

## CLAIMS

**What is claimed is:**

- 1                   1.       A method for wireless communication at a user equipment (UE),  
2    comprising:  
3                    identifying that a scheduling request (SR) is to be transmitted on a first uplink  
4    control channel message having a first transmission time interval (TTI) duration;  
5                    identifying that acknowledgment/negative acknowledgment (ACK/NACK)  
6    information is scheduled for transmission on a second uplink control channel message having  
7    a second TTI duration that is greater than the first TTI duration, wherein the first uplink  
8    control channel message and the second uplink control channel message overlap in time;  
9                    determining that the ACK/NACK information is to be transmitted with the SR  
10   on the first uplink control channel message based at least in part on the first uplink control  
11   channel message overlapping with the second uplink control channel message ;  
12                   determining resources of the first uplink control channel message to be used  
13   for transmission of the SR and the ACK/NACK information; and  
14                   transmitting the SR and the ACK/NACK information on the determined  
15   resources of the first uplink control channel message.
- 1                   2.       The method of claim 1, further comprising:  
1                    determining a format of the first uplink control channel message based at least  
2    in part on a size of the ACK/NACK information, wherein the format of the first uplink  
3    control channel message corresponds to a plurality of resources; and  
4                    identifying an SR configuration that indicates first resources from the plurality  
5    of resources for transmitting the SR and the ACK/NACK information in accordance with the  
6    format, wherein the determined resources comprise the first resources.
- 1                   3.       The method of claim 2, wherein the ACK/NACK information is  
2    associated with communications using the second TTI duration.
- 1                   4.       The method of claim 2, wherein determining the format of the first  
2    uplink control channel message comprises:  
3                    identifying the format based at least in part on the first TTI duration, wherein  
4    the first TTI duration comprises one of a slot or a duration less than the slot, and wherein the

5 format comprises a short physical uplink control channel (sPUCCH) format 3 or an sPUCCH  
6 format 4.

1 5. The method of claim 2, wherein identifying the SR configuration  
2 comprises:

3 identifying the SR configuration from a set of configurations for the  
4 transmission of the ACK/NACK information, or the SR, or a combination thereof.

1 6. The method of claim 5, wherein a first configuration from the set of  
2 configurations comprises an indication of whether the SR is to be transmitted on the first  
3 uplink control channel message or the second uplink control channel message.

1 7. The method of claim 5, wherein a second configuration from the set of  
2 configurations indicates whether the transmission of SR is to be deferred.

1 8. The method of claim 5, wherein a third configuration from the set of  
2 configurations indicates that the second uplink control channel message is to be dropped.

1 9. The method of claim 5, wherein a fourth configuration from the set of  
2 configurations indicates that the second uplink control channel message and the ACK/NACK  
3 information is to be dropped.

1 10. The method of claim 2, wherein the SR configuration is received via  
2 downlink control information (DCI), radio resource control (RRC) messaging, or a  
3 combination thereof.

1 11. The method of claim 2, wherein the SR configuration is preconfigured.

1 12. The method of claim 1, further comprising:  
2 determining that a size of the ACK/NACK information is greater than two  
3 bits.

1 13. The method of claim 1, further comprising:  
2 determining a format of the first uplink control channel message based at least  
3 in part on a size of the ACK/NACK information, wherein the format of the first uplink  
4 control channel message corresponds to a plurality of resources; and

5 identifying an SR configuration that indicates two or more resources from the  
6 plurality of resources to be used for transmitting the SR and the ACK/NACK information in  
7 accordance with the format, wherein the determined resources are selected from the two or  
8 more resources based on the SR configuration.

1 14. The method of claim 13, further comprising:  
2 identifying a coding rate threshold for the resources of the first uplink control  
3 channel message, wherein determining the resources of the first uplink control channel  
4 message comprises:  
5 determining the resources from the two or more resources based at least in part  
6 on the coding rate threshold, the size of the ACK/NACK information, and a number of cyclic  
7 redundancy check (CRC) bits.

1 15. The method of claim 14, further comprising:  
2 selecting, from the two or more resources, a first resource for transmitting the  
3 SR and the ACK/NACK information such that a coding rate of the first resource satisfies the  
4 coding rate threshold based on a payload size of the first resource, wherein the first resource  
5 is a smallest resource of the two or more resources.

