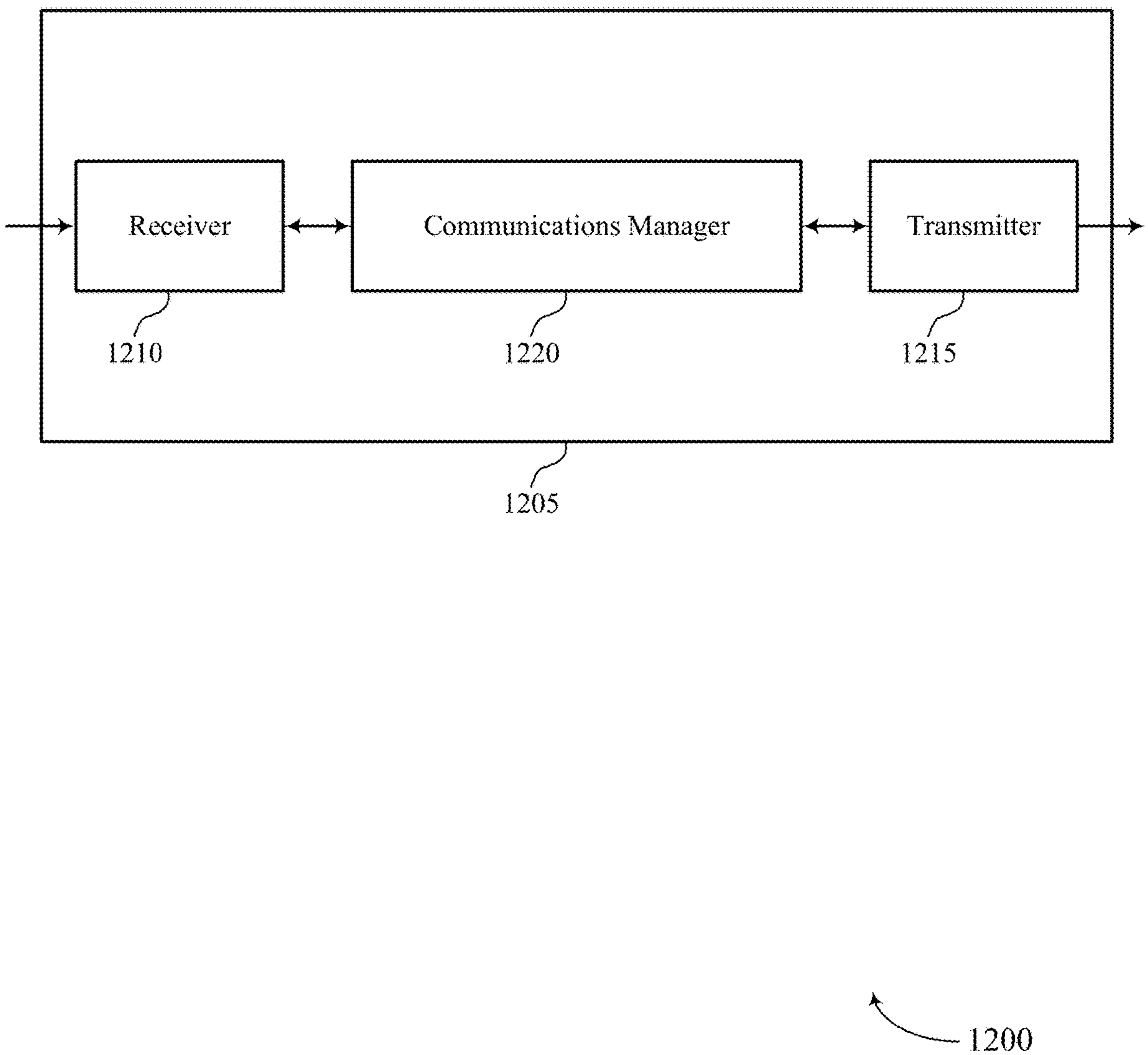

Receiver
Communications Manager
Transmitter
1210
1220
1215
1205
1200

FIG. 12

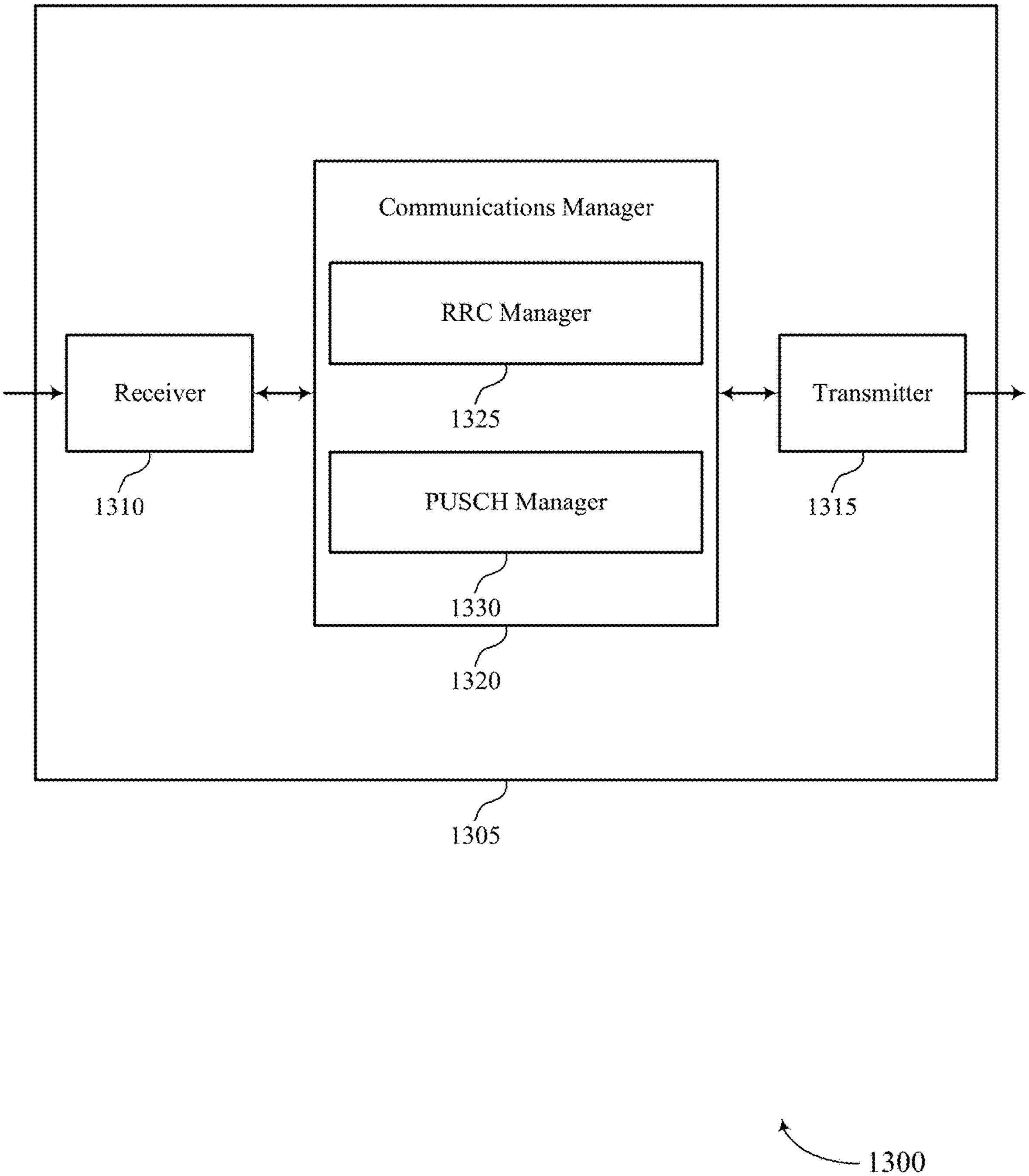

Communications Manager
RRC Manager
1325
Receiver
Transmitter
1310
PUSCH Manager
1315
1330
1320
1305
1300

FIG. 13

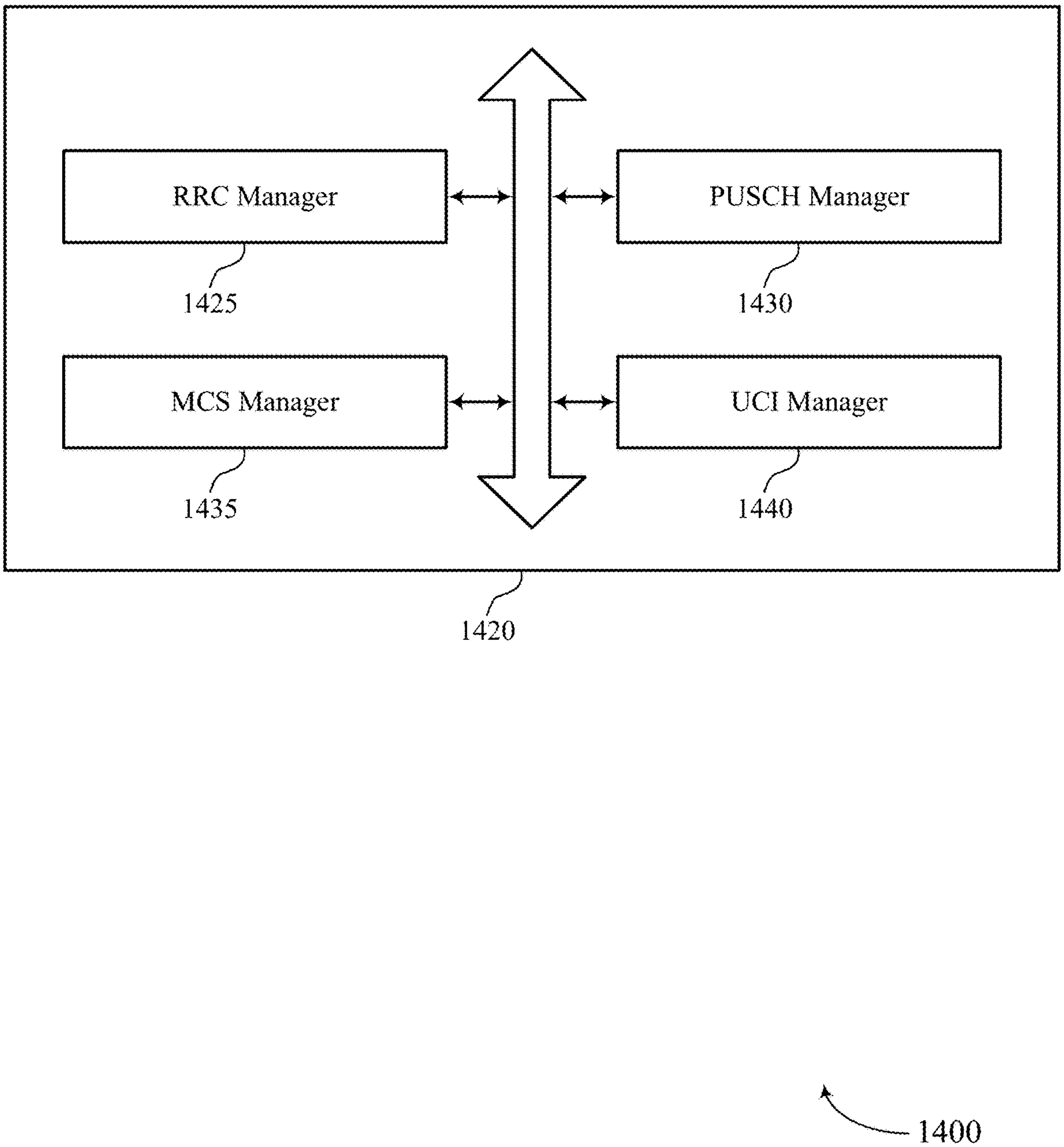

RRC Manager
1425
PUSCH Manager
1430
MCS Manager
1435
UCI Manager
1440
1420
1400

FIG. 14

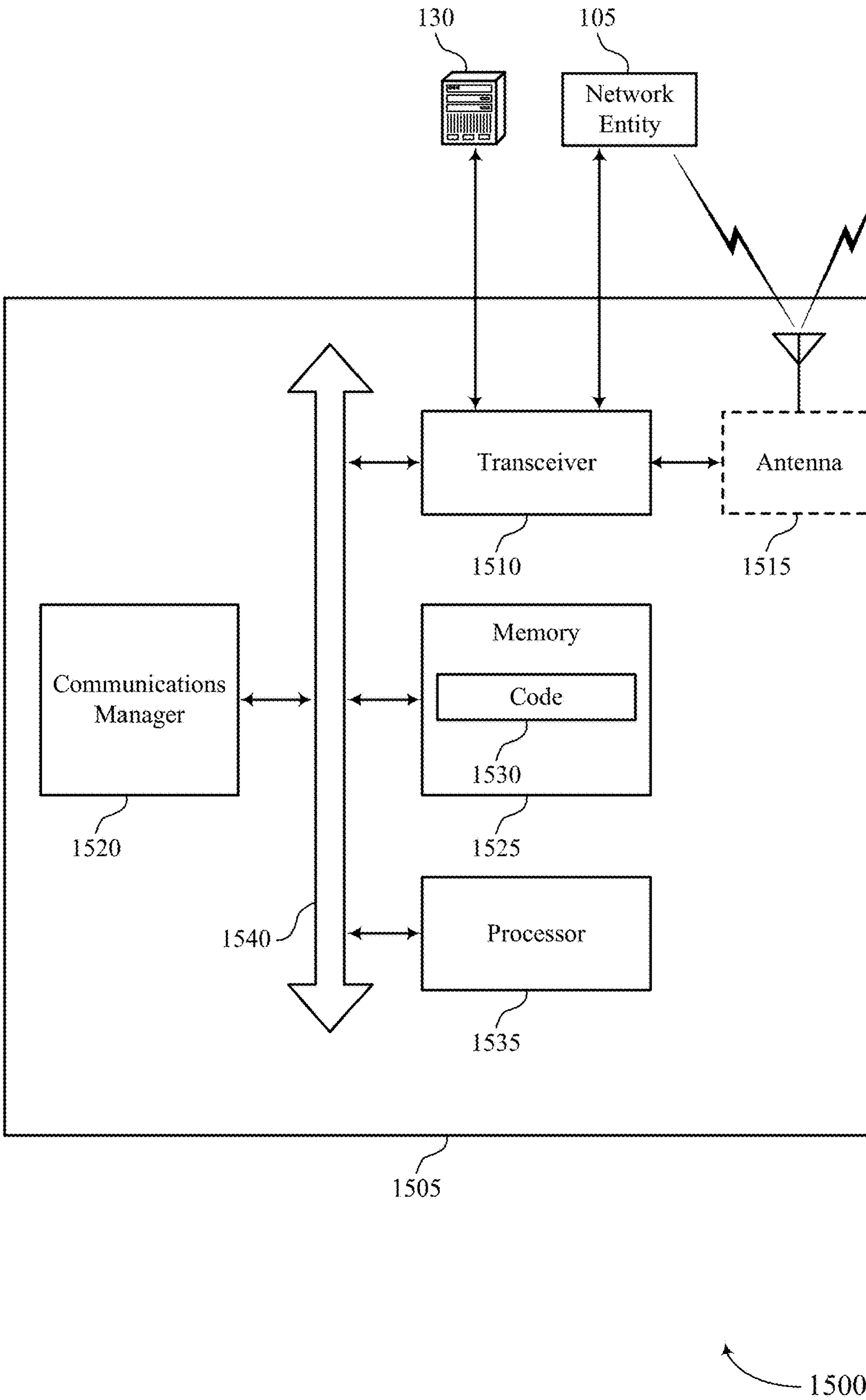

130
105
Network Entity
115
Transceiver
Antenna
1510
1515
Memory
Communications Manager
Code
1530
1520
1525
1540
Processor
1535
1505
1500

FIG. 15

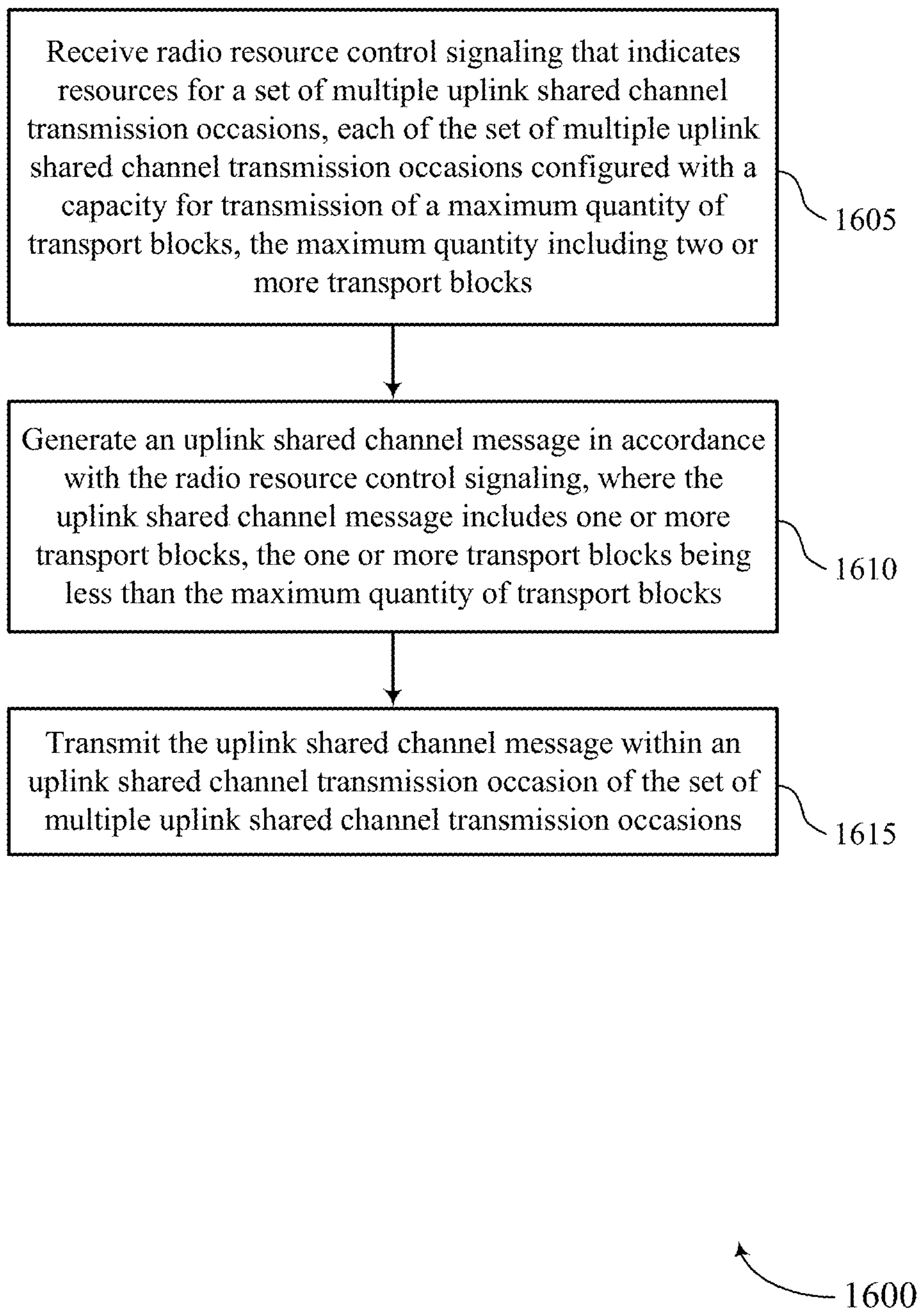

Receive radio resource control signaling that indicates resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of transport blocks, the maximum quantity including two or more transport blocks
1605
Generate an uplink shared channel message in accordance with the radio resource control signaling, where the uplink shared channel message includes one or more transport blocks, the one or more transport blocks being less than the maximum quantity of transport blocks
1610
Transmit the uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions
1615
1600

