

CLAIMS

What is claimed is:

1. A method for wireless communication, comprising:
receiving, by a user equipment (UE), a grant indicating a plurality of resource elements (REs) of an uplink shared channel allocated to the UE for an uplink transmission;
splitting at least a portion of the plurality of REs between hybrid automatic repeat request acknowledgement (HARQ-ACK) data, channel state information part 1 (CSI part 1) data, and CSI part 2 data;
generating the uplink transmission based at least in part on the splitting; and
transmitting, by the UE, the uplink transmission in the plurality of REs of the uplink shared channel.
2. The method of claim 1, further comprising:
receiving radio resource control (RRC) signaling indicating an allocation cap parameter; and
setting a maximum number of the plurality of REs to allocate to the HARQ-ACK data based at least in part on the allocation cap parameter.
3. The method of claim 2, further comprising:
calculating a number of the plurality of REs to allocate to the HARQ-ACK data based at least in part on the maximum number.
4. The method of claim 1, further comprising:
determining a total number of the plurality of REs that are available for allocation based at least in part on a number of subcarriers associated with the grant and a number of symbol periods associated with the grant.
5. The method of claim 1, further comprising:
receiving radio resource control (RRC) signaling indicating an allocation cap parameter; and
setting a maximum number of the plurality of REs to allocate to the CSI part 1 data based at least in part on the allocation cap parameter.
6. The method of claim 5, further comprising:

calculating a number of the plurality of REs to allocate to the CSI part 1 data based at least in part on the maximum number.

7. The method of claim 4, further comprising:

setting the total number of the plurality of REs that are available for allocation as a maximum number of the plurality of REs that are available to allocate to the HARQ-ACK data.

8. The method of claim 4, wherein splitting of at least the portion of the plurality of REs comprises:

allocating a number of the plurality of REs to the HARQ-ACK data;

identifying a remaining number of the plurality of REs that are available for allocation based at least in part on determining that the number of the plurality of REs allocated to the HARQ-ACK data is less than the total number of the plurality of REs that are available for allocation; and

splitting the remaining number of the plurality of REs between the CSI part 1 data and the CSI part 2 data.

9. The method of claim 1, wherein splitting of at least the portion of the plurality of REs comprises:

calculating a number of the plurality of REs to allocate to the HARQ-ACK data in proportion to a weighted payload size of the HARQ-ACK data relative to a function of the weighted payload size of the HARQ-ACK data, a weighted payload size of the CSI part 1 data, and a weighted payload size of a reference payload size.

10. The method of claim 1, wherein splitting of at least the portion of the plurality of REs comprises:

calculating a number of the plurality of REs to allocate to the CSI part 1 data in proportion to a weighted payload size of the CSI part 1 data relative to a function of a weighted payload size of the HARQ-ACK data, the weighted payload size of the CSI part 1 data, and a weighted payload size of a reference payload size.

11. The method of claim 1, wherein splitting of at least the portion of the plurality of REs comprises:

receiving radio resource control (RRC) signaling indicating a weighting factor for the HARQ-ACK data, a weighting factor for the CSI part 1 data, and a weighting factor for the CSI part 2 data; and

determining a weighted payload size of the HARQ-ACK data based at least on part on the weighting factor for the HARQ-ACK data, a weighted payload size of the CSI part 1 data based at least on part on the weighting factor for the CSI part 1 data, and a weighted payload size of a reference payload size based at least on part on the weighting factor for the CSI part 2 data.

12. The method of claim 1, wherein splitting of at least the portion of the plurality of REs comprises:

calculating a number of the plurality of REs to allocate to the CSI part 2 data based at least in part on a number of the plurality of REs allocated to the HARQ-ACK data and a number of the plurality of REs allocated to the CSI part 1 data.

13. The method of claim 1, wherein splitting of at least the portion of the plurality of REs comprises:

calculating a number of the plurality of REs to allocate to the HARQ-ACK data in proportion to a weighted payload size of the HARQ-ACK data relative to a weighted payload size of a reference payload size.

14. The method of claim 1, wherein splitting of at least the portion of the plurality of REs comprises:

calculating a number of the plurality of REs to allocate to the CSI part 1 data in proportion to a weighted payload size of the CSI part 1 data relative to a weighted payload size of a reference payload size.

