

CLAIMS

1. A method for wireless communication, comprising:
receiving a configuration indicating multiple association rules associating random access preambles and physical uplink shared channel (PUSCH) occasion formats;
selecting, as part of a random access procedure, a random access preamble from the random access preambles for transmitting over a random access occasion;
determining, based at least in part on at least one of the association rules in the configuration, a PUSCH occasion format associated with the random access preamble and a corresponding payload resource unit, wherein the corresponding payload resource unit is indicated by a resource block (RB) offset from a first RB; and
transmitting the random access preamble over the random access occasion and, according to the PUSCH occasion format, an associated payload over the corresponding payload resource unit.
2. The method of claim 1, wherein the configuration indicates a set of payload sizes and an indication of resources allocated for payload transmission, and for each payload size in the set of payload sizes, one or more parameters associated with a corresponding PUSCH occasion format and an indication of a starting or ending location of the resources configured for the corresponding PUSCH occasion format.
3. The method of claim 2, wherein the one or more parameters include, for the corresponding PUSCH occasion format, one or more of a random access preamble from the random access preambles, a number of symbols or slots of the corresponding PUSCH occasion format, a number of physical resource blocks of the corresponding PUSCH occasion format, a numerology or waveform of an uplink channel, a transport block size, or a modulation and coding scheme.
4. The method of claim 1, wherein selecting the random access preamble is based at least in part on a buffer status or a radio resource control state.
5. The method of claim 4, wherein selecting the random access preamble is further based on determining, based on the buffer status or the radio resource control state,

that a size associated with the PUSCH occasion format can transmit data in a corresponding buffer.

6. The method of claim 1, wherein the configuration indicates grouping information for the random access preambles as multiple sets of random access preamble groups based on the PUSCH occasion formats, and wherein selecting the random access preamble comprises selecting, based on the grouping information, the random access preamble from one of the multiple sets of random access preamble groups corresponding to the determined PUSCH occasion format.

7. The method of claim 1, further comprising generating the associated payload as a set of uplink channel symbols based at least in part on the determined PUSCH occasion format.

8. The method of claim 7, further comprising generating a demodulation reference signal (DMRS) sequence for the associated payload, wherein transmitting the associated payload comprises concatenating the DMRS sequence and the set of uplink channel symbols.

9. The method of claim 8, wherein generating the DMRS sequence is based at least in part on a frame number, a subframe number, or a slot number associated with transmitting the associated payload, a cell identifier, the determined PUSCH occasion format, a sequence index of the random access preamble, or an index of the random access occasion.

10. The method of claim 1, wherein transmitting the random access preamble and the associated payload comprises determining at least one of a size or a location of resources associated with the random access preamble and the corresponding payload resource unit, and transmitting the random access preamble and the associated payload over the determined resources.

11. The method of claim 10, further comprising receiving the configuration in a system information broadcast from a base station, in radio resource control signaling from the base station, or from a memory.

12. The method of claim 10, wherein the configuration indicates multiplexed resources for payload resource units associated with the random access preambles, including the corresponding payload resource unit associated with the random access preamble.

13. The method of claim 12, wherein the configuration indicates code division multiplexing for payload resource units corresponding to a set of the random access preambles associated with a same PUSCH occasion format.

14. The method of claim 12, wherein the configuration indicates at least one of time or frequency division multiplexing schemes for payload resource units corresponding to a set of the random access preambles associated with a same PUSCH occasion format.

15. The method of claim 12, wherein the configuration indicates at least one of time or frequency division multiplexing schemes for payload resource units corresponding to a set of the random access preambles associated with different PUSCH occasion formats.

16. A method for wireless communication, comprising:
receiving a configuration indicating multiple association rules associating random access preambles and physical uplink shared channel (PUSCH) occasion formats;
receiving, over a random access occasion, a random access preamble, selected from the random access preambles, and, over a corresponding payload resource unit, an associated payload;
determining, based at least in part on at least one of the association rules in the configuration and the random access preamble, a PUSCH occasion format associated with the random access preamble and the corresponding payload resource unit, wherein the

corresponding payload resource unit is indicated by a resource block (RB) offset from a first RB; and

processing the associated payload based on at least one of the PUSCH occasion format or the corresponding payload resource unit for the associated payload.

17. The method of claim 16, wherein the configuration indicates a set of payload sizes, and for each payload size in the set of payload sizes, one or more parameters associated with a corresponding PUSCH occasion format and an indication of a starting or ending location of resources allocated for the corresponding PUSCH occasion format.

