

CLAIMS

What is claimed is:

1. ———— A method for wireless communication at a user equipment (UE), comprising:
 - _receiving a configuration identifying a plurality of sets of control channel resources for a plurality of semi-persistent scheduling (SPS) configurations, the plurality of sets of control channel resources including at least one set corresponding to multiple of the plurality of SPS configurations;
 - _receiving a first downlink ~~signal~~data according to a first SPS configuration of the plurality of SPS configurations and a second downlink ~~signal~~data according to a second SPS configuration of the plurality of SPS configurations, wherein acknowledgment information for the first downlink ~~signal~~data and the second downlink ~~signal~~data are scheduled to be transmitted during a slot;
 - _selecting, based at least in part on a number of acknowledgment information bits for the first downlink ~~signal~~data and the second downlink ~~signal~~data, a set of control channel resources of the plurality of sets of control channel resources identified by the received configuration; and
 - _transmitting the acknowledgment information bits to the base station using the selected set of control channel resources.
2. ———— The method of claim 1, further comprising:
 - _receiving, from the base station, the plurality of SPS configurations, including the first SPS configuration and the second SPS configuration.
3. ———— The method of claim 1, wherein selecting the set of control channel resources comprises:
 - _comparing the number of acknowledgment information bits to a threshold number of bits; and
 - _selecting the set of control channel resources from among the plurality of sets of control channel resources based at least in part on the comparing.
4. ———— The method of claim 3, wherein transmitting the acknowledgment information bits comprises:

_identifying a control channel format to use to transmit the acknowledgment information bits; and

_transmitting the acknowledgment information bits to the base station according to the identified control channel format using the selected set of control channel resources.

5._____The method of claim 3, wherein the received configuration further identifies the threshold number of bits.

6._____The method of claim 3, wherein the threshold number of bits comprises two bits.

7._____The method of claim 1, further comprising:

_receiving, in the slot, a third downlink ~~signal~~data scheduled according to a dynamic configuration.

8._____The method of claim 7, further comprising:

_receiving the first SPS configuration and the second SPS configuration in radio resource control signaling; and

_receiving the dynamic configuration in downlink control information.

9._____The method of claim 7, further comprising:

_identifying a type of codebook configured for the UE, the type of codebook being one of a semi-static codebook or a dynamic codebook, wherein the number of acknowledgment bits are determined based at least in part on the identified type of codebook.

10._____The method of claim 7, further comprising:

_receiving one or more dynamically scheduled downlink data signals according to the dynamic configuration, ~~wherein the dynamically scheduled downlink signals comprise an indication of corresponding acknowledgment messages to be transmitted for the dynamically scheduled downlink signals;~~

combining the acknowledgment information bits for the first downlink ~~signal~~data and the second downlink ~~signal~~data with the acknowledgment messages to be transmitted for the dynamically scheduled downlink ~~signals~~data; and

transmitting, to the base station, the combined acknowledgment information bits with the acknowledgment messages to be transmitted for the dynamically scheduled downlink ~~signals~~data based at least in part on an acknowledgment codebook.

11. ——— The method of claim 10, wherein the acknowledgment codebook comprises a semi-static codebook based at least in part on a first occasion that the first downlink ~~signal~~data is received and a second occasion that the second downlink ~~signal~~data is received, and wherein the acknowledgment information bits for the first downlink ~~signal~~data and the second downlink ~~signal~~data are combined with the acknowledgment messages to be transmitted for the dynamically scheduled downlink ~~signals~~data based at least in part on the semi-static codebook.

12. ——— The method of claim 10, wherein the acknowledgment codebook comprises a dynamic codebook, and wherein the acknowledgment information bits for the first downlink ~~signal~~data and the second downlink ~~signal~~data are appended to the acknowledgment messages to be transmitted for the dynamically scheduled downlink ~~signals~~data based at least in part on the dynamic codebook.

13. ——— The method of claim 1, wherein the plurality of SPS configurations are configured on a plurality of component carriers.

14. ——— The method of claim 1, wherein multiple of the plurality of SPS configurations are active for the UE during a same time.

15. ——— The method of claim 1, wherein the configuration identifying the at least one set of control channel resources corresponding to the multiple of the plurality of SPS configurations is received in a physical uplink control channel configuration.

16. ——— The method of claim 1, further comprising:

_receiving an activation message for starting communications according to the first SPS configuration, wherein the first downlink ~~signal~~data is received based at least in part on the activation message;

_identifying an uplink resource indicator in the activation message, the uplink resource indicator comprising an indication of an uplink resource for transmitting the acknowledgment information bits to the base station;

_transmitting a first set of the acknowledgment information bits to the base station based at least in part on the uplink resource indicator; and

_transmitting subsequent sets of the acknowledgment information bits after the first set of acknowledgment information bits based at least in part on the selected set of control channel resources.

17._____The method of claim 1, further comprising:

_receiving a deactivation message for ending communications according to the first SPS configuration;

_determining an uplink resource for transmitting an acknowledgment message based at least in part on receiving the deactivation message; and

_transmitting the acknowledgment message using the determined uplink resource.

18._____The method of claim 17, further comprising:

_combining the acknowledgment message with one or more additional acknowledgment messages from additional SPS configurations, dynamic downlink messages, or a combination thereof; and

_transmitting, to the base station, the combined acknowledgment messages based at least in part on an acknowledgment codebook.

19._____The method of claim 17, wherein the determined uplink resource comprises an indicated uplink resource via an uplink resource indicator included in the deactivation message.