FIG. 16

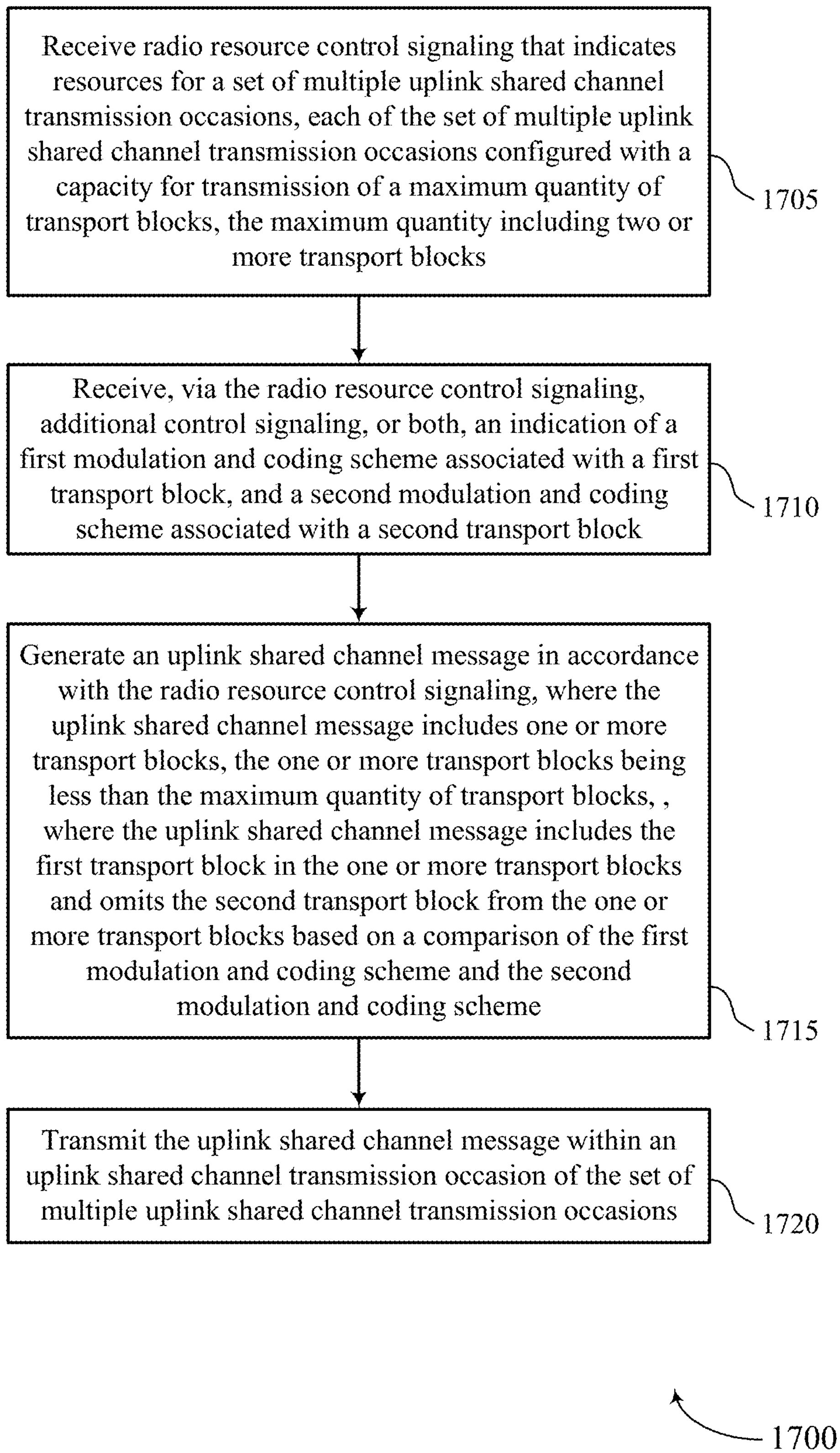
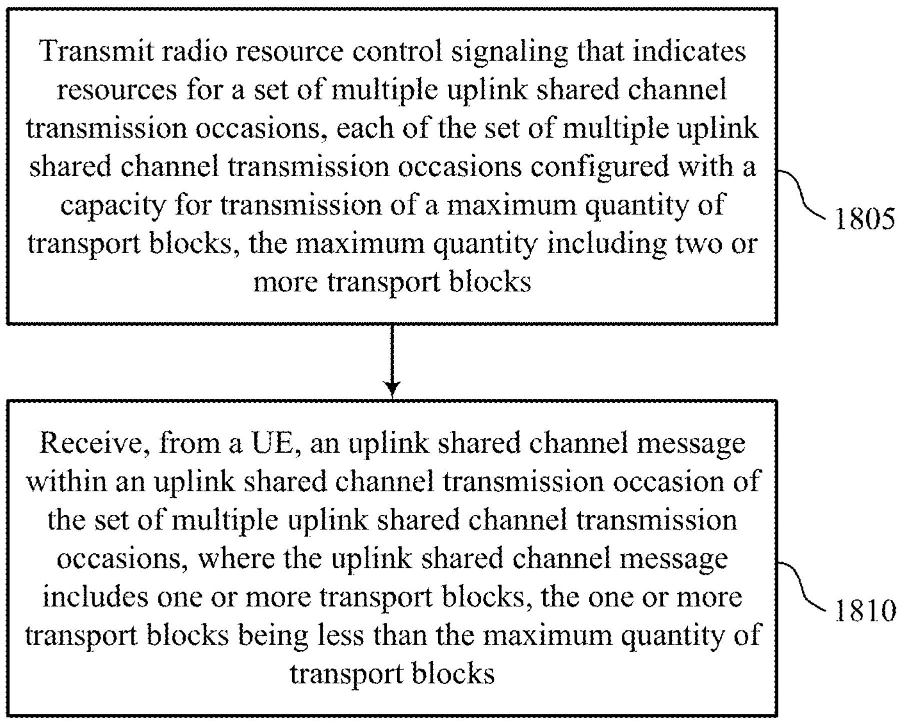

Receive radio resource control signaling that indicates resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of transport blocks, the maximum quantity including two or more transport blocks
1705
Receive, via the radio resource control signaling, additional control signaling, or both, an indication of a first modulation and coding scheme associated with a first transport block, and a second modulation and coding scheme associated with a second transport block
1710
Generate an uplink shared channel message in accordance with the radio resource control signaling, where the uplink shared channel message includes one or more transport blocks, the one or more transport blocks being less than the maximum quantity of transport blocks, , where the uplink shared channel message includes the first transport block in the one or more transport blocks and omits the second transport block from the one or more transport blocks based on a comparison of the first modulation and coding scheme and the second modulation and coding scheme
1715
Transmit the uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions
1720
1700

FIG. 17


Transmit radio resource control signaling that indicates resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of transport blocks, the maximum quantity including two or more transport blocks
1805
Receive, from a UE, an uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the uplink shared channel message includes one or more transport blocks, the one or more transport blocks being less than the maximum quantity of transport blocks
1810

1800

FIG. 18

TECHNIQUES FOR SKIPPING PUSCH OCCASIONS WITH MULTIPLE CODEWORDS

CROSS REFERENCE

[0001] The present Application for Patent claims the benefit of U.S. Provisional Patent Application No. 63/485,856 by HUANG et al., entitled "TECHNIQUES FOR SKIPPING PUSCH OCCASIONS WITH MULTIPLE CODEWORDS," filed Feb. 17, 2023, assigned to the assignee hereof, and expressly incorporated by reference herein.

FIELD OF TECHNOLOGY

[0002] The following relates to wireless communications, including techniques for skipping physical uplink shared channel (PUSCH) occasions with multiple codewords (CWs).

BACKGROUND

[0003] Wireless communications systems are widely deployed to provide various types of communication content such as voice, video, packet data, messaging, broadcast, and so on. These systems may be capable of supporting communication with multiple users by sharing the available system resources (e.g., time, frequency, and power). Examples of such multiple-access systems include fourth generation (4G) systems such as Long Term Evolution (LTE) systems, LTE-Advanced (LTE-A) systems, or LTE-A Pro systems, and fifth generation (5G) systems which may be referred to as New Radio (NR) systems. These systems may employ technologies such as code division multiple access (CDMA), time division multiple access (TDMA), frequency division multiple access (FDMA), orthogonal FDMA (OFDMA), or discrete Fourier transform spread orthogonal frequency division multiplexing (DFT-S-OFDM). A wireless multiple-access communications system may include one or more base stations, each supporting wireless communication for communication devices, which may be known as user equipment (UE).

[0004] In some wireless networks, a UE may receive a configured grant physical uplink shared channel (CG-PUSCH) that includes a set of multiple physical uplink shared channel (PUSCH) transmission occasions usable by the UE for transmitting PUSCH messages. In some cases, the PUSCH transmission occasions may be associated with multiple transport blocks (TBs) or codewords (CWs).

SUMMARY

[0005] The described techniques relate to improved methods, systems, devices, and apparatuses that support techniques for skipping physical uplink shared channel (PUSCH) occasions with multiple codewords (CWs). Generally, aspects of the present disclosure are directed to configurations and mechanisms that enable user equipments (UEs) to drop subsets of transport blocks (TBs) from physical uplink control channel (PUSCH) messages communicated in PUSCH occasions configured for multiple TBs. In other words, aspects of the present disclosure are directed to rules and signaling that enable UEs to transmit PUSCH messages that include only a subset of TBs of a set of TBs enabled for a respective PUSCH occasion. For example, a UE may receive a configured grant PUSCH (CG-PUSCH) configuration that includes (e.g., indicates, configures, schedules) a set of multiple PUSCH occasions usable by the UE for transmitting PUSCH messages. In this example, each PUSCH occasion may be associated with (e.g., configured for, scheduled with) multiple TBs, such as TB1 and TB2. If the UE has only a small amount of data to be transmitted, the UE may transmit a PUSCH message within a PUSCH occasion, where the PUSCH message includes only TB1 (and omits or drops TB2).

[0006] A method is described. The method may include receiving radio resource control (RRC) signaling that indicates (e.g., schedules, configures) resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs, generating an uplink shared channel message in accordance with the RRC signaling, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs, and transmitting the uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions.

[0007] An apparatus is described. The apparatus may include a processor, memory coupled with the processor, and instructions stored in the memory. The instructions may be executable by the processor to cause the apparatus to receive RRC signaling that indicates (e.g., schedules, configures) resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs, generate an uplink shared channel message in accordance with the RRC signaling, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs, and transmit the uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions.

[0008] Another apparatus is described. The apparatus may include means for receiving RRC signaling that indicates (e.g., schedules, configures) resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs, means for generating an uplink shared channel message in accordance with the RRC signaling, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs, and means for transmitting the uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions.

[0009] A non-transitory computer-readable medium storing code is described. The code may include instructions executable by a processor to receive RRC signaling that indicates (e.g., schedules, configures) resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs, generate an uplink shared channel message in accordance with the RRC signaling, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs, and transmit the uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions.

[0010] Some examples of the method, apparatuses, and non-transitory computer-readable medium described herein may further include operations, features, means, or instructions for receiving, via the RRC signaling, additional control signaling, or both, an indication of a first modulation and coding scheme (MCS) associated with a first TB, and a second MCS associated with a second TB, where the uplink shared channel message includes the first TB in the one or more TBs and omits the second TB from the one or more TBs based on a comparison of the first MCS and the second MCS.

[0011] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the uplink shared channel message includes the first TB and omits the second TB based on the first MCS being greater than the second MCS.

[0012] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the uplink shared channel message includes the first TB and omits the second TB based on the first MCS being the same as the second MCS and on a comparison of transmission layers associated with the first TB and the second TB.

[0013] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the uplink shared channel message includes a first TB in the one or more TBs and omits a second TB from the one or more TBs based on the first TB being associated with a first set of transmission layers and the second TB being associated with a second set of transmission layers.

[0014] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the uplink shared channel message includes the first TB and omits the second TB based on the first set of transmission layers being lower than the second set of transmission layers.

[0015] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the first set of transmission layers includes transmission layers one through four and the second set of transmission layers includes transmission layers five through eight.

[0016] Some examples of the method, apparatuses, and non-transitory computer-readable medium described herein may further include operations, features, means, or instructions for transmitting an uplink control information (UCI) message via the first TB of the uplink shared channel message, where the UCI message includes a bit field value that indicates whether a second TB may be included within the one or more TBs of the uplink shared channel message.

[0017] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the UCI message includes first information that may be common across the first TB and the second TB, second information that may be unique to the first TB, and third information that may be unique to the second TB.

[0018] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the first information includes a hybrid automatic repeat request (HARQ) process identifier, channel occupancy time (COT) sharing information, or both, the second information includes a first redundancy version (RV) associated with the first TB, a first new data indicator (NDI) associated with the first TB, or both, and the third information includes a second RV associated with the second TB, a second NDI associated with the second TB, or both.

[0019] Some examples of the method, apparatuses, and non-transitory computer-readable medium described herein may further include operations, features, means, or instructions for transmitting a first UCI message via the first TB of the uplink shared channel message, where the first UCI message includes first information that may be common across the first TB and a second TB, and second information that may be unique to the first TB.

[0020] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the first UCI message further includes a bit field value indicating that the second TB may be included within the one or more TBs of the uplink shared channel message.

[0021] Some examples of the method, apparatuses, and non-transitory computer-readable medium described herein may further include operations, features, means, or instructions for transmitting a second UCI message via the second TB of the uplink shared channel message, where the second UCI message includes third information that may be unique to the second TB.

[0022] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the second UCI message further includes the first information that may be common across the first TB and the second TB.

[0023] Some examples of the method, apparatuses, and non-transitory computer-readable medium described herein may further include operations, features, means, or instructions for transmitting a second uplink shared channel message within a second uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the second uplink shared channel message includes the maximum quantity of TBs.

[0024] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, generating the uplink shared channel message may include operations, features, means, or instructions for generating the uplink shared channel message to include less than the maximum quantity of TBs based on a quantity of uplink traffic within a message buffer at the UE being less than a threshold quantity.

[0025] A method is described. The method may include transmitting RRC signaling that indicates resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs and receiving, from a UE, an uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs.

[0026] An apparatus is described. The apparatus may include a processor, memory coupled with the processor, and instructions stored in the memory. The instructions may be executable by the processor to cause the apparatus to transmit RRC signaling that indicates resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs and receive, from a UE, an uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs.

[0027] Another apparatus is described. The apparatus may include means for transmitting RRC signaling that indicates resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs and means for receiving, from a UE, an uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs.

[0028] A non-transitory computer-readable medium storing code is described. The code may include instructions executable by a processor to transmit RRC signaling that indicates resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs and receive, from a UE, an uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs.

[0029] Some examples of the method, apparatuses, and non-transitory computer-readable medium described herein may further include operations, features, means, or instructions for transmitting, via the RRC signaling, additional control signaling, or both, an indication of a first MCS associated with a first TB, and a second MCS associated with a second TB, where the uplink shared channel message includes the first TB in the one or more TBs and omits the second TB from the one or more TBs based on a comparison of the first MCS and the second MCS.

[0030] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the uplink shared channel message includes the first TB and omits the second TB based on the first MCS being greater than the second MCS.

[0031] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the uplink shared channel message includes the first TB and omits the second TB based on the first MCS being the same as the second MCS and on a comparison of transmission layers associated with the first TB and the second TB.

[0032] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the uplink shared channel message includes a first TB in the one or more TBs and omits a second TB from the one or more TBs based on the first TB being associated with a first set of transmission layers and the second TB being associated with a second set of transmission layers.

[0033] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the uplink shared channel message includes the first TB and omits the second TB based on the first set of transmission layers being lower than the second set of transmission layers.

[0034] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the first set of transmission layers includes transmission layers one through four and the second set of transmission layers includes transmission layers five through eight.

[0035] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the one or more TBs included within the uplink shared channel message includes at least a first TB and the method, apparatuses, and non-transitory computer-readable medium may include further operations, features, means, or instructions for receiving a UCI message via the first TB of the uplink shared channel message, where the UCI message includes a bit field value that indicates whether a second TB may be included within the one or more TBs of the uplink shared channel message.

[0036] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the UCI message includes first information that may be common across the first TB and the second TB, second information that may be unique to the first TB, and third information that may be unique to the second TB.

[0037] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the first information includes a HARQ process identifier, COT sharing information, or both, the second information includes a first RV associated with the first TB, a first NDI associated with the first TB, or both, and the third information includes a second RV associated with the second TB, a second NDI associated with the second TB, or both.

[0038] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the one or more TBs included within the uplink shared channel message includes a first TB and the method, apparatuses, and non-transitory computer-readable medium may include further operations, features, means, or instructions for receiving a first UCI message via the first TB of the uplink shared channel message, where the first UCI message includes first information that may be common across the first TB and a second TB, and second information that may be unique to the first TB.

[0039] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the first UCI message further includes a bit field value indicating that the second TB may be included within the one or more TBs of the uplink shared channel message.

[0040] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the one or more TBs included within the uplink shared channel message includes the second TB and the method, apparatuses, and non-transitory computer-readable medium may include further operations, features, means, or instructions for receiving a second UCI message via the second TB of the uplink shared channel message, where the second UCI message includes third information that may be unique to the second TB.

[0041] In some examples of the method, apparatuses, and non-transitory computer-readable medium described herein, the second UCI message further includes the first information that may be common across the first TB and the second TB.

[0042] Some examples of the method, apparatuses, and non-transitory computer-readable medium described herein may further include operations, features, means, or instructions for receiving a second uplink shared channel message within a second uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the second uplink shared channel message includes the maximum quantity of TBs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0043] FIG. **1** illustrates an example of a wireless communications system that supports techniques for skipping physical uplink shared channel (PUSCH) occasions with multiple codewords (CWs) in accordance with one or more aspects of the present disclosure.

[0044] FIG. **2** illustrates an example of a wireless communications system that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

[0045] FIG. **3** illustrates an example of a CG-PUSCH transmit chain that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

[0046] FIG. **4** illustrates an example of a resource configuration that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

[0047] FIG. **5** illustrates an example of a resource configuration that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

[0048] FIG. **6** illustrates an example of a resource configuration that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

[0049] FIG. **7** illustrates an example of a process flow that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

[0050] FIGS. **8** and **9** illustrate block diagrams of devices that support techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

[0051] FIG. **10** illustrates a block diagram of a communications manager that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

[0052] FIG. **11** illustrates a diagram of a system including a device that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

[0053] FIGS. **12** and **13** illustrate block diagrams of devices that support techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

[0054] FIG. **14** illustrates a block diagram of a communications manager that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

[0055] FIG. **15** illustrates a diagram of a system including a device that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

[0056] FIGS. **16** through **18** illustrate flowcharts showing methods that support techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure.

DETAILED DESCRIPTION

[0057] In some wireless networks, a user equipment (UE) may receive a configured grant physical uplink shared channel (CG-PUSCH) that includes a set of multiple physical uplink shared channel (PUSCH) transmission occasions usable by the UE for transmitting PUSCH messages. In some cases, the PUSCH transmission occasions may be associated with multiple transport blocks (TBs) or codewords (CWs). For example, the UE may be able to transmit PUSCH messages that include a first TB (TB1) and a second TB (TB2) within each PUSCH transmission occasion. In some cases, a message buffer at the UE may not include uplink data to be transmitted, or may include only a small amount of data to be transmitted. In such cases, the UE may not need to use two TBs for each PUSCH occasion to transmit all the buffered data. However, some networks use binary rules or configurations in which each PUSCH occasion is completely used (e.g., TB1 and TB2 are both transmitted in each PUSCH occasion), or where each PUSCH occasion is completely skipped (e.g., TB1 and TB2 are both skipped). Such binary rules offer little flexibility, and may result in wasted resources and/or increased latency.

[0058] Accordingly, aspects of the present disclosure are directed to configurations and mechanisms that enable UEs to drop subsets of TBs from PUSCH messages communicated in PUSCH occasions configured for multiple TBs. In other words, aspects of the present disclosure are directed to rules and signaling that enable UEs to transmit PUSCH messages that include only a subset of TBs of a set of TBs enabled for a respective PUSCH occasion.

[0059] For example, a UE may receive a CG-PUSCH configuration that includes (e.g., indicates, configures, schedules) a set of multiple PUSCH occasions usable by the UE for transmitting PUSCH messages. In this example, each PUSCH occasion may be associated with (e.g., configured with, scheduled with) multiple TBs, such as TB1 and TB2. In this example, if the UE has only a small amount of data to be transmitted, the UE may transmit a PUSCH message within a PUSCH occasion, where the PUSCH message includes only TB1 (and omits/drops TB2). In other words, the UE may transmit PUSCH messages that include fewer TBs than a maximum quantity of TBs enabled for the respective PUSCH transmission occasions.

[0060] In some aspects, the network may define rules or conditions which indicate which TB is to be dropped/omitted in cases where the UE is to transmit a PUSCH message including only a subset of the configured TBs for a given PUSCH transmission occasion. Such rules/conditions may be used by the network to determine which TB to decode first. In other words, the network may be configured to decode "TB1" for a respective PUSCH message, but the rules/configurations may define which TB is regarded as "TB1." In some cases, uplink control information (UCI) messages multiplexed with transmitted PUSCH messages may include a bit field that indicates whether or not TB2 is included within the PUSCH message. As such, the network may determine whether or not to monitor for (and decode) TB2 based on the indicated bit field.

[0061] Aspects of the disclosure are initially described in the context of wireless communications systems. Additional aspects of the disclosure are described in the context of example resource configurations and an example process flow. Aspects of the disclosure are further illustrated by and described with reference to apparatus diagrams, system diagrams, and flowcharts that relate to techniques for skipping PUSCH occasions with multiple CWs.

[0062] FIG. **1** illustrates an example of a wireless communications system **100** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. The wireless communications system **100** may include one or more network entities **105**, one or more UEs **115**, and a core network **130**. In some examples, the wireless communications system **100** may be a Long Term Evolution (LTE) network, an LTE-Advanced (LTE-A) network, an LTE-A Pro network, a New Radio (NR) network, or a network operating in accordance with other systems and radio technologies, including future systems and radio technologies not explicitly mentioned herein.

[0063] The network entities **105** may be dispersed throughout a geographic area to form the wireless communications system **100** and may include devices in different forms or having different capabilities. In various examples, a network entity **105** may be referred to as a network element, a mobility element, a radio access network (RAN) node, or network equipment, among other nomenclature. In some examples, network entities **105** and UEs **115** may wirelessly communicate via one or more communication links **125** (e.g., a radio frequency (RF) access link). For example, a network entity **105** may support a coverage area **110** (e.g., a geographic coverage area) over which the UEs **115** and the network entity **105** may establish one or more communication links **125**. The coverage area **110** may be an example of a geographic area over which a network entity **105** and a UE **115** may support the communication of signals according to one or more radio access technologies (RATs).

[0064] The UEs **115** may be dispersed throughout a coverage area **110** of the wireless communications system **100**, and each UE **115** may be stationary, or mobile, or both at different times. The UEs **115** may be devices in different forms or having different capabilities. Some example UEs **115** are illustrated in FIG. **1**. The UEs **115** described herein may be capable of supporting communications with various types of devices, such as other UEs **115** or network entities **105**, as shown in FIG. **1**.

[0065] As described herein, a node of the wireless communications system **100**, which may be referred to as a network node, or a wireless node, may be a network entity **105** (e.g., any network entity described herein), a UE **115** (e.g., any UE described herein), a network controller, an apparatus, a device, a computing system, one or more components, or another suitable processing entity configured to perform any of the techniques described herein. For example, a node may be a UE **115**. As another example, a node may be a network entity **105**. As another example, a first node may be configured to communicate with a second node or a third node. In one aspect of this example, the first node may be a UE **115**, the second node may be a network entity **105**, and the third node may be a UE **115**. In another aspect of this example, the first node may be a UE **115**, the second node may be a network entity **105**, and the third node may be a network entity **105**. In yet other aspects of this example, the first, second, and third nodes may be different relative to these examples. Similarly, reference to a UE **115**, network entity **105**, apparatus, device, computing system, or the like may include disclosure of the UE **115**, network entity **105**, apparatus, device, computing system, or the like being a node. For example, disclosure that a UE **115** is configured to receive information from a network entity **105** also discloses that a first node is configured to receive information from a second node.

[0066] In some examples, network entities **105** may communicate with the core network **130**, or with one another, or both. For example, network entities **105** may communicate with the core network **130** via one or more backhaul communication links **120** (e.g., in accordance with an S1, N2, N3, or other interface protocol). In some examples, network entities **105** may communicate with one another via a backhaul communication link **120** (e.g., in accordance with an X2, Xn, or other interface protocol) either directly (e.g., directly between network entities **105**) or indirectly (e.g., via a core network **130**). In some examples, network entities **105** may communicate with one another via a midhaul communication link **162** (e.g., in accordance with a midhaul interface protocol) or a fronthaul communication link **168** (e.g., in accordance with a fronthaul interface protocol), or any combination thereof. The backhaul communication links **120**, midhaul communication links **162**, or fronthaul communication links **168** may be or include one or more wired links (e.g., an electrical link, an optical fiber link), one or more wireless links (e.g., a radio link, a wireless optical link), among other examples or various combinations thereof. A UE **115** may communicate with the core network **130** via a communication link **155**.

[0067] One or more of the network entities **105** described herein may include or may be referred to as a base station **140** (e.g., a base transceiver station, a radio base station, an NR base station, an access point, a radio transceiver, a NodeB, an eNodeB (eNB), a next-generation NodeB or a giga-NodeB (either of which may be referred to as a gNB), a 5G NB, a next-generation eNB (ng-eNB), a Home NodeB, a Home eNodeB, or other suitable terminology). In some examples, a network entity **105** (e.g., a base station **140**) may be implemented in an aggregated (e.g., monolithic, standalone) base station architecture, which may be configured to utilize a protocol stack that is physically or logically integrated within a single network entity **105** (e.g., a single RAN node, such as a base station **140**).

