

WHAT IS CLAIMED IS:

1. A receiving method, performed by a terminal device, comprising:
determining a resource mapping relationship between control channel element (CCE) sets in N beam directions, wherein N is a positive integer greater than 1; and
receiving downlink control information (DCI) signaling sent on the CCE sets in the N beam directions based on the resource mapping relationship.
2. The receiving method of claim 1, wherein,
the CCE sets in the N beam directions separately send a complete content of the DCI signaling;
or,
the CCE sets in the N beam directions collectively send the complete content of the DCI signaling.
3. The receiving method of claim 2, wherein,
the CCE sets comprise X CCEs, wherein X is a positive integer;
the X is equal to an aggregation level of the DCI signaling; or,
the X is equal to the aggregation level of the DCI signaling divided by the N.
4. The receiving method of any of claims 1 to 3, wherein the resource mapping relationship comprises a frequency domain mapping relationship.
5. The receiving method of claim 4, wherein the N beam directions correspond to a same frequency domain resource, and the N beam directions correspond to first CCE sets in the same frequency domain;
wherein receiving the DCI signaling sent on the CCE sets in the N beam directions based on the resource mapping relationship comprises:
receiving a same DCI signaling sent on the first CCE sets in the N beam directions separately in response to the N beam directions sending the complete content of the DCI signaling through the same frequency domain resource separately;
or,
receiving the DCI signaling based on first indication information in response to the N beam directions collectively sending the complete content of the DCI signaling through

the same frequency domain resource, the first indication information being configured to indicate a position order in the DCI signaling of a content sent on CCEs in a first CCE set corresponding to each beam direction.

6. The receiving method of claim 4, wherein the N beam directions correspond to different frequency domain resources, and the N beam directions correspond to N CCE sets one by one;

wherein receiving the DCI signaling sent on the CCE sets in the N beam directions based on the resource mapping relationship comprises:

~~receiving, in the N beam directions separately based on second indication information, same DCI signaling sent on the N CCE sets in response to the N beam directions separately sending the complete content of the DCI signaling through different frequency domain resources, the second indication information being configured to indicate a mapping relationship between serial numbers of specific CCEs in the N CCE sets;~~

~~or,~~

receiving, in the N beam directions separately based on ~~third~~ second indication information, same DCI signaling sent on the N CCE sets in response to the N beam directions separately sending the complete content of the DCI signaling through different frequency domain resources, the ~~third~~ second indication information being configured to indicate a mapping relationship between serial numbers of candidate physical downlink control channels (PDCCH candidates) corresponding to the N CCE sets respectively;

~~or,~~

~~receiving the DCI signaling based on fourth indication information in response to the N beam directions collectively send the complete content of the DCI signaling through different frequency domain resources, the fourth indication information being configured to indicate a mapping relationship between serial numbers of specific CCEs in the N CCE sets;~~

~~or,~~

~~receiving the DCI signaling based on fifth indication information in response to the~~

~~N beam directions collectively send the complete content of the DCI signaling through different frequency domain resources, the fifth indication information being configured to indicate a mapping relationship between serial numbers of specific CCEs in the N CCE sets and a position order of contents sent on CCEs in the N CCE sets in the DCI signaling;~~

~~or,~~

~~receiving the DCI signaling based on sixth indication information in response to the N beam directions collectively send the complete content of the DCI signaling through different frequency domain resources, the sixth indication information being configured to indicate a mapping relationship between serial numbers of PDCCH candidates corresponding to the N CCE sets respectively;~~

~~or,~~

~~receiving the DCI signaling based on seventh indication information in response to the N beam directions collectively send the complete content of the DCI signaling through different frequency domain resources, the seventh indication information being configured to indicate a mapping relationship between serial numbers of PDCCH candidates corresponding to the N CCE sets respectively and a position order of contents sent on CCEs in the N CCE sets in the DCI signaling.~~

7. The receiving method of claim 6, wherein,

the mapping relationship between the serial numbers of the specific CCEs is configured based on different aggregation levels;

or, the mapping relationship between the serial numbers of the specific CCEs is the same for all the aggregation levels.

8. The receiving method of claim 6, wherein the specific CCEs are CCEs at a minimum frequency in the CCE sets.

9. The receiving method of claim 6, wherein ~~at least one of the second indication information, the third indication information, the fourth indication information, the fifth indication information, the sixth indication information, and the seventh indication information~~ is configured to indicate an ID of a search space to which the N CCE sets belong, and/or an ID of a control resource set to which the N CCE sets belong.

