CLAIMS

1. A method for wireless communication at a UE, comprising:

generating uplink control information including a set of information bits for transmission in an uplink control message;

receiving, from the base station, a message indicating a set of symbols within an uplink control channel for the transmission of the uplink control message;

determining a frequency hopping position within the set of symbols for the transmission of the uplink control message based at least in part on a number of symbols in the set of symbols and a number of information bits in the set of information bits; and

transmitting, to the base station, the uplink control message including the uplink control information over a first frequency bandwidth of the uplink control channel during a first subset of symbols of the set of symbols and over a second frequency bandwidth of the uplink control channel during a second subset of symbols of the set of symbols according to the frequency hopping position.

2. The method of claim 1, further comprising:

determining that the number of information bits is less than or equal to a threshold.

3. The method of claim 2, further comprising:

determining a duration of the first subset of symbols by taking a floor function of the number of symbols divided by two; and

determining a duration of the second subset of symbols by subtracting the duration of the first subset of symbols from the number of symbols.

4. The method of claim 2, wherein the frequency hopping position is determined based at least in part on a relationship between information symbols and reference symbols in the uplink control message.

5. The method of claim 4, further comprising:

determining that dividing the number of symbols by four yields an integer value;

determining a duration of the first subset of symbols by multiplying the integer value by two; and

determining a duration of the second subset of symbols by multiplying the integer value by two.

6. The method of claim 4, further comprising:

determining that dividing the number of symbols by four yields an integer value and a remainder of one;

determining a duration of the first subset of symbols by multiplying the integer value by two; and

determining a duration of the second subset of symbols by multiplying the integer value by two and adding one.

7. The method of claim 4, further comprising:

determining that dividing the number of symbols by four yields an integer value and a remainder of two;

determining a duration of the first subset of symbols by multiplying the integer value by two; and

determining a duration of the second subset of symbols by multiplying the integer value by two and adding two.

8. The method of claim 4, further comprising:

determining that dividing the number of symbols by four yields an integer value and a remainder of three;

determining a duration of the first subset of symbols by multiplying the integer value by two and adding one; and

determining a duration of the second subset of symbols by multiplying the integer value by two and adding two.

9. The method of claim 4, wherein the uplink control message comprises one or more information symbols and one or more reference symbols that alternate with one another in time.

10. The method of claim 9, further comprising:

determining a duration of the first subset of symbols and a duration of the second subset of symbols, wherein at least one of the first subset of symbols and the second subset of symbols comprises an equal number of information symbols and reference symbols, and wherein an absolute value of a difference between a number of the first subset of symbols and a number of the second subset of symbols is less than or equal to two.

11. The method of claim 1, further comprising:

determining that the number of information bits is greater than a threshold.

12. The method of claim 11, further comprising:

determining a duration of the first subset of symbols by taking a floor function of the number of symbols divided by two; and

determining a duration of the second subset of symbols by subtracting the duration of the first subset of symbols from the number of symbols.

13. The method of claim 11, further comprising:

determining a duration of the first subset of symbols and a duration of the second subset of symbols, wherein an absolute value of a difference between a number of the first subset of symbols and a number of the second subset of symbols is less than or equal to one.

14. The method of claim 1, wherein the uplink control message comprises one or more information symbols and one or more reference symbols that alternate with one another in time.

15. The method of claim 1, further comprising:

receiving an uplink grant that allocates the number of symbols to the UE.

16. The method of claim 1, further comprising:

receiving an indication to use frequency hopping for transmissions over the uplink control channel.

17. The method of claim 1, further comprising:

identifying the number of information bits in the uplink control message based at least in part on a format of the uplink control channel.

18. The method of claim 1, wherein a duration of the first subset of symbols and a duration of the second subset of symbols are unequal.