[0068] In some examples, a network entity **105** may be implemented in a disaggregated architecture (e.g., a disaggregated base station architecture, a disaggregated RAN architecture), which may be configured to utilize a protocol stack that is physically or logically distributed among two or more network entities **105**, such as an integrated access backhaul (IAB) network, an open RAN (O-RAN) (e.g., a network configuration sponsored by the O-RAN Alliance), or a virtualized RAN (vRAN) (e.g., a cloud RAN (C-RAN)). For example, a network entity **105** may include one or more of a central unit (CU) **160**, a distributed unit (DU) **165**, a radio unit (RU) **170**, a RAN Intelligent Controller (RIC) **175** (e.g., a Near-Real Time RIC (Near-RT RIC), a Non-Real Time RIC (Non-RT RIC)), a Service Management and Orchestration (SMO) **180** system, or any combination thereof. An RU **170** may also be referred to as a radio head, a smart radio head, a remote radio head (RRH), a remote radio unit (RRU), or a transmission reception point (TRP). One or more components of the network entities **105** in a disaggregated RAN architecture may be co-located, or one or more components of the network entities **105** may be located in distributed locations (e.g., separate physical locations). In some examples, one or more network entities **105** of a disaggregated RAN architecture may be implemented as virtual units (e.g., a virtual CU (VCU), a virtual DU (VDU), a virtual RU (VRU)).

[0069] The split of functionality between a CU **160**, a DU **165**, and an RU **170** is flexible and may support different functionalities depending on which functions (e.g., network layer functions, protocol layer functions, baseband functions, RF functions, and any combinations thereof) are performed at a CU **160**, a DU **165**, or an RU **170**. For example, a functional split of a protocol stack may be employed between a CU **160** and a DU **165** such that the CU **160** may support one or more layers of the protocol stack and the DU **165** may support one or more different layers of the protocol stack. In some examples, the CU **160** may host upper protocol layer (e.g., layer 3 (L3), layer 2 (L2)) functionality and signaling (e.g., Radio Resource Control (RRC), service data adaption protocol (SDAP), Packet Data Convergence Protocol (PDCP)). The CU **160** may be connected to one or more Dus **165** or RUs **170**, and the one or more Dus **165** or RUs **170** may host lower protocol layers, such as layer 1 (L1) (e.g., physical (PHY) layer) or L2 (e.g., radio link control (RLC) layer, medium access control (MAC) layer) functionality and signaling, and may each be at least partially controlled by the CU **160**. Additionally, or alternatively, a functional split of the protocol stack may be employed between a DU **165** and an RU **170** such that the DU **165** may support one or more layers of the protocol stack and the RU **170** may support one or more different layers of the protocol stack. The DU **165** may support one or multiple different cells (e.g., via one or more RUs **170**). In some cases, a functional split between a CU **160** and a DU **165**, or between a DU **165** and an RU **170** may be within a protocol layer (e.g., some functions for a protocol layer may be performed by one of a CU **160**, a DU **165**, or an RU **170**, while other functions of the protocol layer are performed by a different one of the CU **160**, the DU **165**, or the RU **170**). A CU **160** may be functionally split further into CU control plane (CU-CP) and CU user plane (CU-UP) functions. A CU **160** may be connected to one or more Dus **165** via a midhaul communication link **162** (e.g., F1, F1-c, F1-u), and a DU **165** may be connected to one or more RUs **170** via a fronthaul communication link **168** (e.g., open fronthaul (FH) interface). In some examples, a midhaul communication link **162** or a fronthaul communication link **168** may be implemented in accordance with an interface (e.g., a channel) between layers of a protocol stack supported by respective network entities **105** that are in communication via such communication links.

[0070] In wireless communications systems (e.g., wireless communications system **100**), infrastructure and spectral resources for radio access may support wireless backhaul link capabilities to supplement wired backhaul connections, providing an IAB network architecture (e.g., to a core network **130**). In some cases, in an IAB network, one or more network entities **105** (e.g., IAB nodes **104**) may be partially controlled by each other. One or more IAB nodes **104** may be referred to as a donor entity or an IAB donor. One or more Dus **165** or one or more RUs **170** may be partially controlled by one or more Cus **160** associated with a donor network entity **105** (e.g., a donor base station **140**). The one or more donor network entities **105** (e.g., IAB donors) may be in communication with one or more additional network entities **105** (e.g., IAB nodes **104**) via supported access and backhaul links (e.g., backhaul communication links **120**). IAB nodes **104** may include an IAB mobile termination (IAB-MT) controlled (e.g., scheduled) by Dus **165** of a coupled IAB donor. An IAB-MT may include an independent set of antennas for relay of communications with UEs **115**, or may share the same antennas (e.g., of an RU **170**) of an IAB node **104** used for access via the DU **165** of the IAB node **104** (e.g., referred to as virtual IAB-MT (vIAB-MT)). In some examples, the IAB nodes **104** may include Dus **165** that support communication links with additional entities (e.g., IAB nodes **104**, UEs **115**) within the relay chain or configuration of the access network (e.g., downstream). In such cases, one or more components of the disaggregated RAN architecture (e.g., one or more IAB nodes **104** or components of IAB nodes **104**) may be configured to operate according to the techniques described herein.

[0071] For instance, an access network (AN) or RAN may include communications between access nodes (e.g., an IAB donor), IAB nodes **104**, and one or more UEs **115**. The IAB donor may facilitate connection between the core network **130** and the AN (e.g., via a wired or wireless connection to the core network **130**). That is, an IAB donor may refer to a RAN node with a wired or wireless connection to core network **130**. The IAB donor may include a CU **160** and at least one DU **165** (e.g., and RU **170**), in which case the CU **160** may communicate with the core network **130** via an interface (e.g., a backhaul link). IAB donor and IAB nodes **104** may communicate via an F1 interface according to a protocol that defines signaling messages (e.g., an F1 AP protocol). Additionally, or alternatively, the CU **160** may communicate with the core network via an interface, which may be an example of a portion of backhaul link, and may communicate with other Cus **160** (e.g., a CU **160** associated with an alternative IAB donor) via an Xn-C interface, which may be an example of a portion of a backhaul link.

[0072] An IAB node **104** may refer to a RAN node that provides IAB functionality (e.g., access for UEs **115**, wireless self-backhauling capabilities). A DU **165** may act as a distributed scheduling node towards child nodes associated with the IAB node **104**, and the IAB-MT may act as a scheduled node towards parent nodes associated with the IAB node **104**. That is, an IAB donor may be referred to as a parent node in communication with one or more child nodes (e.g., an IAB donor may relay transmissions for UEs through one or more other IAB nodes **104**). Additionally, or alternatively, an IAB node **104** may also be referred to as a parent node or a child node to other IAB nodes **104**, depending on the relay chain or configuration of the AN. Therefore, the IAB-MT entity of IAB nodes **104** may provide a Uu interface for a child IAB node **104** to receive signaling from a parent IAB node **104**, and the DU interface (e.g., Dus **165**) may provide a Uu interface for a parent IAB node **104** to signal to a child IAB node **104** or UE **115**.

[0073] For example, IAB node **104** may be referred to as a parent node that supports communications for a child IAB node, or referred to as a child IAB node associated with an

IAB donor, or both. The IAB donor may include a CU **160** with a wired or wireless connection (e.g., a backhaul communication link **120**) to the core network **130** and may act as parent node to IAB nodes **104**. For example, the DU **165** of IAB donor may relay transmissions to UEs **115** through IAB nodes **104**, or may directly signal transmissions to a UE **115**, or both. The CU **160** of IAB donor may signal communication link establishment via an F1 interface to IAB nodes **104**, and the IAB nodes **104** may schedule transmissions (e.g., transmissions to the UEs **115** relayed from the IAB donor) through the Dus **165**. That is, data may be relayed to and from IAB nodes **104** via signaling via an NR Uu interface to MT of the IAB node **104**. Communications with IAB node **104** may be scheduled by a DU **165** of IAB donor and communications with IAB node **104** may be scheduled by DU **165** of IAB node **104**.

[0074] In the case of the techniques described herein applied in the context of a disaggregated RAN architecture, one or more components of the disaggregated RAN architecture may be configured to support techniques for skipping PUSCH occasions with multiple CWs as described herein. For example, some operations described as being performed by a UE **115** or a network entity **105** (e.g., a base station **140**) may additionally, or alternatively, be performed by one or more components of the disaggregated RAN architecture (e.g., IAB nodes **104**, Dus **165**, Cus **160**, RUs **170**, RIC **175**, SMO **180**).

[0075] A UE **115** may include or may be referred to as a mobile device, a wireless device, a remote device, a handheld device, or a subscriber device, or some other suitable terminology, where the "device" may also be referred to as a unit, a station, a terminal, or a client, among other examples. A UE **115** may also include or may be referred to as a personal electronic device such as a cellular phone, a personal digital assistant (PDA), a tablet computer, a laptop computer, or a personal computer. In some examples, a UE **115** may include or be referred to as a wireless local loop (WLL) station, an Internet of Things (IoT) device, an Internet of Everything (IoE) device, or a machine type communications (MTC) device, among other examples, which may be implemented in various objects such as appliances, or vehicles, meters, among other examples.

[0076] The UEs **115** described herein may be able to communicate with various types of devices, such as other UEs **115** that may sometimes act as relays as well as the network entities **105** and the network equipment including macro eNBs or gNBs, small cell eNBs or gNBs, or relay base stations, among other examples, as shown in FIG. **1**.

[0077] The UEs **115** and the network entities **105** may wirelessly communicate with one another via one or more communication links **125** (e.g., an access link) using resources associated with one or more carriers. The term "carrier" may refer to a set of RF spectrum resources having a defined physical layer structure for supporting the communication links **125**. For example, a carrier used for a communication link **125** may include a portion of a RF spectrum band (e.g., a bandwidth part (BWP)) that is operated according to one or more physical layer channels for a given radio access technology (e.g., LTE, LTE-A, LTE-A Pro, NR). Each physical layer channel may carry acquisition signaling (e.g., synchronization signals, system information), control signaling that coordinates operation for the carrier, user data, or other signaling. The wireless communications system **100** may support communication with a UE **115** using carrier aggregation or multi-carrier operation. A UE **115** may be configured with multiple downlink component carriers and one or more uplink component carriers according to a carrier aggregation configuration. Carrier aggregation may be used with both frequency division duplexing (FDD) and time division duplexing (TDD) component carriers. Communication between a network entity **105** and other devices may refer to communication between the devices and any portion (e.g., entity, sub-entity) of a network entity **105**. For example, the terms "transmitting," "receiving," or "communicating," when referring to a network entity **105**, may refer to any portion of a network entity **105** (e.g., a base station **140**, a CU **160**, a DU **165**, a RU **170**) of a RAN communicating with another device (e.g., directly or via one or more other network entities **105**).

[0078] In some examples, such as in a carrier aggregation configuration, a carrier may also have acquisition signaling or control signaling that coordinates operations for other carriers. A carrier may be associated with a frequency channel (e.g., an evolved universal mobile telecommunication system terrestrial radio access (E-UTRA) absolute RF channel number (EARFCN)) and may be identified according to a channel raster for discovery by the UEs **115**. A carrier may be operated in a standalone mode, in which case initial acquisition and connection may be conducted by the UEs **115** via the carrier, or the carrier may be operated in a non-standalone mode, in which case a connection is anchored using a different carrier (e.g., of the same or a different radio access technology).

[0079] The communication links **125** shown in the wireless communications system **100** may include downlink transmissions (e.g., forward link transmissions) from a network entity **105** to a UE **115**, uplink transmissions (e.g., return link transmissions) from a UE **115** to a network entity **105**, or both, among other configurations of transmissions. Carriers may carry downlink or uplink communications (e.g., in an FDD mode) or may be configured to carry downlink and uplink communications (e.g., in a TDD mode).

[0080] A carrier may be associated with a particular bandwidth of the RF spectrum and, in some examples, the carrier bandwidth may be referred to as a "system bandwidth" of the carrier or the wireless communications system **100**. For example, the carrier bandwidth may be one of a set of bandwidths for carriers of a particular radio access technology (e.g., 1.4, 3, 5, 10, 15, 20, 40, or 80 megahertz (MHz)). Devices of the wireless communications system **100** (e.g., the network entities **105**, the UEs **115**, or both) may have hardware configurations that support communications using a particular carrier bandwidth or may be configurable to support communications using one of a set of carrier bandwidths. In some examples, the wireless communications system **100** may include network entities **105** or UEs **115** that support concurrent communications using carriers associated with multiple carrier bandwidths. In some examples, each served UE **115** may be configured for operating using portions (e.g., a sub-band, a BWP) or all of a carrier bandwidth.

[0081] Signal waveforms transmitted via a carrier may be made up of multiple subcarriers (e.g., using multi-carrier modulation (MCM) techniques such as orthogonal frequency division multiplexing (OFDM) or discrete Fourier transform spread OFDM (DFT-S-OFDM)). In a system employing MCM techniques, a resource element may refer to resources of one symbol period (e.g., a duration of one modulation symbol) and one subcarrier, in which case the symbol period and subcarrier spacing may be inversely related. The quantity of bits carried by each resource element may depend on the modulation scheme (e.g., the order of the modulation scheme, the coding rate of the modulation scheme, or both), such that a relatively higher quantity of resource elements (e.g., in a transmission duration) and a relatively higher order of a modulation scheme may correspond to a relatively higher rate of communication. A wireless communications resource may refer to a combination of an RF spectrum resource, a time resource, and a spatial resource (e.g., a spatial layer, a beam), and the use of multiple spatial resources may increase the data rate or data integrity for communications with a UE **115**.

[0082] One or more numerologies for a carrier may be supported, and a numerology may include a subcarrier spacing (Δf) and a cyclic prefix. A carrier may be divided into one or more BWPs having the same or different numerologies. In some examples, a UE **115** may be configured with multiple BWPs. In some examples, a single BWP for a carrier may be active at a given time and communications for the UE **115** may be restricted to one or more active BWPs.

[0083] The time intervals for the network entities **105** or the UEs **115** may be expressed in multiples of a basic time unit which may, for example, refer to a sampling period of $T_s=1/(\Delta f_{max} \cdot N_f)$ seconds, for which Δf_{max} may represent a supported subcarrier spacing, and N_f may represent a supported discrete Fourier transform (DFT) size. Time intervals of a communications resource may be organized according to radio frames each having a specified duration (e.g., 10 milliseconds (ms)). Each radio frame may be identified by a system frame number (SFN) (e.g., ranging from 0 to 1023).

[0084] Each frame may include multiple consecutively-numbered subframes or slots, and each subframe or slot may have the same duration. In some examples, a frame may be divided (e.g., in the time domain) into subframes, and each subframe may be further divided into a quantity of slots. Alternatively, each frame may include a variable quantity of slots, and the quantity of slots may depend on subcarrier spacing. Each slot may include a quantity of symbol periods (e.g., depending on the length of the cyclic prefix prepended to each symbol period). In some wireless communications systems **100**, a slot may further be divided into multiple mini-slots associated with one or more symbols. Excluding the cyclic prefix, each symbol period may be associated with one or more (e.g., N_f) sampling periods. The duration of a symbol period may depend on the subcarrier spacing or frequency band of operation.

[0085] A subframe, a slot, a mini-slot, or a symbol may be the smallest scheduling unit (e.g., in the time domain) of the wireless communications system **100** and may be referred to as a transmission time interval (TTI). In some examples, the TTI duration (e.g., a quantity of symbol periods in a TTI) may be variable. Additionally, or alternatively, the smallest scheduling unit of the wireless communications system **100** may be dynamically selected (e.g., in bursts of shortened TTIs (sTTIs)).

[0086] Physical channels may be multiplexed for communication using a carrier according to various techniques. A physical control channel and a physical data channel may be multiplexed for signaling via a downlink carrier, for example, using one or more of time division multiplexing (TDM) techniques, frequency division multiplexing (FDM) techniques, or hybrid TDM-FDM techniques. A control region (e.g., a control resource set (CORESET)) for a physical control channel may be defined by a set of symbol periods and may extend across the system bandwidth or a subset of the system bandwidth of the carrier. One or more control regions (e.g., CORESETs) may be configured for a set of the UEs **115**. For example, one or more of the UEs **115** may monitor or search control regions for control information according to one or more search space sets, and each search space set may include one or multiple control channel candidates in one or more aggregation levels arranged in a cascaded manner. An aggregation level for a control channel candidate may refer to an amount of control channel resources (e.g., control channel elements (CCEs)) associated with encoded information for a control information format having a given payload size. Search space sets may include common search space sets configured for sending control information to multiple UEs **115** and UE-specific search space sets for sending control information to a specific UE **115**.

[0087] In some examples, a network entity **105** (e.g., a base station **140**, an RU **170**) may be movable and therefore provide communication coverage for a moving coverage area **110**. In some examples, different coverage areas **110** associated with different technologies may overlap, but the different coverage areas **110** may be supported by the same network entity **105**. In some other examples, the overlapping coverage areas **110** associated with different technologies may be supported by different network entities **105**. The wireless communications system **100** may include, for example, a heterogeneous network in which different types of the network entities **105** provide coverage for various coverage areas **110** using the same or different radio access technologies.

[0088] The wireless communications system **100** may be configured to support ultra-reliable communications or low-latency communications, or various combinations thereof. For example, the wireless communications system **100** may be configured to support ultra-reliable low-latency communications (URLLC). The UEs **115** may be designed to support ultra-reliable, low-latency, or critical functions. Ultra-reliable communications may include private communication or group communication and may be supported by one or more services such as push-to-talk, video, or data. Support for ultra-reliable, low-latency functions may include prioritization of services, and such services may be used for public safety or general commercial applications. The terms ultra-reliable, low-latency, and ultra-reliable low-latency may be used interchangeably herein.

[0089] In some examples, a UE **115** may be configured to support communicating directly with other UEs **115** via a device-to-device (D2D) communication link **135** (e.g., in accordance with a peer-to-peer (P2P), D2D, or sidelink protocol). In some examples, one or more UEs **115** of a group that are performing D2D communications may be within the coverage area **110** of a network entity **105** (e.g., a base station **140**, an RU **170**), which may support aspects of such D2D communications being configured by (e.g., scheduled by) the network entity **105**. In some examples, one or more UEs **115** of such a group may be outside the coverage area **110** of a network entity **105** or may be otherwise unable to or not configured to receive transmissions from a network entity **105**. In some examples, groups of the UEs **115** communicating via D2D communications may support a one-to-many (1:M) system in which each UE **115** transmits to each of the other UEs **115** in the group. In some examples, a network entity **105** may facilitate the scheduling of resources for D2D communications. In some other examples, D2D communications may be carried out between the UEs **115** without an involvement of a network entity **105**.

[0090] In some systems, a D2D communication link **135** may be an example of a communication channel, such as a sidelink communication channel, between vehicles (e.g., UEs **115**). In some examples, vehicles may communicate using vehicle-to-everything (V2X) communications, vehicle-to-vehicle (V2V) communications, or some combination of these. A vehicle may signal information related to traffic conditions, signal scheduling, weather, safety, emergencies, or any other information relevant to a V2X system. In some examples, vehicles in a V2X system may communicate with roadside infrastructure, such as roadside units, or with the network via one or more network nodes (e.g., network entities **105**, base stations **140**, RUs **170**) using vehicle-to-network (V2N) communications, or with both.

[0091] The core network **130** may provide user authentication, access authorization, tracking, Internet Protocol (IP) connectivity, and other access, routing, or mobility functions. The core network **130** may be an evolved packet core (EPC) or 5G core (5GC), which may include at least one control plane entity that manages access and mobility (e.g., a mobility management entity (MME), an access and mobility management function (AMF)) and at least one user plane entity that routes packets or interconnects to external networks (e.g., a serving gateway (S-GW), a Packet Data Network (PDN) gateway (P-GW), or a user plane function (UPF)). The control plane entity may manage non-access stratum (NAS) functions such as mobility, authentication, and bearer management for the UEs **115** served by the network entities **105** (e.g., base stations **140**) associated with the core network **130**. User IP packets may be transferred through the user plane entity, which may provide IP address allocation as well as other functions. The user plane entity may be connected to IP services **150** for one or more network operators. The IP services **150** may include access to the Internet, Intranet(s), an IP Multimedia Subsystem (IMS), or a Packet-Switched Streaming Service.

[0092] The wireless communications system **100** may operate using one or more frequency bands, which may be in the range of 300 megahertz (MHz) to 300 gigahertz (GHz). Generally, the region from 300 MHz to 3 GHz is known as the ultra-high frequency (UHF) region or decimeter band because the wavelengths range from approximately one decimeter to one meter in length. UHF waves may be blocked or redirected by buildings and environmental features, which may be referred to as clusters, but the waves may penetrate structures sufficiently for a macro cell to provide service to the UEs **115** located indoors. Communications using UHF waves may be associated with smaller antennas and shorter ranges (e.g., less than 100 kilometers) compared to communications using the smaller frequencies and longer waves of the high frequency (HF) or very high frequency (VHF) portion of the spectrum below 300 MHz.

[0093] The wireless communications system **100** may utilize both licensed and unlicensed RF spectrum bands. For example, the wireless communications system **100** may employ License Assisted Access (LAA), LTE-Unlicensed (LTE-U) radio access technology, or NR technology using an unlicensed band such as the 5 GHz industrial, scientific, and medical (ISM) band. While operating using unlicensed RF spectrum bands, devices such as the network entities **105** and the UEs **115** may employ carrier sensing for collision detection and avoidance. In some examples, operations using unlicensed bands may be based on a carrier aggregation configuration in conjunction with component carriers operating using a licensed band (e.g., LAA). Operations using unlicensed spectrum may include downlink transmissions, uplink transmissions, P2P transmissions, or D2D transmissions, among other examples.

[0094] A network entity **105** (e.g., a base station **140**, an RU **170**) or a UE **115** may be equipped with multiple antennas, which may be used to employ techniques such as transmit diversity, receive diversity, multiple-input multiple-output (MIMO) communications, or beamforming. The antennas of a network entity **105** or a UE **115** may be located within one or more antenna arrays or antenna panels, which may support MIMO operations or transmit or receive beamforming. For example, one or more base station antennas or antenna arrays may be co-located at an antenna assembly, such as an antenna tower. In some examples, antennas or antenna arrays associated with a network entity **105** may be located at diverse geographic locations. A network entity **105** may include an antenna array with a set of rows and columns of antenna ports that the network entity **105** may use to support beamforming of communications with a UE **115**. Likewise, a UE **115** may include one or more antenna arrays that may support various MIMO or beamforming operations. Additionally, or alternatively, an antenna panel may support RF beamforming for a signal transmitted via an antenna port.

