CLAIMS

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

receiving, from a network device, a configuration of random access channel resources for transmission of a random access message that includes a random access preamble and a random access payload;

and

transmitting, to the network device, the random access message based at least in part on a time duration of a transmission gap between an ending time of the random access preamble and a starting time of the random access payload, the time duration of the transmission gap being based at least in part on the configuration of the random access channel resources, and the starting time of the random access payload being aligned with a starting time of a random access occasion time window at the network device based at least in part on the time duration of the transmission gap.

2. The method of claim 1, wherein:

the configuration of the random access channel resources is provided at least in part in one or more of a synchronization signal block (SSB), system information block (SIB), or a reference signal (RS) transmission from the network device.

3. The method of claim 1, wherein:

the random access preamble and the random access payload are transmitted without any adjustment based on a propagation delay of transmissions between the UE and the network device.

4. The method of claim 1, wherein the random access preamble is transmitted in a first transmission slot and the random access payload is transmitted in a second transmission slot that is different than the first transmission slot.

5. The method of claim 1, wherein the random access preamble and the random access payload have one or more of a different sub-carrier spacing (SCS), transmission

power, transmission channel bandwidth, transmission or receiving beam configurations, fast Fourier transform (FFT) sampling rate, or any combinations thereof.

6. The method of claim 1, wherein the determining the time duration of the transmission gap comprises:

selecting an initial transmission gap duration based at least in part on the configuration of the random access channel resources; and

adjusting the initial transmission gap duration based at least in part on a timing adjustment for uplink transmissions from the UE to the network device to obtain the time duration of the transmission gap.

7. The method of claim 6, wherein the adjusting the initial transmission gap duration comprises:

subtracting the timing adjustment from the initial transmission gap duration.

8. The method of claim 6, wherein the selecting the initial transmission gap duration comprises:

identifying a guard time of the random access preamble based at least in part on a random access preamble length configuration;

identifying an error vector measurement (EVM) window of the random access payload based at least in part on the configuration of the random access channel resources; and

selecting the initial transmission gap duration from a set of available transmission gap durations based at least in part on the guard time and the EVM window.

9. The method of claim 8, wherein the set of available transmission gap durations include a plurality of transmission gap durations that are mapped to different combinations of values of the guard time and the EVM window.

10. The method of claim 8, wherein at least a subset of the set of available transmission gap durations are based at least in part on a transient period time mask duration for switching a wireless transmitter at the UE between a power-on state and a power-off state.

11. The method of claim 1, wherein the random access message is transmitted using shared radio frequency spectrum, and wherein the time duration of the transmission gap is

further based on a channel occupancy time of the random access message and an outcome of a listen-before-talk (LBT) procedure.

12. The method of claim 11, wherein at least a subset of a set of available transmission gap durations are based at least in part on the channel occupancy time of the random access message and the outcome of the LBT procedure.

13. The method of claim 1, further comprising:

estimating a propagation delay between the UE and the network device; and

determining a timing adjustment based at least in part on the estimated propagation delay, wherein the time duration of the transmission gap is further based at least in part on the timing adjustment.

14. The method of claim 11, further comprising:

determining whether to adjust the time duration of the transmission gap or both the time duration of the transmission gap and a starting time of the random access preamble based at least in part on one or more measurements of one or more downlink transmissions from the network device.

15. The method of claim 1, further comprising:

decoding one or more of a synchronization signal block (SSB), system information block (SIB), or a reference signal (RS) transmission from the network device;

determining the configuration of the random access channel resources based at least in part on the decoding;

estimating a propagation delay between the UE and the network device based at least in part on one or more of the SSB, SIB, or RS;

determining a timing adjustment based at least in part on the propagation delay;

generating the random access preamble and the random access payload for transmission in the random access message;

inserting the transmission gap between the random access preamble and the random access payload; and

applying the timing adjustment to one or more of the random access preamble or the random access payload.

16. The method of claim 1, wherein the random access message is a first message of a two-step random access procedure, and wherein the method further comprises:

receiving a second message of the two-step random access procedure from the network device responsive to transmitting the first message; and

performing a connection establishment procedure with the network device based at least in part on the second message.

17. An apparatus for wireless communication 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, from a network device, a configuration of random access channel resources for transmission of a random access message that includes a random access preamble and a random access payload;

and

transmit, to the network device, the random access message based at least in part on a time duration of a transmission gap between an ending time of the random access preamble and a starting time of the random access payload, the time duration of the transmission gap being based at least in part on the configuration of the random access channel resources, and the starting time of the random access payload being aligned with a starting time of a random access occasion time window at the network device based at least in part on the time duration of the transmission gap.

18. The apparatus of claim 17, wherein:

the configuration of the random access channel resources is provided at least in part in one or more of a synchronization signal block (SSB), system information block (SIB), or a reference signal (RS) transmission from the network device.

19. The apparatus of claim 17, wherein:

the random access preamble and the random access payload are transmitted without any adjustment based on a propagation delay of transmissions between the UE and the network device.

20. The apparatus of claim 17, wherein the random access preamble is transmitted in a first transmission slot and the random access payload is transmitted in a second transmission slot that is different than the first transmission slot.

21. The apparatus of claim 17, wherein the random access preamble and the random access payload have one or more of a different sub-carrier spacing (SCS), transmission power, transmission channel bandwidth, transmission or receiving beam configurations, fast Fourier transform (FFT) sampling rate, or any combinations thereof.

22. The apparatus of claim 17, wherein the instructions are further executable by the processor to cause the apparatus to:

select an initial transmission gap duration based at least in part on the configuration of the random access channel resources; and

adjust the initial transmission gap duration based at least in part on a timing adjustment for uplink transmissions from the UE to the network device to obtain the time duration of the transmission gap.

23. The apparatus of claim 22, wherein the instructions are further executable by the processor to cause the apparatus to:

subtract the timing adjustment from the initial transmission gap duration.

24. The apparatus of claim 17, wherein the random access message is transmitted using shared radio frequency spectrum, and wherein the time duration of the transmission gap is further based on a channel occupancy time of the random access message and an outcome of a listen-before-talk (LBT) procedure.

25. An apparatus for wireless communication at a user equipment (UE), comprising:

means for receiving, from a network device, a configuration of random access channel resources for transmission of a random access message that includes a random access preamble and a random access payload;

and

means for transmitting, to the network device, the random access message based at least in part on a time duration of a transmission gap between an ending time of the random access preamble and a starting time of the random access payload, the time duration of the transmission gap being based at least in part on the configuration of the random access channel resources, and the starting time of the random access payload being aligned with a starting time of a random access occasion time window at the network device based at least in part on the time duration of the transmission gap.

26. The apparatus of claim 25, wherein:

the configuration of the random access channel resources is provided at least in part in one or more of a synchronization signal block (SSB), system information block (SIB), or a reference signal (RS) transmission from the network device.

27. The apparatus of claim 25, wherein:

the random access preamble and the random access payload are transmitted without any adjustment based on a propagation delay of transmissions between the UE and the network device.

28. The apparatus of claim 25, wherein the random access preamble is transmitted in a first transmission slot and the random access payload is transmitted in a second transmission slot that is different than the first transmission slot.

29. The apparatus of claim 25, wherein the random access preamble and the random access payload have one or more of a different sub-carrier spacing (SCS), transmission power, transmission channel bandwidth, transmission or receiving beam configurations, fast Fourier transform (FFT) sampling rate, or any combinations thereof.