CLAIMS

1. A method for wireless communication, comprising:

identifying control information for transmission on a downlink control channel resource block (RB) set that is configured with one or more orthogonal frequency-division multiplexing (OFDM) symbols;

encoding the control information into a plurality of control channel elements (CCEs);

mapping each CCE of the plurality of CCEs to a corresponding unique set of resource element groups (REGs) in the downlink control channel RB set using a mapping function such that the set of REGs is unique regardless of a number of OFDM symbols on which the downlink control channel RB set is configured, wherein each of the one or more OFDM symbols is configured with a plurality of REGs, wherein the mapping function comprises a first floor function of a number of the plurality of REGs to be included in each OFDM symbol of the one or more OFDM symbols divided by a number of REGs to be included in each CCE of the plurality of CCEs, and wherein the mapping function further comprises a second floor function of a CCE index divided by a result of the first floor function; and

transmitting the encoded control information using the downlink control channel RB set.

2. The method of claim 1, wherein mapping each CCE of the plurality of CCEs comprises:

mapping each CCE of the plurality of CCEs such that each corresponding set of REGs is fully contained within a single OFDM symbol of the one or more OFDM symbols.

3. The method of claim 1, further comprising:

allocating the downlink control channel RB set over the one or more OFDM symbols such that the plurality of REGs in each OFDM symbol is a multiple of a number of the plurality of CCEs.

4. The method of claim 1, wherein the mapping function is:

$$n \bmod CCE_{OS} + \left\lfloor \frac{n}{CCE_{OS}} \right\rfloor \cdot N_{sREG,m}^{OS} + i \cdot CCE_{OS}$$

where $CCE_{OS} = \left\lfloor \frac{N_{sREG,m}^{OS}}{N_{sREG}^{sCCE}} \right\rfloor$ and indicates a number of the plurality of CCEs to be included in each OFDM symbol of the one or more OFDM symbols, $N_{sREG,m}^{OS}$ indicates the number of the plurality of REGs to be included in each OFDM symbol, and N_{sREG}^{sCCE} indicates the number of REGs to be included in each CCE,

where $n \in \{0, 1, \ldots, k \cdot CCE_{OS} - 1\}$, and k is a number of OFDM symbols on which the downlink control channel RB set is configured, and

where $i \in \{0, 1, \ldots, N_{sREG}^{sCCE} - 1\}$.

5. The method of claim 1, wherein transmitting the encoded control information using the downlink control channel RB set comprises:

transmitting the encoded control information on a cell-specific reference signal (CRS)-based physical downlink control channel (PDCCH).

6. The method of claim 1, wherein the result of the first floor function comprises a number of the plurality of CCEs to be included in each OFDM symbol of the one or more OFDM symbols.

7. A method for wireless communication, comprising:

receiving a downlink control channel resource block (RB) set that includes a plurality of control channel elements (CCEs) in one or more orthogonal frequency-division multiplexing (OFDM) symbols;

de-mapping the plurality of CCEs from the downlink control channel RB set based at least in part on a mapping function that comprises a first floor function of a number of the plurality of REGs to be included in each OFDM symbol of the one or more OFDM symbols divided by a number of REGs to be included in each CCE of the plurality of CCEs, wherein the mapping function further comprises a second floor function of a CCE index divided by a result of the first floor function, and wherein each CCE is assigned to a corresponding unique set of resource element groups (REGs) in the downlink control channel RB set by the mapping function independent of a number of OFDM symbols on which the downlink control channel RB set is received and wherein each of the one or more OFDM symbols is configured with a plurality of REGs; and

decoding the plurality of CCEs into control information.

8. The method of claim 7, wherein de-mapping the plurality of CCEs comprises:

de-mapping the CCEs from the corresponding unique set of REGs.

9. The method of claim 7, wherein the mapping function is:

$$n \bmod CCE_{OS} + \left\lfloor \frac{n}{CCE_{OS}} \right\rfloor \cdot N_{sREG,m}^{OS} + i \cdot CCE_{OS}$$

where $CCE_{OS} = \left\lfloor \frac{N_{sREG,m}^{OS}}{N_{sREG}^{sCCE}} \right\rfloor$ and indicates a number of the plurality of CCEs to be included in each OFDM symbol of the one or more OFDM symbols, $N_{sREG,m}^{OS}$ indicates the number of the plurality of REGs to be included in each OFDM symbol, and N_{sREG}^{sCCE} indicates the number of REGs to be included in each CCE,

where $n \in \{0, 1, \ldots, k \cdot CCE_{OS} - 1\}$, and k is a number of OFDM symbols on which the downlink control channel RB set is configured, and

where $i \in \{0, 1, \ldots, N_{sREG}^{sCCE} - 1\}$.

10. The method of claim 7, wherein receiving the downlink control channel RB set comprises:

receiving encoded control information on a cell-specific reference signal (CRS)-based physical downlink control channel (PDCCH).

11. The method of claim 7, wherein the result of the first floor function comprises a number of the plurality of CCEs to be included in each OFDM symbol of the one or more OFDM symbols.