[0095] The network entities **105** or the UEs **115** may use MIMO communications to exploit multipath signal propagation and increase spectral efficiency by transmitting or receiving multiple signals via different spatial layers. Such techniques may be referred to as spatial multiplexing. The multiple signals may, for example, be transmitted by the transmitting device via different antennas or different combinations of antennas. Likewise, the multiple signals may be received by the receiving device via different antennas or different combinations of antennas. Each of the multiple signals may be referred to as a separate spatial stream and may carry information associated with the same data stream (e.g., the same CW) or different data streams (e.g., different CWs). Different spatial layers may be associated with different antenna ports used for channel measurement and reporting. MIMO techniques include single-user MIMO (SU-MIMO), for which multiple spatial layers are transmitted to the same receiving device, and multiple-user MIMO (MU-MIMO), for which multiple spatial layers are transmitted to multiple devices.

[0096] Beamforming, which may also be referred to as spatial filtering, directional transmission, or directional reception, is a signal processing technique that may be used at a transmitting device or a receiving device (e.g., a network entity **105**, a UE **115**) to shape or steer an antenna beam (e.g., a transmit beam, a receive beam) along a spatial path between the transmitting device and the receiving device. Beamforming may be achieved by combining the signals communicated via antenna elements of an antenna array such that some signals propagating along particular orientations with respect to an antenna array experience constructive interference while others experience destructive interference. The adjustment of signals communicated via the antenna elements may include a transmitting device or a receiving device applying amplitude offsets, phase offsets, or both to signals carried via the antenna elements associated with the device. The adjustments associated with each of the antenna elements may be defined by a beamforming weight set associated with a particular orientation (e.g., with respect to the antenna array of the transmitting device or receiving device, or with respect to some other orientation).

[0097] A network entity **105** or a UE **115** may use beam sweeping techniques as part of beamforming operations. For example, a network entity **105** (e.g., a base station **140**, an RU **170**) may use multiple antennas or antenna arrays (e.g., antenna panels) to conduct beamforming operations for directional communications with a UE **115**. Some signals (e.g., synchronization signals, reference signals, beam selection signals, or other control signals) may be transmitted by a network entity **105** multiple times along different directions. For example, the network entity **105** may transmit a signal according to different beamforming weight sets associated with different directions of transmission. Transmissions along different beam directions may be used to identify (e.g., by a transmitting device, such as a network entity **105**, or by a receiving device, such as a UE **115**) a beam direction for later transmission or reception by the network entity **105**.

[0098] Some signals, such as data signals associated with a particular receiving device, may be transmitted by transmitting device (e.g., a transmitting network entity **105**, a transmitting UE **115**) along a single beam direction (e.g., a direction associated with the receiving device, such as a receiving network entity **105** or a receiving UE **115**). In some examples, the beam direction associated with transmissions along a single beam direction may be determined based on a signal that was transmitted along one or more beam directions. For example, a UE **115** may receive one or more of the signals transmitted by the network entity **105** along different directions and may report to the network entity **105** an indication of the signal that the UE **115** received with a highest signal quality or an otherwise acceptable signal quality.

[0099] In some examples, transmissions by a device (e.g., by a network entity **105** or a UE **115**) may be performed using multiple beam directions, and the device may use a combination of digital precoding or beamforming to generate a combined beam for transmission (e.g., from a network entity **105** to a UE **115**). The UE **115** may report feedback that indicates precoding weights for one or more beam directions, and the feedback may correspond to a configured set of beams across a system bandwidth or one or more sub-bands. The network entity **105** may transmit a reference signal (e.g., a cell-specific reference signal (CRS), a channel state information reference signal (CSI-RS)), which may be precoded or unprecoded. The UE **115** may provide feedback for beam selection, which may be a precoding matrix indicator (PMI) or codebook-based feedback (e.g., a multi-panel type codebook, a linear combination type codebook, a port selection type codebook). Although these techniques are described with reference to signals transmitted along one or more directions by a network entity **105** (e.g., a base station **140**, an RU **170**), a UE **115** may employ similar techniques for transmitting signals multiple times along different directions (e.g., for identifying a beam direction for subsequent transmission or reception by the UE **115**) or for transmitting a signal along a single direction (e.g., for transmitting data to a receiving device).

[0100] A receiving device (e.g., a UE **115**) may perform reception operations in accordance with multiple receive configurations (e.g., directional listening) when receiving various signals from a receiving device (e.g., a network entity **105**), such as synchronization signals, reference signals, beam selection signals, or other control signals. For example, a receiving device may perform reception in accordance with multiple receive directions by receiving via different antenna subarrays, by processing received signals according to different antenna subarrays, by receiving according to different receive beamforming weight sets (e.g., different directional listening weight sets) applied to signals received at multiple antenna elements of an antenna array, or by processing received signals according to different receive beamforming weight sets applied to signals received at multiple antenna elements of an antenna array, any of which may be referred to as "listening" according to different receive configurations or receive directions. In some examples, a receiving device may use a single receive configuration to receive along a single beam direction (e.g., when receiving a data signal). The single receive configuration may be aligned along a beam direction determined based on listening according to different receive configuration directions (e.g., a beam direction determined to have a highest signal strength, highest signal-to-noise ratio (SNR), or otherwise acceptable signal quality based on listening according to multiple beam directions).

[0101] The wireless communications system **100** may be a packet-based network that operates according to a layered protocol stack. In the user plane, communications at the bearer or PDCP layer may be IP-based. An RLC layer may perform packet segmentation and reassembly to communicate via logical channels. A MAC layer may perform priority handling and multiplexing of logical channels into transport channels. The MAC layer also may implement error detection techniques, error correction techniques, or both to support retransmissions to improve link efficiency. In the control plane, an RRC layer may provide establishment, configuration, and maintenance of an RRC connection between a UE **115** and a network entity **105** or a core network **130** supporting radio bearers for user plane data. A PHY layer may map transport channels to physical channels.

[0102] The UEs **115** and the network entities **105** may support retransmissions of data to increase the likelihood that data is received successfully. Hybrid automatic repeat request (HARQ) feedback is one technique for increasing the likelihood that data is received correctly via a communication link (e.g., a communication link **125**, a D2D communication link **135**). HARQ may include a combination of error detection (e.g., using a cyclic redundancy check (CRC)), forward error correction (FEC), and retransmission (e.g., automatic repeat request (ARQ)). HARQ may improve throughput at the MAC layer in poor radio conditions (e.g., low signal-to-noise conditions). In some examples, a device may support same-slot HARQ feedback, in which case the device may provide HARQ feedback in a specific slot for data received via a previous symbol in the slot. In some other examples, the device may provide HARQ feedback in a subsequent slot, or according to some other time interval.

[0103] The UEs **115** and the network entities **105** of the wireless communications system **100** may support configurations and mechanisms that enable UEs **115** to drop subsets of TBs from PUSCH messages communicated in PUSCH occasions configured for multiple TBs. In other words, the wireless communications system **100** may support rules and signaling that enable UEs **115** to transmit PUSCH messages that include only a subset of TBs of a set of TBs enabled for a respective PUSCH occasion.

[0104] For example, a UE **115** of the wireless communications system **100** may receive a CG-PUSCH configuration from the network that includes (e.g., indicates, configures, schedules) a set of multiple PUSCH occasions usable by the UE **115** for transmitting PUSCH messages. In this example, each PUSCH occasion may be associated with (e.g., configured with, scheduled with) multiple TBs, such as TB1 and TB2. In this example, if the UE **115** has only a small amount of data to be transmitted, the UE **115** may transmit a PUSCH message within a PUSCH occasion, where the PUSCH message includes only TB1 (and omits/drops TB2). In other words, the UE **115** may transmit PUSCH messages that include fewer TBs than a maximum quantity of TBs enabled for the respective PUSCH transmission occasions.

[0105] In some aspects, the network may define rules or conditions which indicate which TB is to be dropped/omitted in cases where the UE **115** is to transmit a PUSCH message including only a subset of the configured TBs for a given PUSCH transmission occasion. Such rules/conditions may be used by the network to determine which TB to decode first. In other words, the network may be configured to decode "TB1" for a respective PUSCH message, but the rules/configurations may define which TB is regarded as "TB1." In some cases, UCI messages multiplexed with transmitted PUSCH messages may include a bit field that indicates whether or not TB2 is included within the PUSCH message. As such, the network may determine whether or not to monitor for (and decode) TB2 based on the indicated bit field.

[0106] Techniques described herein may enable UEs **115** to transmit PUSCH messages with fewer TBs/CWs as compared to a maximum quantity of TBs configured for a respective PUSCH transmission occasion. In other words, aspects of the present disclosure may enable UEs **115** to be configured with PUSCH transmission occasions enabled for multiple TBs, but to selectively "drop" or omit one or more TBs from PUSCH messages communicated in the respective PUSCH transmission occasions, such as based on an amount of data to be communicated within a message buffer at the UE **115**. In this regard, as compared to some "binary" rules implemented by some networks in which all configured TBs are either transmitted or dropped in a respective PUSCH occasion, aspects of the present disclosure may enable improved flexibility in the context of CG-PUSCH configurations associated with multiple TBs. Moreover, by enabling UEs **115** to selectively drop TBs from PUSCH messages, techniques described herein may reduce wasted resources and improve resource utilization within the wireless communications system. Further, by enabling UEs **115** to selectively drop TBs from PUSCH messages, aspects of the present disclosure may reduce or eliminate scenarios where the UE **115** is expected to completely drop a PUSCH message, thereby reducing latency within the network.

[0107] FIG. **2** illustrates an example of a wireless communications system **200** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. Aspects of the wireless communications system **200** may implement, or be implemented by, aspects of the wireless communications system **100**. For example, the wireless communications system **200** illustrates signaling and configurations that enable a UE **115**-*a* to transmit PUSCH messages using less than a maximum quantity of TBs configured for a respective PUSCH transmission occasion, as described previously herein.

[0108] The wireless communications system **200** may include a UE **115**-*a* and a network entity **105**-*b*, which may be examples of UEs **115**, network entities **105**, and other wireless devices as described with reference to FIG. **1**. In some aspects, the UE **115**-*a* may communicate with the network entity **105**-*a* via a communication link **205**. In some cases, the communication link **205** may include an example of an access link (e.g., Uu link). The communication link **205** may include a bi-directional link that can include both uplink and downlink communication. For example, the UE **115**-*a* may transmit uplink transmissions, such as uplink control signals or uplink data signals, to the network entity **105**-*a* using the communication link **205**, and the network entity **105**-*a* may transmit downlink transmissions, such as downlink control signals or downlink data signals, to the UE **115**-*a* using the communication link **205**.

[0109] As noted previously herein, in some wireless networks, wireless devices (e.g., UEs **115**) may receive signaling indicating a CG-PUSCH configuration that includes a set of multiple PUSCH transmission occasions **215** usable by the respective UEs **115** for transmitting PUSCH messages **230**. In other words, a UE **115** may receive a CG-PUSCH configuration including preconfigured uplink transmission opportunities within a CG period **220** that are usable by the UE **115**. In such cases, the UE **115** may transmit PUSCH messages **230** within the allocated resources (e.g., within the PUSCH transmission occasions **215**) if the UE **115** has uplink data in a message buffer. Such CG-PUSCH configurations may be usable in cases where the uplink data at the UE **115** has a variable instantaneous data generation rate.

[0110] Some wireless communications systems may support different types of CG-PUSCH configurations, such as CG-PUSCH Type 1 and CG-PUSCH Type 2. In the context of CG-PUSCH Type 1, all the information of the CG-PUSCH is configured and activated via RRC signaling. That is, the UE **115**-*a* may receive a Type 1 CG-PUSCH configuration via RRC signaling, where the RRC signaling also activates the CG-PUSCH configuration.

[0111] Comparatively, with CG-PUSCH Type 2, the CG-PUSCH configuration may be configured via RRC signaling, but activated via DCI or MAC-CE signaling. In other words, some information of a Type 2 CG-PUSCH configuration may be RRC configured (e.g., periodicity **225** of PUSCH transmission occasions **215**, offsets, etc.), where other information may be indicated via a DCI message that activates the CG-PUSCH configuration. With CG-PUSCH Type 2, DCI messages may activate the CG-PUSCH configuration until another DCI message deactivates or releases the CG-PUSCH configuration. In some aspects, for DCI messages that activate or deactivate (e.g., release) CG-PUSCH configurations, a cyclic redundancy check (CRC) portion of the DCI messages may be scrambled with configured scheduling radio network temporary identifier (CS-RNTI). Moreover, bit field values (e.g., new data indicator (NDI) bit fields, redundancy version (RV) bit fields, HARQ bit fields) may be set to certain predefined values for activation/deactivation DCI messages (e.g., DCI messages may include bit field values NDI=0, RV=0, and HARQ ID=0 used for validation of the activation/release of the CG-PUSCH configuration).

[0112] In some networks, for both Type 1 and Type 2 CG-PUSCH configurations, the RV for each PUSCH transmission occasion **215** may be set to zero (e.g., RV=0), and the HARQ ID may be computed (for each PUSCH transmission occasion **215**) based on a timing with a modulo operation to nrofHARQ-Processes associated with the CG-PUSCH configuration. In other words, in some networks, the HARQ process ID for each respective PUSCH transmission occasion **215** may be determined based on a first symbol of the respective PUSCH transmission occasion **215**. For example, in some networks, and using the modulo operation to nrofHARQ-Processes, the first PUSCH transmission occasion **215**-*a* may be associated with HARQ ID: 0, the second PUSCH transmission occasion **215**-*b* may be associated with HARQ ID: 1, the third PUSCH transmission occasion **215**-*c* may be associated with HARQ ID: 2, the fourth PUSCH transmission occasion **215**-*d* may be associated with HARQ ID: 3, the fifth PUSCH transmission occasion **215**-*e* may be associated with HARQ ID: 0, and the sixth PUSCH transmission occasion **215**-*f* may be associated with HARQ ID: 1.

[0113] In other wireless networks, PUSCH transmission occasions **215** may be used for retransmissions, and parameters of the respective PUSCH transmission occasions **215** may be dynamically set or indicated. Stated differently, the UE **115**-*a* may autonomously determine/signal parameters for each respective PUSCH transmission occasion **215**, such as the HARQ ID, the NDI, and RV. Such parameters may be indicated via UCI messages **235** associated with (e.g., communicated within) the respective PUSCH transmission occasions **215**. The NDI may be toggled for a respective PUSCH transmission occasion **215** to indicate that the PUSCH transmission occasion **215** is used for a new transmission, otherwise, it is used for a retransmission (or vice versa).

[0114] In such networks where parameters of the respective PUSCH transmission occasions **215** are dynamically indicates, the network entity **105**-*a* may determine the parameters used for decoding PUSCH messages **230** based on the UCI messages **235** communicated within the respective PUSCH transmission occasions **215**. In particular, UCI messages **235** (e.g., CG-UCI) may is multiplexed with PUSCH messages **230** within each respective PUSCH transmission occasion **215**, where the UCI messages **235** include bit fields indicating HARQ ID, RV, NDI, and channel occupancy time (COT) sharing information (for unlicensed operations) of the respective PUSCH transmission occasions **215**. In other words, the CG-UCI (e.g., UCI message **235**) may be encoded separately and multiplexed on the CG-PUSCH message **230** that the information corresponds to (e.g., UCI message **235** multiplexed with a PUSCH message **230** of the first PUSCH transmission occasion **215**-*a* indicates information associated with the PUSCH message **230**/first PUSCH transmission occasion **215**-*a*). As such, upon receiving the PUSCH message **230** including the multiplexed UCI message **235**, the network entity **105**-*a* may decode the CG-UCI (UCI message **235**), and use the information of the CG-UCI to decode the uplink data of the PUSCH message **230**.

[0115] Table 1 below illustrates information that may be communicated within UCI messages **235** associated with CG-PUSCH configurations:

TABLE 1

UCI Information for CG-PUSCH Occasions

Bit Field(s) Information	Bitwidth
HARQ Process ID/Number	4
Redundancy Version (RV)	2
New Data Indicator (NDI)	1
Channel Occupancy Time (COT) Sharing Information	$\lceil \log_2 C \rceil$ if both higher layer parameters ul-toDL-COT-SharingED-Threshold and cg-COT-SharingList are configured, where C is the number of combinations configured in cg-COT-SharingList; 1 if ul-toDL-COT-SharingED-Threshold is not configured and cg-COT-SharingList is configured; 0 otherwise; If a UE indicates COT sharing other than "no sharing" in a CG-PUSCH occasion within the UE's initiated COT, the UE should provide consistent sharing information in all subsequent CG-PUSCH occasions, if any, occurring within the same initiated COT such that the same DL starting point and duration are maintained.

[0116] As noted previously herein, in some wireless networks, PUSCH transmission occasions **215** of a CG-PUSCH configuration may support a single TB **240** or CW. That is, for each PUSCH transmission occasion **215**, the UE **115**-*a* may transmit a PUSCH messages **230** including a single TB **240**.

[0117] Comparatively, in other wireless networks, PUSCH transmission occasions **215** may be associated with multiple TBs **240** or CWs. For example, in some cases, the PUSCH transmission occasions **215** illustrated in FIG. **2** may be enabled with (e.g., support) two TBs, such as a first TB **240**-*a* (TB1) and a second TB **240**-*b* (TB2). In such cases, the UE **115**-*a* may PUSCH messages **230** in each PUSCH transmission occasion **215** that include the first TB **240**-*a* (TB1) and the second TB **240**-*b* (TB2).

[0118] In some cases, a message buffer at the UE **115**-*a* may not include uplink data to be transmitted, or may include only a small amount of data to be transmitted. In such cases, the UE **115**-*a* may not need to use two TBs **240** for each PUSCH transmission occasion **215** to transmit all the buffered data. However, some networks use binary rules or configurations in which each PUSCH transmission occasion **215** is completely used (e.g., first TB **240**-*a* and second TB **240**-*b* are both transmitted in each PUSCH transmission occasion **215**), or where each PUSCH transmission occasion **215** is completely skipped (e.g., first TB **240**-*a* and second TB **240**-*b* are both skipped). Such binary rules offer little flexibility, and may result in wasted resources. Moreover, in cases where the UE **115**-*a* has data to transmit via the first TB **240**-*a*, but does not have sufficient data to transmit the second TB **240**-*b*, the UE **115** may nonetheless be expected to skip transmitting both TBs **240**, thereby resulting in increased latency associated with the data that could have otherwise be communicated via the first TB **240**-*a*.

[0119] Accordingly, the UE **115**-*a* and the network entity **105**-*a* of the wireless communications system **200** may support configurations and mechanisms that enable the UE **115**-*a* to drop subsets of TBs **240** from PUSCH messages

230 communicated in PUSCH transmission occasions **215** configured for multiple TBs **240**. In other words, aspects of the present disclosure are directed to rules and signaling that enable the UE **115**-*a* to transmit PUSCH messages **230** that include only a subset of TBs **240** (e.g., subset of CWs) of a set of TBs **240** enabled for a respective PUSCH transmission occasion **215**.

[0120] For the purposes of the present disclosure, a "TB" may indicate or include data to be transmitted prior to encoding, whereas the term "CW" may refer to the data to be transmitted after encoding. As such, for the purposes of the present disclosure, the terms "TB" may "CW" may be used interchangeably.

[0121] For example, referring to the wireless communications system **200** in FIG. **2**, the UE **115**-*a* may receive, from the network entity **105**-*a*, control signaling **210** (e.g., control information) that indicates or schedules a set of uplink shared channel transmission occasions usable by the UE **115**-*a*. In other words, the UE **115**-*a* may receive control signaling **210** (e.g., RRC signaling, downlink control information (DCI) signaling, MAC-CE) that indicates a CG-PUSCH configuration (e.g., Type 1 or Type 2) that includes multiple PUSCH transmission occasions **215** within a CG period **320** that are usable by the UE **115**-*a* for transmitting PUSCH messages **230**. In some aspects, the control signaling **210** may indicate other parameters of the CG-PUSCH configuration, such as a periodicity **225** of the set of PUSCH transmission occasions **215**.

[0122] In some aspects, each of the PUSCH transmission occasions **215** may be enabled with a capacity or communicating a maximum quantity of TBs **240**. For example, the control signaling **210** may indicate that the PUSCH transmission occasions **215** may be used to communicate up to two, three, four, etc. TBs **240** per PUSCH transmission occasion **215** (e.g., maximum quantity of TBs=2, 3, 4, . . . , etc.).

[0123] For instance, as shown in FIG. **2**, the control signaling **210** may indicate that the PUSCH transmission occasions **215** are enabled for transmission of two TBs **240** each (e.g., first TB **240**-*a* and second TB **240**-*b*). While much of the present disclosure is described in the context of PUSCH transmission occasions **215** that are enabled for a maximum of two TBs **240** per PUSCH transmission occasion **215** (e.g., TB1 and TB2), this is solely for illustrative purposes. In this regard, aspects of the present disclosure may be applied to PUSCH transmission occasions **215** enabled with any number of TBs **240**.

[0124] In some aspects, the UE **115**-*a* may be configured to utilize the configured PUSCH transmission occasions **215** to transmit PUSCH messages **230** that include up to the maximum quantity of TBs **240**. For example, in cases where an uplink buffer at the UE **115**-*a* includes sufficient data for two TBs **240**, the UE **115**-*a* may utilize the first PUSCH transmission occasion **215**-*a* to transmit a first PUSCH message **230** that includes the first TB **240**-*a* and the second TB **240**-*b*. Subsequently, the uplink buffer at the UE **115**-*a* may include a smaller amount of uplink data to be transmitted. As such, the UE **115**-*a* may utilize the second PUSCH transmission occasion **215**-*b* to transmit a second PUSCH message **230** that includes the first TB **240**-*a*, but which omits the second TB **240**-*b*. In other words, the UE **115**-*b* may transmit the second PUSCH message **230** in the second PUSCH transmission occasion **215** with fewer than the maximum quantity of enabled TBs **240**.

[0125] In this regard, the UE **115**-*b* may transmit PUSCH messages **230** within the PUSCH transmission occasions **215** that include the maximum quantity of enabled TBs **240** (e.g., PUSCH transmission occasions **215**-*a*, **215**-*c*, **215**-*d*), and/or less than the maximum quantity of enabled TBs **240** (e.g., PUSCH transmission occasions **215**-*b*, **215**-*e*) based on when data arrives at the message buffer/how much data is in the message buffer. That is, the UE **115**-*b* may omit (e.g., skip) one or more TBs **240** from PUSCH messages **230** transmitted via the PUSCH transmission occasions **215**-*b* and **215**-*e*. Moreover, in some cases, the UE **115**-*b* may completely skip a PUSCH transmission occasion **215**. For example, as shown in FIG. **2**, the UE **115**-*b* may refrain from transmitting any PUSCH messages **230** in the PUSCH transmission occasion **215**-*f*, such as in cases where the UE **115**-*a* does not have any uplink data to transmit in the message buffer. In this regard, the PUSCH transmission occasion **215**-*f* may go unused.