19. A method for wireless communication at a base station, comprising:

determining a number of symbols in a set of symbols within an uplink control channel for the transmission, by a user equipment (UE), of an uplink control message;

determining a number of information bits in a set of information bits of uplink control information for transmission in the uplink control message;

determining a frequency hopping position within the set of symbols for the transmission of the uplink control message based at least in part on the number of symbols in the set of symbols and the number of information bits in the set of information bits;

transmitting, to the UE, a message indicating the set of symbols within the uplink control channel and the frequency hopping position; and

receiving, from the UE, the uplink control message including the uplink control information over a first frequency bandwidth of the uplink control channel during a first subset of symbols of the set of symbols and over a second frequency bandwidth of the uplink control channel during a second subset of symbols of the set of symbols according to the frequency hopping position.

20. The method of claim 19, further comprising:

determining that the number of information bits is less than or equal to a threshold.

21. The method of claim 20, further comprising:

determining a duration of the first subset of symbols by taking a floor function of the number of symbols divided by two; and

determining a duration of the second subset of symbols by subtracting the duration of the first subset of symbols from the number of symbols.

22. The method of claim 20, wherein the frequency hopping position is determined based at least in part on a relationship between information symbols and reference symbols in the uplink control message.

23. The method of claim 22, further comprising:

determining that dividing the number of symbols by four yields an integer value;

determining a duration of the first subset of symbols by multiplying the integer value by two; and

determining a duration of the second subset of symbols by multiplying the integer value by two.

24. The method of claim 22, further comprising:

determining that dividing the number of symbols by four yields an integer value and a remainder of one;

determining a duration of the first subset of symbols by multiplying the integer value by two; and

determining a duration of the second subset of symbols by multiplying the integer value by two and adding one.

25. The method of claim 22, further comprising:

determining that dividing the number of symbols by four yields an integer value and a remainder of two;

determining a duration of the first subset of symbols by multiplying the integer value by two; and

determining a duration of the second subset of symbols by multiplying the integer value by two and adding two.

26. The method of claim 22, further comprising:

determining that dividing the number of symbols by four yields an integer value and a remainder of three;

determining a duration of the first subset of symbols by multiplying the integer value by two and adding one; and

determining a duration of the second subset of symbols by multiplying the integer value by two and adding two.

27. The method of claim 22, wherein the uplink control message comprises one or more information symbols and one or more reference symbols that alternate with one another in time.

28. The method of claim 27, further comprising:

determining a duration of the first subset of symbols and a duration of the second subset of symbols, wherein at least one of the first subset of symbols and the second subset of symbols comprises an equal number of information symbols and reference symbols, and wherein an absolute value of a difference between a number of the first subset of symbols and a number of the second subset of symbols is less than or equal to two.

29. The method of claim 19, further comprising:

determining that the number of information bits is greater than a threshold.

30. The method of claim 29, further comprising:

determining a duration of the first subset of symbols by taking a floor function of the number of symbols divided by two; and

determining a duration of the second subset of symbols by subtracting the duration of the first subset of symbols from the number of symbols.

31. The method of claim 29, further comprising:

determining a duration of the first subset of symbols and a duration of the second subset of symbols, wherein an absolute value of a difference between a number of the first subset of symbols and a number of the second subset of symbols is less than or equal to one.

32. The method of claim 19, wherein the uplink control message comprises one or more information symbols and one or more reference symbols that alternate with one another in time.

33. The method of claim 19, further comprising:

transmitting an uplink grant that indicates a format of the uplink control channel, wherein the format of the uplink control channel is associated with the number of information bits in the uplink control message.

34. The method of claim 19, further comprising:

transmitting an indication to use frequency hopping for transmissions over the uplink control channel.

35. The method of claim 19, wherein a duration of the first subset of symbols and a duration of the second subset of symbols are unequal.

36. An apparatus for wireless communication, comprising:

means for generating uplink control information including a set of information bits for transmission in an uplink control message;

means for receiving, from the base station, a message indicating a set of symbols within an uplink control channel for the transmission of the uplink control message;

means for determining a frequency hopping position within the set of symbols for the transmission of the uplink control message based at least in part on a number of symbols in the set of symbols and a number of information bits in the set of information bits; and

means for transmitting, to the base station, the uplink control message including the uplink control information over a first frequency bandwidth of the uplink control channel during

a first subset of symbols of the set of symbols and over a second frequency bandwidth of the uplink control channel during a second subset of symbols of the set of symbols according to the frequency hopping position.