12. An apparatus for wireless communication, comprising:

a processor,

memory coupled with the processor; and

instructions stored in the memory and executable by the processor to cause the apparatus to:

identify control information for transmission on a downlink control channel resource block (RB) set that is configured with one or more orthogonal frequency-division multiplexing (OFDM) symbols;

encode the control information into a plurality of control channel elements (CCEs);

map each CCE of the plurality of CCEs to a corresponding unique set of resource element groups (REGs) in the downlink control channel RB set using a mapping function such that the set of REGs is unique regardless of a number of OFDM symbols on which the downlink control channel RB set is configured, wherein each of the one or more OFDM symbols is configured with a plurality of REGs, wherein the mapping function comprises a first floor function of a number of the plurality of REGs to be included in each OFDM symbol of the one or more OFDM symbols divided by a number of REGs to be included in each CCE of the plurality of CCEs, and wherein the mapping function further comprises a second floor function of a CCE index divided by a result of the first floor function; and

transmit the encoded control information using the downlink control channel RB set.

13. The apparatus of claim 12, wherein the instructions to map each CCE of the plurality of CCEs are executable by the processor to cause the apparatus to:

map each CCE of the plurality of CCEs such that each corresponding set of REGs is fully contained within a single OFDM symbol of the one or more OFDM symbols.

14. The apparatus of claim 12, wherein the instructions are further executable by the processor to cause the apparatus to:

allocate the downlink control channel RB set over the one or more OFDM symbols such that the plurality of REGs in each OFDM symbol is a multiple of a number of the plurality of CCEs.

15. The apparatus of claim 12, wherein the mapping function is:

$$n \bmod CCE_{OS} + \left\lfloor \frac{n}{CCE_{OS}} \right\rfloor \cdot N_{sREG,m}^{OS} + i \cdot CCE_{OS}$$

where $CCE_{OS} = \left\lfloor \frac{N_{sREG,m}^{OS}}{N_{sREG}^{sCCE}} \right\rfloor$ and indicates a number of the plurality of CCEs to be included in each OFDM symbol of the one or more OFDM symbols, $N_{sREG,m}^{OS}$ indicates the

number of the plurality of REGs to be included in each OFDM symbol, and N_{sREG}^{sCCE} indicates the number of REGs to be included in each CCE,

where $n \in \{0, 1, \ldots, k \cdot CCE_{OS} - 1\}$, and k is a number of OFDM symbols on which the downlink control channel RB set is configured, and

where $i \in \{0, 1, \ldots, N_{sREG}^{sCCE} - 1\}$.

16. The apparatus of claim 12, wherein the instructions to transmit the encoded control information using the downlink control channel RB set are executable by the processor to cause the apparatus to:

transmit the encoded control information on a cell-specific reference signal (CRS)-based physical downlink control channel (PDCCH).

17. An apparatus for wireless communication, comprising:

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 downlink control channel resource block (RB) set that includes a plurality of control channel elements (CCEs) in one or more orthogonal frequency-division multiplexing (OFDM) symbols;

de-map the plurality of CCEs from the downlink control channel RB set based at least in part on a mapping function that comprises a first floor function of a number of the plurality of REGs to be included in each OFDM symbol of the one or more OFDM symbols divided by a number of REGs to be included in each CCE of the plurality of CCEs, wherein the mapping function further comprises a second floor function of a CCE index divided by a result of the first floor function, and wherein each CCE is assigned to a corresponding unique set of resource element groups (REGs) in the downlink control channel RB set by the mapping function independent of a number of OFDM symbols on which the downlink control channel RB set is received and wherein each of the one or more OFDM symbols is configured with a plurality of REGs; and

decode the plurality of CCEs into control information.

18. The apparatus of claim 17, wherein the instructions to de-map the plurality of CCEs are executable by the processor to cause the apparatus to:

de-map the CCEs from the corresponding unique set of REGs.

19. The apparatus of claim 17, wherein the mapping function is:

$$n \bmod CCE_{OS} + \left\lfloor \frac{n}{CCE_{OS}} \right\rfloor \cdot N_{sREG,m}^{OS} + i \cdot CCE_{OS}$$

where $CCE_{OS} = \left\lfloor \frac{N_{sREG,m}^{OS}}{N_{sREG}^{sCCE}} \right\rfloor$ and indicates a number of the plurality of CCEs to be included in each OFDM symbol of the one or more OFDM symbols, $N_{sREG,m}^{OS}$ indicates the number of the plurality of REGs to be included in each OFDM symbol, and N_{sREG}^{sCCE} indicates the number of REGs to be included in each CCE,

where $n \in \{0, 1, \ldots, k \cdot CCE_{OS} - 1\}$, and k is a number of OFDM symbols on which the downlink control channel RB set is configured, and

where $i \in \{0, 1, \ldots, N_{sREG}^{sCCE} - 1\}$.

20. The apparatus of claim 17, wherein the instructions to receive the downlink control channel RB set are executable by the processor to cause the apparatus to:

receive encoded control information on a cell-specific reference signal (CRS)-based physical downlink control channel (PDCCH).