[0126] In some aspects, to avoid the network entity **105**-*a* having to blindly detect which TB **240** is skipped in cases where a PUSCH message **230** includes less than the maximum quantity of TBs **240**, the UE **115**-*a* may be configured (via the control signaling **210**) to skip/omit the second TB **240**-*b* and transmit the first TB **240**-*a*. In such cases, the UE **115**-*a* may be configured with rules or parameters that are used to determine which TB **240** is considered to be the "first TB **240**-*a* (TB1)" For example, in some cases, the first TB **240**-*a* (TB1) may be defined as the TB **240** which is mapped to MIMO layers 1-4, where the second TB **240**-*b* (TB 2) may be defined as the TB **240** that is mapped to MIMO layer 5-8 (or vice versa). In this regard, in cases where the UE **115**-*a* transmits a PUSCH message **230** including less than the maximum quantity of TBs **240**, the UE **115**-*b* may be configured to include/transmit the first TB **240**-*a* mapped to the lower MIMO layers (e.g., MIMO layers 1-4), and may be configured to omit or skip the second TB **240**-*b* mapped to the higher MIMO layers (e.g., MIMO layers 5-8).

[0127] The generation of PUSCH messages **230** using multiple TBs **240** mapped to different MIMO layers may be further shown and described with reference to FIG. **3**.

[0128] FIG. **3** illustrates an example of a CG-PUSCH transmit chain **300** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. Aspects of the CG-PUSCH transmit chain **300** may implement, or be implemented by, aspects of wireless communications system **100**, the wireless communications system **200**, or both.

[0129] The CG-PUSCH transmit chain **300** illustrates an example in which a UE **115** generates a PUSCH message using less than a maximum quantity of TBs configured for a respective PUSCH transmission occasion. For example, as shown in FIG. **3**, a UE **115** may receive a CG-PUSCH configuration including PUSCH transmission occasions that are enabled for transmitting up to two TBs, including a first TB **305**-*a* and a second TB **305**-*b*. In this example, the first TB **305**-*a* may be mapped to a first set of MIMO layers **310**-*a* (e.g., layers 1-4), and the second TB **305**-*b* may be mapped to a second set of MIMO layers **310**-*b* (e.g., layers 5-8).

[0130] In cases where the UE **115** is to transmit a PUSCH message including both TBs **305**, each of the TBs **305** mapped to the respective sets of MIMO layers **310** may be precoded for the PUSCH message at **315** (thereby generating CWs after encoding), and may go through waveform generation at **320** to generate a waveform/PUSCH message that includes both TBs **305**.

[0131] Comparatively, as shown in FIG. **3**, in cases where the UE **115** is to transmit a PUSCH message that includes less than the maximum quantity of TBs **305**, the UE **115** may be configured to include/transmit the first TB **305**-*a*, and omit or skip the second TB **305**-*b*. For instance, as shown in FIG. **3**, the UE **115** may perform precoding of the first TB **305**-*a* at **315**, and may perform waveform generation at **320** to generate a waveform/PUSCH message that includes only the first TB **305**-*a*.

[0132] Reference will again be made to FIG. **2**. In additional or alternative implementations, which TB **240** is regarded as "TB1" (and therefore which TBs **240** are transmitted or skipped in cases where the UE **115**-*a* transmits less than the maximum quantity of TBs **240**) may be based on modulation and coding schemes (MCSs) associated with the respective TBs **240**. For example, in some cases, the first TB **240**-*a* (TB1) may be defined as the TB **240** with the higher MCS, where the second TB **240**-*b* (TB2) may be defined as the TB **240** with the lower MCS (or vice versa). In such cases, the respective MCSs corresponding to the respective TBs **240** may be indicated or configured via the control signaling **210**. In this regard, in cases where the UE **115**-*a* transmits a PUSCH message **230** including less than the maximum quantity of TBs **240**, the UE **115**-*b* may be configured to include/transmit the first TB **240**-*a* with the higher MCS, and may be configured to omit or skip the second TB **240**-*b* with the lower MCS.

[0133] In cases where the first MCS of the first TB **240**-*a* and the second MCS of the second TB **240**-*b* are the same, the UE **115**-*a* may be configured to fall back to some other parameter to determine which TB(s) **240** will be included and which TB(s) **240** will be omitted from a PUSCH message **230**. For example, in cases where the MCSs of the TBs **240** are the same, the first TB **240**-*a* (TB1) may be defined as the TB **240** that is mapped to MIMO transmission layers 1-4.

[0134] In some aspects, the PUSCH messages **230** transmitted by the UE **115**-*a* may include one or more bit fields that indicate whether subsequent TBs **240** are included in the respective PUSCH messages **230** or not. Such bit fields may be used to indicate whether the network entity **105**-*a* is expected to decode all the TBs **240** enabled for a respective PUSCH transmission occasion **215**, or less than all the TBs **240** enabled for a respective PUSCH transmission occasion **215**. In other words, such bit field values may prevent the need for the network entity **105**-*a* to perform blind detection to determine whether TBs **240** are skipped in the respective PUSCH messages **230** or not.

[0135] For example, the PUSCH messages **230** transmitted via the PUSCH transmission occasions **215**-*a*, **215**-*c*, and **215**-*d* may include one or more bit field values that indicate that the second TB **240**-*b* is included within the respective messages (so that the network entity **105**-*b* knows to decode the second TB **240**-*b*). Comparatively, the PUSCH messages **230** transmitted via the PUSCH transmission occasions **215**-*b* and **215**-*e* may include one or more bit field values that indicate that the second TB **240**-*b* is omitted from the respective messages (so that the network entity **105**-*b* knows not to decode the second TB **240**-*b*).

[0136] In cases where the PUSCH transmission occasions **215** are enabled with more than two TBs **240** (e.g., three TBs **240**, four TBs **240**, etc.), the PUSCH messages **230** may include additional bit fields that indicate whether each of the respective TBs **240** is included or not (e.g., first set of bit field values indicating whether TB2 is included, second set of bit field values indicating whether TB3 is included, etc.). Indicators/bit fields used.

[0137] In some cases, the bit field values indicating whether subsequent TBs **240** are included in the respective PUSCH messages **230** may be included within UCI message **235** (e.g., CG-UCI) that are multiplexed with the respective PUSCH messages **230**. In other words, the PUSCH messages **230** may include UCI messages **235**, where information in the UCI messages **235** is decoded by the network entity **105**-*a* to enable the network entity **105**-*a* to decode the data of the respective PUSCH messages **230**. In other words, upon receiving a PUSCH message **230**, the network entity **105**-*a* may be configured to decode the UCI messages **235** included within (e.g., multiplexed with) the PUSCH message **230**, and may use the decoded UCI to decode the remainder of the PUSCH message **230**.

[0138] In some cases, the control signaling **210** may indicate a format of PUSCH messages **230**, including how UCI messages **235** are to be multiplexed with the PUSCH messages **230**. Example resource configurations for PUSCH messages **230** including UCI messages **235** are shown and described in FIGS. **4**-**6**.

[0139] FIG. **4** illustrates an example of a resource configuration **400** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. Aspects of the resource configuration **400** may implement, or be implemented by, aspects of the wireless communications system **100**, the wireless communications system **200**, the CG-PUSCH transmit chain **300**, or any combination thereof.

[0140] As shown in FIG. **4**, a PUSCH message may include a first TB **405**-*a* and a second TB **405**-*b*. In some implementations, the first TB **405**-*a* may include a UCI message **410**, where the second TB **405**-*b* does not include any UCI. In other words, in accordance with the resource configuration **400**, all the UCIs may be jointly encoded and multiplexed on the first TB **505**-*a*. In this example, the UCI message **410** included in the first TB **405**-*a* may include multiple different UCI portions **415**. The respective UCI portions **415** may include information that is common across the TBs **405**, or unique/specific to the respective TBs **405**. For instance, the UCI message **410** may include a first UCI portion **415**-*a* that includes information that is common across the first TB **405**-*a* and the second TB **405**-*b*, such as a HARQ process ID **420**, COT information **425**, or both. Comparatively, the second UCI portion **415**-*b* and the third UCI portion **415**-*c* may include information that is unique/specific to the first TB **405**-*a* and the second TB **405**-*b*, respectively. Information that is unique/specific to the respective TBs **405** may include RVs **430**-*a*, **430**-*b* of the respective TBs **405**, NDIs **435**-*a*, **435**-*b* that indicate whether the respective TBs **405** include new data or whether the TBs **405** are retransmissions, and the like.

[0141] In some implementations, the second UCI portion **415**-*b* may additionally include a TB2 indicator **440** that is used to indicate whether or not the second TB **405**-*b* is included within the respective PUSCH message or not. In other words, the TB2 indicator **440** may be set to "1" in cases where the second TB **405**-*b* is included in the PUSCH message, or set to "0" in cases where the second TB **405**-*b* is not included in the PUSCH message (or vice versa). In cases where the second TB **405**-*b* is not included in the PUSCH message, the bit fields of the third UCI portion **415**-*c* (e.g., RV **430**-*b*, NDI **435**-*b*) may be set to predefined values, such as all "0s."

[0142] FIG. **5** illustrates an example of a resource configuration **500** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. Aspects of the resource configuration **500** may implement, or be implemented by, aspects of the wireless communications system **100**, the wireless communications system **200**, the CG-PUSCH transmit chain **300**, the resource configuration **400**, or any combination thereof.

[0143] As shown in FIG. **5**, a PUSCH message may include a first TB **505**-*a* and a second TB **505**-*b*. In some implementations, the first TB **505**-*a* may include a first UCI message **510**-*a*, and the second TB **505**-*b* may include a second UCI message **510**-*b*. In this example, the first UCI message **510**-*a* may include a first UCI portion **515**-*a* that includes information that is common across the TBs **505**-*a*, **505**-*b* (e.g., HARQ process ID **520**, COT information **525**), and a second UCI portion **515**-*b* that includes information that is specific to the first TB **505**-*a* (e.g., RV **530**-*a*, NDI **535**-*a*). In this regard, The common UCI and UCI that is specific to the first TB **505**-*a* may be jointly encoded and multiplexed on the first TB **505**-*a*. Comparatively, the second UCI message **510**-*b* may include a third UCI portion **515**-*c* that includes information that is specific to the second TB **505**-*b* (e.g., RV **530**-*b*, NDI **535**-*b*).

[0144] In some implementations, the first UCI message **510**-*a* may additionally include a TB2 indicator **540** that is used to indicate whether or not the second TB **505**-*b* is included within the respective PUSCH message or not. In other words, the TB2 indicator **540** may be set to "1" in cases where the second TB **505**-*b* is included in the PUSCH message, or set to "0" in cases where the second TB **505**-*b* is not included in the PUSCH message (or vice versa).

[0145] In cases where the second TB **505**-*b* is omitted from the PUSCH message, the resource configuration **500** illustrated in FIG. **5** may result in a more efficient use of resources (e.g., less overhead) as compared to the resource configuration **400** illustrated in FIG. **4**. Specifically, the resource configuration **400** illustrated in FIG. **4** may result in information that is specific to the second TB **405**-*b* to be transmitted regardless as to whether the second TB **405**-*b* is included in the PUSCH message. In such cases, the third UCI portion **415**-*c* may result in wasted resources and increased overhead in cases where the second TB **405**-*b* is omitted. Comparatively, in cases where the second TB **505**-*b* in FIG. **5** is omitted from the PUSCH messages, the second UCI message **510**-*b* would not be transmitted, thereby resulting in lower overhead as compared to the resource configuration **400** in FIG. **4**.

[0146] FIG. **6** illustrates an example of a resource configuration **600** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. Aspects of the resource configuration **600** may implement, or be implemented by, aspects of the wireless communications system **100**, the wireless communications system **200**, the CG-PUSCH transmit chain **300**, the resource configuration **400**, the resource configuration **500**, or any combination thereof.

[0147] As shown in FIG. **6**, a PUSCH message may include a first TB **605**-*a* and a second TB **605**-*b*. In some implementations, the first TB **605**-*a* may include a first UCI message **610**-*a*, and the second TB **605**-*b* may include a second UCI message **610**-*b*. In this example, the first UCI message **610**-*a* may include a first UCI portion **615**-*a* that includes information that is common across the TBs **605**-*a*, **605**-*b* (e.g., HARQ process ID **620**, COT information **625**), and a second UCI portion **615**-*b* that includes information that is specific to the first TB **605**-*a* (e.g., RV **630**-*a*, NDI **635**-*a*). In this regard, the common UCI for both TBs **605** and the UCI that is unique to the first TB **605**-*a* may be jointly encoded and multiplexed on the first TB **605**-*a*.

[0148] Similarly, the second UCI message **610**-*b* may include the first UCI portion **615**-*a* that includes information that is common across the TBs **605**-*a*, **605**-*b* (e.g., HARQ process ID **620**, COT information **625**), and a third UCI portion **615**-*c* that includes information that is specific to the second TB **605**-*b* (e.g., RV **630**-*b*, NDI **635**-*b*). In this regard, the common UCI for both TBs **605** and the UCI that is unique to the second TB **605**-*b* may be jointly encoded and multiplexed on the second TB **605**-*b*.

[0149] As compared to the resource configuration **500** illustrated in FIG. **5** in which the common UCI is communicated only via the first TB **505**-*a*, the common UCI may be repeated across the TBs **605** of the resource configuration **600** illustrated in FIG. **6**. Repeating the common information (e.g., first UCI portion **615**-*a*) across both TBs **605** may be more robust and may improve the probability that the common UCI is successfully received and decoded by the network.

[0150] As noted previously herein, in some implementations, the first UCI message **610**-*a* may additionally include a TB2 indicator **640** that is used to indicate whether or not the second TB **605**-*b* is included within the respective PUSCH message or not. In other words, the TB2 indicator **640** may be set to "1" in cases where the second TB **605**-*b* is included in the PUSCH message, or set to "0" in cases where the second TB **605**-*b* is not included in the PUSCH message (or vice versa).

[0151] In some aspects, the network may configure or predefine which resource configuration **400**, **500**, **600** is to be used to generate PUSCH messages. In other words, the control signaling **210** illustrated in FIG. **2** may indicate which resource configuration **40**, **500**, or **600** (or some other resource configuration) that the UE **115**-*a* is to use when generating PUSCH messages **230**.

[0152] FIG. **7** illustrates an example of a process flow **700** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. Aspects of the process flow **700** may implement, or be implemented by, aspects of the wireless communications system **100**, the wireless communications system **200**, the CG-PUSCH transmit chain **300**, the resource configuration **400**, the resource configuration **500**, the resource configuration **600**, or any combination thereof. For example, the process flow **700** illustrates signaling and configurations that enable a UE **115**-*b* to transmit PUSCH messages using less than a maximum quantity of TBs configured for a respective PUSCH transmission occasion, as described previously herein.

[0153] The process flow **700** includes a UE **115**-*b* and a network entity **105**-*b*, which may be examples of UEs **115**, network entities **105**, and other wireless devices as described herein. For example, the UE **115**-*b* and the network entity **105**-*b* illustrated in FIG. **7** may include examples of the UE **115**-*a* and the network entity **105**-*a*, respectively, as illustrated in FIG. **2**.

[0154] In some examples, the operations illustrated in process flow **700** may be performed by hardware (e.g., including circuitry, processing blocks, logic components, and other components), code (e.g., software or firmware) executed by a processor, or any combination thereof. Alternative examples of the following may be implemented, where some steps are performed in a different order than described or are not performed at all. In some cases, steps may include additional features not mentioned below, or further steps may be added.

[0155] At **705**, the UE **115**-*b* may receive, from the network entity **105**-*b*, control signaling (e.g., control information) that indicates or schedules a set of uplink shared channel transmission occasions usable by the UE **115**-*b*. In other words, the UE **115**-*b* may receive control signaling (e.g., RRC signaling, DCI signaling, MAC-CE) that indicates a CG-PUSCH configuration (e.g., Type 1 or Type 2) that includes multiple PUSCH transmission occasions usable by the UE **115**-*b* for transmitting PUSCH messages. In some aspects, each of the PUSCH transmission occasions may be enabled with a capacity or communicating a maximum quantity of TBs. For example, the control information may indicate that the PUSCH transmission occasions may be used to communicate up to two, three, four, etc. TBs per PUSCH transmission occasion (e.g., maximum quantity of TBs=2, 3, 4, . . . , etc.).

[0156] Much of the present disclosure is described in the context of PUSCH transmission occasions that are enabled for a maximum of two TBs per PUSCH transmission occasion (e.g., TB1 and TB2). However, this is solely for illustrative purposes. In this regard, aspects of the present disclosure may be applied to PUSCH transmission occasions enabled with any number of TBs.

[0157] In some aspects, the control signaling may indicate additional parameters or characteristics associated with the CG-PUSCH configuration, PUSCH transmission occasions, supported TBs, and the like. Other information/parameters that may be indicated via the control signaling may include, but are not limited to, MCSs associated with the respective TBs, transmission/communication layers mapped to the respective TBs, rules/conditions indicating when the UE **115**-*b* is enabled to transmit fewer than the maximum configured number of TBs, rules/conditions indicating which TB(s) the UE **115**-*b* is to drop when transmitting fewer than the maximum configured number of TBs, how UCI is to be divided up across TBs (e.g., which TBs carry which UCI), and the like.

[0158] At **710**, the UE **115**-*b* may evaluate an uplink message buffer at the UE **115**-*b*. In other words, the UE **115**-*b* may evaluate how much uplink traffic (e.g., how much PUSCH traffic) the UE **115**-*b* has to transmit within a message buffer maintained at the UE **115**-*b*. In some aspects, the UE **115**-*b* may evaluate the message buffer at **710** based on receiving the control signaling at **705**. In some aspects, the amount of uplink traffic within the message buffer may be used to determine how many TBs the UE **115**-*b* will include within PUSCH messages transmitted via the configured PUSCH transmission occasions (e.g., whether the UE **115**-*b* will use the maximum quantity of configured TBs, or less than the maximum quantity of configured TBs).

[0159] A **715**, the UE **115**-*b* may generate a first PUSCH message. In particular, the UE **115**-*b* may generate a PUSCH messages that is to be transmitted within a PUSCH transmission occasion configured via the control signaling at **705**. In other words, the UE **115**-*b* may be configured to generate a PUSCH message in accordance with the received CG-PUSCH configuration. The first PUSCH message may include encoded data stored in the message buffer at the UE **115**-*b*.

[0160] In some aspects, the UE **115**-*b* may generate the first PUSCH message such that the message includes fewer than the maximum quantity of TBs configured for the respective PUSCH transmission occasion. For example, in cases where the CG-PUSCH configuration includes PUSCH transmission occasions that are enabled with two TBs each (TB1 and TB2) (e.g., maximum quantity of TBs=2), the UE **115**-*b* may generate the first PUSCH message to include a single TB (e.g., TB1). In this regard, the PUSCH message may include TB1 and omit TB2 such that the message includes fewer than the maximum quantity of TBs for the PUSCH transmission occasion.

[0161] In some aspects, the UE **115**-*b* may generate the first PUSCH message based on evaluating the message buffer at **710**. For example, the UE **115**-*b* may generate the first PUSCH message to include less than the maximum quantity of TBs in cases where the message buffer includes a quantity of uplink data that is less than a threshold amount. That is, the UE **115**-*b* may skip or omit TBs from the first PUSCH message in cases where the UE **115**-*b* does not have at least a threshold amount of data to transmit. For instance, if the quantity of uplink data in the message buffer may be transmitted in a single TB, the UE **115**-*b* may generate the first PUSCH message using a single TB despite the respective PUSCH transmission occasion of the first PUSCH message being enabled for two TBs.

[0162] In some aspects, the UE **115**-*b* may be configured to utilize parameters, rules, and/or conditions configured via the control signaling to determine which TBs to include or omit from the first PUSCH message. In other words, the control signaling (e.g., CG-PUSCH configuration) may define certain parameter, rules, or conditions that the UE **115**-*b* is to use to determine when to include fewer TBs than the maximum quantity of TBs, and which TBs should be included in such PUSCH messages.

[0163] For example, the UE **115**-*b* may be configured to include or omit TBs from the first PUSCH message based on sets of transmission/communication layers mapped to the respective TBs. For instance, in some cases, the first TB (TB1) may be mapped to a first set of transmission layers 1-4, and the second TB (TB2) may be mapped to a second set of transmission layers 5-8. In this example, the UE **115**-*b* may generate the first PUSCH message to include the first TB (and omit the second TB) based on the first TB being mapped to the first set of transmission layers (e.g., based on the first TB being mapped to the lower set of transmission layers).

[0164] In additional or alternative implementations, the UE **115**-*b* may be configured to include the TB (TB1) that is associated with the higher MCS, and may be configured to omit the TB (TB2) that is associated with the lower MCS, where the respective MCSs may be configured via the control signaling at **705**. In cases where the first MCS of the first TB and the second MCS of the second TB are the same, the UE **115**-*b* may be configured to fall back to some other parameter to determine which TB(s) will be included and which TB(s) will be omitted, such as the transmission layers mapped to the respective TBs. For instance, in cases where the first TB and the second TB are associated with the same MCS, the UE **115**-*b* may be configured to include the TB associated with the lower set of transmission layers.

[0165] In some aspects, as described previously herein, the UE **115**-*b* may generate the first PUSCH message to include UCI. That is, the UE **115**-*b* may multiplex one or more PUSCH messages with the first PUSCH message, as shown and described in FIGS. **4-6**. In particular, the control signaling at **705** may indicate one or more rules or parameters regarding how UCI is to be encoded within PUSCH messages, and the UE **115**-*b* may generate the first PUSCH message in accordance with the rules/parameters. For instance, the control signaling may indicate that the UE **115**-*b* is to use one of the resource configurations **400**, **500**, or **600** to generate PUSCH messages including UCI.

[0166] At **720**, the UE **115**-*b* may transmit the first PUSCH message to the network entity **105**-*b* within the PUSCH transmission occasion of the CG-PUSCH configuration. In particular, the UE **115**-*b* may transmit the first PUSCH message based on generating the first PUSCH message at **715**. In this regard, the first PUSCH message transmitted at **720** may include fewer than the maximum quantity of TBs enabled for the PUSCH transmission occasion. For instance, in cases where the PUSCH transmission occasion is enabled for two TBs (e.g., TB1 and TB2), the first PUSCH message may include TB1, and omit TB2. As such, the UE **115**-*b* may transmit the first PUSCH message at **720** based on receiving the control signaling at **705**, evaluating the message buffer at **710**, generating the first PUSCH message at **715**, or any combination thereof.

