CLAIMS

1. A method for wireless communication at a user equipment, comprising: receiving, from a network entity, a configuration of physical random access channel (PRACH) occasions for a two-step random access procedure, the configuration indicating a quantity of synchronization signal blocks associated with a single PRACH occasion of the PRACH occasions and a quantity of contention-based preambles for each of the synchronization signal blocks per valid PRACH occasion of the PRACH occasions; determining an association between the synchronization signal blocks and a set of PRACH occasions based at least in part on the configuration and an association pattern period of the two-step random access procedure, wherein the association pattern period is based at least in part on a finite range/time domain configured by the network entity; mapping resources of the synchronization signal blocks to the set of PRACH occasions and one or more physical uplink shared channel resource units over PRACH configuration periods of the association pattern period of the two-step random access procedure based at least in part on the association; and performing the two-step random access procedure with the network entity based at least in part on the mapping.

2. The method of claim 1, further comprising: determining, a second association between the synchronization signal blocks and the set of PRACH occasions based at least in part on a second association pattern period of the two-step random access procedure; and mapping the resources of the synchronization signal blocks to the set of PRACH occasions and the one or more physical uplink shared channel resource units over additional PRACH configuration periods of the second association pattern period of the two-step random access procedure.

3. The method of claim 2, wherein the second association over the second association pattern period of the two-step random access procedure is different from the association over the association pattern period of the two-step random access procedure.

4. The method of claim 1, wherein receiving, from the network entity, the configuration, further comprises: receiving, from the network entity, signaling that includes the configuration, wherein the signaling comprises system information signaling, radio resource control signaling, or both.

5. The method of claim 1, further comprising: determining the association between the synchronization signal blocks and the set of PRACH occasions based at least in part on a PRACH occasion index of the one or more PRACH occasions, wherein the configuration comprises the PRACH occasion index.

6. The method of claim 1, further comprising: determining the association between the synchronization signal blocks and the set of PRACH occasions based at least in part on a preamble sequence of a random access preamble, wherein the configuration comprises the preamble sequence.

7. The method of claim 1, further comprising: determining the association between the synchronization signal blocks and the set of PRACH occasions based at least in part on a physical uplink shared channel resource unit index associated with the one or more physical uplink shared channel resource units, wherein the configuration comprises the physical uplink shared channel resource unit index.

8. The method of claim 1, wherein the set of PRACH occasions and the one or more physical uplink shared channel resource units are associated with different synchronization signal blocks of the synchronization signal blocks based at least in part on a quantity of symbols between the set of PRACH occasions and the one or more physical uplink shared channel resource units.

9. The method of claim 8, wherein the quantity of symbols between the set of PRACH occasions and the one or more physical uplink shared channel resource units is configured by the network entity.

10. The method of claim 1, further comprising: determining that the one or more physical uplink shared channel resource units share one or more of time resources and frequency resources; and determining a mapping between the one or more physical uplink shared channel resource units sharing one or more of the time resources and the frequency resources and a synchronization signal block of the synchronization signal blocks or a portion of synchronization signal blocks of the synchronization signal blocks, wherein the portion of synchronization signal blocks of the synchronization signal blocks are grouped.

11. The method of claim 10, wherein determining the mapping between the one or more physical uplink shared channel resource units sharing one or more of the time

resources and the frequency resources, and the synchronization signal block of the synchronization signal blocks or the portion of synchronization signal blocks of the synchronization signal blocks comprises: mapping the one or more physical uplink shared channel resource units sharing one or more of the time resources and the frequency resources to the synchronization signal block of the synchronization signal blocks based at least in part on an analog beam forming capability.

12. The method of claim 10, wherein determining the mapping between the one or more physical uplink shared channel resource units sharing one or more of the time resources and the frequency resources, and the synchronization signal block of the synchronization signal blocks or the portion of synchronization signal blocks of the synchronization signal blocks comprises: mapping the one or more physical uplink shared channel resource units sharing one or more of the time resources and the frequency resources to the portion of synchronization signal blocks of the synchronization signal blocks based at least in part on a digital beam forming capability.

13. The method of claim 1, further comprising: determining that the one or more PRACH occasions of the two-step random access procedure are shared with a four-step random access procedure based at least in part on a UE capability, a random access procedure fallback capability, a load balancing capability, or a multiplexing of contention-free random access and contention-based random access, or any combination thereof.

14. The method of claim 1, further comprising: determining that a number of synchronization signal blocks satisfies a threshold; and determining that a random access preamble of a random access message of the two-step random access procedure and a random access message of a four-step random access procedure are configured with different subsets of preamble sequences.

15. The method of claim 14, wherein an index of preamble sequences in each subset of the subsets of preamble sequences are consecutive.

16. The method of claim 14, wherein preamble sequences in each subset of the subsets of preamble sequences are nonoverlapping.

17. The method of claim 1, further comprising: determining that number of synchronization signal blocks is greater than a threshold, wherein the number of

synchronization signal blocks are mapped to same PRACH occasions of the one or more PRACH occasions shared between a random access preamble of the two-step random access procedure and a random access message of a four-step random access procedure.

18. The method of claim 17, wherein the number of synchronization signal blocks have different transmit beams.

19. The method of claim 17, wherein the random access preamble of the two-step random access procedure and the random access message of the four-step random access procedure are mapped to different synchronization signal blocks of the number of synchronization signal blocks.

