

CLAIMS

1. A method for transmitting information, comprising:

5 determining a time-frequency resource for a downlink control channel of at least one terminal device, wherein the time-frequency resource for the downlink control channel of the at least one terminal device is mapped in a first control region within a bandwidth of a system in a manner of mapping in a frequency domain and then in a time domain; and

10 sending the downlink control channel of the at least one terminal device through the time-frequency resource for the downlink control channel of the at least one terminal device,

 wherein at least one orthogonal frequency division multiplexing (OFDM) symbol in the first control region is associated with a beam number, and the time-
15 frequency resource for the downlink control channel corresponding to the beam number is located on the at least one OFDM symbol associated with the beam number.

2. The method of claim 1, wherein determining the time-frequency resource for the downlink control channel of the at least one terminal device comprises:

20 determining a Control Channel Element (CCE) resource corresponding to at least one control channel candidate of a specific terminal device in the at least one terminal device in the first control region according to at least one of: a Radio Network Temporary Identity (RNTI) of the specific terminal device, a present time-domain scheduling unit number, a carrier frequency number, a CCE Aggregation Level (AL),
25 the beam number and/or a cell identifier;

 responsive to that the CCE resource corresponding to the first control channel candidate is not allocated, allocating the CCE resource corresponding to the first control channel candidate to the specific terminal device; and responsive to that the CCE resource corresponding to the first control channel candidate has been allocated,
30 allocating an unallocated CCE resource corresponding to a next control channel candidate to the specific terminal device; and

 after CCE resource allocation for the at least one terminal device is completed, mapping a CCE resource in the first control region in the manner of mapping in the frequency domain and then in the time domain to obtain the time-frequency resource

for the downlink control channel of the at least one terminal device.

3. The method of claim 1 or claim 2, further comprising:

5 sending control region configuration information to the at least one terminal device, wherein the control region configuration information indicates a configuration of the first control region.

4. The method of any one of claims 1-3, further comprising:

10 sending configuration information of a first search space to a specific terminal device in the at least one terminal device, wherein the configuration information of the first search space indicates an OFDM symbol where the time-frequency resource for the downlink control channel of the specific terminal device is located.

5. The method of any one of claims 1-4, further comprising:

15 sending configuration information of a second search space to the at least one terminal device, wherein the configuration information of the second search space indicates the at least one OFDM symbol associated with the beam number.

20 6. The method of any one of claims 1-5, wherein sending the downlink control channel of the at least one terminal device through the time-frequency resource for the downlink control channel of the at least one terminal device comprises:

25 sending the downlink control channel of the at least one terminal device by beamforming on the at least one OFDM symbol in the first control region through the time-frequency resource for the downlink control channel of the at least one terminal device.

7. A method for receiving information, comprising:

30 receiving configuration information from a network device, wherein the configuration information indicates a configuration of a first control region corresponding to a terminal device within a bandwidth of a system; and

 detecting a downlink control channel of the terminal device in the first control region according to the configuration information,

 wherein at least one orthogonal frequency division multiplexing (OFDM)

symbol in the first control region is associated with a beam number, and a time-frequency resource for the downlink control channel corresponding to the beam number is located on the at least one OFDM symbol associated with the beam number.

- 5 8. The method of claim 7, wherein detecting the downlink control channel of the terminal device in the first control region according to the configuration information comprises:

 determining the first control region and a mapping manner for the first control region according to the configuration information;

- 10 determining a Control Channel Element (CCE) resource corresponding to at least one control channel candidate of the terminal device in the first control region according to at least one of: a Radio Network Temporary Identity (RNTI) of the terminal device, a present time-domain scheduling unit number, a carrier frequency number, a CCE Aggregation Level (AL), the beam number or a cell identifier; and

- 15 detecting the downlink control channel of the terminal device according to the CCE resource corresponding to the at least one control channel candidate and the mapping manner.

- 20 9. The method of claim 8, wherein the mapping manner for the first control region is a manner of mapping in a frequency domain and then in a time domain, and the first control region comprises one or more OFDM symbols.

