CLAIMS

1. A method for wireless communications by a transmitter, comprising:

identifying resources, within an uplink short burst (ULSB) region within a transmission time interval (TTI), for transmitting at least a portion of uplink control information (UCI), the UCI including at least one of one scheduling request (SR) bit and one or more acknowledgment (ACK) bits for acknowledging or negatively acknowledging downlink transmissions, wherein the SR bit and the one or more ACK bits are transmitted in a same symbol using frequency division multiplexing (FDM); and

transmitting the UCI using the identified resources.

2. The method of claim 1, wherein the identifying comprises:

identifying a first resource block (RB) within the ULSB for transmitting the SR bit and the one or more ACK bits; or

identifying a second RB for transmitting the SR bit without the one or more ACK bits.

3. The method of claim 2, wherein the first RB is identified based on a value of the SR bit.

4. The method of claim 3, wherein the value of the SR bit corresponds to a negative or a positive SR.

5. The method of claim 2, wherein identifying the first resource block (RB) further comprises:

identifying at least a first set of two bit-sequences to use to convey an ACK bit of the one or more ACK bits and the SR bit having a first value using the first RB; and

identifying at least a second set of two bit-sequences to use to convey the ACK bit of the one or more ACK bits and the SR bit having a second value using the first RB.

6. The method of claim 2, wherein identifying the first resource block (RB) further comprises:

identifying at least a first set of four bit-sequences to use to convey two ACK bits of the

one or more ACK bits and the SR bit having a first value using the first RB; and

identifying at least a second set of four bit-sequences to use to convey the two ACK bits of the one or more ACK bits and the SR bit having a second value using the first RB.

7. The method of claim 2, wherein the second RB is identified when there are no ACK bits to be transmitted, and wherein a value of the SR bit is for a positive SR.

8. The method of claim 1, wherein the identifying comprises:

identifying a first symbol in the ULSB semi-statically configured for transmission of the SR bit; and

using the first symbol for transmission of at least one ACK bit of the one or more ACK bits.

9. The method of claim 8, further comprising:

using a second symbol for transmission of the SR bit, wherein the second symbol is located in one of: the ULSB, an uplink long burst (ULLB) region of the TTI, or a subsequent TTI.

10. The method of claim 1, wherein the identifying comprises:

identifying a first resource block (RB) within the ULSB for transmitting the SR bit if the SR bit is a first value; or

identifying a second RB within the ULSB for transmitting the SR bit if the SR bit is a second value.

11. The method of claim 10, wherein:

the first value of the SR bit is for a positive SR and the second value of the SR bit is for a negative SR.

12. The method of claim 10, wherein the identifying comprises:

identifying at least four bit-sequences to use to convey at least two ACK bits when transmitting the SR bit using the first RB or the second RB.

13. The method of claim 12, wherein the identifying further comprises identifying at least one of the at least four bit-sequences for transmitting the SR bit without ACK bits using the first RB for the SR bit being the first value.

14. The method of claim 10, wherein the identifying comprises:

identifying one bit-sequence in one RB for transmitting the SR bit without ACK bits; or

identifying at least two RBs for transmitting the SR bit with at least two ACK bits of the one or more ACK bits; and

identifying at least four bit-sequences to use to convey the at least two ACK bits of the one or more ACK bits when transmitting the SR bit using one of the at least two RBs.

15. The method of claim 1, wherein:

the SR bit and the one or more ACK bits are transmitted in adjacent RBs.

16. The method of claim 1, further comprising:

splitting power between the SR bit and the one or more ACK bits.

17. The method of claim 1, wherein:

the SR bit and the one or more ACK bits are transmitted in the same symbol using FDM only if a power headroom (PHR) is above a threshold value.

18. The method of claim 1, wherein:

the SR bit and the one or more ACK bits are transmitted in the same symbol in ACK resource with the one or more ACK bits bundled to a single bit if a power headroom (PHR) is below a threshold value.

19. The method of claim 1, wherein the identifying comprises:

identifying a first resource block (RB) within the ULSB used for a first one of the one or more ACK bits if the first ACK bit is a first value; or

identifying a second RB within the ULSB used for the first ACK bit if the first ACK bit

is a second value.

20. The method of claim 19, wherein the identifying comprises:

identifying at least four bit-sequences to use to convey at least two ACK bits of the one or more ACK bits when transmitting SR using the first RB or the second RB.

