

## CLAIMS

**What is claimed is:**

CLAIMS

1. A method for wireless communication at a user equipment (UE), comprising:
  - identifying that the UE is configured to use a two-step random access channel (RACH) procedure, the two-step RACH procedure including an uplink request message and a downlink response;
  - generating a preamble sequence that is one of a set of predefined cyclic sequences associated with two-step RACH procedures;
  - transmitting the uplink request message as part of the two-step RACH procedure, in accordance with a message configuration,
  - wherein the uplink request message including includes a preamble portion that is one of a plurality of predefined sequences comprising a first cyclic prefix and repetitions of the generated preamble sequence in succession with the first cyclic prefix, and
  - wherein the uplink request message includes a payload portion that comprises a waveform of second cyclic prefix and a physical uplink shared channel;
  - wherein the preamble portion is associated with a transmission occasion of the physical uplink shared channel; demodulation reference signal (DMRS) and the UE,
  - and receiving the downlink response as part of the two-step RACH procedure and in response to the uplink request message.
2. The method of claim 1, further comprising:
  - receiving an indication of the preamble portion before transmitting the uplink request message.
3. The method of claim 1, wherein transmitting the uplink request message comprises:
  - transmitting the payload portion using a payload size that is based, at least in part, on whether the two-step RACH procedure is for initial access or for handover.

4. The method of claim 1, wherein transmitting the uplink request message comprises:

transmitting the payload portion using a fixed payload size.

5. The method of claim ~~1~~, ~~wherein transmitting 1~~, further comprising:  
receiving a mapping between the uplink request message comprises:  
transmitting the generated preamble portion sequence of the uplink request  
message back to back with set of predefined cyclic sequences and a transmission occasion for  
the payload portion of; and

selecting the transmission occasion based on the uplink request message  
~~without use of cyclic prefixes~~ mapping between resource elements of the generated preamble  
portion sequence of the set of predefined cyclic sequences and the transmission occasion.

6. The method of claim ~~1~~, ~~further comprising:~~  
~~receiving, via remaining minimum system information or radio resource~~  
~~control signaling, an association between the preamble portion of the uplink request message~~  
~~and the payload portion of the uplink request message.~~

~~7. The method of claim 6, 5,~~ wherein transmitting the uplink request message comprises:

transmitting the preamble portion of the uplink request message during a first transmission time interval; and

transmitting, in accordance with the received ~~association~~ mapping, the payload portion of the uplink request message during the transmission occasion comprising a second transmission time interval.

~~8. 7.~~ The method of claim ~~7, 6,~~ wherein transmitting the uplink request message further comprises:

transmitting the preamble portion of the uplink request message and the payload portion of the uplink request message without an intervening transmission time interval between the first transmission time interval and the second transmission time interval.

9.—~~8.~~ The method of claim ~~7~~,6, wherein transmitting the uplink request message further comprises:

transmitting the preamble portion of the uplink request message and the payload portion of the uplink request message with an intervening transmission time interval between the first transmission time interval and the second transmission time interval, wherein the intervening transmission time interval is available for non-RACH transmissions.

~~109.~~ The method of claim ~~1~~, ~~further comprising: 1,~~  
~~selecting a preamble sequence from wherein the set of predefined cyclic sequences is part of a plurality of predefined sequences for transmission of the preamble portion of the uplink request message, and~~ wherein only a portion of the plurality of predefined sequences are associated with two-step RACH procedures.

~~11.—10.~~ The method of claim ~~1~~, ~~further comprising: 1,~~  
~~selecting a preamble sequence from the plurality of predefined sequences for transmission of the preamble portion of the uplink request message, wherein the selected~~ wherein the generated preamble sequence shares a resource association with another preamble sequence of the ~~plurality~~ set of predefined cyclic sequences; and, the method further comprising:

applying an additional differentiating factor to the uplink request message to allow differentiation of the payload portion of the uplink request message.

~~1211.~~ The method of claim ~~11~~,10, wherein the additional differentiating factor is one or more of use of different demodulation reference signal ports or use of different scrambling identifications.