37. An apparatus for wireless communication, comprising:

means for determining a number of symbols in a set of symbols within an uplink control channel for the transmission, by a user equipment (UE), of an uplink control message;

means for determining a number of information bits in a set of information bits of uplink control information for transmission in the uplink control message;

means for determining a frequency hopping position within the set of symbols for the transmission of the uplink control message based at least in part on the number of symbols in the set of symbols and the number of information bits in the set of information bits;

means for transmitting, to the UE, a message indicating the set of symbols within the uplink control channel and the frequency hopping position; and

means for receiving, from the UE, the uplink control message including the uplink control information over a first frequency bandwidth of the uplink control channel during a first subset of symbols of the set of symbols and over a second frequency bandwidth of the uplink control channel during a second subset of symbols of the set of symbols according to the frequency hopping position.

38. An apparatus for wireless communication, comprising:

a processor;

memory in electronic communication with the processor; and

instructions stored in the memory and operable, when executed by the processor, to cause the apparatus to:

generate uplink control information including a set of information bits for transmission in an uplink control message;

receive, from the base station, a message indicating a set of symbols within an uplink control channel for the transmission of the uplink control message;

determine a frequency hopping position within the set of symbols for the transmission of the uplink control message based at least in part on a number of symbols in the set of symbols and a number of information bits in the set of information bits; and

transmit, to the base station, the uplink control message including the uplink control information over a first frequency bandwidth of the uplink control channel during a first subset of symbols of the set of symbols and over a second frequency bandwidth of the uplink control channel during a second subset of symbols of the set of symbols according to the frequency hopping position.

39. The apparatus of claim 38, wherein the instructions are further executable by the processor to:

determine that the number of information bits is less than or equal to a threshold.

40. The apparatus of claim 39, wherein the instructions are further executable by the processor to:

determine a duration of the first subset of symbols by taking a floor function of the number of symbols divided by two; and

determine a duration of the second subset of symbols by subtracting the duration of the first subset of symbols from the number of symbols.

41. The apparatus of claim 39, wherein the frequency hopping position is determined based at least in part on a relationship between information symbols and reference symbols in the uplink control message.

42. The apparatus of claim 41, wherein the instructions are further executable by the processor to:

determine that dividing the number of symbols by four yields an integer value;

determine a duration of the first subset of symbols by multiplying the integer value by two; and

determine a duration of the second subset of symbols by multiplying the integer value by two.

43. The apparatus of claim 41, wherein the instructions are further executable by the processor to:

determine that dividing the number of symbols by four yields an integer value and a remainder of one;

determine a duration of the first subset of symbols by multiplying the integer value by two; and

determine a duration of the second subset of symbols by multiplying the integer value by two and adding one.

44. The apparatus of claim 41, wherein the instructions are further executable by the processor to:

determine that dividing the number of symbols by four yields an integer value and a remainder of two;

determine a duration of the first subset of symbols by multiplying the integer value by two; and

determine a duration of the second subset of symbols by multiplying the integer value by two and adding two.

45. The apparatus of claim 41, wherein the instructions are further executable by the processor to:

determine that dividing the number of symbols by four yields an integer value and a remainder of three;

determine a duration of the first subset of symbols by multiplying the integer value by two and adding one; and

determine a duration of the second subset of symbols by multiplying the integer value by two and adding two.

46. The apparatus of claim 38, wherein the instructions are further executable by the processor to:

determine that the number of information bits is greater than a threshold.

47. The apparatus of claim 46, wherein the instructions are further executable by the processor to:

determine a duration of the first subset of symbols by taking a floor function of the number of symbols divided by two; and

determine a duration of the second subset of symbols by subtracting the duration of the first subset of symbols from the number of symbols.

48. The apparatus of claim 38, wherein a duration of the first subset of symbols and a duration of the second subset of symbols are unequal.