21. The method of claim 19, wherein the identifying comprises:

identifying one RB for transmitting the SR bit without ACK bits; or

identifying at least two RBs for transmitting the SR bit with at least the first ACK bit of the one or more ACK bits.

22. A method for wireless communications by a user equipment, comprising:

identifying extended resources, adjacent in time to a common uplink region within a transmission time interval (TTI), dynamically available for uplink transmission by the UE, wherein the extended resources are identified using a hopping position calculated based on the common uplink region; and

sending an uplink transmission using the extended resources.

23. The method of claim 22, wherein the extended resources comprise at least one of:

resources occurring prior to the common uplink region; or

resources occurring after to the common uplink region.

24. The method of claim 22, wherein different durations of the extended resources are available to different UEs, including the UE.

25. The method of claim 22, wherein the common uplink region is shared between UEs using code division multiplexing (CDM) groups, and wherein the extended resources are shared between the UEs using code division multiplexing (CDM) groups.

26. The method of claim 25, wherein the CDM groups of the common uplink region and the extended resources are not overlapping in time.

27. An apparatus, comprising:

a non-transitory memory comprising executable instructions; and

a processor in data communication with the memory and configured, by executing the instructions, to:

identify resources, within an uplink short burst (ULSB) region within a transmission time interval (TTI), for transmitting at least a portion of uplink control information (UCI), the UCI including at least one of one scheduling request (SR) bit and one or more acknowledgment (ACK) bits for acknowledging or negatively acknowledging downlink transmissions, wherein the SR bit and the one or more ACK bits are transmitted in a same symbol using frequency division multiplexing (FDM); and

transmit the UCI using the identified resources.

28. The apparatus of claim 27, wherein the processor being configured to identify the resources is further configured to:

identify a first resource block (RB) within the ULSB for transmitting the SR bit and the one or more ACK bits; or

identify a second RB for transmitting the SR bit without the one or more ACK bits.

29. The apparatus of claim 28, wherein the first RB is identified based on a value of the SR bit.

30. The apparatus of claim 29, wherein the value of the SR bit corresponds to a negative or a positive SR.

31. The apparatus of claim 28, wherein the processor being configured to identify the first RB is further configured to:

identify at least a first set of two bit-sequences to use to convey an ACK bit of the one or more ACK bits and the SR bit having a first value using the first RB; and

identify at least a second set of two bit-sequences to use to convey the ACK bit of the one or more ACK bits and the SR bit having a second value using the first RB.

32. The apparatus of claim 28, wherein the processor being configured to identify the first RB is further configured to:

identify at least a first set of four bit-sequences to use to convey two ACK bits of the one or more ACK bits and the SR bit having a first value using the first RB; and

identify at least a second set of four bit-sequences to use to convey the two ACK bits of the one or more ACK bits and the SR bit having a second value using the first RB.

33. The apparatus of claim 28, wherein the second RB is identified when there are no ACK bits to be transmitted, and wherein a value of the SR bit is for a positive SR.

34. The apparatus of claim 27, wherein the processor being configured to identify the resources is further configured to:

identify a first symbol in the ULSB semi-statically configured for transmission of the SR bit; and

use the first symbol for transmission of at least one ACK bit of the one or more ACK bits.

35. The apparatus of claim 34, wherein the processor is further configured to:

use a second symbol for transmission of the SR bit, wherein the second symbol is located in one of: the ULSB, an uplink long burst (ULLB) region of the TTI, or a subsequent TTI.

36. The apparatus of claim 27, wherein the processor being configured to identify the resources is further configured to:

identify a first resource block (RB) within the ULSB for transmitting the SR bit if the SR bit is a first value; or

identify a second RB within the ULSB for transmitting the SR bit if the SR bit is a second value.

37. The apparatus of claim 36, wherein:

the first value of the SR bit is for a positive SR and the second value of the SR bit is for a

negative SR.

38. The apparatus of claim 36, wherein the processor being configured to identify the resources is further configured to:

identify at least four bit-sequences to use to convey at least two ACK bits when transmitting the SR bit using the first RB or the second RB.

39. The apparatus of claim 38, wherein the processor being configured to identify the resources is further configured to:

identify at least one of the at least four bit-sequences for transmitting the SR bit without ACK bits using the first RB for the SR bit being the first value.