10. The receiving method of claim 6, wherein,
the mapping relationship between the serial numbers of the PDCCH candidates is configured based on different aggregation levels;

or, the mapping relationship between the serial numbers of the PDCCH candidates is same for all the aggregation levels.

11. The receiving method of any of claims 1 to 3, wherein the resource mapping relationship comprises a time domain mapping relationship.

12. The receiving method of claim 11, wherein the N beam directions correspond to a same time domain resource, and the N beam directions correspond to second CCE sets in the same time domain;

wherein receiving the DCI signaling sent on the CCE sets in the N beam directions based on the resource mapping relationship comprises:

receiving same DCI signaling sent on the second CCE sets in N beam directions separately in response to the N beam directions separately sending the complete content of the DCI signaling through the same time domain resource;

or,

~~receiving the DCI signaling based on eighth indication information in response to the N beam directions collectively sending the complete content of the DCI signaling through the same time domain resource, the eighth indication information being configured to indicate a position order in the DCI signaling of a content sent on CCEs in a second CCE set corresponding to each beam direction.~~

13. The receiving method of claim 12, wherein the N beam directions correspond to different time domain resources, and the N beam directions correspond to N CCE sets one by one;

wherein receiving the DCI signaling sent on the CCE sets in the N beam directions based on the resource mapping relationship comprises:

receiving, in the N beam directions separately based on ~~ninth~~third indication information, same DCI signaling sent on the N CCE sets in response to the N beam directions separately sending the complete content of the DCI signaling through different

time domain resources, the ~~ninth~~third indication information being configured to indicate a mapping relationship between time domains of the N CCE sets;

~~or,~~

~~receiving the DCI signaling based on tenth indication information in response to the N beam directions collectively send the complete content of the DCI signaling through different time domain resources, the tenth indication information being configured to indicate a mapping relationship between time domains of the N CCE sets;~~

~~or,~~

~~receiving the DCI signaling based on eleventh indication information in response to the N beam directions collectively send the complete content of the DCI signaling through different time domain resources, the eleventh indication information being configured to indicate a mapping relationship between time domains of the N CCE sets and a position order of contents sent on CCEs in the N CCE sets in the DCI signaling.~~

14. The receiving method of claim 13, wherein,

the mapping relationship between the time domains of the N CCE sets comprises a mapping relationship between serial numbers of specific CCEs corresponding to the N CCE sets respectively;

or, the mapping relationship between the time domains of the N CCE sets comprises a mapping relationship between serial numbers of PDCCH candidates corresponding to the N CCE sets respectively.

~~15. The receiving method of claim 14, wherein the specific CCEs are CCEs at a minimum frequency in the CCE sets.~~

~~16~~15. The receiving method of claim 13, wherein,

the mapping relationship between the time domains of the CCE sets is configured based on different aggregation levels;

or, the mapping relationship between the time domains of the CCE sets is same for all the aggregation levels.

~~17~~16. The receiving method of claim 13, wherein ~~at least one of the ninth~~third indication information, ~~the tenth indication information, and the eleventh indication~~

~~information~~ is configured to indicate an ID of a search space to which the N CCE sets belong, and/or an ID of a control resource set to which the N CCE sets belong.

~~18~~17. The receiving method of any of claims 1 to 3, wherein determining the resource mapping relationship between the CCE sets in the N beam directions comprises:

determining the resource mapping relationship between the CCE sets in the N beam directions according to an instruction of a network device;

or, determining a predefined resource mapping relationship as the resource mapping relationship between the CCE sets in the N beam directions.

~~19~~18. The receiving method of any of claims 1 to 3, wherein,
each CCE set comprises a PDCCH candidate.

~~20~~19. The receiving method of any of claims 1 to 3, wherein,
CCE sets in different beam directions belong to a same search space;
or, the CCE sets in different beam directions belong to different search spaces in a same control resource set;

or, the CCE sets in different beam directions belong to different control resource sets.