15. The method of claim 1, further comprising:

determining a reference payload size based at least on part on a value of a rank indication.

16. The method of claim 1, further comprising:

processing the grant to determine that none of the plurality of REs are allocated for transmission of uplink data and that each of the plurality of REs is allocated for transmission of the HARQ-ACK data, or the CSI part 1 data, or the CSI part 2 data.

17. The method of claim 1, further comprising:
processing the grant to determine that the uplink transmission is to include non-access stratum data and not to include access stratum data.
18. The method of claim 1, wherein splitting of at least the portion of the plurality of REs comprises:
splitting at least the portion of the plurality of REs between the HARQ-ACK data, the CSI part 1 data, the CSI part 2 data, and uplink data based at least in part on a reference payload size of the CSI part 2 data.
19. A method for wireless communication, comprising:
transmitting, by a base station, a grant indicating a plurality of resource elements (REs) of an uplink shared channel allocated to a user equipment (UE) for an uplink transmission;
splitting at least a portion of the plurality of REs between hybrid automatic repeat request acknowledgement (HARQ-ACK) data, channel state information part 1 (CSI part 1) data, and CSI part 2 data; and
monitoring the plurality of REs of the uplink shared channel for the uplink transmission based at least in part on the splitting.
20. The method of claim 19, further comprising:
transmitting radio resource control (RRC) signaling indicating an allocation cap parameter.
21. The method of claim 20, wherein splitting of at least the portion of the plurality of REs comprises:
setting a maximum number of the plurality of REs available to allocate to the HARQ-ACK data based at least in part on the allocation cap parameter.
22. The method of claim 21, wherein splitting of at least the portion of the plurality of REs comprises:
calculating a number of the plurality of REs allocated to the HARQ-ACK data based at least in part on the maximum number of the plurality of REs available to allocate to the HARQ-ACK data.

23. The method of claim 20, wherein splitting of at least the portion of the plurality of REs comprises:

setting a maximum number of the plurality of REs available to allocate to the CSI part 1 data based at least in part on the allocation cap parameter.

24. The method of claim 23, wherein splitting of at least the portion of the plurality of REs comprises:

calculating a number of the plurality of REs allocated to the CSI part 1 data based at least in part on the maximum number of the plurality of REs available to allocate to the CSI part 1 data.

25. The method of claim 19, further comprising:

determining a total number of the plurality of REs that are available for allocation based at least in part on a number of subcarriers associated with the grant and a number of symbol periods associated with the grant.

26. The method of claim 25, wherein splitting of at least the portion of the plurality of REs comprises:

splitting at least the portion of the plurality of REs between the HARQ-ACK data, the CSI part 1 data, and the CSI part 2 data based at least in part on the total number of the plurality of REs that are available for allocation.

27. The method of claim 25, wherein the total number of the plurality of REs that are available for allocation excludes REs of the plurality of REs assigned to at least one reference signal.

28. The method of claim 25, wherein transmitting the grant further comprises:

generating the grant to indicate that none of the total number of the plurality of REs are allocated for transmission of uplink data and that each of total number of the plurality of REs is allocated for transmission of the HARQ-ACK data, the CSI part 1 data, or the CSI part 2 data.

29. The method of claim 25, wherein transmitting the grant further comprises:

generating the grant to indicate that the uplink transmission is to include non-access stratum data and not to include access stratum data.

30. The method of claim 19, wherein splitting of at least the portion of the plurality of REs comprises:

calculating a number of the plurality of REs allocated to the HARQ-ACK data in proportion to a weighted payload size of the HARQ-ACK data relative to a function of the weighted payload size of the HARQ-ACK data, a weighted payload size of the CSI part 1 data, and a weighted payload size of a reference payload size.

31. The method of claim 19, wherein splitting of at least the portion of the plurality of REs comprises:

calculating a number of the plurality of REs allocated to the CSI part 1 data in proportion to a weighted payload size of the CSI part 1 data relative to a function of a weighted payload size of the HARQ-ACK data, the weighted payload size of the CSI part 1 data, and a weighted payload size of a reference payload size.