40. The apparatus of claim 36, wherein the processor being configured to identify the resources is further configured to:

identify one bit-sequence in one RB for transmitting the SR bit without ACK bits; or

identify at least two RBs for transmitting the SR bit with at least two ACK bits of the one or more ACK bits; and

identify at least four bit-sequences to use to convey the at least two ACK bits of the one or more ACK bits when transmitting the SR bit using one of the at least two RBs.

41. The apparatus of claim 27, wherein:

the SR bit and the one or more ACK bits are transmitted in adjacent RBs.

42. The apparatus of claim 27, further the processor is further configured to:

splitting power between the SR bit and the one or more ACK bits.

43. The apparatus of claim 27, wherein:

the SR bit and the one or more ACK bits are transmitted in the same symbol using FDM only if a power headroom (PHR) is above a threshold value.

44. The apparatus of claim 27, wherein:

the SR bit and the one or more ACK bits are transmitted in the same symbol in ACK resource with the one or more ACK bits bundled to a single bit if a power headroom (PHR) is below a threshold value.

45. The apparatus of claim 27, wherein the processor being configured to identify the resources is further configured to:

identify a first resource block (RB) within the ULSB used for a first one of the one or more ACK bits if the first ACK bit is a first value; or

identify a second RB within the ULSB used for the first ACK bit if the first ACK bit is a second value.

46. The apparatus of claim 45, wherein the processor being configured to identify the resources is further configured to:

identify at least four bit-sequences to use to convey at least two ACK bits of the one or more ACK bits when transmitting SR using the first RB or the second RB.

47. The apparatus of claim 45, wherein the processor being configured to identify the resources is further configured to:

identify one RB for transmitting the SR bit without ACK bits; or

identify at least two RBs for transmitting the SR bit with at least the first ACK bit of the one or more ACK bits.

48. An apparatus, comprising:

a non-transitory memory comprising executable instructions; and

a processor in data communication with the memory and configured, by executing the instructions, to:

identify extended resources, adjacent in time to a common uplink region within a transmission time interval (TTI), dynamically available for uplink transmission by the apparatus, wherein the extended resources are identified using a hopping position calculated based on the common uplink region; and

send an uplink transmission using the extended resources.

49. The apparatus of claim 48, wherein the extended resources comprise at least one of:
resources occurring prior to the common uplink region; or
resources occurring after to the common uplink region.

50. The apparatus of claim 48, wherein different durations of the extended resources are available to different apparatuses.

51. The apparatus of claim 48, wherein the common uplink region is shared between UEs using code division multiplexing (CDM) groups, and wherein the extended resources are shared between the UEs using code division multiplexing (CDM) groups.

52. The apparatus of claim 51, wherein the CDM groups of the common uplink region and the extended resources are not overlapping in time.

53. An apparatus, comprising:
means for identifying resources, within an uplink short burst (ULSB) region within a transmission time interval (TTI), for transmitting at least a portion of uplink control information (UCI), the UCI including at least one of one scheduling request (SR) bit and one or more acknowledgment (ACK) bits for acknowledging or negatively acknowledging downlink transmissions, wherein the SR bit and the one or more ACK bits are transmitted in a same symbol using frequency division multiplexing (FDM); and
means for transmitting the UCI using the identified resources.

54. A non-transitory computer readable medium having instructions stored thereon for performing a method comprising:
identifying resources, within an uplink short burst (ULSB) region within a transmission time interval (TTI), for transmitting at least a portion of uplink control information (UCI), the UCI including at least one of one scheduling request (SR) bit and one or more acknowledgment (ACK) bits for acknowledging or negatively acknowledging downlink transmissions, wherein the SR bit and the one or more ACK bits are transmitted in a same symbol using frequency

division multiplexing (FDM); and

transmitting the UCI using the identified resources.

55. An apparatus, comprising:

means for identifying extended resources, adjacent in time to a common uplink region within a transmission time interval (TTI), dynamically available for uplink transmission by the apparatus, wherein the extended resources are identified using a hopping position calculated based on the common uplink region; and

means for sending an uplink transmission using the extended resources.

56. A non-transitory computer readable medium having instructions stored thereon for performing a method comprising:

identifying extended resources, adjacent in time to a common uplink region within a transmission time interval (TTI), dynamically available for uplink transmission by a UE, wherein the extended resources are identified using a hopping position calculated based on the common uplink region; and

sending an uplink transmission using the extended resources.