CLAIMS

1. A method for wireless communications at a user equipment (UE), comprising:

receiving a configuration message for a two-step random access procedure, the configuration message comprising configuration information for periodic transmission of a preamble and transmission of a payload, the preamble and the payload associated with a first message of the two-step random access procedure;

identifying a first configuration periodicity for transmitting the preamble based at least in part on the configuration message;

identifying a frame corresponding to the first configuration periodicity based at least in part on the configuration information indicating a time offset in frames associated with the frame;

identifying a second configuration periodicity for transmitting the payload based at least in part on the configuration message, wherein the first configuration periodicity and the second configuration periodicity are separately configured; and

transmitting the preamble of the first message in the identified frame based at least in part on the first configuration periodicity and the payload of the first message based at least in part on the second configuration periodicity.

2. The method of claim 1, wherein receiving the configuration message further comprises:

receiving the configuration message via radio resource control signaling or via a system information transmission.

3. The method of claim 1, further comprising:

identifying a transmission gap in the configuration message, the transmission gap indicating a time duration between transmission of the preamble and transmission of the payload; and

transmitting the payload of the first message after the identified transmission gap.

4. The method of claim 1, wherein transmitting the preamble and the payload of the first message further comprises:

transmitting the preamble of the first message in at least one random access occasion, the at least one random access occasion occurring based at least in part on the first configuration periodicity; and

transmitting the payload of the first message in at least one uplink shared data channel occasion, the at least one uplink shared data channel occasion occurring based at least in part on the second configuration periodicity.

5. The method of claim 4, wherein each random access occasion is associated with one or more uplink shared data channel occasions.

6. The method of claim 5, further comprising:

identifying the one or more uplink shared data channel occasions associated with each random access occasion based at least in part on a preamble sequence grouping.

7. The method of claim 6, wherein the one or more uplink shared data channel occasions comprise a same modulation and coding scheme, payload size, waveform, or a combination thereof.

8. The method of claim 1, further comprising:

determining the second configuration periodicity based at least in part on a periodicity relationship with the first configuration periodicity.

9. The method of claim 8, wherein the periodicity relationship is defined as:

$$T_{RO,2step} = N \times T_{PO,2step},$$

where $T_{RO,2step}$ is the first configuration periodicity associated with the preamble of the first message, $T_{PO,2step}$ is the second configuration periodicity associated with the payload of the first message, and N is a configurable integer greater than or equal to one as indicated in the configuration message.

10. The method of claim 1, further comprising:

determining the first configuration periodicity based at least in part on a periodicity relationship with a periodicity of a first message configuration in a four-step random access procedure.

11. The method of claim 10, wherein the periodicity relationship is defined as:

$$T_{RO,2step} = \lambda \times T_{RO,4step},$$

where $T_{RO,2step}$ is the first configuration periodicity associated with the preamble of the first message, $T_{RO,4step}$ is the periodicity of the first message configuration in the four-step random access procedure, and λ is a scaling factor, the scaling factor comprising an integer greater than or equal to one as indicated in the configuration message.

12. The method of claim 1, further comprising:

determining the frame for the first configuration periodicity based at least in part on a frame relationship with a periodicity of one or more random access occasions.

13. The method of claim 12, wherein the frame relationship is defined as:

$$(n_{SFN}\ mod\ T_{RO,2step}) = ((y + \Delta y)\ mod\ T_{RO,2step}),$$

where $T_{RO,2step}$ is the first configuration periodicity, n_{SFN} is a frame number for transmission occasions of the preamble and the payload of the first message of the two-step random access procedure, y is a frame number for the one or more random access occasions, and Δy is the time offset in frames.

14. The method of claim 13, further comprising:

receiving Δy in the configuration message, an additional configuration message, a system information transmission, or a combination thereof.

15. The method of claim 1, further comprising:

determining a subframe or slot for the first configuration periodicity based at least in part on a subframe relationship with a periodicity of one or more random access occasions.

16. The method of claim 15, wherein the subframe relationship is defined as:

$$(S_n + \Delta s)\ mod\ L,$$

where S_n is a subframe or slot number containing a random access occasions, Δs is a time offset in subframes or slots, and L is a constant denoting a number of subframes or slots in the frame.

17. The method of claim 1, further comprising:

identifying a plurality of preamble formats, a transmission gap, or a combination thereof, in the configuration message for the two-step random access procedure;

selecting a preamble format from the plurality of preamble formats for transmission of the preamble of the first message; and

transmitting the preamble of the first message with the selected preamble format.

18. The method of claim 17, wherein the preamble and the payload of the first message are transmitted within a same slot or on different slots based at least in part on the selected preamble format, the transmission gap, or a combination thereof.