10. A network device, comprising:

- 25 a processing module, configured to determine a time-frequency resource for a downlink control channel of at least one terminal device, wherein the time-frequency resource for the downlink control channel of the at least one terminal device is mapped in a first control region within a bandwidth of a system in a manner of mapping in a frequency domain and then in a time domain; and

- 30 a transceiver module, configured to send the downlink control channel of the at least one terminal device through the time-frequency resource for the downlink control channel of the at least one terminal device,

 wherein at least one orthogonal frequency division multiplexing (OFDM) symbol in the first control region is associated with a beam number, and the time-

frequency resource for the downlink control channel corresponding to the beam number is located on the at least one OFDM symbol associated with the beam number.

11. The network device of claim 10, wherein the manner of mapping in the frequency domain and then in the time domain comprises:

mapping a first OFDM symbol in the first control region along the frequency domain, and then mapping a next OFDM symbol in the first control region.

12. The network device of claim 10 or 11, wherein the processing module is configured to:

determine a Control Channel Element (CCE) resource corresponding to at least one control channel candidate of a specific terminal device in the at least one terminal device in the first control region according to at least one of: a Radio Network Temporary Identity (RNTI) of the specific terminal device, a present time-domain scheduling unit number, a carrier frequency number, a CCE Aggregation Level (AL), the beam number and/or a cell identifier;

responsive to that the CCE resource corresponding to the first control channel candidate is not allocated, allocate the CCE resource corresponding to the first control channel candidate to the specific terminal device; and responsive to that the CCE resource corresponding to the first control channel candidate has been allocated, allocate an unallocated CCE resource corresponding to a next control channel candidate to the specific terminal device; and

after CCE resource allocation for the at least one terminal device is completed, map a CCE resource in the first control region according to the manner of mapping in the frequency domain and then in the time domain to obtain the time-frequency resource for the downlink control channel of the at least one terminal device.

13. The network device of claim 12, wherein a CCE resource corresponding to a control channel candidate is continuous on the frequency domain.

14. The network device of any one of claims 10-13, wherein the transceiver module is further configured to send control region configuration information to the at least one terminal device, wherein the control region configuration information is for indicating

a configuration of the first control region.

15. The network device of any one of claims 10-14, wherein the transceiver module is further configured to send configuration information of a first search space to a specific
5 terminal device in the at least one terminal device, wherein the configuration information of the first search space is for indicating an OFDM symbol where the time-frequency resource for the downlink control channel of the specific terminal device is located.

10 16. The network device of any one of claims 10-15, wherein the transceiver module is further configured to send configuration information of a second search space to the at least one terminal device, wherein the configuration information of the second search space is for indicating the at least one OFDM symbol associated with the beam number.

15 17. The network device of any one of claims 10-16, wherein the transceiver module is specifically configured to send the downlink control channel of the at least one terminal device by beamforming on the at least one OFDM symbol in the first control region through the time-frequency resource for the downlink control channel of the at least one terminal device.

20

18. A terminal device, comprising:

a transceiver module, configured to receive configuration information sent by a network device, wherein the configuration information is for indicating a configuration of a first control region corresponding to the terminal device within a bandwidth of a
25 system; and

a processing module, configured to detect a downlink control channel of the terminal device in the first control region according to the configuration information,

wherein at least one orthogonal frequency division multiplexing (OFDM) symbol in the first control region is associated with a beam number, and a time-
30 frequency resource for the downlink control channel corresponding to the beam number is located on the at least one OFDM symbol associated with the beam number.

19. The terminal device of claim 18, wherein the processing module is specifically

configured to:

determine the first control region and a mapping manner for the first control region according to the configuration information;

- 5 determine a Control Channel Element (CCE) resource corresponding to at least one control channel candidate of the terminal device in the first control region according to at least one of: a Radio Network Temporary Identity (RNTI) of the terminal device, a present time-domain scheduling unit number, a carrier frequency number, a CCE Aggregation Level (AL), the beam number or a cell identifier; and

- 10 detect the downlink control channel of the terminal device according to the CCE resource corresponding to the at least one control channel candidate and the mapping manner.

20. The terminal device of claim 19, wherein

- 15 the mapping manner for the first control region is a manner of mapping in a frequency domain and then in a time domain, and the first control region comprises one or more OFDM symbols; or

 the mapping manner for the first control region is a manner of mapping in a time domain first and then in a frequency domain, and the first control region comprises multiple OFDM symbols.