20._____A method for wireless communication at a user equipment (UE), comprising:

_receiving a plurality of semi-persistent scheduling (SPS) configurations;

~~receiving a first downlink signal~~data according to a first SPS configuration of the plurality of SPS configurations and a second downlink ~~signal~~data according to a second SPS configuration of the plurality of SPS configurations, wherein acknowledgment information for the first downlink ~~signal~~data and the second downlink ~~signal~~data are scheduled to be transmitted during a slot;

~~determining an order of a plurality of downlink signals received according to the plurality of SPS configurations, the plurality of downlink signals comprising at least the first downlink signal and the second downlink signal;~~

~~generating, for transmitting acknowledgment information bits to the base station, an acknowledgment codebook based at least in part on the determined order of the plurality of downlink signals; and~~

~~transmitting the acknowledgment information bits to the base station using the generated acknowledgment codebook.~~

21. — ~~The method of claim 20, wherein the determined order of the plurality of downlink signals comprises a time-first, component carrier-second order.~~

22. — ~~The method of claim 20, wherein the order of the plurality of downlink signals is determined based at least in part on a corresponding index of each of the plurality of SPS configurations and a component carrier index, and wherein each of the plurality of SPS configurations are configured within a same component carrier associated with the component carrier index; and transmitting the acknowledgment information bits to the base station using the generated acknowledgment codebook.~~

21. The method of claim 20, further comprising: determining an order of a plurality of downlink data received according to the plurality of SPS configurations, the plurality of downlink data comprising at least the first downlink data and the second downlink data, wherein the determined order of the plurality of downlink data comprises a time-first, component carrier-second order.

23. — ~~22.~~ The method of claim 20, further comprising: generating a semi-static acknowledgment codebook comprising the acknowledgment information bits and default values for transmission occasions where no downlink ~~signal~~data is received; and

_extracting the acknowledgment information bits from the semi-static acknowledgment codebook to generate a dynamic acknowledgment codebook, wherein an order of the acknowledgment information bits is the same for the semi-static acknowledgment codebook and the dynamic acknowledgment codebook.

24. ———— ~~23.~~ A method for wireless communication at a base station, comprising:

_transmitting a configuration identifying a plurality of sets of control channel resources for a plurality of semi-persistent scheduling (SPS) configurations of a user equipment (UE), the plurality of sets of control channel resources including at least one set corresponding to multiple of the plurality of SPS configurations;

_transmitting a first downlink ~~signal~~data according to a first SPS configuration of the plurality of SPS configurations and a second downlink ~~signal~~data according to a second SP configuration of the plurality of SPS configurations, wherein acknowledgment information for the first downlink ~~signal~~data and the second downlink ~~signal~~data are scheduled to be transmitted during a slot;

_selecting, based at least in part on a number of acknowledgment information bits for the first downlink ~~signal~~data and the second downlink ~~signal~~data, a set of control channel resources of the plurality of sets of control channel resources identified by the transmitted configuration; and

_receiving the acknowledgment information bits from the UE using the selected set of control channel resources.

25. ———— ~~24.~~ The method of claim ~~24~~23, further comprising:

_transmitting, to the UE, the plurality of SPS configurations, including the first SPS configuration and the second SPS configuration.

26. ———— ~~25.~~ The method of claim ~~24~~23, wherein selecting the set of control channel resources comprises:

_comparing the ~~determined~~ number of acknowledgment information bits to a threshold number of bits; and

_selecting the set of control channel resources from among the plurality of sets of control channel resources based at least in part on the comparing.

~~27.~~ ~~_____~~ ~~26.~~ The method of claim ~~26~~~~25~~, wherein receiving the acknowledgment information bits comprises:

~~_~~identifying a control channel format to use to receive the acknowledgment information bits; and

~~_~~receiving the acknowledgment information bits from the UE according to the identified control channel format using the selected set of control channel resources.

~~28.~~ ~~_____~~ ~~27.~~ The method of claim ~~26~~~~25~~, wherein the transmitted configuration further identifies the threshold number of bits, and wherein the threshold number of bits comprises two bits.

~~29.~~ ~~_____~~ ~~28.~~ The method of claim ~~26~~~~25~~, wherein the acknowledgment information bits are received based at least in part on a dynamic acknowledgment codebook comprising the acknowledgment information bits in an order that is based at least in part on when each of a plurality of downlink ~~signals~~~~data~~ are transmitted for each of the plurality of SPS configurations, a component carrier that each of the plurality of downlink ~~signals~~~~data~~ are transmitted on, a slot in which each of the plurality of downlink ~~signals~~~~data~~ are transmitted, a semi-static acknowledgment codebook, or a combination thereof.

~~30.~~ ~~_____~~ ~~29.~~ An apparatus for wireless communication at a user equipment (UE), comprising:

~~means for receiving~~ a processor, memory coupled with the processor; and instructions stored in the memory and executable by the processor to cause the apparatus to: receive a configuration identifying a plurality of sets of control channel resources for a plurality of semi-persistent scheduling (SPS) configurations, the plurality of sets of control channel resources including at least one set corresponding to multiple of the plurality of SPS configurations;

~~means for receiving~~ receive a first downlink ~~signal~~~~data~~ according to a first SPS configuration of the plurality of SPS configurations and a second downlink ~~signal~~~~data~~ according to a second SPS configuration of the plurality of SPS configurations, wherein acknowledgment information for the first downlink ~~signal~~~~data~~ and the second downlink ~~signal~~~~data~~ are scheduled to be transmitted during a slot;

~~means for selecting~~ select, based at least in part on a number of acknowledgment information bits for the first downlink ~~signal~~data and the second downlink ~~signal~~data, a set of control channel resources of the plurality of sets of control channel resources identified by the received configuration; and

~~means for transmitting~~ transmit the acknowledgment information bits to the base station using the selected set of control channel resources.