1 16. The method of claim 14, further comprising:  
2 selecting, from the two or more resources, a first resource for transmitting the  
3 SR and the ACK/NACK information;  
4 determining that the first resource does not satisfy the coding rate threshold  
5 based on a payload size of the first resource; and  
6 selecting, from the two or more resources, a second resource such that a  
7 coding rate of the second resource satisfies the coding rate threshold, wherein the second  
8 resource is larger than the first resource.

1 17. The method of claim 16, wherein each of the two or more resources are  
2 mapped to a number of resource blocks (RBs).

1 18. The method of claim 16, wherein determining the format of the first  
2 uplink control channel message comprises:  
3 identifying the format based at least in part on the first TTI duration, wherein  
4 the first TTI duration comprises one of a slot or a duration less than the slot, and wherein the

5 format comprises a short physical uplink control channel (sPUCCH) format 3 or an sPUCCH  
6 format 4.

1 19. The method of claim 1, further comprising:  
2 determining a format of the first uplink control channel message based at least  
3 in part on a size of the ACK/NACK information, wherein the format of the first uplink  
4 control channel message corresponds to a plurality of resources; and  
5 identifying a most recent instance of the first uplink control channel message  
6 having the determined format that was indicated to the UE, wherein determining the  
7 resources of the first uplink control channel message to be used for transmission of the SR  
8 and the ACK/NACK information is based at least in part on the most recent instance, or the  
9 determined format, or a combination thereof.

1 20. The method of claim 19, wherein determining the format of the first  
2 uplink control channel message comprises:  
3 identifying a format configuration for the resources based at least in part on  
4 the first TTI duration, the first TTI duration comprising a slot or duration less than the slot,  
5 and wherein the format comprises a short physical uplink control channel (sPUCCH) format  
6 3 or an sPUCCH format 4.

1 21. The method of claim 1, further comprising:  
2 determining an absence of downlink control information (DCI) comprising an  
3 ACK/NACK resource indicator (ARI) for the first uplink control channel message, wherein  
4 determining the resources of the first uplink control channel message to be used for  
5 transmission of the SR and the ACK/NACK information is based on the absence of the DCI.

1 22. The method of claim 1, further comprising:  
2 receiving an SR configuration that indicates the SR is to be transmitted on the  
3 first uplink control channel message.

1 23. A method for wireless communication at a user equipment (UE),  
2 comprising:  
3 receiving an indication of a plurality of control channel resources of an uplink  
4 control channel to be used for an uplink control message;  
5 identifying a coding rate threshold for the uplink control message;  
6 determining a payload size of the uplink control message;

7                   selecting, from the plurality of control channel resources, a control channel  
8 resource based at least in part on the coding rate threshold and the determined payload size of  
9 the uplink control message; and  
10                   transmitting the uplink control message to a base station using the selected  
11 control channel resource.

1                   24.     The method of claim 23, wherein selecting the control channel  
2 resource comprises:  
3                   selecting the control channel resource based at least in part on the coding rate  
4 threshold, a size of acknowledgment/negative acknowledgment (ACK/NACK) information  
5 within the uplink control message, and a number of cyclic redundancy check (CRC) bits for  
6 the uplink control message.

1                   25.     The method of claim 23, wherein selecting the control channel  
2 resource comprises:  
3                   selecting the control channel resource such that a coding rate of the control  
4 channel resource satisfies the coding rate threshold, wherein the control channel resource is a  
5 smallest resource of the plurality of control channel resources.

1                   26.     The method of claim 23, wherein selecting the control channel  
2 resource comprises:  
3                   selecting the control channel resource from the plurality of control channel  
4 resources;  
5                   determining that the control channel resource does not satisfy the coding rate  
6 threshold based on the payload size of the uplink control message; and  
7                   selecting, from the plurality of control channel resources, a second control  
8 channel resource such that a coding rate of the second control channel resource satisfies the  
9 coding rate threshold, wherein the second control channel resource is larger than the control  
10 channel resource.

1                   27.     The method of claim 23, further comprising:  
2                   receiving an indication of which of the plurality of control channel resources  
3 to use for the uplink control message, wherein the indication is received via an  
4 acknowledgment (ACK/NACK) resource indicator of downlink control information (DCI).

1                   28.     The method of claim 23, wherein a format of the uplink control  
2 message is a short physical uplink control channel (sPUCCH) format 4.

