CLAIMS

~~WHAT IS CLAIMED IS:~~

1.——— A method of wireless communication of a base station, comprising:

receiving, from a user equipment (UE), ~~an~~a first acknowledgement (ACK)/negative ACK (NACK) (ACK/NACK) feedback indicating that a subset of codeblock groups (CBGs) of a set of transmitted CBGs corresponding to a first transport block (TB) failed to be properly decoded;

~~retransmitting~~ transmitting, based on the first ACK/NACK feedback, ~~the subset~~in a same resource allocation, a retransmission of ~~CBGs;~~ the subset of CBGs corresponding to the first TB and

~~transmitting~~ a transmission of new data corresponding to a second TB; transmitting a downlink control information (DCI) message comprising information indicating the subset of CBGs that is being retransmitted, wherein the information comprises a CBG-level bitmap that explicitly indicates, in the DCI message, a CBG index for each of the subset of CBGs that is being retransmitted; and receiving, from the UE, a second ACK/NACK feedback indicating feedback for the first TB and the second TB that are associated with different hybrid automatic repeat request (HARQ) processes in the same resource allocation, the second ACK/NACK feedback comprising a CBG-level ACK/NACK indicating whether at least one retransmitted CBG corresponding to the first TB failed to be properly decoded and a TB-level ACK/NACK indicating whether the second TB is properly decoded and does not require retransmission.

2.——— The method of claim 1, wherein the subset of CBGs ~~is retransmitted in a~~ of the first TB and the new data of the second TB are transmitted in respective portions of a subframe ~~and corresponds to a first transport block (TB), the method further comprising transmitting at least a portion of a second TB corresponding to new data to the UE in the subframe~~.

3.——— The method of claim 2, wherein the subset of CBGs is retransmitted in a first mini-slot corresponding to a first set of symbols in the subframe, and ~~the~~at least a portion of the second TB is transmitted in a second mini-slot corresponding to a second set of symbols in the subframe.

4.——— The method of claim 2, wherein the first TB, comprising the subset of CBGs that are retransmitted, is associated with a first ~~hybrid automatic repeat request (~~HARQ~~)~~ process and the second TB~~-~~, comprising the new data, is associated with a second HARQ process different than the first HARQ process.

5.——— The method of claim 1, wherein the ~~information indicating the subset of CBGs that is being retransmitted is transmitted in a downlink control information (DCI) message.~~

6. The method of claim 5, wherein the DCI message further indicates at least one of a slot boundary between athe first transport block (TB) corresponding to the subset of CBGs that is retransmitted and athe second TB corresponding to the new data, or a modulation and coding scheme (MCS) associated with the new data.

7. The method of claim 5, wherein the information indicating the subset of CBGs that is being retransmitted is explicitly indicated in the DCI message.

8. The method of claim 5, wherein the information indicating the subset of CBGs that is being retransmitted is implicitly indicated in the DCI message within cyclic redundancy check (CRC) bits of the DCI message.

9. 6. The method of claim 1,

wherein the set of CBGs corresponds to a first transport block (TB) and athe second TB are transmitted via a first multiple-input multiple-output (MIMO) transmission, the first TB and the second TB being associated with a first hybrid automatic repeat request (HARQ) process, the first ACK/NACK feedback being received in response to the first MIMO transmission;, and

wherein the subset of CBGs is associated with the first HARQ process and is retransmitted via a second MIMO transmission in a subframe along with one or more TBs the new data corresponding to new data the second TB associated with a second HARQ process.

10. 7. The method of claim 1, wherein a size of a CBG is configurable based on a size of a transport block to which the CBG corresponds.

11. 8. The method of claim 1, wherein a number of codeblocks (CBs) in each CBG of the set of transmitted CBGs is different than a number CBs in each CBG of the subset of CBGs being retransmitted.

12. 9. An apparatus for wireless communication, comprising:

at least one processor coupled to a memory and configured to:

receive, from a user equipment (UE), ana first acknowledgement (ACK)/negative ACK (NACK) (ACK/NACK) feedback indicating that a subset of codeblock groups (CBGs) of a set of transmitted CBGs for a first transport block (TB) failed to be properly decoded;

retransmit transmit, based on the first ACK/NACK feedback, the subsetin a same resource allocation, a retransmission of the subset of CBGs; of the first TB and

a transmission of new data of a second TB; transmit a downlink control information (DCI) message comprising information indicating the subset of CBGs that is being retransmitted.