~~21. A receiving apparatus, implemented in a terminal device, comprising a determining module and a receiving module; wherein,~~

~~the determining module is configured to determine a resource mapping relationship between control channel element (CCE) sets in N beam directions, wherein N is a positive integer greater than 1; and~~

~~the receiving module is configured to receive downlink control information (DCI) signaling sent on the CCE sets in the N beam directions based on the resource mapping relationship.~~

~~22. The receiving apparatus according to claim 21, wherein,~~
~~the CCE sets in the N beam directions separately send a complete content of the DCI signaling;~~

~~or,~~

~~the CCE sets in the N beam directions collectively send the complete content of the DCI signaling.~~

~~23. The receiving apparatus of claim 22, wherein,
the CCE sets comprise X CCEs, wherein X is a positive integer;
the X is equal to an aggregation level of the DCI signaling; or,
the X is equal to the aggregation level of the DCI signaling divided by the N.~~

~~24. The receiving apparatus of any of claims 21 to 23, wherein the resource mapping relationship comprises a frequency domain mapping relationship.~~

~~25. The receiving apparatus of claim 24, wherein the N beam directions correspond to a same frequency domain resource, and the N beam directions correspond to first CCE sets in the same frequency domain;~~

~~wherein the receiving module is configured to receive a same DCI signaling sent on the first CCE sets in the N beam directions separately in response to the N beam directions sending the complete content of the DCI signaling through the same frequency domain resource separately;~~

~~or,~~

~~the receiving module is configured to receive the DCI signaling based on first indication information in response to the N beam directions collectively sending the complete content of the DCI signaling through the same frequency domain resource, the first indication information being configured to indicate a position order in the DCI signaling of a content sent on CCEs in a first CCE set corresponding to each beam direction.~~

~~26. The receiving apparatus of claim 24, wherein the N beam directions correspond to different frequency domain resources, and the N beam directions correspond to N CCE sets one by one;~~

~~wherein the receiving module is configured to receive, in the N beam directions separately based on second indication information, same DCI signaling sent on the N CCE sets in response to the N beam directions separately sending the complete content of the DCI signaling through different frequency domain resources, the second indication information being configured to indicate a mapping relationship between serial numbers of specific CCEs in the N CCE sets;~~

or,

~~the receiving module is configured to receive, in the N beam directions separately based on third indication information, same DCI signaling sent on the N CCE sets in response to the N beam directions separately sending the complete content of the DCI signaling through different frequency domain resources, the third indication information being configured to indicate a mapping relationship between serial numbers of candidate physical downlink control channels (PDCCH candidates) corresponding to the N CCE sets respectively;~~

or,

~~the receiving module is configured to receive the DCI signaling based on fourth indication information in response to the N beam directions collectively send the complete content of the DCI signaling through different frequency domain resources, the fourth indication information being configured to indicate a mapping relationship between serial numbers of specific CCEs in the N CCE sets;~~

or,

~~the receiving module is configured to receive the DCI signaling based on fifth indication information in response to the N beam directions collectively send the complete content of the DCI signaling through different frequency domain resources, the fifth indication information being configured to indicate a mapping relationship between serial numbers of specific CCEs in the N CCE sets and a position order of contents sent on CCEs in the N CCE sets in the DCI signaling;~~

or,

~~the receiving module is configured to receive the DCI signaling based on sixth indication information in response to the N beam directions collectively send the complete content of the DCI signaling through different frequency domain resources, the sixth indication information being configured to indicate a mapping relationship between serial numbers of PDCCH candidates corresponding to the N CCE sets respectively;~~

or,

~~the receiving module is configured to receive the DCI signaling based on seventh~~

~~indication information in response to the N beam directions collectively send the complete content of the DCI signaling through different frequency domain resources, the seventh indication information being configured to indicate a mapping relationship between serial numbers of PDCCH candidates corresponding to the N CCE sets respectively and a position order of contents sent on CCEs in the N CCE sets in the DCI signaling.~~

~~27. The receiving apparatus of claim 26, wherein,
the mapping relationship between the serial numbers of the specific CCEs is configured based on different aggregation levels;~~

~~or, the mapping relationship between the serial numbers of the specific CCEs is the same for all the aggregation levels.~~

~~28. The receiving apparatus of claim 26, wherein the specific CCEs are CCEs at a minimum frequency in the CCE sets.~~

~~29. The receiving apparatus of claim 26, wherein at least one of the second indication information, the third indication information, the fourth indication information, the fifth indication information, the sixth indication information, and the seventh indication information is configured to indicate an ID of a search space to which the N CCE sets belong, and/or an ID of a control resource set to which the N CCE sets belong.~~