1                   29.     A method for wireless communication at a base station, comprising:  
2                   configuring a plurality of resources of an uplink control channel for the  
3 transmission of an uplink control message based at least in part on a format and a coding rate  
4 threshold of the uplink control message, wherein the uplink control message has a first  
5 transmission time interval (TTI) duration that is less than a second TTI duration; and  
6                   transmitting, to a user equipment (UE), an indication of the plurality of  
7 resources of the uplink control channel to use for the uplink control message.

1                   30.     The method of claim 29, wherein transmitting the indication  
2 comprises:  
3                   transmitting the indication via an acknowledgment/negative acknowledgment  
4 (ACK/NACK) resource indicator of downlink control information (DCI).

1                   31.     The method of claim 29, wherein each of the plurality of resources are  
2 mapped to a number of resource blocks (RBs).

1                   32.     The method of claim 29, wherein the format comprises a short physical  
2 uplink control channel (sPUCCH) format 4.

1                   33.     An apparatus for wireless communication, comprising:  
2                   a processor;  
3                   memory in electronic communication with the processor; and  
4                   instructions stored in the memory and executable by the processor to cause the  
5 apparatus to:  
6                   identify that a scheduling request (SR) is to be transmitted on a first  
7 uplink control channel message having a first transmission time interval (TTI)  
8 duration;  
9                   identify that acknowledgment/negative acknowledgment  
10 (ACK/NACK) information is scheduled for transmission on a second uplink control  
11 channel message having a second TTI duration that is greater than the first TTI  
12 duration, wherein the first uplink control channel message and the second uplink  
13 control channel message overlap in time;

14                   determine that the ACK/NACK information is to be transmitted with  
15           the SR on the first uplink control channel message based at least in part on the first  
16           uplink control channel message overlapping with the second uplink control channel  
17           message;  
18                   determine resources of the first uplink control channel message to be  
19           used for transmission of the SR and the ACK/NACK information; and  
20                   transmit the SR and the ACK/NACK information on the determined  
21           resources of the first uplink control channel message.

1           34.    An apparatus for wireless communication, comprising:  
2           a processor;  
3           memory in electronic communication with the processor; and  
4           instructions stored in the memory and executable by the processor to cause the  
5   apparatus to:  
6                   receive an indication of a plurality of control channel resources of an  
7           uplink control channel to be used for an uplink control message;  
8                   identify a coding rate threshold for the uplink control message;  
9                   determine a payload size of the uplink control message;  
10                  select, from the plurality of control channel resources, a control  
11           channel resource based at least in part on the coding rate threshold and the determined  
12           payload size of the uplink control message; and  
13                  transmit the uplink control message to a base station using the selected  
14           control channel resource.

1           35.    An apparatus for wireless communication, comprising:  
2           a processor;  
3           memory in electronic communication with the processor; and  
4           instructions stored in the memory and executable by the processor to cause the  
5   apparatus to:  
6                   identify a format of an uplink control channel, the uplink control  
7           channel having a first transmission time interval (TTI) duration that is less than a  
8           second TTI duration;  
9                   determine a coding rate threshold for an uplink control message;

10                   configure a plurality of resources of the uplink control channel for the  
11           transmission of the uplink control message based at least in part on the format and the  
12           coding rate threshold; and  
13                   transmit, to a user equipment (UE), an indication of the plurality of  
14           resources of the uplink control channel to use for the uplink control message.

1                   36.     An apparatus for wireless communication, comprising:  
2                   means for identifying that a scheduling request (SR) is to be transmitted on a  
3           first uplink control channel message having a first transmission time interval (TTI) duration;  
4                   means for identifying that acknowledgment/negative acknowledgment  
5           (ACK/NACK) information is scheduled for transmission on a second uplink control channel  
6           message having a second TTI duration that is greater than the first TTI duration, wherein the  
7           first uplink control channel message and the second uplink control channel message overlap  
8           in time;  
9                   means for determining that the ACK/NACK information is to be transmitted  
10          with the SR on the first uplink control channel message based at least in part on the first  
11          uplink control channel message overlapping with the second uplink control channel message;  
12                  means for determining resources of the first uplink control channel message to  
13          be used for transmission of the SR and the ACK/NACK information; and  
14                  means for transmitting the SR and the ACK/NACK information on the  
15          determined resources of the first uplink control channel message.