13. The apparatus of claim 12, wherein the information comprises a CBG-level bitmap that explicitly indicates, in the DCI message, a CBG index for each of the subset of CBGs that is being retransmitted in a subframe ; and corresponds to a first transport block (TB), the method further comprising transmittingreceive, from the UE, a second ACK/NACK feedback indicating feedback for the first TB and the second TB that are associated with different hybrid automatic repeat request (HARQ) processes in the same resource allocation, the second ACK/NACK feedback comprising a CBG-level ACK/NACK indicating whether at least a portion of a second TBone retransmitted CBG corresponding to new data to the UE in the subframethe first TB failed to be properly decoded and a TB-level ACK/NACK indicating whether the second TB is properly decoded and does not require retransmission.

10. The apparatus of claim 9, wherein the retransmission of the subset of CBGs of the first TB and the transmission of the new data of the second TB are transmitted in a subframe within the same resource allocation.

14. 11. The apparatus of claim 1310, wherein the subset of CBGs is retransmitted in a first mini-slot corresponding to a first set of symbols in the subframe, and theat least a portion of the second TB is transmitted in a second mini-slot corresponding to a second set of symbols in the subframe.

15. The apparatus of claim 12, wherein the information indicating the subset of CBGs that is being retransmitted is transmitted in a downlink control information (DCI) message and is either explicitly indicated in the DCI message or implicitly indicated in the DCI message within cyclic redundancy check (CRC) bits of the DCI message.

16. 12. A method of wireless communication of a user equipment (UE), comprising:

determining that one or more codeblock groups (CBGs) of a set of CBGs for a first transport block (TB) received from a base station failed to be properly decoded at the UE;

sending, to the base station, ana first acknowledgement (ACK)/negative ACK (NACK) (ACK/NACK) feedback indicating the one or more CBGs that failed to be properly decoded; and

receiving, from the base station, a retransmission of CBGs of the set of CBGs of the first TB in response to the first ACK/NACK feedback, and a transmission of new data of a second TB, and a downlink control information (DCI) message comprising information indicating retransmitted CBGs of the set of CBGs, wherein the information comprises a CBG-level bitmap that explicitly indicates, in the DCI message, a CBG index for each of the retransmitted CBGs; and sending, to the base station, a second ACK/NACK feedback indicating feedback for the first TB and the second TB that are associated with different

hybrid automatic repeat request (HARQ) processes in a same resource allocation, the second ACK/NACK feedback comprising a CBG-level ACK/NACK indicating whether at least one retransmitted CBG corresponding to the first TB failed to be properly decoded and a TB-level ACK/NACK indicating whether the second TB is properly decoded and does not require retransmission.

13. The method of claim 12, wherein the retransmission of CBGs of the first TB and the transmission of the new data of the second TB are received in a subframe within the same resource allocation.

~~17.~~ 14. The method of claim ~~16, wherein the retransmitted CBGs correspond to a first transport block (TB), and the retransmission of CBGs is received in a subframe, the method further comprising receiving new data corresponding to a second TB from the base station in the subframe.~~

~~18. The method of claim 17~~13, wherein the first TB, comprising the retransmitted CBGs, is associated with a first ~~hybrid automatic repeat request (~~HARQ~~)~~ process and the second TB, comprising the new data, is associated with a second HARQ process different than the first HARQ process.

15. The method of claim 13, further comprising: determining that the at least one retransmitted CBG of the first TB failed to be properly decoded; and determining that the second TB has been successfully decoded, wherein the CBG-level ACK/NACK in the second ACK/NACK feedback indicates that the at least one retransmitted CBG failed to be properly decoded and the TB-level ACK/NACK indicates that the second TB has been successfully decoded and that the CBG-level ACK/NACK corresponds to the first TB.

~~19.~~ 16. The method of claim ~~16, wherein the information indicating the retransmitted CBGs of the set of CBGs is received in a downlink control information (DCI) message, and~~12, wherein the DCI message further indicates at least one of a slot boundary between ~~a~~the first ~~transport block (~~TB~~)~~ corresponding to the retransmitted CBGs of the set of CBGs and ~~a~~the second TB corresponding to the new data, or a modulation and coding scheme (MCS) associated with the new data.

