CLAIMS

1. A method of wireless communication performed by a user equipment (UE), comprising:

receiving a downlink control information signal, wherein the downlink control information signal indicates an uplink grant for multiple contiguous uplink repetitions, the multiple contiguous uplink repetitions being contiguous across one or more slot boundaries;

identifying resources allocated for the multiple contiguous uplink repetitions based on the uplink grant, wherein the identified resources include first resources for a first repetition of uplink data and second resources for a second repetition of uplink data;

transmitting the first repetition of uplink data using the first resources; and

transmitting the second repetition of the uplink data using the second resources.

2. The method of claim 1, wherein the first repetition and the second repetition are transmitted in the same slot.

3. The method of claim 1, wherein the first repetition and the second repetition are transmitted in different slots.

4. The method of claim 1, wherein the uplink data is transmitted on a physical uplink shared channel (PUSCH).

5. The method of claim 1, further comprising:

determining a transport block size (TBS) for the uplink grant.

6. The method of claim 5, wherein the TBS is based on a length in symbols of the first repetition.

7. The method of claim 5, wherein the TBS is based on a length of a first repetition.

8. The method of claim 7, wherein the TBS is further based on a number of symbols carrying demodulation reference signals (DMRS) scheduled during the first repetition.

9. The method of claim 7, wherein the TBS is further based on a number of usable symbols for the first repetition.

10. The method of claim 1, wherein the uplink grant comprises a timing resource allocation that includes:

a start symbol indicator indicating a value of a start symbol within a first slot; and

a length indicator indicating a length of a number of symbols;

wherein a sum of the value of the start symbol and the length indicator is greater than fourteen.

11. The method of claim 10, wherein the timing resource allocation indicates one or more symbols in the first slot and one or more symbols in the second slot.

12. The method of claim 10, further comprising determining to transmit a sounding reference signal during one or more symbols associated with the timing resource allocation, wherein:

the transmitting of the first repetition occurs prior to transmitting of the sounding reference signal, over a first number of symbols;

the transmitting of the second repetition occurs after the transmitting of the sounding reference signal, over a second number of symbols; and

a sum of the first number of symbols and the second number of symbols is equal to the length of the number of symbols included in the timing resource allocation.

13. The method of claim 10, further comprising determining to transmit a sounding reference signal during one or more symbols associated with the timing resource allocation, wherein:

the transmitting of the first repetition and the transmitting of the second repetition occur prior to transmitting of the sounding reference signal, over the length of the number of symbols included in the timing resource allocation; and

a timing for transmission of the sounding reference signal is determined in accordance with a slot offset parameter.

14. The method of claim 1, wherein the uplink grant comprises a frequency resource allocation that includes a number of resource blocks or resource elements.

15. The method of claim 14, further comprising:

identifying, from among of the multiple contiguous repetitions that includes the first repetition and the second repetition, a longest repetition that is transmitted over a greatest number of symbols;

determining a total number of resource blocks or resource elements associated with the longest repetition based on the duration and the bandwidth associated with the longest repetition;

identifying a shorter repetition that is shorter than the longest repetition; and

increasing a bandwidth associated with the shorter repetition until a total number of resource blocks or resource elements associated with the shorter repetition matches the total number of resource blocks or resource elements associated with the longest repetition.

16. The method of claim 1, wherein:

the uplink grant indicates an inter-slot frequency hopping pattern;

the transmitting of the first repetition comprises transmitting the first repetition at a first frequency in the inter-slot frequency hopping pattern; and

the transmitting of the second repetition comprises transmitting the second repetition at a second frequency in the inter-slot frequency hopping pattern.

17. The method of claim 1, wherein:

the uplink grant indicates an intra-slot frequency hopping pattern;

the transmitting of the first repetition comprises transmitting a first portion of the first repetition at a first frequency in the intra-slot frequency hopping pattern and a second portion of the first repetition at a second frequency in the intra-slot frequency hopping pattern; and

the transmitting of the second repetition comprises transmitting a first portion of the second repetition at ~~a~~ the first frequency in the intra-slot frequency hopping pattern and a second portion of the second repetition at ~~a~~ the second frequency in the intra-slot frequency hopping pattern.

18. The method of claim 1, wherein PUSCH mapping Type B is applied to all of the multiple contiguous ~~nominal~~ uplink repetitions.

19. The method of claim 1, wherein each of the multiple contiguous ~~nominal~~ uplink repetitions is configured independently based on a length of repetitions in the time domain.

20. The method of claim 1, wherein the UE is configured with multiple DMRS locations.

21. The method of claim 20, wherein the multiple DMRS locations are determined as a function of a starting symbol and/or length of each repetition.

22. The method of claim 20, wherein the downlink control information signal indicates which of the multiple DMRS locations are to be used.

23. The method of claim 20, wherein the multiple DMRS locations are signaled as a function of a number of ports or a pattern used for a first PUSCH.