1                   37.     The apparatus of claim 36, further comprising:  
2                   means for determining a format of the first uplink control channel message  
3           based at least in part on a size of the ACK/NACK information, wherein the format of the first  
4           uplink control channel message corresponds to a plurality of resources; and  
5                   means for identifying an SR configuration that indicates first resources from  
6           the plurality of resources to be used for transmitting the SR and the ACK/NACK information  
7           in accordance with the format, wherein the determined resources comprise the first resources.

1                   38.     The apparatus of claim 37, wherein the means for determining the  
2           format of the first uplink control channel message further comprises:  
3                   means for identifying the format based at least in part on the first TTI  
4           duration, wherein the first TTI duration comprises one of a slot or a duration less than the

5 slot, and wherein the format comprises a short physical uplink control channel (sPUCCH)  
6 format 3 or an sPUCCH format 4.

1 39. The apparatus of claim 37, wherein the means for identifying the SR  
2 configuration further comprises:  
3 means for identifying the SR configuration from a set of configurations for the  
4 transmission of the ACK/NACK information, or the SR, or a combination thereof.

1 40. The apparatus of claim 39, wherein a first configuration from the set of  
2 configurations comprises an indication of whether the SR is to be transmitted on the first  
3 uplink control channel message or the second uplink control channel message.

1 41. The apparatus of claim 39, wherein a second configuration from the set  
2 of configurations indicates whether the transmission of SR is to be deferred.

1 42. The apparatus of claim 39, wherein a third configuration from the set  
2 of configurations indicates that the second uplink control channel message is to be dropped.

1 43. The apparatus of claim 39, wherein a fourth configuration from the set  
2 of configurations indicates that the second uplink control channel message and the  
3 ACK/NACK information is to be dropped.

1 44. The apparatus of claim 37, wherein the SR configuration is received  
2 via downlink control information (DCI), radio resource control (RRC) messaging, or a  
3 combination thereof.

1 45. The apparatus of claim 37, wherein the SR configuration is  
2 preconfigured.

1 46. The apparatus of claim 36, further comprising:  
2 means for determining that a size of the ACK/NACK information is greater  
3 than two bits.

1 47. The apparatus of claim 36, further comprising:  
2 means for determining a format of the first uplink control channel message  
3 based at least in part on a size of the ACK/NACK information, wherein the format of the first  
4 uplink control channel message corresponds to a plurality of resources; and

5 means for identifying an SR configuration that indicates two or more  
6 resources from the plurality of resources to be used for transmitting the SR and the  
7 ACK/NACK information in accordance with the format, wherein the determined resources  
8 are selected from the two or more resources based on the SR configuration.

1 48. The apparatus of claim 47, further comprising:  
2 means for identifying a coding rate threshold for the resources of the first  
3 uplink control channel message, wherein the instruction to determine the resources of the first  
4 uplink control channel message are executable by the processor to cause the apparatus to:  
5 means for determining the resources from the two or more resources based at  
6 least in part on the coding rate threshold, the size of the ACK/NACK information, and a  
7 number of cyclic redundancy check (CRC) bits.

1 49. The apparatus of claim 48, further comprising:  
2 means for selecting, from the two or more resources, a first resource for  
3 transmitting the SR and the ACK/NACK information such that a coding rate of the first  
4 resource satisfies the coding rate threshold based on a payload size of the first resource,  
5 wherein the first resource is a smallest resource of the two or more resources.

1 50. The apparatus of claim 48, further comprising:  
2 means for selecting, from the two or more resources, a first resource for  
3 transmitting the SR and the ACK/NACK information;  
4 means for determining that the first resource does not satisfy the coding rate  
5 threshold based on a payload size of the first resource; and  
6 means for selecting, from the two or more resources, a second resource such  
7 that a coding rate of the second resource satisfies the coding rate threshold, wherein the  
8 second resource is larger than the first resource.

1 51. The apparatus of claim 47, wherein each of the two or more resources  
2 are mapped to a number of resource blocks (RBs).

1 52. The apparatus of claim 47, wherein the means for determining the  
2 format of the first uplink control channel message further comprises:  
3 means for identifying the format based at least in part on the first TTI  
4 duration, wherein the first TTI duration comprises one of a slot or a duration less than the

5 slot, and wherein the format comprises a short physical uplink control channel (sPUCCH)  
6 format 3 or an sPUCCH format 4.