32. The method of claim 19, wherein splitting of at least the portion of the plurality of REs comprises:

transmitting radio resource control (RRC) signaling indicating a weighting factor for the HARQ-ACK data, a weighting factor for the CSI part 1 data, and a weighting factor for the CSI part 2 data; and

determining a weighted payload size of the HARQ-ACK data based at least in part on the weighting factor for the HARQ-ACK data, a weighted payload size of the CSI part 1 data based at least in part on the weighting factor for the CSI part 1 data, and a weighted payload size of a reference payload size based at least in part on the weighting factor for the CSI part 2 data.

33. The method of claim 19, wherein splitting of at least the portion of the plurality of REs comprises:

calculating a number of the plurality of REs allocated to the CSI part 2 data based at least in part on a number of the plurality of REs allocated to the HARQ-ACK data and a number of the plurality of REs allocated to the CSI part 1 data.

34. The method of claim 19, further comprising:

determining a reference payload size based at least in part on a value of a rank indication.

35. The method of claim 19, wherein splitting of at least the portion of the plurality of REs comprises:

splitting at least the portion of the plurality of REs between the HARQ-ACK data, the CSI part 1 data, the CSI part 2 data, and uplink data based at least in part on a reference payload size of the CSI part 2 data.

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

means for receiving a grant indicating a plurality of resource elements (REs) of an uplink shared channel allocated to the UE for an uplink transmission;

means for splitting at least a portion of the plurality of REs between hybrid automatic repeat request acknowledgement (HARQ-ACK) data, channel state information part 1 (CSI part 1) data, and CSI part 2 data;

means for generating the uplink transmission based at least in part on the splitting; and

means for transmitting the uplink transmission in the plurality of REs of the uplink shared channel.

37. The apparatus of claim 36, further comprising:

means for receiving radio resource control (RRC) signaling indicating an allocation cap parameter; and

means for setting a maximum number of the plurality of REs to allocate to the HARQ-ACK data based at least in part on the allocation cap parameter.

38. The apparatus of claim 37, further comprising:

means for calculating a number of the plurality of REs to allocate to the HARQ-ACK data based at least in part on the maximum number.

39. The apparatus of claim 36, further comprising:

means for determining a total number of the plurality of REs that are available for allocation based at least in part on a number of subcarriers associated with the grant and a number of symbol periods associated with the grant.

40. The apparatus of claim 36, further comprising:
means for receiving radio resource control (RRC) signaling indicating an allocation cap parameter; and
means for setting a maximum number of the plurality of REs to allocate to the CSI part 1 data based at least in part on the allocation cap parameter.

41. The apparatus of claim 40, further comprising:
means for calculating a number of the plurality of REs to allocate to the CSI part 1 data based at least in part on the maximum number.

42. The apparatus of claim 39, further comprising:
means for setting the total number of the plurality of REs that are available for allocation as a maximum number of the plurality of REs that are available to allocate to the HARQ-ACK data.

43. The apparatus of claim 39, wherein the means for splitting at least the portion of the plurality of REs further comprises:
means for allocating a number of the plurality of REs to the HARQ-ACK data;
means for identifying a remaining number of the plurality of REs that are available for allocation based at least in part on the number of the plurality of REs allocated to the HARQ-ACK data being less than the total number of the plurality of REs that are available for allocation; and
means for splitting the remaining number of the plurality of REs between the CSI part 1 data and the CSI part 2 data.

44. The apparatus of claim 36, wherein the means for splitting at least the portion of the plurality of REs further comprises:
means for calculating a number of the plurality of REs to allocate to the HARQ-ACK data in proportion to a weighted payload size of the HARQ-ACK data relative to a function of the weighted payload size of the HARQ-ACK data, a weighted payload size of the CSI part 1 data, and a weighted payload size of a reference payload size.

45. The apparatus of claim 36, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for calculating a number of the plurality of REs to allocate to the CSI part 1 data in proportion to a weighted payload size of the CSI part 1 data relative to a function of a weighted payload size of the HARQ-ACK data, the weighted payload size of the CSI part 1 data, and a weighted payload size of a reference payload size.