18. The method of claim 17, wherein the one or more parameters include, for the corresponding PUSCH occasion format, one or more of a random access preamble from the random access preambles, a number of symbols or slots of the corresponding PUSCH occasion format, a number of physical resource blocks of the corresponding PUSCH occasion format, a numerology or waveform of an uplink channel, a transport block size, or a modulation and coding scheme.

19. The method of claim 16, wherein the configuration indicates grouping information for the random access preambles as multiple sets of random access preamble group based on the PUSCH occasion formats.

20. The method of claim 16, wherein receiving the associated payload comprises receiving a set of uplink channel symbols or slots corresponding to the determined PUSCH occasion format.

21. The method of claim 20, further comprising receiving a demodulation reference signal (DMRS) sequence for the associated payload, wherein receiving the associated payload comprises demodulating the set of uplink channel symbols based on the DMRS sequence.

22. The method of claim 16, wherein receiving the random access preamble and the associated payload comprises determining resources associated with the random access preamble and the corresponding payload resource unit.

23. The method of claim 22, further comprising transmitting the configuration in a system information broadcast, or in radio resource control signaling.

24. The method of claim 23, wherein the configuration indicates multiplexed resources for payload resource units associated with the random access preambles, including the corresponding payload resource unit associated with the random access preamble.

25. The method of claim 24, wherein the configuration indicates code division multiplexing for payload resource units corresponding to a set of the random access preambles associated with a same PUSCH occasion format.

26. The method of claim 24, wherein the configuration indicates at least one of time or frequency division multiplexing schemes for payload resource units corresponding to a set of the random access preambles associated with a same PUSCH occasion format.

27. The method of claim 24, wherein the configuration indicates at least one of time or frequency division multiplexing schemes for payload resource units corresponding to a set of the random access preambles associated with different PUSCH occasion formats.

28. An apparatus for wireless communication, comprising:
a transceiver;
a memory configured to store instructions; and
one or more processors coupled with the transceiver and the memory, wherein the instructions are executable by the one or more processors to cause the apparatus to:

receive a configuration indicating multiple association rules associating random access preambles and physical uplink shared channel (PUSCH) occasion formats;

select, as part of a random access procedure, a random access preamble from the random access preambles for transmitting over a random access occasion;

determine, based at least in part on at least one of the association rules in the configuration, a PUSCH occasion format associated with the random access preamble and a corresponding payload resource unit, wherein the corresponding payload resource unit is indicated by a resource block (RB) offset from a first RB; and

transmit the random access preamble over the random access occasion and, according to the PUSCH occasion format, an associated payload over the corresponding payload resource unit.

29. The apparatus of claim 28, wherein the configuration indicates a set of payload sizes and an indication of resources allocated for payload transmission, and for each payload size in the set of payload sizes, one or more parameters associated with a corresponding PUSCH occasion format and an indication of a starting or ending location of the resources configured for the corresponding PUSCH occasion format.

30. The apparatus of claim 29, wherein the one or more parameters include, for the corresponding PUSCH occasion format, one or more of a random access preamble from the random access preambles, a number of symbols or slots of the corresponding PUSCH occasion format, a number of physical resource blocks of the corresponding PUSCH occasion format, a numerology or waveform of an uplink channel, a transport block size, or a modulation and coding scheme.

31. The apparatus of claim 28, wherein the instructions are further executable by the one or more processors to cause the apparatus to select the random access preamble based at least in part on a buffer status or a radio resource control state.

32. The apparatus of claim 31, wherein the instructions are further executable by the one or more processors to cause the apparatus to select the random access preamble further based on determining, based on the buffer status or the radio resource control state, that a size associated with the PUSCH occasion format can transmit data in a corresponding buffer.

33. The apparatus of claim 28, wherein the configuration indicates grouping information for the random access preambles as multiple sets of random access preamble groups based on the PUSCH occasion formats, and wherein the instructions are further executable by the one or more processors to cause the apparatus to select, based on the grouping information, the random access preamble from one of the multiple sets of random access preamble groups corresponding to the determined PUSCH occasion format.

34. The apparatus of claim 28, wherein the instructions are further executable by the one or more processors to cause the apparatus to generate the associated payload as a set of uplink channel symbols based at least in part on the determined PUSCH occasion format.