1           53.     The apparatus of claim 36, further comprising:  
2                 means for determining a format of the first uplink control channel message  
3 based at least in part on a size of the ACK/NACK information, wherein the format of the first  
4 uplink control channel message corresponds to a plurality of resources; and  
5                 means for identifying a most recent instance of the first uplink control channel  
6 message having the determined format that was indicated to the UE, wherein determining the  
7 resources of the first uplink control channel message to be used for transmission of the SR  
8 and the ACK/NACK information is based at least in part on the most recent instance, or the  
9 determined format, or a combination thereof.

1           54.     The apparatus of claim 53, wherein the means for determining the  
2 format of the first uplink control channel message further comprises:  
3                 means for identifying a format configuration for the resources based at least in  
4 part on the first TTI duration, the first TTI duration comprising a slot or duration less than the  
5 slot, and wherein the format comprises a short physical uplink control channel (sPUCCH)  
6 format 3 or an sPUCCH format 4.

1           55.     The apparatus of claim 36, further comprising:  
2                 means for determining an absence of downlink control information (DCI)  
3 comprising an ACK/NACK resource indicator (ARI) for the first uplink control channel  
4 message, wherein determining the resources of the first uplink control channel message to be  
5 used for transmission of the SR and the ACK/NACK information is based on the absence of  
6 the DCI.

1           56.     The apparatus of claim 36, further comprising:  
2                 means for receiving an SR configuration that indicates the SR is to be  
3 transmitted on the first uplink control channel message.

1           57.     An apparatus for wireless communication, comprising:  
2                 means for receiving an indication of a plurality of control channel resources of  
3 an uplink control channel to be used for an uplink control message;  
4                 means for identifying a coding rate threshold for the uplink control message;  
5                 means for determining a payload size of the uplink control message;

6 means for selecting, from the plurality of control channel resources, a control  
7 channel resource based at least in part on the coding rate threshold and the determined  
8 payload size of the uplink control message; and  
9 means for transmitting the uplink control message to a base station using the  
10 selected control channel resource.

1 58. The apparatus of claim 57, wherein the means for selecting the control  
2 channel resource further comprises:

3 means for selecting the control channel resource based at least in part on the  
4 coding rate threshold, a size of acknowledgment/negative acknowledgment (ACK/NACK)  
5 information within the uplink control message, and a number of cyclic redundancy check  
6 (CRC) bits for the uplink control message.

1 59. The apparatus of claim 57, wherein the means for selecting the control  
2 channel resource further comprises:

3 means for selecting the control channel resource such that a coding rate of the  
4 control channel resource satisfies the coding rate threshold, wherein the control channel  
5 resource is a smallest resource of the plurality of control channel resources.

1 60. The apparatus of claim 57, wherein the means for selecting the control  
2 channel resource further comprises:

3 means for selecting the control channel resource from the plurality of control  
4 channel resources;

5 means for determining that the control channel resource does not satisfy the  
6 coding rate threshold based on the payload size of the uplink control message; and

7 means for selecting, from the plurality of control channel resources, a second  
8 control channel resource such that a coding rate of the second control channel resource  
9 satisfies the coding rate threshold, wherein the second control channel resource is larger than  
10 the control channel resource.

1 61. The apparatus of claim 57, further comprising:

2 means for receiving an indication of which of the plurality of control channel  
3 resources to use for the uplink control message, wherein the indication is received via an  
4 acknowledgment/negative acknowledgment (ACK/NACK) resource indicator of downlink  
5 control information (DCI).

1                   62.     The apparatus of claim 57, wherein a format of the uplink control  
2 channel is a short physical uplink control channel (sPUCCH) format 4.

1                   63.     An apparatus for wireless communication, comprising:  
2                   means for configuring a plurality of resources of an uplink control channel for  
3 the transmission of an uplink control message based at least in part on a format and a coding  
4 rate threshold of the uplink control message, wherein the uplink control message has a first  
5 transmission time interval (TTI) duration that is less than a second TTI duration; and  
6                   means for transmitting, to a user equipment (UE), an indication of the plurality  
7 of resources of the uplink control channel to use for the uplink control message.

1                   64.     The apparatus of claim 63, wherein the means for transmitting the  
2 indication further comprises:  
3                   means for transmitting the indication via an acknowledgment/negative  
4 acknowledgment (ACK/NACK) resource indicator of downlink control information (DCI).

1                   65.     The apparatus of claim 63, wherein each of the plurality of resources  
2 are mapped to a number of resource blocks (RBs).