46. The apparatus of claim 36, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for receiving radio resource control (RRC) signaling indicating a weighting factor for the HARQ-ACK data, a weighting factor for the CSI part 1 data, and a weighting factor for the CSI part 2 data; and

means for determining a weighted payload size of the HARQ-ACK data based at least on part on the weighting factor for the HARQ-ACK data, a weighted payload size of the CSI part 1 data based at least on part on the weighting factor for the CSI part 1 data, and a weighted payload size of a reference payload size based at least on part on the weighting factor for the CSI part 2 data.

47. The apparatus of claim 36, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for calculating a number of the plurality of REs to allocate to the CSI part 2 data based at least in part on a number of the plurality of REs allocated to the HARQ-ACK data and a number of the plurality of REs allocated to the CSI part 1 data.

48. The apparatus of claim 36, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for calculating a number of the plurality of REs to allocate to the HARQ-ACK data in proportion to a weighted payload size of the HARQ-ACK data relative to a weighted payload size of a reference payload size.

49. The apparatus of claim 36, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for calculating a number of the plurality of REs to allocate to the CSI part 1 data in proportion to a weighted payload size of the CSI part 1 data relative to a weighted payload size of a reference payload size.

50. The apparatus of claim 36, further comprising:

means for determining a reference payload size based at least in part on a value of a rank indication.

51. The apparatus of claim 36, further comprising:

means for processing the grant to determine that none of the plurality of REs are allocated for transmission of uplink data and that each of the plurality of REs is allocated for transmission of the HARQ-ACK data, or the CSI part 1 data, or the CSI part 2 data.

52. The apparatus of claim 36, further comprising:

means for processing the grant to determine that the uplink transmission is to include non-access stratum data and not to include access stratum data.

53. The apparatus of claim 36, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for splitting at least the portion of the plurality of REs between the HARQ-ACK data, the CSI part 1 data, the CSI part 2 data, and uplink data based at least in part on a reference payload size of the CSI part 2 data.

54. An apparatus for wireless communication by a base station, comprising:

means for transmitting a grant indicating a plurality of resource elements (REs) of an uplink shared channel allocated to a user equipment (UE) for an uplink transmission;

means for splitting at least a portion of the plurality of REs between hybrid automatic repeat request acknowledgement (HARQ-ACK) data, channel state information part 1 (CSI part 1) data, and CSI part 2 data; and

means for monitoring the plurality of REs of the uplink shared channel for the uplink transmission based at least in part on the splitting.

55. The apparatus of claim 54, further comprising:

means for transmitting radio resource control (RRC) signaling indicating an allocation cap parameter.

56. The apparatus of claim 55, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for setting a maximum number of the plurality of REs available to allocate to the HARQ-ACK data based at least in part on the allocation cap parameter.

57. The apparatus of claim 56, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for calculating a number of the plurality of REs allocated to the HARQ-ACK data based at least in part on the maximum number of the plurality of REs available to allocate to the HARQ-ACK data.

58. The apparatus of claim 54, further comprising:

means for determining a total number of the plurality of REs that are available for allocation based at least in part on a number of subcarriers associated with the grant and a number of symbol periods associated with the grant.

59. The apparatus of claim 55, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for setting a maximum number of the plurality of REs available to allocate to the CSI part 1 data based at least in part on the allocation cap parameter.

60. The apparatus of claim 59, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for calculating a number of the plurality of REs allocated to the CSI part 1 data based at least in part on the maximum number of the plurality of REs available to allocate to the CSI part 1 data.

61. The apparatus of claim 58, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for splitting at least the portion of the plurality of REs between the HARQ-ACK data, the CSI part 1 data, and the CSI part 2 data based at least in part on the total number of the plurality of REs that are available for allocation.

62. The apparatus of claim 58, wherein the total number of the plurality of REs that are available for allocation excludes REs of the plurality of REs assigned to at least one reference signal.

63. The apparatus of claim 58, wherein the means for transmitting the grant further comprises:

means for generating the grant to indicate that none of the total number of the plurality of REs are allocated for transmission of uplink data and that each of total number of the plurality of REs is allocated for transmission of the HARQ-ACK data, the CSI part 1 data, or the CSI part 2 data.

