

CLAIMS

What is claimed is:

1. A method implemented by a wireless transmit/receive unit (WTRU) for wireless communications, the method comprising:

determining, for each of a plurality of downlink (DL) transmissions, identifying a respective codebook process from a set of codebook processes based on a first indication associated with a respective codebook process index; wherein each of the plurality of DL transmissions is associated with one or more associating a set of bits of hybrid automatic repeat request (HARQ) feedback bits with the identified codebook process;

maintaining the set of bits associated with the identified codebook process based on a condition;

receiving, in downlink control information (DCI), a second indication to transmit the set of HARQ feedback bits using one or more uplink (UL) control resources, wherein the second indication comprises at least a associated with the identified codebook process index and a HARQ retransmission indicator;

determining one or more DL transmissions from the plurality of DL transmissions based on: 1) the respective codebook process determined for each respective DL transmission, 2) the received codebook process index, and 3) the received HARQ retransmission indicator; and

transmitting the set of HARQ feedback bits associated with the determined one or more DL transmissions using the one or more UL control resources based on the second indication.

2. The method of claim 1, further comprising wherein the association is determined by any of:

the first indication received in downlink control information (receiving a respective DCI that schedules a respective DL transmission of the plurality of DL transmissions);

one or more parameters associated with a set of downlink transmissions to which the set of bits of HARQ feedback correspond; and

one or more parameters associated with a resource on which a set of downlink transmissions is received determining, based on the received respective DCI, the first indication associated with the respective codebook process index.

3. The method of claim 2, wherein the first indication associated with the respective ~~indicates an identification of the~~ codebook process index comprises a value of zero or one in a field from the respective DCI.

4. The method of claim 24, wherein the respective DCI is a first DCI, the received DCI is a second DCI, and the second DCI is different from the first DCI~~set of bits of HARQ feedback corresponds to a set of downlink transmissions.~~

5. The method of claim 24, wherein the respective DCI comprises the received DCI~~condition comprises any of:~~

~~a listen before talk (LBT) failure;~~

~~reception of a message indicating that the HARQ feedback corresponds to a set of downlink transmissions that was not successfully received; and~~

~~reception of a message instructing the WTRU to maintain the codebook process.~~

6. The method of claim 1, wherein the second indication comprises a field in the DCI indicating a number of codebook processes for which HARQ feedback information is to be included.

76. The method of claim 1, wherein the second indication comprises any of:

an uplink resource indication associated with the respective~~identified~~ codebook process;

a downlink control information (DCI) format;

one or more bits in the~~a~~ DCI;

a Radio Network Temporary Identifier (RNTI); or~~and~~

timing information of transmitting the set of HARQ feedback bit~~s~~transmission.

8. The method of claim 1, wherein the respective codebook process comprises HARQ feedback information for each respective DL transmission.

9. The method of claim 1, wherein the codebook process index is a field in the DCI indicating an index of a codebook process for which corresponding HARQ feedback information is to be included or transmitted.

10. The method of claim 1, wherein the one or more UL control resources comprise at least a Physical Uplink Control Channel (PUCCH) resource.

11. The method of claim 1, wherein each of the plurality of DL transmissions is a Physical Downlink Shared Channel (PDSCH) transmission.

~~7. A method implemented by a wireless transmit/receive unit (WTRU) for wireless communications, the method comprising:~~

~~receiving, by the WTRU, an indication not to perform listen-before-talk (LBT) or to perform short LBT before transmitting a hybrid automatic repeat request (HARQ) feedback; and~~
~~transmitting the HARQ feedback in accordance with the indication.~~

~~8. The method of claim 7, further comprising:~~

~~performing, by the WTRU, short LBT on condition that the indication indicates to perform short LBT before transmitting the HARQ feedback.~~

~~9. The method of claim 7, wherein transmitting the HARQ feedback comprises transmitting the HARQ feedback without performing LBT, on condition that the indication indicates not to perform LBT before transmitting the HARQ feedback.~~

~~10. The method of claim 7, wherein the indication comprises any of: a specific Radio Network Temporary Identifier (RNTI) used to scramble a scheduling signal to which the HARQ feedback would be responsive, a Search Space set on which the scheduling signal to which the HARQ feedback would be responsive was received, a control resource set (CORESET) on which the scheduling signal to which the HARQ feedback would be responsive was received, and a slot format indication associated with the scheduling signal to which the HARQ feedback would be responsive.~~