~~13.—12.~~ The method of claim ~~1~~, ~~further comprising:~~  
~~selecting a preamble sequence from the plurality of predefined sequences for transmission of the preamble portion of the uplink request message~~1, wherein the selected preamble sequence has a resource association with more than one payload resource; and  
~~applying an additional identifying factor to the uplink request message to allow identification of the payload portion of the uplink request message.~~

~~14.—The method of claim 13, wherein the additional identifying factor is one or more of use of different demodulation reference signal ports or use of different scrambling identifications.~~

~~15.—The method of claim 1, wherein transmitting the uplink request message comprises:~~

~~transmitting the payload portion during a time resource that is time-multiplexed with ~~payload~~payloads portions from additional UEs.~~

~~16.—The method of claim 1, wherein transmitting the uplink request message comprises:~~

~~transmitting the payload portion during a time resource that is code division-multiplexed with payload portions from additional UEs.~~

~~17.—~~13. A method for wireless communication at a base station, comprising:

receiving, as part of a two-step random access channel (RACH) procedure, an uplink request message from a user equipment (UE); ~~the uplink request message including a preamble portion that is one of a plurality of predefined sequences and a payload portion that comprises a waveform of a physical uplink shared channel, wherein the preamble portion is associated with a transmission occasion of the physical uplink shared channel; and) in accordance with a message configuration,~~

wherein the uplink request message includes a preamble portion comprising a first cyclic prefix preceding repetitions of a preamble sequence that is one of a set of predefined cyclic sequences associated with two-step RACH procedures, and

wherein the uplink request message includes a payload portion that comprises a second cyclic prefix and a physical uplink shared channel associated with a demodulation reference signal (DMRS) and the UE,

and transmitting a downlink response as part of the two-step RACH procedure and in response to the uplink request message.

~~18~~14. The method of claim ~~17~~,13, further comprising:  
transmitting an indication of the preamble portion to the UE before receiving the uplink request message.

~~19~~.—~~15~~. The method of claim ~~17~~,13, wherein receiving the uplink request message comprises:

receiving the payload portion using a payload size that is based, at least in part, on whether the two-step RACH procedure is for initial access or for handover.

~~20~~.—~~16~~. The method of claim ~~17~~,13, wherein receiving the uplink request message comprises:

receiving the payload portion using a fixed payload size.

~~21~~17. The method of claim ~~17~~, wherein receiving the uplink request message comprises:

receiving the preamble portion of the uplink request message back-to-back with the payload portion of the uplink request message without use of cyclic prefixes between resource elements of the preamble portion.

~~22~~.—The method of claim ~~17~~,13, further comprising:  
transmitting, via ~~remaining minimum system information or radio resource control signaling, an association~~ a mapping between the preamble ~~portion~~ sequence of the uplink request ~~messageset of predefined cyclic sequences and the payload portion of the uplink request message~~ a transmission occasion, wherein the preamble sequence indicates the transmission occasion based at least in part on the mapping.

~~23~~.—~~18~~. The method of claim ~~22~~,17, wherein receiving the uplink request message comprises:

receiving the preamble portion of the uplink request message during a first transmission time interval; and

receiving, in accordance with the transmitted ~~association~~ mapping, the payload portion of the uplink request message during a second transmission time interval.

~~24~~19. The method of claim ~~17~~,13, wherein ~~receiving the uplink request message further comprises:~~

~~receiving in the preamble portion a preamble sequence is selected from the set of predefined cyclic sequences, which is part of a plurality of predefined sequences, wherein only a portion of the plurality of predefined sequences are associated with two-step RACH procedures.~~

~~25. — 20. —~~ The method of claim ~~17~~,13, wherein ~~receiving the uplink request message further comprises:~~

~~receiving in the preamble portion a preamble sequence is selected from the plurality set of predefined cyclic sequences, and wherein the selected preamble sequence shares a resource association with another preamble sequence of the plurality set of predefined cyclic sequences; and, the method further comprising:~~

~~differentiating the payload portion of the uplink request message via a differentiating factor.~~

~~26~~21. The method of claim ~~25~~,20, wherein the differentiating factor is one or more of use of different demodulation reference signal ports or use of different scrambling identifications.