64. The apparatus of claim 54, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for calculating a number of the plurality of REs allocated to the HARQ-ACK data in proportion to a weighted payload size of the HARQ-ACK data relative to a function of the weighted payload size of the HARQ-ACK data, a weighted payload size of the CSI part 1 data, and a weighted payload size of reference payload size.

65. The apparatus of claim 54, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for calculating a number of the plurality of REs allocated to the CSI part 1 data in proportion to a weighted payload size of the CSI part 1 data relative to a function of a weighted payload size of the HARQ-ACK data, the weighted payload size of the CSI part 1 data, and a weighted payload size of a reference payload size.

66. The apparatus of claim 54, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for transmitting radio resource control (RRC) signaling indicating a weighting factor for the HARQ-ACK data, a weighting factor for the CSI part 1 data, and a weighting factor for the CSI part 2 data; and

means for determining a weighted payload size of the HARQ-ACK data based at least on part on the weighting factor for the HARQ-ACK data, a weighted payload size of the CSI part 1 data based at least on part on the weighting factor for the CSI part 1 data, and a weighted payload size of a reference payload size based at least on part on the weighting factor for the CSI part 2 data.

67. The apparatus of claim 54, wherein the means for splitting at least the portion of the plurality of REs further comprises:

calculate a number of the plurality of REs allocated to the CSI part 2 data based at least in part on a number of the plurality of REs allocated to the HARQ-ACK data and a number of the plurality of REs allocated to the CSI part 1 data.

68. The apparatus of claim 58, wherein the means for transmitting the grant further comprises:

means for generating the grant to indicate that the uplink transmission is to include non-access stratum data and not to include access stratum data.

69. The apparatus of claim 54, further comprising:

means for determining a reference payload size based at least in part on a value of a rank indication.

70. The apparatus of claim 54, wherein the means for splitting at least the portion of the plurality of REs further comprises:

means for splitting at least the portion of the plurality of REs between the HARQ-ACK data, the CSI part 1 data, the CSI part 2 data, and uplink data based at least in part on a reference payload size of the CSI part 2 data.

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

a processor;

memory in electronic communication with the processor; and

instructions stored in the memory and executable by the processor to cause the apparatus to:

receive a grant indicating a plurality of resource elements (REs) of an uplink shared channel allocated to the UE for an uplink transmission;

split at least a portion of the plurality of REs between hybrid automatic repeat request acknowledgement (HARQ-ACK) data, channel state information part 1 (CSI part 1) data, and CSI part 2 data;

generate the uplink transmission based at least in part on the splitting;

and

transmit the uplink transmission in the plurality of REs of the uplink shared channel.

72. An apparatus for wireless communication by a base station, comprising:
a processor;
memory in electronic communication with the processor; and
instructions stored in the memory and executable by the processor to cause the apparatus to:

transmit a grant indicating a plurality of resource elements (REs) of an uplink shared channel allocated to a user equipment (UE) for an uplink transmission;
split at least a portion of the plurality of REs between hybrid automatic repeat request acknowledgement (HARQ-ACK) data, channel state information part 1 (CSI part 1) data, and CSI part 2 data; and
monitor the plurality of REs of the uplink shared channel for the uplink transmission based at least in part on the splitting.

73. A non-transitory computer-readable medium storing code for wireless communication by a user equipment (UE), the code comprising instructions executable by a processor to:

receive a grant indicating a plurality of REs of an uplink shared channel allocated to the UE for an uplink transmission;
split at least a portion of the plurality of REs between hybrid automatic repeat request acknowledgement (HARQ-ACK) data, channel state information part 1 (CSI part 1) data, and CSI part 2 data;
generate the uplink transmission based at least in part on the splitting; and
transmit the uplink transmission in the plurality of REs of the uplink shared channel.

74. A non-transitory computer-readable medium storing code for wireless communication by a base station, the code comprising instructions executable by a processor to:

transmit a grant indicating a plurality of resource elements (REs) of an uplink shared channel allocated to a user equipment (UE) for an uplink transmission;
split at least a portion of the plurality of REs between hybrid automatic repeat request acknowledgement (HARQ-ACK) data, channel state information part 1 (CSI part 1) data, and CSI part 2 data; and

monitor the plurality of REs of the uplink shared channel for the uplink transmission based at least in part on the splitting.