~~30. The receiving apparatus of claim 26, wherein,
the mapping relationship between the serial numbers of the PDCCH candidates is configured based on different aggregation levels;~~

~~or, the mapping relationship between the serial numbers of the PDCCH candidates is same for all the aggregation levels.~~

~~31. The receiving apparatus of any of claims 21 to 23, wherein the resource mapping relationship comprises a time domain mapping relationship.~~

~~32. The receiving apparatus of claim 31, wherein the N beam directions correspond to a same time domain resource, and the N beam directions correspond to second CCE sets in the same time domain;~~

~~wherein the receiving module is configured to receive same DCI signaling sent on~~

~~the second CCE sets in N beam directions separately in response to the N beam directions separately sending the complete content of the DCI signaling through the same time domain resource;~~

~~or,~~

~~the receiving module is configured to receive the DCI signaling based on eighth indication information in response to the N beam directions collectively sending the complete content of the DCI signaling through the same time domain resource, the eighth indication information being configured to indicate a position order in the DCI signaling of a content sent on CCEs in a second CCE set corresponding to each beam direction.~~

~~33. The receiving apparatus of claim 32, wherein the N beam directions correspond to different time domain resources, and the N beam directions correspond to N CCE sets one by one;~~

~~wherein the receiving module is configured to receive, in the N beam directions separately based on ninth indication information, same DCI signaling sent on the N CCE sets in response to the N beam directions separately sending the complete content of the DCI signaling through different time domain resources, the ninth indication information being configured to indicate a mapping relationship between time domains of the N CCE sets;~~

~~or,~~

~~the receiving module is configured to receive the DCI signaling based on tenth indication information in response to the N beam directions collectively send the complete content of the DCI signaling through different time domain resources, the tenth indication information being configured to indicate a mapping relationship between time domains of the N CCE sets;~~

~~or,~~

~~the receiving module is configured to receive the DCI signaling based on eleventh indication information in response to the N beam directions collectively send the complete content of the DCI signaling through different time domain resources, the eleventh indication information being configured to indicate a mapping relationship~~

~~between time domains of the N CCE sets and a position order of contents sent on CCEs in the N CCE sets in the DCI signaling.~~

~~34. The receiving apparatus of claim 33, wherein,~~

~~the mapping relationship between the time domains of the N CCE sets comprises a mapping relationship between serial numbers of specific CCEs corresponding to the N CCE sets respectively;~~

~~or, the mapping relationship between the time domains of the N CCE sets comprises a mapping relationship between serial numbers of PDCCH candidates corresponding to the N CCE sets respectively.~~

~~35. The receiving apparatus of claim 34, wherein the specific CCEs are CCEs at a minimum frequency in the CCE sets.~~

~~36. The receiving apparatus of claim 33, wherein,~~

~~the mapping relationship between the time domains of the CCE sets is configured based on different aggregation levels;~~

~~or, the mapping relationship between the time domains of the CCE sets is same for all the aggregation levels.~~

~~37. The receiving apparatus of claim 33, wherein at least one of the ninth indication information, the tenth indication information, and the eleventh indication information is configured to indicate an ID of a search space to which the N CCE sets belong, and/or an ID of a control resource set to which the N CCE sets belong.~~

~~38. The receiving apparatus of any of claims 21 to 23, wherein,~~

~~the determining module is configured to determine the resource mapping relationship between the CCE sets in the N beam directions according to an instruction of a network device;~~

~~or, the determining module is configured to determine a predefined resource mapping relationship as the resource mapping relationship between the CCE sets in the N beam directions.~~

~~39. The receiving apparatus of any of claims 21 to 23, wherein,~~

~~each CCE set comprises a PDCCH candidate.~~

~~40. The receiving apparatus of any of claims 21 to 23, wherein,
CCE sets in different beam directions belong to a same search space;
or, the CCE sets in different beam directions belong to different search spaces in a
same control resource set;~~

~~or, the CCE sets in different beam directions belong to different control resource sets.~~

~~41~~20. A terminal device, comprising:

a processor;

a transceiver connected with the processor; and

a memory for storing executable instructions of the processor;

wherein the processor is configured to load and execute the executable instructions
to implement the receiving method of any one of claims 1 to ~~20~~19.

~~42. A computer readable storage medium having executable instructions stored
thereon that, wherein the executable instructions are loaded and executed by a processor
to implement the receiving method of any one of claims 1 to 20.~~