[0167] In some aspects, the first PUSCH message may include one or more bit fields that indicates that the second TB is not included in the first PUSCH message. For example, the first PUSCH message may include one or more bit fields of a TB2 indicator **440**, **540**, **640** that which indicate that the second TB is not included in the first PUSCH message (so that the network entity **105**-*b* knows not to attempt to decode the second TB).

[0168] In some aspects, the first PUSCH message may include UCI. That is, the first PUSCH message may be multiplexed with one or more UCI messages, as shown and described in FIGS. **4-6**. In some aspects, the network entity **105**-*b* may be configured to decode the UCI (e.g., UCI messages), and may subsequently use the decoded UCI to decode the information included within the first PUSCH message.

[0169] At **725**, the UE **115**-*b* may transmit a second PUSCH message to the network entity **105**-*b* within a second PUSCH transmission occasion of the CG-PUSCH configuration. In some cases, the second PUSCH message may include the maximum quantity of TBs enabled for the second PUSCH transmission occasion. For example, in cases where the PUSCH transmission occasions of the CG-PUSCH configuration are enabled for two TBs (TB1 and TB2), the second PUSCH message may include both TB1 and TB2. In some cases, the UE **115**-*b* may generate the second PUSCH message to include the maximum quantity of TBs based on a quantity of uplink data in the message buffer at the UE **115**-*b* satisfying some threshold quantity.

[0170] In some aspects, the second PUSCH message may include one or more bit fields that indicates that the second TB is included in the second PUSCH message. For example, the second PUSCH message may include one or more bit fields of a TB2 indicator **440**, **540**, **640** that which indicate that the second TB is included within the second PUSCH message (so that the network entity **105**-*b* knows to decode the second TB).

[0171] As noted previously herein with respect to the first PUSCH message, the second PUSCH message at **725** may include UCI. That is, the second PUSCH message may be multiplexed with one or more UCI messages, as shown and described in FIGS. **4-6**.

[0172] At **730**, the UE **115**-*b* may skip a third PUSCH transmission occasion of the CG-PUSCH configuration. That is, the UE **115**-*b* may refrain from transmitting any PUSCH messages in the third PUSCH transmission occasion. In some cases, the UE **115**-*b* may skip the third PUSCH transmission occasion if the UE **115**-*b* does not have any uplink data to transmit in the message buffer at the UE **115**-*b*.

[0173] Techniques described herein may enable the UE **115**-*b* to transmit PUSCH messages with fewer TBs/CWs as compared to a maximum quantity of TBs configured for a respective PUSCH transmission occasion. In other words, aspects of the present disclosure may enable the UE **115**-*b* to be configured with PUSCH transmission occasions enabled for multiple TBs, but to selectively "drop" or omit one or more TBs from PUSCH messages communicated in the respective PUSCH transmission occasions, such as based on an amount of data to be communicated within a message buffer at the UE **115**-*b*. In this regard, as compared to some "binary" rules implemented by some networks in which all configured TBs are either transmitted or dropped in a respective PUSCH occasion, aspects of the present disclosure may enable improved flexibility in the context of CG-PUSCH configurations associated with multiple TBs. Moreover, by enabling the UE **115**-*b* to selectively drop TBs from PUSCH messages, techniques described herein may reduce wasted resources and improve resource utilization within the wireless communications system. Further, by enabling the UE **115**-*b* to selectively drop TBs from PUSCH messages, aspects of the present disclosure may reduce or eliminate scenarios where the UE **115**-*b* is expected to completely drop a PUSCH message, thereby reducing latency within the network.

[0174] FIG. **8** illustrates a block diagram **800** of a device **805** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. The device **805** may be an example of aspects of a UE **115** as described herein. The device **805** may include a receiver **810**, a transmitter **815**, and a communications manager **820**. The device **805** may also include a processor. Each of these components may be in communication with one another (e.g., via one or more buses).

[0175] The receiver **810** may provide a means for receiving information such as packets, user data, control information, or any combination thereof associated with various information channels (e.g., control channels, data channels, information channels related to techniques for skipping PUSCH occasions with multiple CWs). Information may be passed on to other components of the device **805**. The receiver **810** may utilize a single antenna or a set of multiple antennas.

[0176] The transmitter **815** may provide a means for transmitting signals generated by other components of the device **805**. For example, the transmitter **815** may transmit information such as packets, user data, control information, or any combination thereof associated with various information channels (e.g., control channels, data channels, information channels related to techniques for skipping PUSCH occasions with multiple CWs). In some examples, the transmitter **815** may be co-located with a receiver **810** in a transceiver module. The transmitter **815** may utilize a single antenna or a set of multiple antennas.

[0177] The communications manager **820**, the receiver **810**, the transmitter **815**, or various combinations thereof or various components thereof may be examples of means for performing various aspects of techniques for skipping PUSCH occasions with multiple CWs as described herein. For example, the communications manager **820**, the receiver **810**, the transmitter **815**, or various combinations or components thereof may support a method for performing one or more of the functions described herein.

[0178] In some examples, the communications manager **820**, the receiver **810**, the transmitter **815**, or various combinations or components thereof may be implemented in hardware (e.g., in communications management circuitry). The hardware may include a processor, a digital signal processor (DSP), a central processing unit (CPU), an application-specific integrated circuit (ASIC), a field-programmable gate array (FPGA) or other programmable logic device, a microcontroller, discrete gate or transistor logic, discrete hardware components, or any combination thereof configured as or otherwise supporting a means for performing the functions described in the present disclosure. In some examples, a processor and memory coupled with the processor may be configured to perform one or more of the functions described herein (e.g., by executing, by the processor, instructions stored in the memory).

[0179] Additionally, or alternatively, in some examples, the communications manager **820**, the receiver **810**, the transmitter **815**, or various combinations or components thereof may be implemented in code (e.g., as communications management software or firmware) executed by a processor. If implemented in code executed by a processor, the functions of the communications manager **820**, the receiver **810**, the transmitter **815**, or various combinations or components thereof may be performed by a general-purpose processor, a DSP, a CPU, an ASIC, an FPGA, a microcontroller, or any combination of these or other programmable logic devices (e.g., configured as or otherwise supporting a means for performing the functions described in the present disclosure).

[0180] In some examples, the communications manager **820** may be configured to perform various operations (e.g., receiving, obtaining, monitoring, outputting, transmitting) using or otherwise in cooperation with the receiver **810**, the transmitter **815**, or both. For example, the communications manager **820** may receive information from the receiver **810**, send information to the transmitter **815**, or be integrated in combination with the receiver **810**, the transmitter **815**, or both to obtain information, output information, or perform various other operations as described herein.

[0181] For example, the communications manager **820** may be configured as or otherwise support a means for receiving RRC signaling that schedules resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions scheduled with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs. The communications manager **820** may be configured as or otherwise support a means for generating an uplink shared channel message in accordance with the RRC signaling, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs. The communications manager **820** may be configured as or otherwise support a means for transmitting the uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions.

[0182] By including or configuring the communications manager **820** in accordance with examples as described herein, the device **805** (e.g., a processor controlling or otherwise coupled with the receiver **810**, the transmitter **815**, the communications manager **820**, or a combination thereof) may support techniques that enable UEs **115** to transmit PUSCH messages with fewer TBs/CWs as compared to a maximum quantity of TBs configured for a respective PUSCH transmission occasion. In other words, aspects of the present disclosure may enable UEs **115** to be configured with PUSCH transmission occasions enabled for multiple TBs, but to selectively "drop" or omit one or more TBs from PUSCH messages communicated in the respective PUSCH transmission occasions, such as based on an amount of data to be communicated within a message buffer at the UE **115**. In this regard, as compared to some "binary" rules implemented by some networks in which all configured TBs are either transmitted or dropped in a respective PUSCH occasion, aspects of the present disclosure may enable improved flexibility in the context of CG-PUSCH configurations associated with multiple TBs. Moreover, by enabling UEs **115** to selectively drop TBs from PUSCH messages, techniques described herein may reduce wasted resources and improve resource utilization within the wireless communications system. Further, by enabling UEs **115** to selectively drop TBs from PUSCH messages, aspects of the present disclosure may reduce or eliminate scenarios where the UE **115** is expected to completely drop a PUSCH message, thereby reducing latency within the network.

[0183] FIG. **9** illustrates a block diagram **900** of a device **905** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. The device **905** may be an example of aspects of a device **805** or a UE **115** as described herein. The device **905** may include a receiver **910**, a transmitter **915**, and a communications manager **920**. The device **905** may also include a processor. Each of these components may be in communication with one another (e.g., via one or more buses).

[0184] The receiver **910** may provide a means for receiving information such as packets, user data, control information, or any combination thereof associated with various information channels (e.g., control channels, data channels, information channels related to techniques for skipping PUSCH occasions with multiple CWs). Information may be passed on to other components of the device **905**. The receiver **910** may utilize a single antenna or a set of multiple antennas.

[0185] The transmitter **915** may provide a means for transmitting signals generated by other components of the device **905**. For example, the transmitter **915** may transmit information such as packets, user data, control information, or any combination thereof associated with various information channels (e.g., control channels, data channels, information channels related to techniques for skipping PUSCH occasions with multiple CWs). In some examples, the transmitter **915** may be co-located with a receiver **910** in a transceiver module. The transmitter **915** may utilize a single antenna or a set of multiple antennas.

[0186] The device **905**, or various components thereof, may be an example of means for performing various aspects of techniques for skipping PUSCH occasions with multiple CWs as described herein. For example, the communications manager **920** may include an RRC manager **925**, a UCI manager **930**, an PUSCH manager **935**, or any combination thereof. The communications manager **920** may be an example of aspects of a communications manager **820** as described herein. In some examples, the communications manager **920**, or various components thereof, may be configured to perform various operations (e.g., receiving, obtaining, monitoring, outputting, transmitting) using or otherwise in cooperation with the receiver **910**, the transmitter **915**, or both. For example, the communications manager **920** may receive information from the receiver **910**, send information to the transmitter **915**, or be integrated in combination with the receiver **910**, the transmitter **915**, or both to obtain information, output information, or perform various other operations as described herein.

[0187] The RRC manager **925** may be configured as or otherwise support a means for receiving RRC signaling that schedules resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions scheduled with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs. The UCI manager **930** may be configured as or otherwise support a means for generating an uplink shared channel message in accordance with the RRC signaling, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs. The PUSCH manager **935** may be configured as or otherwise support a means for transmitting the uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions.

[0188] FIG. **10** illustrates a block diagram **1000** of a communications manager **1020** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. The communications manager **1020** may be an example of aspects of a communications manager **820**, a communications manager **920**, or both, as described herein. The communications manager **1020**, or various components thereof, may be an example of means for performing various aspects of techniques for skipping PUSCH occasions with multiple CWs as described herein. For example, the communications manager **1020** may include an RRC manager **1025**, a UCI manager **1030**, an PUSCH manager **1035**, an MCS manager **1040**, or any combination thereof. Each of these components may communicate, directly or indirectly, with one another (e.g., via one or more buses).

[0189] The RRC manager **1025** may be configured as or otherwise support a means for receiving RRC signaling that schedules resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions scheduled with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs. The UCI manager **1030** may be configured as or otherwise support a means for generating an uplink shared channel message in accordance with the RRC signaling, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs. The PUSCH manager **1035** may be configured as or otherwise support a means for transmitting the uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions.

[0190] In some examples, the MCS manager **1040** may be configured as or otherwise support a means for receiving, via the RRC signaling, additional control signaling, or both, an indication of a first MCS associated with a first TB, and a second MCS associated with a second TB, where the uplink shared channel message includes the first TB in the one or more TBs and omits the second TB from the one or more TBs based on a comparison of the first MCS and the second MCS.

[0191] In some examples, the uplink shared channel message includes the first TB and omits the second TB based on the first MCS being greater than the second MCS.

[0192] In some examples, the uplink shared channel message includes the first TB and omits the second TB based on the first MCS being the same as the second MCS and on a comparison of transmission layers associated with the first TB and the second TB.

[0193] In some examples, the uplink shared channel message includes a first TB in the one or more TBs and omits a second TB from the one or more TBs based on the first TB being associated with a first set of transmission layers and the second TB being associated with a second set of transmission layers.

[0194] In some examples, the uplink shared channel message includes the first TB and omits the second TB based on the first set of transmission layers being lower than the second set of transmission layers.

[0195] In some examples, the first set of transmission layers includes transmission layers one through four. In some examples, the second set of transmission layers includes transmission layers five through eight.

[0196] In some examples, the UCI manager **1030** may be configured as or otherwise support a means for transmitting a UCI message via the first TB of the uplink shared channel message, where the UCI message includes a bit field value that indicates whether a second TB is included within the one or more TBs of the uplink shared channel message.

[0197] In some examples, the UCI message includes first information that is common across the first TB and the second TB, second information that is unique to the first TB, and third information that is unique to the second TB.

[0198] In some examples, the first information includes a HARQ process identifier, COT sharing information, or both. In some examples, the second information includes a first RV associated with the first TB, a first NDI associated with the first TB, or both. In some examples, the third information includes a second RV associated with the second TB, a second NDI associated with the second TB, or both.

[0199] In some examples, the UCI manager **1030** may be configured as or otherwise support a means for transmitting a first UCI message via the first TB of the uplink shared channel message, where the first UCI message includes first information that is common across the first TB and a second TB, and second information that is unique to the first TB.

[0200] In some examples, the first UCI message further includes a bit field value indicating that the second TB is included within the one or more TBs of the uplink shared channel message.

[0201] In some examples, the UCI manager **1030** may be configured as or otherwise support a means for transmitting a second UCI message via the second TB of the uplink shared channel message, where the second UCI message includes third information that is unique to the second TB.

[0202] In some examples, the second UCI message further includes the first information that is common across the first TB and the second TB.

[0203] In some examples, the PUSCH manager **1035** may be configured as or otherwise support a means for transmitting a second uplink shared channel message within a second uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the second uplink shared channel message includes the maximum quantity of TBs.

[0204] In some examples, to support generating the uplink shared channel message, the PUSCH manager **1035** may be configured as or otherwise support a means for generating the uplink shared channel message to include less than the maximum quantity of TBs based on a quantity of uplink traffic within a message buffer at the UE being less than a threshold quantity.

[0205] FIG. **11** illustrates a diagram of a system **1100** including a device **1105** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. The device **1105** may be an example of or include the components of a device **805**, a device **905**, or a UE **115** as described herein. The device **1105** may communicate (e.g., wirelessly) with one or more network entities **105**, one or more UEs **115**, or any combination thereof. The device **1105** may include components for bi-directional voice and data communications including components for transmitting and receiving communications, such as a communications manager **1120**, an input/output (I/O) controller **1110**, a transceiver **1115**, an antenna **1125**, a memory **1130**, code **1135**, and a processor **1140**. These components may be in electronic communication or otherwise coupled (e.g., operatively, communicatively, functionally, electronically, electrically) via one or more buses (e.g., a bus **1145**).

[0206] The I/O controller **1110** may manage input and output signals for the device **1105**. The I/O controller **1110** may also manage peripherals not integrated into the device **1105**. In some cases, the I/O controller **1110** may represent a physical connection or port to an external peripheral. In some cases, the I/O controller **1110** may utilize an operating system such as iOS®, ANDROID®, MS-DOS®, MS-WINDOWS®, OS/2®, UNIX®, LINUX®, or another known operating system. Additionally, or alternatively, the I/O controller **1110** may represent or interact with a modem, a keyboard, a mouse, a touchscreen, or a similar device. In some cases, the I/O controller **1110** may be implemented as part of a processor, such as the processor **1140**. In some cases, a user may interact with the device **1105** via the I/O controller **1110** or via hardware components controlled by the I/O controller **1110**.

[0207] In some cases, the device **1105** may include a single antenna **1125**. However, in some other cases, the device **1105** may have more than one antenna **1125**, which may be capable of concurrently transmitting or receiving multiple wireless transmissions. The transceiver **1115** may communicate bi-directionally, via the one or more antennas **1125**, wired, or wireless links as described herein. For example, the transceiver **1115** may represent a wireless transceiver and may communicate bi-directionally with another wireless transceiver. The transceiver **1115** may also include a modem to modulate the packets, to provide the modulated packets to one or more antennas **1125** for transmission, and to demodulate packets received from the one or more antennas **1125**. The transceiver **1115**, or the transceiver **1115** and one or more antennas **1125**, may be an example of a transmitter **815**, a transmitter **915**, a receiver **810**, a receiver **910**, or any combination thereof or component thereof, as described herein.

[0208] The memory **1130** may include random access memory (RAM) and read-only memory (ROM). The memory **1130** may store computer-readable, computer-executable code **1135** including instructions that, when executed by the processor **1140**, cause the device **1105** to perform various functions described herein. The code **1135** may be stored in a non-transitory computer-readable medium such as system memory or another type of memory. In some cases, the code **1135** may not be directly executable by the processor **1140** but may cause a computer (e.g., when compiled and executed) to perform functions described herein. In some cases, the memory **1130** may contain, among other things, a basic I/O system (BIOS) which may control basic hardware or software operation such as the interaction with peripheral components or devices.

[0209] The processor **1140** may include an intelligent hardware device (e.g., a general-purpose processor, a DSP, a CPU, a microcontroller, an ASIC, an FPGA, a programmable logic device, a discrete gate or transistor logic component, a discrete hardware component, or any combination thereof). In some cases, the processor **1140** may be configured to operate a memory array using a memory controller. In some other cases, a memory controller may be integrated into the processor **1140**. The processor **1140** may be configured to execute computer-readable instructions stored in a memory (e.g., the memory **1130**) to cause the device **1105** to perform various functions (e.g., functions or tasks supporting techniques for skipping PUSCH occasions with multiple CWs). For example, the device **1105** or a component of the device **1105** may include a processor **1140** and memory **1130** coupled with or to the processor **1140**, the processor **1140** and memory **1130** configured to perform various functions described herein.

[0210] For example, the communications manager **1120** may be configured as or otherwise support a means for receiving RRC signaling that schedules resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions scheduled with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs. The communications manager **1120** may be configured as or otherwise support a means for generating an uplink shared channel message in accordance with the RRC signaling, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs. The communications manager **1120** may be configured as or otherwise support a means for transmitting the uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions.

[0211] By including or configuring the communications manager **1120** in accordance with examples as described herein, the device **1105** may support techniques that enable UEs **115** to transmit PUSCH messages with fewer TBs/CWs as compared to a maximum quantity of TBs configured for a respective PUSCH transmission occasion. In other words, aspects of the present disclosure may enable UEs **115** to be configured with PUSCH transmission occasions enabled for multiple TBs, but to selectively "drop" or omit one or more TBs from PUSCH messages communicated in the respective PUSCH transmission occasions, such as based on an amount of data to be communicated within a message buffer at the UE **115**. In this regard, as compared to some "binary" rules implemented by some networks in which all configured TBs are either transmitted or dropped in a respective PUSCH occasion, aspects of the present disclosure may enable improved flexibility in the context of CG-PUSCH configurations associated with multiple TBs. Moreover, by enabling UEs **115** to selectively drop TBs from PUSCH messages, techniques described herein may reduce wasted resources and improve resource utilization within the wireless communications system. Further, by enabling UEs **115** to selectively drop TBs from PUSCH messages, aspects of the present disclosure may reduce or eliminate scenarios where the UE **115** is expected to completely drop a PUSCH message, thereby reducing latency within the network.

[0212] In some examples, the communications manager **1120** may be configured to perform various operations (e.g., receiving, monitoring, transmitting) using or otherwise in cooperation with the transceiver **1115**, the one or more antennas **1125**, or any combination thereof. Although the communications manager **1120** is illustrated as a separate component, in some examples, one or more functions described with reference to the communications manager **1120** may be supported by or performed by the processor **1140**, the memory **1130**, the code **1135**, or any combination thereof. For example, the code **1135** may include instructions executable by the processor **1140** to cause the device **1105** to perform various aspects of techniques for skipping PUSCH occasions with multiple CWs as described herein, or the processor **1140** and the memory **1130** may be otherwise configured to perform or support such operations.

[0213] FIG. **12** illustrates a block diagram **1200** of a device **1205** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. The device **1205** may be an example of aspects of a network entity **105** as described herein. The device **1205** may include a receiver **1210**, a transmitter **1215**, and a communications manager **1220**. The device **1205** may also include a processor. Each of these components may be in communication with one another (e.g., via one or more buses).

[0214] The receiver **1210** may provide a means for obtaining (e.g., receiving, determining, identifying) information such as user data, control information, or any combination thereof (e.g., I/Q samples, symbols, packets, protocol data units, service data units) associated with various channels (e.g., control channels, data channels, information channels, channels associated with a protocol stack). Information may be passed on to other components of the device **1205**. In some examples, the receiver **1210** may support obtaining information by receiving signals via one or more antennas. Additionally, or alternatively, the receiver **1210** may support obtaining information by receiving signals via one or more wired (e.g., electrical, fiber optic) interfaces, wireless interfaces, or any combination thereof.

[0215] The transmitter **1215** may provide a means for outputting (e.g., transmitting, providing, conveying, sending) information generated by other components of the device **1205**. For example, the transmitter **1215** may output information such as user data, control information, or any combination thereof (e.g., I/Q samples, symbols, packets, protocol data units, service data units) associated with various channels (e.g., control channels, data channels, information channels, channels associated with a protocol stack). In some examples, the transmitter **1215** may support outputting information by transmitting signals via one or more antennas. Additionally, or alternatively, the transmitter **1215** may support outputting information by transmitting signals via one or more wired (e.g., electrical, fiber optic) interfaces, wireless interfaces, or any combination thereof. In some examples, the transmitter **1215** and the receiver **1210** may be co-located in a transceiver, which may include or be coupled with a modem.

[0216] The communications manager **1220**, the receiver **1210**, the transmitter **1215**, or various combinations thereof or various components thereof may be examples of means for performing various aspects of techniques for skipping PUSCH occasions with multiple CWs as described herein. For example, the communications manager **1220**, the receiver **1210**, the transmitter **1215**, or various combinations or components thereof may support a method for performing one or more of the functions described herein.

[0217] In some examples, the communications manager **1220**, the receiver **1210**, the transmitter **1215**, or various combinations or components thereof may be implemented in hardware (e.g., in communications management circuitry). The hardware may include a processor, a DSP, a CPU, an ASIC, an FPGA or other programmable logic device, a microcontroller, discrete gate or transistor logic, discrete hardware components, or any combination thereof configured as or otherwise supporting a means for performing the functions described in the present disclosure. In some examples, a processor and memory coupled with the processor may be configured to perform one or more of the functions described herein (e.g., by executing, by the processor, instructions stored in the memory).