20. The method of claim 19, wherein a portion of the number of synchronization signal blocks mapped to the random access preamble of the two-step random access procedure are one or more of consecutive in time domain or nonconsecutive in the time domain.

21. The method of claim 19, wherein transmit beams mapped to the random access preamble of the two-step random access procedure and the random access message of the four-step random access procedure have a same or different preamble sequence size based at least in part on a spatial separation of the transmit beams mapped to the random access preamble of the two-step random access procedure and the random access message of the four-step random access procedure.

22. The method of claim 19, wherein the random access preamble of the random access message of the two-step random access procedure and the random access message of the four-step random access procedure have different receive beams.

23. A method for wireless communication at a network entity, comprising: outputting a configuration of physical random access channel (PRACH) occasions for a two-step random access procedure, the configuration indicating a quantity of synchronization signal blocks associated with a single PRACH occasion of the PRACH occasions and a quantity of contention-based preambles for each of the synchronization signal blocks per valid PRACH occasion of the PRACH occasions; determining an association between the synchronization signal blocks and a set of PRACH occasions based at least in part on the configuration and an association pattern period of the two-step random access procedure,

wherein the association pattern period is based at least in part on a finite range/time domain configured by the network entity; mapping resources of the synchronization signal blocks to the set of PRACH occasions and one or more physical uplink shared channel resource units over PRACH configuration periods of the association pattern period of the two-step random access procedure based at least in part on the association; and performing the two-step random access procedure with a user equipment based at least in part on the mapping.

24. The method of claim 23, wherein outputting the configuration comprises: outputting signaling comprising the configuration indicating the quantity of synchronization signal blocks associated with the single PRACH occasion of the PRACH occasions and the quantity of contention-based preambles for each of the synchronization signal blocks per valid PRACH occasion of the PRACH occasions, wherein the signaling comprises system information signaling or radio resource control signaling, or both.

25. The method of claim 23, wherein the set of PRACH occasions and the one or more physical uplink shared channel resource units are associated with different synchronization signal blocks of the synchronization signal blocks based at least in part on a quantity of symbols between the set of PRACH occasions and the one or more physical uplink shared channel resource units.

26. The method of claim 23, further comprising: determining that the one or more physical uplink shared channel resource units share one or more of time resources and frequency resources; and determining a mapping between the one or more physical uplink shared channel resource units sharing one or more of the time resources and the frequency resources and a synchronization signal block of the synchronization signal blocks or a portion of synchronization signal blocks of the synchronization signal blocks, wherein the portion of synchronization signal blocks of the synchronization signal blocks are grouped.

27. The method of claim 26, wherein determining the mapping between the one or more physical uplink shared channel resource units sharing one or more of the time resources and the frequency resources, and the synchronization signal block of the synchronization signal blocks or the portion of synchronization signal blocks of the synchronization signal blocks comprises: mapping the one or more physical uplink shared channel resource units sharing one or more of the time resources and the frequency resources

to the synchronization signal block of the synchronization signal blocks based at least in part on an analog beam forming capability.

28. An apparatus for wireless communication, comprising: one or more processors, one or more memories coupled with the one or more processors; and instructions stored in the one or more memories and individually or collectively executable by the one or more processors to cause the apparatus to: receive, from a network entity, a configuration of physical random access channel (PRACH) occasions for a two-step random access procedure, the configuration indicating a quantity of synchronization signal blocks associated with a single PRACH occasion of the PRACH occasions and a quantity of contention-based preambles for each of the synchronization signal blocks per valid PRACH occasion of the PRACH occasions; determine an association between the synchronization signal blocks and a set of PRACH occasions based at least in part on the configuration and an association pattern period of the two-step random access procedure, wherein the association pattern period is based at least in part on a finite range/time domain configured by the network entity; map resources of the synchronization signal blocks to the set of PRACH occasions and one or more physical uplink shared channel resource units over PRACH configuration periods of the association pattern period of the two-step random access procedure based at least in part on the association; and perform the two-step random access procedure with the network entity based at least in part on the mapping.

29. The apparatus of claim 28, wherein instructions are further individually or collectively executable by the one or more processors to cause the apparatus to: determine, a second association between the synchronization signal blocks and the set of PRACH occasions based at least in part on a second association pattern period of the two-step random access procedure; and map the resources of the synchronization signal blocks to the set of PRACH occasions and the one or more physical uplink shared channel resource units over additional PRACH configuration periods of the second association pattern period of the two-step random access procedure.

30. An apparatus for wireless communication, comprising: one or more processors, one or more memories coupled with the one or more processors; and instructions stored in the one or more memories and individually or collectively executable by the one or more processors to cause the apparatus to: output a configuration of physical random access channel (PRACH) occasions for a two-step random access procedure, the configuration

indicating a quantity of synchronization signal blocks associated with a single PRACH occasion of the PRACH occasions and a quantity of contention-based preambles for each of the synchronization signal blocks per valid PRACH occasion of the PRACH occasions; determine an association between the synchronization signal blocks and a set of PRACH occasions based at least in part on the configuration and an association pattern period of the two-step random access procedure, wherein the association pattern period is based at least in part on a finite range/time domain configured by a network entity; map resources of the synchronization signal blocks to the set of PRACH occasions and one or more physical uplink shared channel resource units over PRACH configuration periods of the association pattern period of the two-step random access procedure based at least in part on the association; and perform the two-step random access procedure with a user equipment based at least in part on the mapping.