~~11. The method of claim 7, wherein the indication is any of the following associated with a scheduling signal to which the HARQ feedback would be responsive:~~

~~a RNTI;~~
~~a downlink control information (DCI) format;~~
~~an aggregation level of a DCI scheduling transport block (TB);~~
~~a Search Space on which a DCI scheduling TB was detected;~~
~~a CORESET on which a DCI scheduling TB was detected;~~
~~a Physical Uplink Control Channel (PUCCH) resource indication;~~
~~a HARQ codebook size;~~
~~timing information of HARQ feedback;~~
~~a HARQ process identification (ID);~~
~~a slot format indication; and~~
~~a bit indication in DCI.~~

12. ~~— A method implemented by a wireless transmit/receive unit (WTRU) for wireless communications, the method comprising:~~

~~receiving an indication to transmit HARQ feedback;~~

~~determining that the HARQ feedback is to be transmitted on one or more ongoing Channel Occupancy Times (COTs) based on the indication; and~~

~~transmitting the HARQ feedback based on the determination.~~

13. ~~— The method of claim 12, wherein the indication is received in Downlink Control Information (DCI) and includes at least one of a COT number, a COT index, and a COT offset indicating a COT on which the HARQ feedback is to be transmitted.~~

14. ~~— The method of claim 12, wherein the indication includes at least a timing value or a resource allocation in DCI for HARQ transmission.~~

15. ~~— The method of claim 12, wherein the indication is a search space or a CORESET used for DCI transmission.~~

1246. A wireless transmit/receive unit (WTRU) for wireless communications, the WTRU comprising:
a processor configured to: determine, for each of a plurality of downlink (DL) transmissions,
identify a respective codebook process from a set of codebook processes based on a first
indication associated with a respective codebook process index; , wherein each of the plurality of DL
transmissions is

associated a set of bits of with one or more hybrid automatic repeat request (HARQ) feedback
bits; with the identified codebook process; and

maintain the set of bits associated with the identified codebook process based on a
condition;

a receiver configured to receive, in downlink control information (DCI), a second indication to
transmit a the set of HARQ feedback using one or more uplink (UL) control resources, wherein the second
indication comprises at least a bits associated with the identified codebook process index and a HARQ
retransmission indicator; and

the processor further configured to determine one or more DL transmissions from the plurality of
DL transmissions based on: 1) the respective codebook process determined for each respective DL

transmission, 2) the received codebook process index, and 3) the received HARQ retransmission indicator; and

a transmitter configured to transmit the set of HARQ feedback bits associated with the determined one or more DL transmissions using the one or more UL control resources based on the second indication.

1347. The WTRU of claim 1246, wherein the receiver is configured to receive a respective association is determined by any of:

the first indication received in downlink control information (DCI) that schedules a respective DL transmission of the plurality of DL transmissions.);

one or more parameters associated with a set of downlink transmissions to which the set of bits of HARQ feedback correspond; and

one or more parameters associated with a resource on which a set of downlink transmissions is received and wherein the processor is configured to determine, based on the received respective DCI, the first indication associated with the respective codebook process index.

1448. The WTRU of claim 1346, wherein the first indication associated with indicates an identification of the respective codebook process index comprises a value of zero or one in a field from the respective DCI.

1549. The WTRU of claim 1346, wherein the set of bits of HARQ feedback corresponds to a set of downlink transmissions; respective DCI is a first DCI, the received DCI is a second DCI, and the second DCI is different from the first DCI.

1620. The WTRU of claim 1346, wherein the respective DCI comprises the received DCI; condition comprises any of:

a listen before talk (LBT) failure;

reception of a message indicating that the HARQ feedback corresponds to a set of downlink transmissions that was not successfully received; and

reception of a message instructing the WTRU to maintain the codebook process.

17. The WTRU of claim 12, wherein the second indication comprises a field in the DCI indicating a number of codebook processes for which HARQ feedback information is to be included.

1824. The WTRU of claim 1246, wherein the second indication comprises any of:
an uplink resource indication associated with the respectiveidentified codebook process;
a downlink control information (DCI) format;
one or more bits in thea DCI;
a Radio Network Temporary Identifier (RNTI); orand
timing information of transmitting the set of HARQ feedback bitstransmission.

19. The WTRU of claim 12, wherein the codebook process index is a field in the DCI indicating an index of a codebook process for which corresponding HARQ feedback information is to be included or transmitted.

20. The WTRU of claim 12, wherein the one or more UL control resources comprise at least a Physical Uplink Control Channel (PUCCH) resource.