35. The apparatus of claim 34, wherein the instructions are further executable by the one or more processors to cause the apparatus to generate a demodulation reference signal (DMRS) sequence for the associated payload, wherein the instructions are further executable by the one or more processors to cause the apparatus to transmit the associated payload at least in part by concatenating the DMRS sequence and the set of uplink channel symbols.

36. The apparatus of claim 35, wherein the instructions are further executable by the one or more processors to cause the apparatus to generate the DMRS sequence based at least in part on a frame number, a subframe number, or a slot number associated with transmitting the associated payload, a cell identifier, the determined PUSCH occasion format, a sequence index of the random access preamble, or an index of the random access occasion.

37. The apparatus of claim 28, wherein the instructions are further executable by the one or more processors to cause the apparatus to transmit the random access preamble and the associated payload at least in part by determining at least one of a size or a location of resources associated with the random access preamble and the corresponding payload resource unit, and transmitting the random access preamble and the associated payload over the determined resources.

38. The apparatus of claim 37, wherein the instructions are further executable by the one or more processors to cause the apparatus to receive the configuration in a system information broadcast from a base station, in radio resource control signaling from the base station, or from a memory.

39. The apparatus of claim 37, wherein the configuration indicates multiplexed resources for payload resource units associated with the random access preambles, including the corresponding payload resource unit associated with the random access preamble.

40. The apparatus of claim 39, wherein the configuration indicates code division multiplexing for payload resource units corresponding to a set of the random access preambles associated with a same PUSCH occasion format.

41. The apparatus of claim 39, wherein the configuration indicates at least one of time or frequency division multiplexing schemes for payload resource units corresponding to a set of the random access preambles associated with a same PUSCH occasion format.

42. The apparatus of claim 39, wherein the configuration indicates at least one of time or frequency division multiplexing schemes for payload resource units corresponding to a set of the random access preambles associated with different PUSCH occasion formats.

43. An apparatus for wireless communication, comprising:
a transceiver;

a memory configured to store instructions; and
 one or more processors coupled with the transceiver and the memory, wherein the instructions are executable by the one or more processors to cause the apparatus to:

receive a configuration indicating multiple association rules associating random access preambles and physical uplink shared channel (PUSCH) occasion formats;

receive, over a random access occasion, a random access preamble, selected from the random access preambles, and, over a corresponding payload resource unit, an associated payload;

determine, based at least in part on at least one of the association rules in the configuration and the random access preamble, a PUSCH occasion format associated with the random access preamble and the corresponding payload resource unit, wherein the corresponding payload resource unit is indicated by a resource block (RB) offset from a first RB; and

process the associated payload based on at least one of the PUSCH occasion format or the corresponding payload resource unit for the associated payload.

44. The apparatus of claim 43, wherein the configuration indicates a set of payload sizes, and for each payload size in the set of payload sizes, one or more parameters associated with a corresponding PUSCH occasion format and an indication of a starting or ending location of resources allocated for the corresponding PUSCH occasion format.

45. The apparatus of claim 44, wherein the one or more parameters include, for the corresponding PUSCH occasion format, one or more of a random access preamble from the random access preambles, a number of symbols or slots of the corresponding PUSCH occasion format, a number of physical resource blocks of the corresponding PUSCH occasion format, a numerology or waveform of an uplink channel, a transport block size, or a modulation and coding scheme.

46. The apparatus of claim 43, wherein the configuration indicates grouping information for the random access preambles as multiple sets of random access preamble group based on the PUSCH occasion formats.

47. The apparatus of claim 43, wherein the instructions are further executable by the one or more processors to cause the apparatus to receive the associated payload at least in part by receiving a set of uplink channel symbols or slots corresponding to the determined PUSCH occasion format.

48. The apparatus of claim 47, wherein the instructions are further executable by the one or more processors to cause the apparatus to receive a demodulation reference signal (DMRS) sequence for the associated payload, wherein the instructions are further executable by the one or more processors to cause the apparatus to receive the associated payload at least in part by demodulating the set of uplink channel symbols based on the DMRS sequence.

49. The apparatus of claim 43, wherein the instructions are further executable by the one or more processors to cause the apparatus to receive the random access preamble and the associated payload at least in part by determining resources associated with the random access preamble and the corresponding payload resource unit.

50. The apparatus of claim 49, wherein the instructions are further executable by the one or more processors to cause the apparatus to transmit the configuration in a system information broadcast, or in radio resource control signaling.

51. The apparatus of claim 50, wherein the configuration indicates multiplexed resources for payload resource units associated with the random access preambles, including the corresponding payload resource unit associated with the random access preamble.