49. An apparatus for wireless communication, comprising:

a processor;

memory in electronic communication with the processor; and

instructions stored in the memory and operable, when executed by the processor, to cause the apparatus to:

determine a number of symbols in a set of symbols within an uplink control channel for the transmission, by a user equipment (UE), of an uplink control message;

determine a number of information bits in a set of information bits of uplink control information for transmission in the uplink control message;

determine a frequency hopping position within the set of symbols for the transmission of the uplink control message based at least in part on the number of symbols in the set of symbols and the number of information bits in the set of information bits;

transmit, to the UE, a message indicating the set of symbols within the uplink control channel and the frequency hopping position; and

receive, from the UE, the uplink control message including the uplink control information over a first frequency bandwidth of the uplink control channel during a first subset of symbols of the set of symbols and over a second frequency bandwidth of the uplink control channel during a second subset of symbols of the set of symbols according to the frequency hopping position.

50. The apparatus of claim 49, wherein the instructions are further executable by the processor to:

determine that the number of information bits is less than or equal to a threshold.

51. The apparatus of claim 50, wherein the instructions are further executable by the processor to:

determine a duration of the first subset of symbols by taking a floor function of the number of symbols divided by two; and

determine a duration of the second subset of symbols by subtracting the duration of the first subset of symbols from the number of symbols.

52. The apparatus of claim 50, wherein the frequency hopping position is determined based at least in part on a relationship between information symbols and reference symbols in the uplink control message.

53. The apparatus of claim 52, wherein the instructions are further executable by the processor to:

determine that dividing the number of symbols by four yields an integer value;

determine a duration of the first subset of symbols by multiplying the integer value by two; and

determine a duration of the second subset of symbols by multiplying the integer value by two.

54. The apparatus of claim 52, wherein the instructions are further executable by the processor to:

determine that dividing the number of symbols by four yields an integer value and a remainder of one;

determine a duration of the first subset of symbols by multiplying the integer value by two; and

determine a duration of the second subset of symbols by multiplying the integer value by two and adding one.

55. The apparatus of claim 52, wherein the instructions are further executable by the processor to:

determine that dividing the number of symbols by four yields an integer value and a remainder of two;

determine a duration of the first subset of symbols by multiplying the integer value by two; and

determine a duration of the second subset of symbols by multiplying the integer value by two and adding two.

56. The apparatus of claim 52, wherein the instructions are further executable by the processor to:

determine that dividing the number of symbols by four yields an integer value and a remainder of three;

determine a duration of the first subset of symbols by multiplying the integer value by two and adding one; and

determine a duration of the second subset of symbols by multiplying the integer value by two and adding two.

57. The apparatus of claim 49, wherein the instructions are further executable by the processor to:

determine that the number of information bits is greater than a threshold.

58. The apparatus of claim 57, wherein the instructions are further executable by the processor to:

determine a duration of the first subset of symbols by taking a floor function of the number of symbols divided by two; and

determine a duration of the second subset of symbols by subtracting the duration of the first subset of symbols from the number of symbols.

59. The apparatus of claim 49, wherein a duration of the first subset of symbols and a duration of the second subset of symbols are unequal.

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

generate uplink control information including a set of information bits for transmission in an uplink control message;

receive, from the base station, a message indicating a set of symbols within an uplink control channel for the transmission of the uplink control message;

determine a frequency hopping position within the set of symbols for the transmission of the uplink control message based at least in part on a number of symbols in the set of symbols and a number of information bits in the set of information bits; and

transmit, to the base station, the uplink control message including the uplink control information over a first frequency bandwidth of the uplink control channel during a first subset of symbols of the set of symbols and over a second frequency bandwidth of the uplink control channel during a second subset of symbols of the set of symbols according to the frequency hopping position.

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

determine a number of symbols in a set of symbols within an uplink control channel for the transmission, by a user equipment (UE), of an uplink control message;

determine a number of information bits in a set of information bits of uplink control information for transmission in the uplink control message;

determine a frequency hopping position within the set of symbols for the transmission of the uplink control message based at least in part on the number of symbols in the set of symbols and the number of information bits in the set of information bits;

transmit, to the UE, a message indicating the set of symbols within the uplink control channel and the frequency hopping position; and

receive, from the UE, the uplink control message including the uplink control information over a first frequency bandwidth of the uplink control channel during a first subset of symbols of the set of symbols and over a second frequency bandwidth of the uplink control channel during a second subset of symbols of the set of symbols according to the frequency hopping position.