

CLAIMS

1. A method of wireless communication by a user equipment (UE), the method comprising: receiving configuration information from a base station, the configuration information indicating at least two different random access channel (RACH) request configuration parameters, wherein each of the RACH request configuration parameters is associated with a respective radio resource control (RRC) state; generating a first message associated with a two-step RACH procedure including a preamble and a payload, the payload including data on an uplink data channel and at least one reference signal; determining at least one power control scheme for transmission of the first message based on a modulation and coding scheme (MCS) and bandwidth configured for the payload, wherein the at least one power control scheme is indicated in the at least two different RACH request configuration parameters; and transmitting the first message to the base station using at least one of the at least two different RACH request configuration parameters that corresponds to an RRC state of the UE, the preamble being transmitted on a first set of resources associated with a RACH occasion and the payload being transmitted on a second set of resources.
2. The method of claim 1, wherein the uplink data channel comprises a physical uplink shared channel (PUSCH), and the at least one reference signal comprises a demodulation reference signal (DMRS).
3. The method of claim 1, wherein the configuration information is included in at least one of a system information block (SIB) or a RRC message from the base station.
4. The method of claim 1, wherein the preamble and the payload are transmitted using different power control schemes indicated by the at least one of the at least two different RACH request configuration parameters.
5. The method of claim 1, wherein the first message comprises a time gap between the preamble and the payload, and the time gap comprises a configurable number of slots or symbols between the preamble and the payload.
6. The method of claim 1, wherein the preamble indicates at least one of a size of the payload or the modulation and coding scheme (MCS) configured for the payload.
7. The method of claim 1, wherein the configuration information indicates at least one configuration in a time domain, a frequency domain, or a spatial domain for the first set of resources associated with the RACH occasion.

8. The method of claim 7, where the configuration information indicates at least one of: a physical RACH (PRACH) configuration index associated with at least one RACH occasion configuration in the time domain, a number of RACH occasions available for the two-step RACH procedure associated with the at least one configuration in the frequency domain, a starting frequency resource associated with the RACH occasions, a number of preamble sequences per synchronization signal (SS)/physical broadcast channel (PBCH) block, or a number of SS/PBCH blocks associated with each of the RACH occasions.
9. The method of claim 1, wherein the RRC state of the UE is associated with at least one of a size of the payload or the modulation and coding scheme (MCS) configured for the payload.
10. The method of claim 1, wherein at least one of a sequence length associated with the preamble or a subcarrier spacing associated with the transmitting the first message is based on at least one of a type of a cell operated by the base station or the RRC state of the UE.
11. The method of claim 1, wherein: the preamble occupies a different bandwidth portion than the payload, the preamble is transmitted with a different target power or a different power ramping step size than the payload, the preamble is transmitted via a different beam pair than the payload, or the preamble is transmitted with a different subcarrier spacing than the payload.
12. The method of claim 1, further comprising: receiving a second message associated with the two-step RACH procedure from the base station in response to the first message, wherein the second message includes control information on a downlink control channel and data on a downlink data channel.
13. The method of claim 12, wherein the first message comprises a msgA initiating the two-step RACH procedure and the second message comprises a msgB enabling completion of the two-step RACH procedure.
14. An apparatus for wireless communication by a user equipment (UE), the apparatus comprising: a memory; and at least one processor coupled to the memory and configured to: receive configuration information from a base station, the configuration information indicating at least two different random access channel (RACH) request configuration parameters, wherein each of the RACH request configuration parameters is associated with a respective radio resource control (RRC) state; generate a first message associated with a two-step RACH procedure including a preamble and a payload, the payload including data on an uplink data channel and at least one reference signal; determine at least one power control scheme for transmission of the first message based on a modulation and coding scheme (MCS) and bandwidth configured for the payload, wherein the at least one power control scheme is indicated in the at least two different RACH request configuration parameters; and transmit the first

message to the base station using at least one of the at least two different RACH request configuration parameters that corresponds to an RRC state of the UE, the preamble being transmitted on a first set of resources associated with a RACH occasion and the payload being transmitted on a second set of resources.