~~20.~~ 17. The method of claim ~~19, wherein the information indicating the retransmitted CBGs of the set of CBGs is explicitly indicated in the DCI message as a CBG level bitmap that indicates which CBGs of the set of CBGs are being retransmitted.~~

~~21. The method of claim 19, wherein the information indicating the retransmitted CBGs of the set of CBGs is implicitly indicated in the DCI message within cyclic redundancy check (CRC) bits of the DCI message.~~

~~22. The method of claim 21,~~

~~wherein the retransmitted CBGs of the set of CBGs are determined based on the CRC bits.~~

~~23. The method of claim 17~~12, further comprising:

~~determining that at least one retransmitted CBG of the first TB failed to be properly decoded;~~

~~determining that the second TB has been successfully decoded; and~~

~~sending, to the base station, a second ACK/NACK feedback, the second ACK/NACK feedback including a CBG level ACK/NACK indicating the at least one retransmitted CBG that failed to be properly decoded, a TB level ACK indicating that the second TB has been successfully decoded, and an indicator indicating that the CBG level ACK/NACK corresponds to the first TB.~~

~~24. The method of claim 16, further comprising:~~

~~determining whether the retransmission of CBGs include the one of more CBGs that failed to be properly decoded based on the information indicating the retransmitted CBGs of the set of CBGs; and~~, wherein the second ACK/NACK feedback is sent based on determining whether the retransmission of CBGs include the one or more CBGs that failed to be properly decoded.

~~sending a second ACK/NACK feedback based on determining whether the retransmission of CBGs include the one of more CBGs that failed to be properly decoded.~~

~~25.~~ 18. An apparatus for wireless communication, comprising:

~~at least one processor coupled to a memory and configured to:~~

~~determine that one or more codeblock groups (CBGs) of a set of CBGs for a first transport block (TB) received from a base station failed to be properly decoded at the a user equipment (UE;~~

~~); send, to the base station, an~~a first acknowledgement (ACK)/negative ACK (NACK) (ACK/NACK) feedback indicating the one or more CBGs that failed to be properly decoded; ~~and~~

~~receive, from the base station, a retransmission of CBGs of the set of CBGs of the first TB in response to the first ACK/NACK feedback, and a transmission of new data of a second TB, and a downlink control information (DCI) message comprising information indicating retransmitted CBGs of the set of CBGs.~~

~~26. The apparatus of claim 25~~, wherein the information comprises a CBG-level bitmap that explicitly indicates, in the DCI message, a CBG index for each of the retransmitted CBGs ~~correspond to a first transport block (TB) and the~~ ; and send, to the base station, a second ACK/NACK feedback indicating feedback for the first TB and the second TB that are associated with different hybrid automatic repeat request (HARQ) processes in a same resource allocation, the second ACK/NACK feedback comprising a CBG-level ACK/NACK indicating whether at least one retransmitted CBG corresponding to the first TB failed to be properly decoded and a TB-level ACK/NACK indicating whether the second TB is properly decoded and does not require retransmission.

19. The apparatus of claim 18, wherein the retransmission of CBGs ~~is~~of the first TB and the transmission of the new data of the second TB are received in a same subframe~~, and~~ within the same resource allocation.

20. The apparatus of claim 19, wherein the at least one processor is further configured to

~~receive new data corresponding to a second TB from the base station in the subframe.~~

~~27. The apparatus of claim 25, wherein the information indicating the retransmitted CBGs of the set of CBGs is received in a downlink control information (DCI) message, and~~ : determine that at least one retransmitted CBG of the first TB failed to be properly decoded; and determine that the second TB has been successfully decoded, wherein the CBG-level ACK/NACK in the second ACK/NACK feedback indicates that the at least one retransmitted CBG failed to be properly decoded and the TB-level ACK/NACK indicates that the second TB has been successfully decoded and that the first CBG-level ACK/NACK corresponds to the first TB.

21. The apparatus of claim 18, wherein the DCI message further indicates at least one of a slot boundary between ~~a~~the first ~~transport block (~~TB~~)~~ corresponding to the retransmitted CBGs of the set of CBGs and ~~a~~the second TB corresponding to the new data, or a modulation and coding scheme (MCS) associated with the new data.

~~28. The apparatus of claim 27, wherein the information indicating the retransmitted CBGs of the set of CBGs is implicitly indicated in the DCI message within cyclic redundancy check (CRC) bits of the DCI message.~~

~~29.~~ 22. The apparatus of claim ~~25~~18, wherein the at least one processor is further configured to:

~~———~~ determine whether the retransmission of CBGs include the one of more CBGs that failed to be properly decoded based on the information indicating the retransmitted CBGs of the set of CBGs~~; and~~

~~send a~~ , wherein the second ACK/NACK feedback is sent based on determining whether the retransmission of CBGs include the one ~~of~~or more CBGs.

30. The apparatus of claim 26, wherein the at least one processor is further configured to:

determine that at least one retransmitted CBG of the first TB failed to be properly decoded;

determine that the second TB has been successfully decoded; and

send, to the base station, a second ACK/NACK feedback, the second ACK/NACK feedback including a first CBG level ACK/NACK indicating the at least one retransmitted CBG that failed to be properly decoded, a TB level ACK indicating that the second TB has been successfully decoded, and an indicator indicating that the CBG level ACK/NACK corresponds to the first TB.