~~27. — 22. —~~ The method of claim ~~17~~,13, wherein ~~receiving the uplink request message further comprises:~~

~~receiving in the preamble portion a preamble sequence is selected from the plurality set of predefined cyclic sequences, and wherein the selected preamble sequence has a resource association with more than one payload resource; and, the method further comprising:~~

~~identifying the payload portion of the uplink request message via an identifying factor.~~

~~28~~23. The method of claim ~~27~~,22, wherein the identifying factor is one or more of use of different ~~demodulation reference signal~~DMRS ports or use of different scrambling identifications.

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

~~means for identifying 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:~~

~~identify that the UE is configured to use a two-step random access channel (RACH) procedure, the two-step RACH procedure including an uplink request message and a downlink response;~~

~~means for transmitting generate a preamble sequence that is one of a set of predefined cyclic sequences associated with two-step RACH procedures;~~

~~transmit the uplink request message as part of the two-step RACH procedure, in accordance with a message configuration,~~

~~wherein the uplink request message including includes a preamble portion that is one of a plurality of predefined sequences comprising a first cyclic prefix and repetitions of the generated preamble sequence in succession with the first cyclic prefix, and~~

~~wherein the uplink request message includes a payload portion that comprises a waveform of second cyclic prefix and a physical uplink shared channel; wherein the preamble portion is associated with a transmission occasion of the physical uplink shared channel; demodulation reference signal (DMRS) and the UE,~~

~~means for receiving; and~~

~~receive the downlink response as part of the two-step RACH procedure and in response to the uplink request message.~~

25. The apparatus of claim 24, wherein the instructions are further executable by the processor to cause the apparatus to:

receive an indication of the preamble portion before transmitting the uplink request message.

26. The apparatus of claim 24, wherein the instructions to transmit the uplink request message are executable by the processor to cause the apparatus to:

transmit the payload portion using a payload size that is based, at least in part, on whether the two-step RACH procedure is for initial access or for handover.

27. The apparatus of claim 24, wherein the instructions to transmit the uplink request message are executable by the processor to cause the apparatus to:  
transmit the payload portion using a fixed payload size.

28. The apparatus of claim 24, wherein the instructions are further executable by the processor to cause the apparatus to:  
receive a mapping between the generated preamble sequence of the set of predefined cyclic sequences and a transmission occasion for the payload portion; and  
select the transmission occasion based on the mapping between the generated preamble sequence of the set of predefined cyclic sequences and the transmission occasion.

29. The apparatus of claim 28, wherein the instructions to transmit the uplink request message are executable by the processor to cause the apparatus to:  
transmit the preamble portion of the uplink request message during a first transmission time interval; and  
transmit, in accordance with the received mapping, the payload portion of the uplink request message during a second transmission time interval.

30. An apparatus for wireless communication at a base station, comprising:  
means for receiving 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, as part of a two-step random access channel (RACH) procedure, an uplink request message from a user equipment (UE), in accordance with a message configuration.

wherein the uplink request message including includes a preamble portion comprising a first cyclic prefix preceding repetitions of a preamble sequence that is one of a plurality set of predefined cyclic sequences associated with two-step RACH procedures, and

wherein the uplink request message includes a payload portion that comprises a waveform of second cyclic prefix and a physical uplink shared channel; wherein the preamble portion is associated with a transmission occasion of the physical uplink shared channel; demodulation reference signal (DMRS) and the UE,

~~means for transmitting~~ and transmit a downlink response as part of the two-step RACH procedure and in response to the uplink request message.

31. The method of claim 1, wherein:

a first preamble resource element of the preamble portion includes the first cyclic prefix;

the first cyclic prefix is not preceded by another cyclic prefix of the preamble portion; and

subsequent preamble resource elements of the preamble portion do not include the first cyclic prefix or another cyclic prefix.