15. The apparatus of claim 14, wherein the uplink data channel comprises a physical uplink shared channel (PUSCH), and the at least one reference signal comprises a demodulation reference signal (DMRS).

16. The apparatus of claim 14, wherein the configuration information is included in at least one of a system information block (SIB) or a radio resource control (RRC) message from the base station.

17. The apparatus of claim 14, wherein the preamble and the payload are transmitted using different power control schemes indicated by the at least one of the at least two different RACH request configuration parameters.

18. The apparatus of claim 14, wherein the first message comprises a time gap between the preamble and the payload, and the time gap comprises a configurable number of slots or symbols between the preamble and the payload.

19. The apparatus of claim 14, wherein the preamble indicates at least one of a size of the payload or the modulation and coding scheme (MCS) configured for the payload.

20. The apparatus of claim 14, wherein the configuration information indicates at least one configuration in a time domain, a frequency domain, or a spatial domain for the first set of resources associated with the RACH occasion.

21. The apparatus of claim 20, where the configuration information indicates at least one of: a physical RACH (PRACH) configuration index associated with at least one RACH occasion configuration in the time domain, a number of RACH occasions available for the two-step RACH procedure associated with the at least one configuration in the frequency domain, a starting frequency resource associated with the RACH occasions, a number of preamble sequences per synchronization signal (SS)/physical broadcast channel (PBCH) block, or a number of SS/PBCH blocks associated with each of the RACH occasions.

22. The apparatus of claim 14, wherein the RRC state of the UE is associated with at least one of a size of the payload or the modulation and coding scheme (MCS) configured for the payload.

23. The apparatus of claim 14, wherein at least one of a sequence length associated with the preamble or a subcarrier spacing associated with the transmission of the first message is based on at least one of a type of a cell operated by the base station or the RRC state of the UE.

24. An apparatus for wireless communication by a user equipment (UE), the apparatus comprising: means for receiving configuration information from a base station, the configuration information indicating at least two different random access channel (RACH) request configuration parameters, wherein each of the RACH request configuration parameters is associated with a respective radio resource control (RRC) state; means for generating a first message associated with a two-step RACH procedure including a preamble and a payload, the payload including data on an uplink data channel and at least one reference signal; means for determining at least one power control scheme for transmission of the first message based on a modulation and coding scheme (MCS) and bandwidth configured for the payload, wherein the at least one power control scheme is indicated in the at least two different RACH request configuration parameters; and means for transmitting the first message to the base station using at least one of the at least two different RACH request configuration parameters that corresponds to an RRC state of the UE, the preamble being transmitted on a first set of resources associated with a RACH occasion and the payload being transmitted on a second set of resources.

25. The apparatus of claim 24, wherein the uplink data channel comprises a physical uplink shared channel (PUSCH), and the at least one reference signal comprises a demodulation reference signal (DMRS).

26. The apparatus of claim 24, wherein the configuration information is included in at least one of a system information block (SIB) or a radio resource control (RRC) message from the base station.

27. A non-transitory computer-readable medium storing computer executable code for wireless communication by a user equipment (UE), the code when executed by a processor cause the processor to: receive configuration information from a base station, the configuration information indicating at least two different random access channel (RACH) request configuration parameters, wherein each of the RACH request configuration parameters is associated with a respective radio resource control (RRC) state; generate a first message associated with a two-step RACH procedure including a preamble and a payload, the payload including data on an uplink data channel and at least one reference signal; determine at least one power control scheme for transmission of the first message based on a modulation and coding scheme (MCS) and bandwidth configured for the payload, wherein the at least one power control scheme is indicated in the at least two different RACH request configuration parameters; and transmit the first message to the base station using at least one of the at least two different RACH request configuration parameters that corresponds to an RRC state of the UE, the preamble being

transmitted on a first set of resources associated with a RACH occasion and the payload being transmitted on a second set of resources.