52. The apparatus of claim 51, wherein the configuration indicates code division multiplexing for payload resource units corresponding to a set of the random access preambles associated with a same PUSCH occasion format.

53. The apparatus of claim 51, wherein the configuration indicates at least one of time or frequency division multiplexing schemes for payload resource units corresponding to a set of the random access preambles associated with a same PUSCH occasion format.

54. The apparatus of claim 51, wherein the configuration indicates at least one of time or frequency division multiplexing schemes for payload resource units corresponding to a set of the random access preambles associated with different PUSCH occasion formats.

55. An apparatus for wireless communication, comprising:

means for receiving a configuration indicating multiple association rules associating random access preambles and physical uplink shared channel (PUSCH) occasion formats;

means for selecting, as part of a random access procedure, a random access preamble from the random access preambles for transmitting over a random access occasion;

means for determining, based at least in part on at least one of the association rules in the configuration, a PUSCH occasion format associated with the random access preamble and a corresponding payload resource unit, wherein the corresponding payload resource unit is indicated by a resource block (RB) offset from a first RB; and

means for transmitting the random access preamble over the random access occasion and, according to the PUSCH occasion format, an associated payload over the corresponding payload resource unit.

56. The apparatus of claim 55, wherein the configuration indicates a set of payload sizes and an indication of resources allocated for payload transmission, and for each payload size in the set of payload sizes, one or more parameters associated with a corresponding PUSCH occasion format and an indication of a starting or ending location of the resources configured for the corresponding PUSCH occasion format.

57. An apparatus for wireless communication, comprising:

means for receiving a configuration indicating multiple association rules associating random access preambles and physical uplink shared channel (PUSCH) occasion formats;

means for receiving, over a random access occasion, a random access preamble, selected from the random access preambles, and, over a corresponding payload resource unit, an associated payload;

means for determining, based at least in part on at least one of the association rules in the configuration and the random access preamble, a PUSCH occasion format associated with the random access preamble and the corresponding payload resource unit, wherein the corresponding payload resource unit is indicated by a resource block (RB) offset from a first RB; and

means for processing the associated payload based on at least one of the PUSCH occasion format or the corresponding payload resource unit for the associated payload.

58. The apparatus of claim 57, wherein the configuration indicates a set of payload sizes, and for each payload size in the set of payload sizes, one or more parameters associated with a corresponding PUSCH occasion format and an indication of a starting or ending location of resources allocated for the corresponding PUSCH occasion format.

59. A computer-readable medium, comprising code executable by one or more processors for wireless communications, the code comprising code for:

receiving a configuration indicating multiple association rules associating random access preambles and physical uplink shared channel (PUSCH) occasion formats;

selecting, as part of a random access procedure, a random access preamble from the random access preambles for transmitting over a random access occasion;

determining, based at least in part on at least one of the association rules in the configuration, a PUSCH occasion format associated with the random access preamble and a corresponding payload resource unit, wherein the corresponding payload resource unit is indicated by a resource block (RB) offset from a first RB; and

transmitting the random access preamble over the random access occasion and, according to the PUSCH occasion format, an associated payload over the corresponding payload resource unit.

60. The computer-readable medium of claim 59, wherein the configuration indicates a set of payload sizes and an indication of resources allocated for payload transmission, and for each payload size in the set of payload sizes, one or more parameters associated with a corresponding PUSCH occasion format and an indication of a starting or ending location of the resources configured for the corresponding PUSCH occasion format.

61. A computer-readable medium, comprising code executable by one or more processors for wireless communications, the code comprising code for:

- receiving a configuration indicating multiple association rules associating random access preambles and physical uplink shared channel (PUSCH) occasion formats;

- receiving, over a random access occasion, a random access preamble, selected from the random access preambles, and, over a corresponding payload resource unit, an associated payload;

- determining, based at least in part on at least one of the association rules in the configuration and the random access preamble, a PUSCH occasion format associated with the random access preamble and the corresponding payload resource unit, wherein the corresponding payload resource unit is indicated by a resource block (RB) offset from a first RB; and

- processing the associated payload based on at least one of the PUSCH occasion format or the corresponding payload resource unit for the associated payload.

62. The computer-readable medium of claim 61, wherein the configuration indicates a set of payload sizes, and for each payload size in the set of payload sizes, one or more parameters associated with a corresponding PUSCH occasion format and an indication of a starting or ending location of resources allocated for the corresponding PUSCH occasion format.