24. A user equipment (UE), comprising:

at least one transceiver; and

at least one processor, the at least one processor configured to:

receive, via the at least one transceiver, a downlink control information signal, wherein the downlink control information indicates an uplink grant for multiple contiguous

uplink repetitions, the multiple contiguous uplink repetitions being contiguous across one or more slot boundaries;

identify resources allocated for the multiple contiguous uplink repetitions based on the uplink grant, wherein the identified resources include first resources for a first repetition of uplink data and second resources for a second repetition of uplink data;

cause the at least one transceiver to transmit the first repetition of uplink data using the first resources; and

cause the at least one transceiver to transmit the second repetition of the uplink data using the second resources.

25. The UE of claim 24, wherein the first repetition and the second repetition are transmitted in the same slot.

26. The UE of claim 24, wherein the first repetition and the second repetition are transmitted in different slots.

27. The UE of claim 24, wherein the uplink data is transmitted on a physical uplink shared channel (PUSCH).

28. The UE of claim 24, wherein the at least one processor is further configured to:

determine a transport block size (TBS) for the uplink grant.

29. The UE of claim 28, wherein the TBS is based on a length in symbols of the first repetition.

30. The UE of claim 28, wherein the TBS is based on a length of a first repetition.

31. The UE of claim 30, wherein the TBS is further based on a number of symbols carrying demodulation reference signals (DMRS) scheduled during the first repetition.

32. The UE of claim 30, wherein the TBS is further based on a number of usable symbols for the first repetition.

33. The UE of claim 24, wherein the uplink grant comprises a timing resource allocation that includes:

a start symbol indicator indicating a value of a start symbol within a first slot; and

a length indicator indicating a length of a number of symbols;

wherein a sum of the value of the start symbol and the length indicator is greater than fourteen.

34. The UE of claim 33, wherein the timing resource allocation indicates one or more symbols in the first slot and one or more symbols in the second slot.

35. The UE of claim 33, wherein the at least one processor is further configured to determine to transmit a sounding reference signal during one or more symbols associated with the timing resource allocation, wherein:

transmission of the first repetition occurs prior to transmission of the sounding reference signal, over a first number of symbols;

transmission of the second repetition occurs after transmission of the sounding reference signal, over a second number of symbols; and

a sum of the first number of symbols and the second number of symbols is equal to the length value included in the timing resource allocation.

36. The UE of claim 33, wherein the at least one processor is further configured to determine to transmit a sounding reference signal during one or more symbols associated with the timing resource allocation, wherein:

transmission of the first repetition and transmission of the second repetition occur prior to transmission of the sounding reference signal, over a number of symbols corresponding to the length value included in the timing resource allocation; and

a timing for transmission of the sounding reference signal is determined in accordance with a slot offset parameter.

37. The UE of claim 24, wherein the uplink grant comprises a frequency resource allocation that includes a number of resource blocks and/or resource elements.

38. The UE of claim 37, wherein the at least one processor is further configured to:

identify, from among of the multiple contiguous repetitions that includes the first repetition and the second repetition, a longest repetition that is transmitted over a greatest number of symbols;

determine a total number of resource blocks or resource elements associated with the longest repetition based on the duration and the bandwidth associated with the longest repetition;

identify a shorter repetition that is shorter than the longest repetition; and

increase a bandwidth associated with the shorter repetition until a total number of resource blocks or resource elements associated with the shorter repetition matches the total number of resource blocks or resource elements associated with the longest repetition.

39. The UE of claim 24, wherein:

the uplink grant indicates an inter-slot frequency hopping pattern;

the transmitting of the first repetition comprises transmitting the first repetition at a first frequency in the inter-slot frequency hopping pattern; and

the transmitting of the second repetition comprises transmitting the second repetition at a second frequency in the inter-slot frequency hopping pattern.

40. The UE of claim 24, wherein:

the uplink grant indicates an intra-slot frequency hopping pattern;

transmission of the first repetition comprises transmission of a first portion of the first repetition at a first frequency in the intra-slot frequency hopping pattern and a second portion of the first repetition at a second frequency in the intra-slot frequency hopping pattern; and

transmission of the second repetition comprises transmission of a first portion of the second repetition at ~~a~~ the first frequency in the intra-slot frequency hopping pattern and a second portion of the second repetition at ~~a~~ the second frequency in the intra-slot frequency hopping pattern.

41. The UE of claim 24, wherein PUSCH mapping Type B is applied to all of the multiple contiguous ~~nominal~~ uplink repetitions.

42. The UE of claim 24, wherein each of the multiple contiguous ~~nominal~~ uplink repetitions is configured independently based on a length of repetitions in the time domain.

43. The UE of claim 24, wherein the UE is configured with multiple DMRS locations.

44. The UE of claim 43, wherein the multiple DMRS locations are determined as a function of a start symbol or length of each repetition.

45. The UE of claim 43, wherein the downlink control information signal indicates which of the multiple DMRS locations are to be used.

46. The UE of claim 43, wherein the multiple DMRS locations are signaled as a function of a number of ports and/or a pattern used for a first PUSCH.