[0218] Additionally, or alternatively, in some examples, the communications manager **1220**, the receiver **1210**, the transmitter **1215**, or various combinations or components thereof may be implemented in code (e.g., as communications management software or firmware) executed by a processor. If implemented in code executed by a processor (e.g., processor-executable code), the functions of the communications manager **1220**, the receiver **1210**, the transmitter **1215**, or various combinations or components thereof may be performed (individually or collectively) by a general-purpose processor, a DSP, a CPU, an ASIC, an FPGA, a microcontroller, or any combination of these or other programmable logic devices (e.g., configured as or otherwise supporting a means for performing the functions described in the present disclosure).

[0219] In some examples, the communications manager **1220** may be configured to perform various operations (e.g., receiving, obtaining, monitoring, outputting, transmitting) using or otherwise in cooperation with the receiver **1210**, the transmitter **1215**, or both. For example, the communications manager **1220** may receive information from the receiver **1210**, send information to the transmitter **1215**, or be integrated in combination with the receiver **1210**, the transmitter **1215**, or both to obtain information, output information, or perform various other operations as described herein.

[0220] For example, the communications manager **1220** may be configured as or otherwise support a means for transmitting RRC signaling that schedules resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions scheduled with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs. The communications manager **1220** may be configured as or otherwise support a means for receiving, from a UE, an uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs.

[0221] By including or configuring the communications manager **1220** in accordance with examples as described herein, the device **1205** (e.g., a processor controlling or otherwise coupled with the receiver **1210**, the transmitter **1215**, the communications manager **1220**, or a combination thereof) may support techniques that enable UEs **115** to transmit PUSCH messages with fewer TBs/CWs as compared to a maximum quantity of TBs configured for a respective PUSCH transmission occasion. In other words, aspects of the present disclosure may enable UEs **115** to be configured with PUSCH transmission occasions enabled for multiple TBs, but to selectively "drop" or omit one or more TBs from PUSCH messages communicated in the respective PUSCH transmission occasions, such as based on an amount of data to be communicated within a message buffer at the UE **115**. In this regard, as compared to some "binary" rules implemented by some networks in which all configured TBs are either transmitted or dropped in a respective PUSCH occasion, aspects of the present disclosure may enable improved flexibility in the context of CG-PUSCH configurations associated with multiple TBs. Moreover, by enabling UEs **115** to selectively drop TBs from PUSCH messages, techniques described herein may reduce wasted resources and improve resource utilization within the wireless communications system. Further, by enabling UEs **115** to selectively drop TBs from PUSCH messages, aspects of the present disclosure may reduce or eliminate scenarios where the UE **115** is expected to completely drop a PUSCH message, thereby reducing latency within the network.

[0222] FIG. **13** illustrates a block diagram **1300** of a device **1305** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. The device **1305** may be an example of aspects of a device **1205** or a network entity **105** as described herein. The device **1305** may include a receiver **1310**, a transmitter **1315**, and a communications manager **1320**. The device **1305** may also include a processor. Each of these components may be in communication with one another (e.g., via one or more buses).

[0223] The receiver **1310** may provide a means for obtaining (e.g., receiving, determining, identifying) information such as user data, control information, or any combination thereof (e.g., I/Q samples, symbols, packets, protocol data units, service data units) associated with various channels (e.g., control channels, data channels, information channels, channels associated with a protocol stack). Information may be passed on to other components of the device **1305**. In some examples, the receiver **1310** may support obtaining information by receiving signals via one or more antennas. Additionally, or alternatively, the receiver **1310** may support obtaining information by receiving signals via one or more wired (e.g., electrical, fiber optic) interfaces, wireless interfaces, or any combination thereof.

[0224] The transmitter **1315** may provide a means for outputting (e.g., transmitting, providing, conveying, sending) information generated by other components of the device **1305**. For example, the transmitter **1315** may output information such as user data, control information, or any combination thereof (e.g., I/Q samples, symbols, packets, protocol data units, service data units) associated with various channels (e.g., control channels, data channels, information channels, channels associated with a protocol stack). In some examples, the transmitter **1315** may support outputting information by transmitting signals via one or more antennas. Additionally, or alternatively, the transmitter **1315** may support outputting information by transmitting signals via one or more wired (e.g., electrical, fiber optic) interfaces, wireless interfaces, or any combination thereof. In some examples, the transmitter **1315** and the receiver **1310** may be co-located in a transceiver, which may include or be coupled with a modem.

[0225] The device **1305**, or various components thereof, may be an example of means for performing various aspects of techniques for skipping PUSCH occasions with multiple CWs as described herein. For example, the communications manager **1320** may include an RRC manager **1325** an PUSCH manager **1330**, or any combination thereof. The communications manager **1320** may be an example of aspects of a communications manager **1220** as described herein. In some examples, the communications manager **1320**, or various components thereof, may be configured to perform various operations (e.g., receiving, obtaining, monitoring, outputting, transmitting) using or otherwise in cooperation with the receiver **1310**, the transmitter **1315**, or both. For example, the communications manager **1320** may receive information from the receiver **1310**, send information to the transmitter **1315**, or be integrated in combination with the receiver **1310**, the transmitter **1315**, or both to obtain information, output information, or perform various other operations as described herein.

[0226] The RRC manager **1325** may be configured as or otherwise support a means for transmitting RRC signaling that schedules resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions scheduled with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs. The PUSCH manager **1330** may be configured as or otherwise support a means for receiving, from a UE, an uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs.

[0227] FIG. **14** illustrates a block diagram **1400** of a communications manager **1420** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. The communications manager **1420** may be an example of aspects of a communications manager **1220**, a communications manager **1320**, or both, as described herein. The communications manager **1420**, or various components thereof, may be an example of means for performing various aspects of techniques for skipping PUSCH occasions with multiple CWs as described herein. For example, the communications manager **1420** may include an RRC manager **1425**, an PUSCH manager **1430**, an MCS manager **1435**, a UCI manager **1440**, or any combination thereof. Each of these components may communicate, directly or indirectly, with one another (e.g., via one or more buses) which may include communications within a protocol layer of a protocol stack, communications associated with a logical channel of a protocol stack (e.g., between protocol layers of a protocol stack, within a device, component, or virtualized component associated with a network entity **105**, between devices, components, or virtualized components associated with a network entity **105**), or any combination thereof.

[0228] The RRC manager **1425** may be configured as or otherwise support a means for transmitting RRC signaling that schedules resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions scheduled with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs. The PUSCH manager **1430** may be configured as or otherwise support a means for receiving, from a UE, an uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs.

[0229] In some examples, the MCS manager **1435** may be configured as or otherwise support a means for transmitting, via the RRC signaling, additional control signaling, or both, an indication of a first MCS associated with a first TB, and a second MCS associated with a second TB, where the uplink shared channel message includes the first TB in the one or more TBs and omits the second TB from the one or more TBs based on a comparison of the first MCS and the second MCS.

[0230] In some examples, the uplink shared channel message includes the first TB and omits the second TB based on the first MCS being greater than the second MCS.

[0231] In some examples, the uplink shared channel message includes the first TB and omits the second TB based on the first MCS being the same as the second MCS and on a comparison of transmission layers associated with the first TB and the second TB.

[0232] In some examples, the uplink shared channel message includes a first TB in the one or more TBs and omits a second TB from the one or more TBs based on the first TB being associated with a first set of transmission layers and the second TB being associated with a second set of transmission layers.

[0233] In some examples, the uplink shared channel message includes the first TB and omits the second TB based on the first set of transmission layers being lower than the second set of transmission layers.

[0234] In some examples, the first set of transmission layers includes transmission layers one through four. In some examples, the second set of transmission layers includes transmission layers five through eight.

[0235] In some examples, the one or more TBs included within the uplink shared channel message includes at least a first TB, and the UCI manager **1440** may be configured as or otherwise support a means for receiving a UCI message via the first TB of the uplink shared channel message, where the UCI message includes a bit field value that indicates whether a second TB is included within the one or more TBs of the uplink shared channel message.

[0236] In some examples, the UCI message includes first information that is common across the first TB and the second TB, second information that is unique to the first TB, and third information that is unique to the second TB.

[0237] In some examples, the first information includes a HARQ process identifier, COT sharing information, or both. In some examples, the second information includes a first RV associated with the first TB, a first NDI associated with the first TB, or both. In some examples, the third information includes a second RV associated with the second TB, a second NDI associated with the second TB, or both.

[0238] In some examples, the one or more TBs included within the uplink shared channel message includes a first TB, and the PUSCH manager **1430** may be configured as or otherwise support a means for receiving a first UCI message via the first TB of the uplink shared channel message, where the first UCI message includes first information that is common across the first TB and a second TB, and second information that is unique to the first TB.

[0239] In some examples, the first UCI message further includes a bit field value indicating that the second TB is included within the one or more TBs of the uplink shared channel message.

[0240] In some examples, the one or more TBs included within the uplink shared channel message includes the second TB, and the UCI manager **1440** may be configured as or otherwise support a means for receiving a second UCI message via the second TB of the uplink shared channel message, where the second UCI message includes third information that is unique to the second TB.

[0241] In some examples, the second UCI message further includes the first information that is common across the first TB and the second TB.

[0242] In some examples, the PUSCH manager **1430** may be configured as or otherwise support a means for receiving a second uplink shared channel message within a second uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the second uplink shared channel message includes the maximum quantity of TBs.

[0243] FIG. **15** illustrates a diagram of a system **1500** including a device **1505** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. The device **1505** may be an example of or include the components of a device **1205**, a device **1305**, or a network entity **105** as described herein. The device **1505** may communicate with one or more network entities **105**, one or more UEs **115**, or any combination thereof, which may include communications over one or more wired interfaces, over one or more wireless interfaces, or any combination thereof. The device **1505** may include components that support outputting and obtaining communications, such as a communications manager **1520**, a transceiver **1510**, an antenna **1515**, a memory

1525, code 1530, and a processor 1535. These components may be in electronic communication or otherwise coupled (e.g., operatively, communicatively, functionally, electronically, electrically) via one or more buses (e.g., a bus 1540).

[0244] The transceiver 1510 may support bi-directional communications via wired links, wireless links, or both as described herein. In some examples, the transceiver 1510 may include a wired transceiver and may communicate bi-directionally with another wired transceiver. Additionally, or alternatively, in some examples, the transceiver 1510 may include a wireless transceiver and may communicate bi-directionally with another wireless transceiver. In some examples, the device 1505 may include one or more antennas 1515, which may be capable of transmitting or receiving wireless transmissions (e.g., concurrently). The transceiver 1510 may also include a modem to modulate signals, to provide the modulated signals for transmission (e.g., by one or more antennas 1515, by a wired transmitter), to receive modulated signals (e.g., from one or more antennas 1515, from a wired receiver), and to demodulate signals. In some implementations, the transceiver 1510 may include one or more interfaces, such as one or more interfaces coupled with the one or more antennas 1515 that are configured to support various receiving or obtaining operations, or one or more interfaces coupled with the one or more antennas 1515 that are configured to support various transmitting or outputting operations, or a combination thereof. In some implementations, the transceiver 1510 may include or be configured for coupling with one or more processors or memory components that are operable to perform or support operations based on received or obtained information or signals, or to generate information or other signals for transmission or other outputting, or any combination thereof. In some implementations, the transceiver 1510, or the transceiver 1510 and the one or more antennas 1515, or the transceiver 1510 and the one or more antennas 1515 and one or more processors or memory components (for example, the processor 1535, or the memory 1525, or both), may be included in a chip or chip assembly that is installed in the device 1505. In some examples, the transceiver may be operable to support communications via one or more communications links (e.g., a communication link 125, a backhaul communication link 120, a midhaul communication link 162, a fronthaul communication link 168).

[0245] The memory 1525 may include RAM and ROM. The memory 1525 may store computer-readable, computer-executable code 1530 including instructions that, when executed by the processor 1535, cause the device 1505 to perform various functions described herein. The code 1530 may be stored in a non-transitory computer-readable medium such as system memory or another type of memory. In some cases, the code 1530 may not be directly executable by the processor 1535 but may cause a computer (e.g., when compiled and executed) to perform functions described herein. In some cases, the memory 1525 may contain, among other things, a BIOS which may control basic hardware or software operation such as the interaction with peripheral components or devices.

[0246] The processor 1535 may include an intelligent hardware device (e.g., a general-purpose processor, a DSP, an ASIC, a CPU, an FPGA, a microcontroller, a programmable logic device, discrete gate or transistor logic, a discrete hardware component, or any combination thereof). In some cases, the processor 1535 may be configured to operate a memory array using a memory controller. In some other cases, a memory controller may be integrated into the processor 1535. The processor 1535 may be configured to execute computer-readable instructions stored in a memory (e.g., the memory 1525) to cause the device 1505 to perform various functions (e.g., functions or tasks supporting techniques for skipping PUSCH occasions with multiple CWs). For example, the device 1505 or a component of the device 1505 may include a processor 1535 and memory 1525 coupled with the processor 1535, the processor 1535 and memory 1525 configured to perform various functions described herein. The processor 1535 may be an example of a cloud-computing platform (e.g., one or more physical nodes and supporting software such as operating systems, virtual machines, or container instances) that may host the functions (e.g., by executing code 1530) to perform the functions of the device 1505. The processor 1535 may be any one or more suitable processors capable of executing scripts or instructions of one or more software programs stored in the device 1505 (such as within the memory 1525). In some implementations, the processor 1535 may be a component of a processing system. A processing system may generally refer to a system or series of machines or components that receives inputs and processes the inputs to produce a set of outputs (which may be passed to other systems or components of, for example, the device 1505). For example, a processing system of the device 1505 may refer to a system including the various other components or subcomponents of the device 1505, such as the processor 1535, or the transceiver 1510, or the communications manager 1520, or other components or combinations of components of the device 1505. The processing system of the device 1505 may interface with other components of the device 1505, and may process information received from other components (such as inputs or signals) or output information to other components. For example, a chip or modem of the device 1505 may include a processing system and one or more interfaces to output information, or to obtain information, or both. The one or more interfaces may be implemented as or otherwise include a first interface configured to output information and a second interface configured to obtain information, or a same interface configured to output information and to obtain information, among other implementations. In some implementations, the one or more interfaces may refer to an interface between the processing system of the chip or modem and a transmitter, such that the device 1505 may transmit information output from the chip or modem. Additionally, or alternatively, in some implementations, the one or more interfaces may refer to an interface between the processing system of the chip or modem and a receiver, such that the device 1505 may obtain information or signal inputs, and the information may be passed to the processing system. A person having ordinary skill in the art will readily recognize that a first interface also may obtain information or signal inputs, and a second interface also may output information or signal outputs.

[0247] In some examples, a bus 1540 may support communications of (e.g., within) a protocol layer of a protocol stack. In some examples, a bus 1540 may support communications associated with a logical channel of a protocol stack (e.g., between protocol layers of a protocol stack), which may include communications performed within a component of the device 1505, or between different components of the device 1505 that may be co-located or located in different locations (e.g., where the device **1505** may refer to a system in which one or more of the communications manager **1520**, the transceiver **1510**, the memory **1525**, the code **1530**, and the processor **1535** may be located in one of the different components or divided between different components).

[0248] In some examples, the communications manager **1520** may manage aspects of communications with a core network **130** (e.g., via one or more wired or wireless backhaul links). For example, the communications manager **1520** may manage the transfer of data communications for client devices, such as one or more UEs **115**. In some examples, the communications manager **1520** may manage communications with other network entities **105**, and may include a controller or scheduler for controlling communications with UEs **115** in cooperation with other network entities **105**. In some examples, the communications manager **1520** may support an X2 interface within an LTE/LTE-A wireless communications network technology to provide communication between network entities **105**.

[0249] For example, the communications manager **1520** may be configured as or otherwise support a means for transmitting RRC signaling that schedules resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions scheduled with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs. The communications manager **1520** may be configured as or otherwise support a means for receiving, from a UE, an uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs.

[0250] By including or configuring the communications manager **1520** in accordance with examples as described herein, the device **1505** may support techniques that enable UEs **115** to transmit PUSCH messages with fewer TBs/CWs as compared to a maximum quantity of TBs configured for a respective PUSCH transmission occasion. In other words, aspects of the present disclosure may enable UEs **115** to be configured with PUSCH transmission occasions enabled for multiple TBs, but to selectively "drop" or omit one or more TBs from PUSCH messages communicated in the respective PUSCH transmission occasions, such as based on an amount of data to be communicated within a message buffer at the UE **115**. In this regard, as compared to some "binary" rules implemented by some networks in which all configured TBs are either transmitted or dropped in a respective PUSCH occasion, aspects of the present disclosure may enable improved flexibility in the context of CG-PUSCH configurations associated with multiple TBs. Moreover, by enabling UEs **115** to selectively drop TBs from PUSCH messages, techniques described herein may reduce wasted resources and improve resource utilization within the wireless communications system. Further, by enabling UEs **115** to selectively drop TBs from PUSCH messages, aspects of the present disclosure may reduce or eliminate scenarios where the UE **115** is expected to completely drop a PUSCH message, thereby reducing latency within the network.

[0251] In some examples, the communications manager **1520** may be configured to perform various operations (e.g., receiving, obtaining, monitoring, outputting, transmitting) using or otherwise in cooperation with the transceiver **1510**, the one or more antennas **1515** (e.g., where applicable), or any combination thereof. Although the communications manager **1520** is illustrated as a separate component, in some examples, one or more functions described with reference to the communications manager **1520** may be supported by or performed by the transceiver **1510**, the processor **1535**, the memory **1525**, the code **1530**, or any combination thereof. For example, the code **1530** may include instructions executable by the processor **1535** to cause the device **1505** to perform various aspects of techniques for skipping PUSCH occasions with multiple CWs as described herein, or the processor **1535** and the memory **1525** may be otherwise configured to perform or support such operations.

[0252] FIG. **16** illustrates a flowchart showing a method **1600** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. The operations of the method **1600** may be implemented by a UE or its components as described herein. For example, the operations of the method **1600** may be performed by a UE **115** as described with reference to FIGS. **1** through **11**. In some examples, a UE may execute a set of instructions to control the functional elements of the UE to perform the described functions. Additionally, or alternatively, the UE may perform aspects of the described functions using special-purpose hardware.

[0253] At **1605**, the method may include receiving RRC signaling that indicates (e.g., schedules, configures) resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs. The operations of **1605** may be performed in accordance with examples as disclosed herein. In some examples, aspects of the operations of **1605** may be performed by an RRC manager **1025** as described with reference to FIG. **10**.

[0254] At **1610**, the method may include generating an uplink shared channel message in accordance with the RRC signaling, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs. The operations of **1610** may be performed in accordance with examples as disclosed herein. In some examples, aspects of the operations of **1610** may be performed by a UCI manager **1030** as described with reference to FIG. **10**.

[0255] At **1615**, the method may include transmitting the uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions. The operations of **1615** may be performed in accordance with examples as disclosed herein. In some examples, aspects of the operations of **1615** may be performed by an PUSCH manager **1035** as described with reference to FIG. **10**.

[0256] FIG. **17** illustrates a flowchart showing a method **1700** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. The operations of the method **1700** may be implemented by a UE or its components as described herein. For example, the operations of the method **1700** may be performed by a UE **115** as described with reference to FIGS. **1** through **11**. In some examples, a

UE may execute a set of instructions to control the functional elements of the UE to perform the described functions. Additionally, or alternatively, the UE may perform aspects of the described functions using special-purpose hardware.

[0257] At **1705**, the method may include receiving RRC signaling that indicates resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs. The operations of **1705** may be performed in accordance with examples as disclosed herein. In some examples, aspects of the operations of **1705** may be performed by an RRC manager **1025** as described with reference to FIG. **10**.

[0258] At **1710**, the method may include receiving, via the RRC signaling, additional control signaling, or both, an indication of a first MCS associated with a first TB, and a second MCS associated with a second TB. The operations of **1710** may be performed in accordance with examples as disclosed herein. In some examples, aspects of the operations of **1710** may be performed by an MCS manager **1040** as described with reference to FIG. **10**.

[0259] At **1715**, the method may include generating an uplink shared channel message in accordance with the RRC signaling, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs, where the uplink shared channel message includes the first TB in the one or more TBs and omits the second TB from the one or more TBs based on a comparison of the first MCS and the second MCS. The operations of **1715** may be performed in accordance with examples as disclosed herein. In some examples, aspects of the operations of **1715** may be performed by a UCI manager **1030** as described with reference to FIG. **10**.

[0260] At **1720**, the method may include transmitting the uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions. The operations of **1720** may be performed in accordance with examples as disclosed herein. In some examples, aspects of the operations of **1720** may be performed by an PUSCH manager **1035** as described with reference to FIG. **10**.

[0261] FIG. **18** illustrates a flowchart showing a method **1800** that supports techniques for skipping PUSCH occasions with multiple CWs in accordance with one or more aspects of the present disclosure. The operations of the method **1800** may be implemented by a network entity or its components as described herein. For example, the operations of the method **1800** may be performed by a network entity as described with reference to FIGS. **1** through **7** and **12** through **15**. In some examples, a network entity may execute a set of instructions to control the functional elements of the network entity to perform the described functions. Additionally, or alternatively, the network entity may perform aspects of the described functions using special-purpose hardware.

[0262] At **1805**, the method may include transmitting RRC signaling that indicates resources for a set of multiple uplink shared channel transmission occasions, each of the set of multiple uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs. The operations of **1805** may be performed in accordance with examples as disclosed herein. In some examples, aspects of the operations of **1805** may be performed by an RRC manager **1425** as described with reference to FIG. **14**.

[0263] At **1810**, the method may include receiving, from a UE, an uplink shared channel message within an uplink shared channel transmission occasion of the set of multiple uplink shared channel transmission occasions, where the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs. The operations of **1810** may be performed in accordance with examples as disclosed herein. In some examples, aspects of the operations of **1810** may be performed by an PUSCH manager **1430** as described with reference to FIG. **14**.

[0264] The following provides an overview of aspects of the present disclosure:

[0265] Aspect 1: A method for wireless communication at a UE, comprising: receiving RRC signaling that schedules resources for a plurality of uplink shared channel transmission occasions, each of the plurality of uplink shared channel transmission occasions scheduled with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs; generating an uplink shared channel message in accordance with the RRC signaling, wherein the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs; and transmitting the uplink shared channel message within an uplink shared channel transmission occasion of the plurality of uplink shared channel transmission occasions.

[0266] Aspect 2: The method of aspect 1, further comprising: receiving, via the RRC signaling, additional control signaling, or both, an indication of a first MCS associated with a first TB, and a second MCS associated with a second TB, wherein the uplink shared channel message includes the first TB in the one or more TBs and omits the second TB from the one or more TBs based at least in part on a comparison of the first MCS and the second MCS.

[0267] Aspect 3: The method of aspect 2, wherein the uplink shared channel message includes the first TB and omits the second TB based at least in part on the first MCS being greater than the second MCS.