19. The method of claim 1, wherein the preamble and the payload of the first message are transmitted within a same bandwidth, partially overlapping bandwidths, or disjoint bandwidths.

20. A method for wireless communications at a network device, comprising:

transmitting, to a user equipment (UE), a configuration message for a two-step random access procedure, the configuration message comprising configuration information for periodic transmission of a preamble and periodic transmission of a payload by the UE, the preamble and the payload associated with a first message of the two-step random access procedure;

determining a first configuration periodicity for receiving the preamble based at least in part on the configuration message;

determining a frame corresponding to the first configuration periodicity based at least in part on the configuration information indicating a time offset in frames associated with the frame;

determining a second configuration periodicity for receiving the payload based at least in part on the configuration message; and

receiving, from the UE, the preamble of the first message in the determined frame based at least in part on the first configuration periodicity and the payload of the first message based at least in part on the second configuration periodicity, wherein the first configuration periodicity and the second configuration periodicity are separately configured.

21. The method of claim 20, wherein transmitting the configuration message further comprises:

transmitting, to the UE, the configuration message via radio resource control signaling or via a system information transmission.

22. The method of claim 20, further comprising:

transmitting, to the UE, a transmission gap in the configuration message, the transmission gap indicating a time duration between transmission of the preamble and transmission of the payload; and

receiving, from the UE, the payload of the first message after the transmission gap.

23. The method of claim 20, wherein receiving the preamble and the payload of the first message further comprises:

receiving, from the UE, the preamble of the first message in at least one random access occasion, the at least one random access occasion occurring based at least in part on the first configuration periodicity; and

receiving, from the UE, the payload of the first message in at least one uplink shared data channel occasion, the at least one uplink shared data channel occasion occurring based at least in part on the second configuration periodicity.

24. The method of claim 20, further comprising:

determining the second configuration periodicity based at least in part on a periodicity relationship with the first configuration periodicity.

25. The method of claim 20, further comprising:

determining the first configuration periodicity based at least in part on a periodicity relationship with a periodicity of a first message configuration in a four-step random access procedure.

26. The method of claim 20, further comprising:

determining the frame for the first configuration periodicity based at least in part on a frame relationship with a periodicity of one or more random access occasions.

27. The method of claim 20, further comprising:

determining a subframe or slot for the first configuration periodicity based at least in part on a subframe relationship with a periodicity of one or more random access occasions.

28. The method of claim 20, further comprising:

transmitting, to the UE, a plurality of preamble formats, a transmission gap, or a combination thereof, in the configuration message for the two-step random access procedure; and

receiving, from the UE, the preamble of the first message with one preamble format from the plurality of preamble formats.

29. The method of claim 20, wherein the preamble and the payload of the first message are received within a same bandwidth, partially overlapping bandwidths, or disjoint bandwidths.

30. An apparatus for wireless communications at a user equipment (UE), comprising:

means for receiving a configuration message for a two-step random access procedure, the configuration message comprising configuration information for periodic transmission of a preamble and periodic transmission of a payload, the preamble and the payload associated with a first message of the two-step random access procedure;

means for identifying a first configuration periodicity for transmitting the preamble based at least in part on the configuration message;

means for identifying a frame corresponding to the first configuration periodicity based at least in part on the configuration information indicating a time offset in frames associated with the frame;

means for identifying a second configuration periodicity for transmitting the payload based at least in part on the configuration message, wherein the first configuration periodicity and the second configuration periodicity are separately configured; and

means for transmitting the preamble of the first message in the identified frame based at least in part on the first configuration periodicity and the payload of the first message based at least in part on the second configuration periodicity.

31. The apparatus of claim 30, wherein the means for receiving the configuration message further comprise:

means for receiving the configuration message via radio resource control signaling or via a system information transmission.

32. The apparatus of claim 30, further comprising:

means for identifying a transmission gap in the configuration message, the transmission gap indicating a time duration between transmission of the preamble and transmission of the payload; and

means for transmitting the payload of the first message after the identified transmission gap.

33. The apparatus of claim 30, wherein the means for transmitting the preamble and the payload of the first message further comprise:

means for transmitting the preamble of the first message in at least one random access occasion, the at least one random access occasion occurring based at least in part on the first configuration periodicity; and

means for transmitting the payload of the first message in at least one uplink shared data channel occasion, the at least one uplink shared data channel occasion occurring based at least in part on the second configuration periodicity.

34. The apparatus of claim 33, wherein each random access occasion is associated with one or more uplink shared data channel occasions.

35. The apparatus of claim 34, further comprising:

means for identifying the one or more uplink shared data channel occasions associated with each random access occasion based at least in part on a preamble sequence grouping.

36. The apparatus of claim 35, wherein the one or more uplink shared data channel occasions comprise a same modulation and coding scheme, payload size, waveform, or a combination thereof.

37. The apparatus of claim 30, further comprising:

means for determining the second configuration periodicity based at least in part on a periodicity relationship with the first configuration periodicity.

38. The apparatus of claim 37, wherein the periodicity relationship is defined as:

$$T_{RO,2step} = N \times T_{PO,2step},$$

where $T_{RO,2step}$ is the first configuration periodicity associated with the preamble of the first message, $T_{PO,2step}$ is the second configuration periodicity associated with the payload of the first message, and N is a configurable integer greater than or equal to one as indicated in the configuration message.

39. The apparatus of claim 30, further comprising:

means for determining the first configuration periodicity based at least in part on a periodicity relationship with a periodicity of a first message configuration in a four-step random access procedure.

40. The apparatus of claim 39, wherein the periodicity relationship is defined as:

$$T_{RO,2step} = \lambda \times T_{RO,4step},$$

where $T_{RO,2step}$ is the first configuration periodicity associated with the preamble of the first message, $T_{RO,4step}$ is the periodicity of the first message configuration in the four-step random access procedure, and λ is a scaling factor, the scaling factor comprising an integer greater than or equal to one as indicated in the configuration message.

41. The apparatus of claim 30, further comprising:

means for determining the frame for the first configuration periodicity based at least in part on a frame relationship with a periodicity of one or more random access occasions.

42. The apparatus of claim 41, wherein the frame relationship is defined as:

$$(n_{SFN}\ mod\ T_{RO,2step}) = ((y + \Delta y)\ mod\ T_{RO,2step}),$$

where $T_{RO,2step}$ is the first configuration periodicity, n_{SFN} is a frame number for transmission occasions of the preamble and the payload of the first message of the two-step random access procedure, y is a frame number for the one or more random access occasions, and Δy is the time offset in frames.

43. The apparatus of claim 42, further comprising:

means for receiving Δy in the configuration message, an additional configuration message, a system information transmission, or a combination thereof.

44. The apparatus of claim 30, further comprising:

means for determining a subframe or slot for the first configuration periodicity based at least in part on a subframe relationship with a periodicity of one or more random access occasions.

45. The apparatus of claim 44, wherein the subframe relationship is defined as:

$(S_n + \Delta s)\ mod\ L,$

where S_n is a subframe or slot number containing a random access occasions, Δs is a time offset in subframes or slots, and L is a constant denoting a number of subframes or slots in a frame.

46. The apparatus of claim 30, further comprising:

means for identifying a plurality of preamble formats, a transmission gap, or a combination thereof, in the configuration message for the two-step random access procedure;

means for selecting a preamble format from the plurality of preamble formats for transmission of the preamble of the first message; and

means for transmitting the preamble of the first message with the selected preamble format.

47. The apparatus of claim 46, wherein the preamble and the payload of the first message are transmitted within a same slot or on different slots based at least in part on the selected preamble format, the transmission gap, or a combination thereof.

48. The apparatus of claim 30, wherein the preamble and the payload of the first message are transmitted within a same bandwidth, partially overlapping bandwidths, or disjoint bandwidths.

49. An apparatus for wireless communications at a network device, comprising:

means for transmitting, to a user equipment (UE), a configuration message for a two-step random access procedure, the configuration message comprising configuration information for periodic transmission of a preamble and periodic transmission of a payload by the UE, the preamble and the payload associated with a first message of the two-step random access procedure;

means for determining a first configuration periodicity for receiving the preamble based at least in part on the configuration message;

means for determining a frame corresponding to the first configuration periodicity based at least in part on the configuration information indicating a time offset in frames associated with the frame;

means for determining a second configuration periodicity for receiving the payload based at least in part on the configuration message; and

means for receiving, from the UE, the preamble of the first message in the determined frame based at least in part on the first configuration periodicity and the payload of the first message based at least in part on the second configuration periodicity, wherein the first configuration periodicity and the second configuration periodicity are separately configured.

50. The apparatus of claim 49, wherein the means for transmitting the configuration message further comprise:

means for transmitting, to the UE, the configuration message via radio resource control signaling or via a system information transmission.

51. The apparatus of claim 49, further comprising:

means for transmitting, to the UE, a transmission gap in the configuration message, the transmission gap indicating a time duration between transmission of the preamble and transmission of the payload; and

means for receiving, from the UE, the payload of the first message after the transmission gap.