[0268] Aspect 4: The method of any of aspects 2 through 3, wherein the uplink shared channel message includes the first TB and omits the second TB based at least in part on the first MCS being the same as the second MCS and on a comparison of transmission layers associated with the first TB and the second TB.

[0269] Aspect 5: The method of any of aspects 1 through 4, wherein the uplink shared channel message includes a first TB in the one or more TBs and omits a second TB from the one or more TBs based at least in part on the first TB being associated with a first set of transmission layers and the second TB being associated with a second set of transmission layers.

[0270] Aspect 6: The method of aspect 5, wherein the uplink shared channel message includes the first TB and omits the second TB based at least in part on the first set of transmission layers being lower than the second set of transmission layers.

[0271] Aspect 7: The method of aspect 6, wherein the first set of transmission layers comprises transmission layers one through four, and the second set of transmission layers comprises transmission layers five through eight.

[0272] Aspect 8: The method of any of aspects 1 through 7, wherein the one or more TBs included within the uplink shared channel message includes at least a first TB, the method further comprising: transmitting a UCI message via the first TB of the uplink shared channel message, wherein the UCI message comprises a bit field value that indicates whether a second TB is included within the one or more TBs of the uplink shared channel message.

[0273] Aspect 9: The method of aspect 8, wherein the UCI message comprises first information that is common across the first TB and the second TB, second information that is unique to the first TB, and third information that is unique to the second TB.

[0274] Aspect 10: The method of aspect 9, wherein the first information comprises a HARQ process identifier, COT sharing information, or both, and the second information comprises a first RV associated with the first TB, a first NDI associated with the first TB, or both, and the third information comprises a second RV associated with the second TB, a second NDI associated with the second TB, or both.

[0275] Aspect 11: The method of any of aspects 1 through 10, wherein the one or more TBs included within the uplink shared channel message includes a first TB, the method further comprising: transmitting a first UCI message via the first TB of the uplink shared channel message, wherein the first UCI message comprises first information that is common across the first TB and a second TB, and second information that is unique to the first TB.

[0276] Aspect 12: The method of aspect 11, wherein the first UCI message further includes a bit field value indicating that the second TB is included within the one or more TBs of the uplink shared channel message.

[0277] Aspect 13: The method of any of aspects 11 through 12, wherein the one or more TBs included within the uplink shared channel message includes the second TB, the method further comprising: transmitting a second UCI message via the second TB of the uplink shared channel message, wherein the second UCI message comprises third information that is unique to the second TB.

[0278] Aspect 14: The method of aspect 13, wherein the second UCI message further includes the first information that is common across the first TB and the second TB.

[0279] Aspect 15: The method of any of aspects 1 through 14, further comprising: transmitting a second uplink shared channel message within a second uplink shared channel transmission occasion of the plurality of uplink shared channel transmission occasions, wherein the second uplink shared channel message includes the maximum quantity of TBs.

[0280] Aspect 16: The method of any of aspects 1 through 15, wherein generating the uplink shared channel message comprises: generating the uplink shared channel message to include less than the maximum quantity of TBs based at least in part on a quantity of uplink traffic within a message buffer at the UE being less than a threshold quantity.

[0281] Aspect 17: A method for wireless communication at a network entity, comprising: transmitting RRC signaling that schedules resources for a plurality of uplink shared channel transmission occasions, each of the plurality of uplink shared channel transmission occasions scheduled with a capacity for transmission of a maximum quantity of TBs, the maximum quantity including two or more TBs; and receiving, from a UE, an uplink shared channel message within an uplink shared channel transmission occasion of the plurality of uplink shared channel transmission occasions, wherein the uplink shared channel message includes one or more TBs, the one or more TBs being less than the maximum quantity of TBs.

[0282] Aspect 18: The method of aspect 17, further comprising: transmitting, via the RRC signaling, additional control signaling, or both, an indication of a first MCS associated with a first TB, and a second MCS associated with a second TB, wherein the uplink shared channel message includes the first TB in the one or more TBs and omits the second TB from the one or more TBs based at least in part on a comparison of the first MCS and the second MCS.

[0283] Aspect 19: The method of aspect 18, wherein the uplink shared channel message includes the first TB and omits the second TB based at least in part on the first MCS being greater than the second MCS.

[0284] Aspect 20: The method of any of aspects 18 through 19, wherein the uplink shared channel message includes the first TB and omits the second TB based at least in part on the first MCS being the same as the second MCS and on a comparison of transmission layers associated with the first TB and the second TB.

[0285] Aspect 21: The method of any of aspects 17 through 20, wherein the uplink shared channel message includes a first TB in the one or more TBs and omits a second TB from the one or more TBs based at least in part on the first TB being associated with a first set of transmission layers and the second TB being associated with a second set of transmission layers.

[0286] Aspect 22: The method of aspect 21, wherein the uplink shared channel message includes the first TB and omits the second TB based at least in part on the first set of transmission layers being lower than the second set of transmission layers.

[0287] Aspect 23: The method of aspect 22, wherein the first set of transmission layers comprises transmission layers one through four, and the second set of transmission layers comprises transmission layers five through eight.

[0288] Aspect 24: The method of any of aspects 17 through 23, wherein the one or more TBs included within the uplink shared channel message includes at least a first TB, the method further comprising: receiving a UCI message via the first TB of the uplink shared channel message, wherein the UCI message comprises a bit field value that indicates whether a second TB is included within the one or more TBs of the uplink shared channel message.

[0289] Aspect 25: The method of aspect 24, wherein the UCI message comprises first information that is common across the first TB and the second TB, second information that is unique to the first TB, and third information that is unique to the second TB.

[0290] Aspect 26: The method of aspect 25, wherein the first information comprises a HARQ process identifier, COT sharing information, or both, and the second information comprises a first RV associated with the first TB, a first NDI associated with the first TB, or both, and the third information comprises a second RV associated with the second TB, a second NDI associated with the second TB, or both.

[0291] Aspect 27: The method of any of aspects 17 through 26, wherein the one or more TBs included within the uplink shared channel message includes a first TB, the method further comprising: receiving a first UCI message via the first TB of the uplink shared channel message, wherein the first UCI message comprises first information that is common across the first TB and a second TB, and second information that is unique to the first TB.

[0292] Aspect 28: The method of aspect 27, wherein the first UCI message further includes a bit field value indicating that the second TB is included within the one or more TBs of the uplink shared channel message.

[0293] Aspect 29: The method of any of aspects 27 through 28, wherein the one or more TBs included within the uplink shared channel message includes the second TB, the method further comprising: receiving a second UCI message via the second TB of the uplink shared channel message, wherein the second UCI message comprises third information that is unique to the second TB.

[0294] Aspect 30: The method of aspect 29, wherein the second UCI message further includes the first information that is common across the first TB and the second TB.

[0295] Aspect 31: The method of any of aspects 17 through 30, further comprising: receiving a second uplink shared channel message within a second uplink shared channel transmission occasion of the plurality of uplink shared channel transmission occasions, wherein the second uplink shared channel message includes the maximum quantity of TBs.

[0296] Aspect 32: An apparatus comprising a processor; memory coupled with the processor; and instructions stored in the memory and executable by the processor to cause the apparatus to perform a method of any of aspects 1 through 16.

[0297] Aspect 33: An apparatus comprising at least one means for performing a method of any of aspects 1 through 16.

[0298] Aspect 34: A non-transitory computer-readable medium storing code the code comprising instructions executable by a processor to perform a method of any of aspects 1 through 16.

[0299] Aspect 35: An apparatus comprising a processor; memory coupled with the processor; and instructions stored in the memory and executable by the processor to cause the apparatus to perform a method of any of aspects 17 through 31.

[0300] Aspect 36: An apparatus comprising at least one means for performing a method of any of aspects 17 through 31.

[0301] Aspect 37: A non-transitory computer-readable medium storing code the code comprising instructions executable by a processor to perform a method of any of aspects 17 through 31.

[0302] It should be noted that the methods described herein describe possible implementations, and that the operations and the steps may be rearranged or otherwise modified and that other implementations are possible. Further, aspects from two or more of the methods may be combined.

[0303] Although aspects of an LTE, LTE-A, LTE-A Pro, or NR system may be described for purposes of example, and LTE, LTE-A, LTE-A Pro, or NR terminology may be used in much of the description, the techniques described herein are applicable beyond LTE, LTE-A, LTE-A Pro, or NR networks. For example, the described techniques may be applicable to various other wireless communications systems such as Ultra Mobile Broadband (UMB), Institute of Electrical and Electronics Engineers (IEEE) 802.11 (Wi-Fi), IEEE 802.16 (WiMAX), IEEE 802.20, Flash-OFDM, as well as other systems and radio technologies not explicitly mentioned herein.

[0304] Information and signals described herein may be represented using any of a variety of different technologies and techniques. For example, data, instructions, commands, information, signals, bits, symbols, and chips that may be referenced throughout the description may be represented by voltages, currents, electromagnetic waves, magnetic fields or particles, optical fields or particles, or any combination thereof.

[0305] The various illustrative blocks and components described in connection with the disclosure herein may be implemented or performed using a general-purpose processor, a DSP, an ASIC, a CPU, an FPGA or other programmable logic device, discrete gate or transistor logic, discrete hardware components, or any combination thereof designed to perform the functions described herein. A general-purpose processor may be a microprocessor but, in the alternative, the processor may be any processor, controller, microcontroller, or state machine. A processor may also be implemented as a combination of computing devices (e.g., a combination of a DSP and a microprocessor, multiple microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration).

[0306] The functions described herein may be implemented using hardware, software executed by a processor, firmware, or any combination thereof. If implemented using software executed by a processor, the functions may be stored as or transmitted using one or more instructions or code of a computer-readable medium. Other examples and implementations are within the scope of the disclosure and appended claims. For example, due to the nature of software, functions described herein may be implemented using software executed by a processor, hardware, firmware, hardwiring, or combinations of any of these. Features implementing functions may also be physically located at various positions, including being distributed such that portions of functions are implemented at different physical locations.

[0307] Computer-readable media includes both non-transitory computer storage media and communication media including any medium that facilitates transfer of a computer program from one location to another. A non-transitory storage medium may be any available medium that may be accessed by a general-purpose or special-purpose computer.

By way of example, and not limitation, non-transitory computer-readable media may include RAM, ROM, electrically erasable programmable ROM (EEPROM), flash memory, compact disk (CD) ROM or other optical disk storage, magnetic disk storage or other magnetic storage devices, or any other non-transitory medium that may be used to carry or store desired program code means in the form of instructions or data structures and that may be accessed by a general-purpose or special-purpose computer, or a general-purpose or special-purpose processor. Also, any connection is properly termed a computer-readable medium. For example, if the software is transmitted from a website, server, or other remote source using a coaxial cable, fiber optic cable, twisted pair, digital subscriber line (DSL), or wireless technologies such as infrared, radio, and microwave, then the coaxial cable, fiber optic cable, twisted pair, DSL, or wireless technologies such as infrared, radio, and microwave are included in the definition of computer-readable medium. Disk and disc, as used herein, include CD, laser disc, optical disc, digital versatile disc (DVD), floppy disk and Blu-ray disc. Disks may reproduce data magnetically, and discs may reproduce data optically using lasers. Combinations of the above are also included within the scope of computer-readable media.

[0308] As used herein, including in the claims, "or" as used in a list of items (e.g., a list of items prefaced by a phrase such as "at least one of" or "one or more of") indicates an inclusive list such that, for example, a list of at least one of A, B, or C means A or B or C or AB or AC or BC or ABC (i.e., A and B and C). Also, as used herein, the phrase "based on" shall not be construed as a reference to a closed set of conditions. For example, an example step that is described as "based on condition A" may be based on both a condition A and a condition B without departing from the scope of the present disclosure. In other words, as used herein, the phrase "based on" shall be construed in the same manner as the phrase "based at least in part on."

[0309] The term "determine" or "determining" encompasses a variety of actions and, therefore, "determining" can include calculating, computing, processing, deriving, investigating, looking up (such as via looking up in a table, a database or another data structure), ascertaining and the like. Also, "determining" can include receiving (e.g., receiving information), accessing (e.g., accessing data stored in memory) and the like. Also, "determining" can include resolving, obtaining, selecting, choosing, establishing, and other such similar actions.

[0310] In the appended figures, similar components or features may have the same reference label. Further, various components of the same type may be distinguished by following the reference label by a dash and a second label that distinguishes among the similar components. If just the first reference label is used in the specification, the description is applicable to any one of the similar components having the same first reference label irrespective of the second reference label, or other subsequent reference label.

[0311] The description set forth herein, in connection with the appended drawings, describes example configurations and does not represent all the examples that may be implemented or that are within the scope of the claims. The term "example" used herein means "serving as an example, instance, or illustration," and not "preferred" or "advantageous over other examples." The detailed description includes specific details for the purpose of providing an understanding of the described techniques. These techniques, however, may be practiced without these specific details. In some instances, known structures and devices are shown in block diagram form in order to avoid obscuring the concepts of the described examples.

[0312] The description herein is provided to enable a person having ordinary skill in the art to make or use the disclosure. Various modifications to the disclosure will be apparent to a person having ordinary skill in the art, and the generic principles defined herein may be applied to other variations without departing from the scope of the disclosure. Thus, the disclosure is not limited to the examples and designs described herein but is to be accorded the broadest scope consistent with the principles and novel features disclosed herein.

What is claimed is:

1. An apparatus for wireless communication at a user equipment (UE), comprising:
- one or more memories storing processor-executable code; and
- one or more processors coupled with the one or more memories and individually or collectively operable to execute the code to cause the UE to:
  - receive radio resource control signaling that indicates resources for a plurality of uplink shared channel transmission occasions, each of the plurality of uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of transport blocks, the maximum quantity including two or more transport blocks;
  - generate an uplink shared channel message in accordance with the radio resource control signaling, wherein the uplink shared channel message includes one or more transport blocks, the one or more transport blocks being less than the maximum quantity of transport blocks; and
  - transmit the uplink shared channel message within an uplink shared channel transmission occasion of the plurality of uplink shared channel transmission occasions.

2. The apparatus of claim **1**, wherein the one or more processors are individually or collectively further operable to execute the code to cause the UE to:
- receive, via the radio resource control signaling, additional control signaling, or both, an indication of a first modulation and coding scheme associated with a first transport block, and a second modulation and coding scheme associated with a second transport block, wherein the uplink shared channel message includes the first transport block in the one or more transport blocks and omits the second transport block from the one or more transport blocks based at least in part on a comparison of the first modulation and coding scheme and the second modulation and coding scheme.

3. The apparatus of claim **2**, wherein the uplink shared channel message includes the first transport block and omits the second transport block based at least in part on the first modulation and coding scheme being greater than the second modulation and coding scheme.

4. The apparatus of claim **2**, wherein the uplink shared channel message includes the first transport block and omits the second transport block based at least in part on the first modulation and coding scheme being the same as the second modulation and coding scheme and on a comparison of transmission layers associated with the first transport block and the second transport block.

5. The apparatus of claim **1**, wherein the uplink shared channel message includes a first transport block in the one or more transport blocks and omits a second transport block from the one or more transport blocks based at least in part on the first transport block being associated with a first set of transmission layers and the second transport block being associated with a second set of transmission layers.

6. The apparatus of claim **5**, wherein the uplink shared channel message includes the first transport block and omits the second transport block based at least in part on the first set of transmission layers being lower than the second set of transmission layers.

7. The apparatus of claim **6**, wherein the first set of transmission layers comprises transmission layers one through four, and wherein the second set of transmission layers comprises transmission layers five through eight.

8. The apparatus of claim **1**, wherein the one or more transport blocks included within the uplink shared channel message includes at least a first transport block, wherein the one or more processors are individually or collectively further operable to execute the code to cause the UE to:

transmit an uplink control information message via the first transport block of the uplink shared channel message, wherein the uplink control information message comprises a bit field value that indicates whether a second transport block is included within the one or more transport blocks of the uplink shared channel message.

9. The apparatus of claim **8**, wherein the uplink control information message comprises first information that is common across the first transport block and the second transport block, second information that is unique to the first transport block, and third information that is unique to the second transport block.

10. The apparatus of claim **9**, wherein the first information comprises a hybrid automatic repeat request process identifier, channel occupancy time sharing information, or both, and wherein the second information comprises a first redundancy version associated with the first transport block, a first new data indicator associated with the first transport block, or both, and wherein the third information comprises a second redundancy version associated with the second transport block, a second new data indicator associated with the second transport block, or both.

11. The apparatus of claim **1**, wherein the one or more transport blocks included within the uplink shared channel message includes a first transport block, wherein the one or more processors are individually or collectively further operable to execute the code to cause the UE to:

transmit a first uplink control information message via the first transport block of the uplink shared channel message, wherein the first uplink control information message comprises first information that is common across the first transport block and a second transport block, and second information that is unique to the first transport block.

12. The apparatus of claim **11**, wherein the first uplink control information message further includes a bit field value indicating that the second transport block is included within the one or more transport blocks of the uplink shared channel message.

13. The apparatus of claim **11**, wherein the one or more transport blocks included within the uplink shared channel message includes the second transport block, wherein the one or more processors are individually or collectively further operable to execute the code to cause the UE to:

transmit a second uplink control information message via the second transport block of the uplink shared channel message, wherein the second uplink control information message comprises third information that is unique to the second transport block.

14. The apparatus of claim **13**, wherein the second uplink control information message further includes the first information that is common across the first transport block and the second transport block.

15. The apparatus of claim **1**, wherein the one or more processors are individually or collectively further operable to execute the code to cause the UE to:

transmit a second uplink shared channel message within a second uplink shared channel transmission occasion of the plurality of uplink shared channel transmission occasions, wherein the second uplink shared channel message includes the maximum quantity of transport blocks.

16. The apparatus of claim **1**, wherein, to generate the uplink shared channel message, wherein the one or more processors are individually or collectively further operable to execute the code to cause the UE to:

generate the uplink shared channel message to include less than the maximum quantity of transport blocks based at least in part on a quantity of uplink traffic within a message buffer at the UE being less than a threshold quantity.

17. An apparatus for wireless communication at a network entity, comprising:

one or more memories storing processor-executable code; and

one or more processors coupled with the one or more memories and individually or collectively operable to execute the code to cause the network entity to:

transmit radio resource control signaling that indicates resources for a plurality of uplink shared channel transmission occasions, each of the plurality of uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of transport blocks, the maximum quantity including two or more transport blocks; and

receive, from a user equipment (UE), an uplink shared channel message within an uplink shared channel transmission occasion of the plurality of uplink shared channel transmission occasions, wherein the uplink shared channel message includes one or more transport blocks, the one or more transport blocks being less than the maximum quantity of transport blocks.

18. The apparatus of claim **17**, wherein the one or more processors are individually or collectively further operable to execute the code to cause the network entity to:

transmit, via the radio resource control signaling, additional control signaling, or both, an indication of a first modulation and coding scheme associated with a first transport block, and a second modulation and coding scheme associated with a second transport block, wherein the uplink shared channel message includes the first transport block in the one or more transport blocks and omits the second transport block from the one or more transport blocks based at least in part on a comparison of the first modulation and coding scheme and the second modulation and coding scheme.

19. The apparatus of claim **18**, wherein the uplink shared channel message includes the first transport block and omits the second transport block based at least in part on the first modulation and coding scheme being greater than the second modulation and coding scheme.

20. The apparatus of claim **18**, wherein the uplink shared channel message includes the first transport block and omits the second transport block based at least in part on the first modulation and coding scheme being the same as the second modulation and coding scheme and on a comparison of transmission layers associated with the first transport block and the second transport block.

21. The apparatus of claim **17**, wherein the uplink shared channel message includes a first transport block in the one or more transport blocks and omits a second transport block from the one or more transport blocks based at least in part on the first transport block being associated with a first set of transmission layers and the second transport block being associated with a second set of transmission layers.

22. The apparatus of claim **21**, wherein the uplink shared channel message includes the first transport block and omits the second transport block based at least in part on the first set of transmission layers being lower than the second set of transmission layers.

23. The apparatus of claim **22**, wherein the first set of transmission layers comprises transmission layers one through four, and wherein the second set of transmission layers comprises transmission layers five through eight.

24. The apparatus of claim **17**, wherein the one or more transport blocks included within the uplink shared channel message includes at least a first transport block, wherein the one or more processors are individually or collectively further operable to execute the code to cause the network entity to:

receive an uplink control information message via the first transport block of the uplink shared channel message, wherein the uplink control information message comprises a bit field value that indicates whether a second transport block is included within the one or more transport blocks of the uplink shared channel message.

25. The apparatus of claim **24**, wherein the uplink control information message comprises first information that is common across the first transport block and the second transport block, second information that is unique to the first transport block, and third information that is unique to the second transport block.

26. The apparatus of claim **25**, wherein the first information comprises a hybrid automatic repeat request process identifier, channel occupancy time sharing information, or both, and wherein the second information comprises a first redundancy version associated with the first transport block, a first new data indicator associated with the first transport block, or both, and wherein the third information comprises a second redundancy version associated with the second transport block, a second new data indicator associated with the second transport block, or both.

27. The apparatus of claim **17**, wherein the one or more transport blocks included within the uplink shared channel message includes a first transport block, wherein the one or more processors are individually or collectively further operable to execute the code to cause the network entity to:

receive a first uplink control information message via the first transport block of the uplink shared channel message, wherein the first uplink control information message comprises first information that is common across the first transport block and a second transport block, and second information that is unique to the first transport block.

28. The apparatus of claim **27**, wherein the first uplink control information message further includes a bit field value indicating that the second transport block is included within the one or more transport blocks of the uplink shared channel message.

29. A method for wireless communication at a user equipment (UE), comprising:

receiving radio resource control signaling that indicates resources for a plurality of uplink shared channel transmission occasions, each of the plurality of uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of transport blocks, the maximum quantity including two or more transport blocks;

generating an uplink shared channel message in accordance with the radio resource control signaling, wherein the uplink shared channel message includes one or more transport blocks, the one or more transport blocks being less than the maximum quantity of transport blocks; and

transmitting the uplink shared channel message within an uplink shared channel transmission occasion of the plurality of uplink shared channel transmission occasions.

30. A method for wireless communication at a network entity, comprising:

transmitting radio resource control signaling that indicates resources for a plurality of uplink shared channel transmission occasions, each of the plurality of uplink shared channel transmission occasions configured with a capacity for transmission of a maximum quantity of transport blocks, the maximum quantity including two or more transport blocks; and

receiving, from a user equipment (UE), an uplink shared channel message within an uplink shared channel transmission occasion of the plurality of uplink shared channel transmission occasions, wherein the uplink shared channel message includes one or more transport blocks, the one or more transport blocks being less than the maximum quantity of transport blocks.

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