52. The apparatus of claim 49, wherein the means for receiving the preamble and the payload of the first message further comprise:

means for receiving, from the UE, the preamble of the first message in at least one random access occasion, the at least one random access occasion occurring based at least in part on the first configuration periodicity; and

means for receiving, from the UE, the payload of the first message in at least one uplink shared data channel occasion, the at least one uplink shared data channel occasion occurring based at least in part on the second configuration periodicity.

53. The apparatus of claim 49, further comprising:

means for determining the second configuration periodicity based at least in part on a periodicity relationship with the first configuration periodicity.

54. The apparatus of claim 49, further comprising:

means for determining the first configuration periodicity based at least in part on a periodicity relationship with a periodicity of a first message configuration in a four-step random access procedure.

55. The apparatus of claim 49, further comprising:

means for determining the frame for the first configuration periodicity based at least in part on a frame relationship with a periodicity of one or more random access occasions.

56. The apparatus of claim 49, further comprising:

means for determining a subframe or slot for the first configuration periodicity based at least in part on a subframe relationship with a periodicity of one or more random access occasions.

57. The apparatus of claim 49, further comprising:

means for transmitting, to the UE, a plurality of preamble formats, a transmission gap, or a combination thereof, in the configuration message for the two-step random access procedure; and

means for receiving, from the UE, the preamble of the first message with one preamble format from the plurality of preamble formats.

58. The apparatus of claim 49, wherein the preamble and the payload of the first message are received within a same bandwidth, partially overlapping bandwidths, or disjoint bandwidths.

59. An apparatus for wireless communications at 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 configuration message for a two-step random access procedure, the configuration message comprising configuration information for periodic transmission of a preamble and periodic transmission of a payload, the preamble and the payload associated with a first message of the two-step random access procedure;

identify a first configuration periodicity for transmitting the preamble based at least in part on the configuration message;

identify a frame corresponding to the first configuration periodicity based at least in part on the configuration information indicating a time offset in frames associated with the frame;

identify a second configuration periodicity for transmitting the payload based at least in part on the configuration message, wherein the first configuration periodicity and the second configuration periodicity are separately configured; and

transmit the preamble of the first message in the identified frame based at least in part on the first configuration periodicity and the payload of the first message based at least in part on the second configuration periodicity.

60. An apparatus for wireless communications at 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, to a user equipment (UE), a configuration message for a two-step random access procedure, the configuration message comprising configuration information for periodic transmission of a preamble and periodic transmission of a

payload by the UE, the preamble and the payload associated with a first message of the two-step random access procedure;

determine a first configuration periodicity for receiving the preamble based at least in part on the configuration message;

determine a frame corresponding to the first configuration periodicity based at least in part on the configuration information indicating a time offset in frames associated with the frame;

determine a second configuration periodicity for receiving the payload based at least in part on the configuration message; and

receive, from the UE, the preamble of the first message in the determined frame based at least in part on the first configuration periodicity and the payload of the first message based at least in part on the second configuration periodicity, wherein the first configuration periodicity and the second configuration periodicity are separately configured.

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

receive a configuration message for a two-step random access procedure, the configuration message comprising configuration information for periodic transmission of a preamble and periodic transmission of a payload, the preamble and the payload associated with a first message of the two-step random access procedure;

identify a first configuration periodicity for transmitting the preamble based at least in part on the configuration message;

identify a frame corresponding to the first configuration periodicity based at least in part on the configuration information indicating a time offset in frames associated with the frame;

identify a second configuration periodicity for transmitting the payload based at least in part on the configuration message, wherein the first configuration periodicity and the second configuration periodicity are separately configured; and

transmit the preamble of the first message in the identified frame based at least in part on the first configuration periodicity and the payload of the first message based at least in part on the second configuration periodicity.

62. A non-transitory computer-readable medium storing code for wireless communications at a network device, the code comprising instructions executable by a processor to:

transmit, to a user equipment (UE), a configuration message for a two-step random access procedure, the configuration message comprising configuration information for periodic transmission of a preamble and periodic transmission of a payload by the UE, the preamble and the payload associated with a first message of the two-step random access procedure;

determine a first configuration periodicity for receiving the preamble based at least in part on the configuration message;

determine a frame corresponding to the first configuration periodicity based at least in part on the configuration information indicating a time offset in frames associated with the frame;

determine a second configuration periodicity for receiving the payload based at least in part on the configuration message; and

receive, from the UE, the preamble of the first message in the determined frame based at least in part on the first configuration periodicity and the payload of the first message based at least in part on the second configuration periodicity, wherein the first configuration periodicity and the second configuration periodicity are separately configured.