

A terminal device receives Downlink Control Information (DCI) sent by a network device; the terminal device determines an uplink multiple access manner for the terminal device according to a DCI format of the DCI or determines an uplink multiple access manner for the terminal device according to parameter indication information carried in the DCI; and the terminal device transmits uplink data according to the uplink multiple access manner.

In such a manner, the terminal device determines the uplink multiple access manner for the terminal device through the DCI format of the DCI or the parameter indication information carried in the DCI, so that the network device may flexibly regulate the uplink multiple access manner adopted for the terminal device.

Optionally, in an implementation mode of the first aspect, the operation that the terminal device determines the uplink multiple access manner for the terminal device according to the DCI format of the DCI may include that: the terminal device determines the uplink multiple access manner for the terminal device according to the DCI format of the DCI and correspondences between DCI formats and uplink multiple access manners.

Optionally, different DCI formats correspond to different control information lengths, and/or DCI format indication bits in different DCI formats indicate different information.

For example, the total number of bits of control information in a DCI format 0 and format 4 is different or contents at DCI format indication bits in the DCI format 0 and format 4 are different.

It is to be understood that the correspondences between the DCI formats and the uplink multiple access manners may be determined and sent to the terminal device by the network device and may also be predetermined by the terminal device and the network device. There are no limits made in the embodiments of the disclosure.

In such a manner, the terminal device determines the uplink multiple access manner through the DCI format of the DCI, so that the network device may flexibly regulate the uplink multiple access manner adopted for the terminal device.

Optionally, in an implementation mode of the first aspect, the operation that the terminal device determines the uplink multiple access manner for the terminal device according to the parameter indication information carried in the DCI may include that: the terminal device determines transmission information of the terminal

the terminal device according to a DCI format of the DCI or parameter indication information carried in the DCI.

Specifically, the network device sends the DCI to the terminal device to indicate an uplink multiple access manner to the terminal device. Herein, the network device may indicate the uplink multiple access manner to the terminal device through the DCI format of the DCI, for example, a DCI format 0 and a DCI format 4. Or the network device may indicate the uplink multiple access manner to the terminal device through the parameter indication information carried in the DCI, for example, information for indicating the number of transmission layers, physical resource configuration manner indication information, DMRS port indication information, PMI information or codeword indication information. The terminal device, after receiving the DCI, may determine the uplink multiple access manner for the terminal device through the DCI format of the DCI or the parameter indication information carried in the DCI.

Optionally, the operation that the terminal device determines the uplink multiple access manner for the terminal device according to the DCI format of the DCI includes that: the terminal device determines the uplink multiple access manner according to the DCI format of the DCI and correspondences between DCI formats and uplink multiple access manners.

Optionally, different DCI formats correspond to different control information lengths, and/or DCI format indication bits in different DCI formats indicate different information.

Herein, the correspondences between the DCI formats and the uplink multiple access manners may be determined and indicated to the terminal device by the network device and may also be predetermined by both the network device and the terminal device, for example, specified in a protocol.

Optionally, the operation that the terminal device determines the uplink multiple access manner for the terminal device according to the parameter indication information carried in the DCI includes that: the terminal device determines transmission information of the terminal device according to the parameter indication information, here, the transmission information includes at least one of the number of transmission layers or a physical resource configuration manner for the terminal device; and the terminal device determines the uplink multiple access manner

Furthermore, as illustrated in FIG. 4, before the operation that the network device sends the DCI to the terminal device, the method may further include 251 to 253.

In 251, the network device determines the correspondences between the DCI formats and the uplink multiple access manners.

In 252, the network device sends information of the correspondences between the DCI formats and the uplink multiple access manners to the terminal device.

In 253, the terminal device receives the information of the correspondences between the DCI formats and the uplink multiple access manners from the network device.

It is to be understood that the correspondences between the DCI formats and the uplink multiple access manners may be determined and sent to the terminal device by the network device and may also be predetermined by the terminal device and the network device. There are no limits made in the embodiment of the disclosure.

Optionally, different DCI formats correspond to different control information lengths, and/or the DCI format indication bits in different DCI formats indicate different information.

For example, the total number of bits of control information in the DCI format 0 is different from the total number of bits of control information in the DCI format 4, or contents at DCI format indication bits in the DCI format 0 are different from content at DCI format indication bits in the DCI format 4.

In the embodiment, the terminal device determines the uplink multiple access manner through the DCI format of the DCI, so that the network device may flexibly regulate the uplink multiple access manner adopted for the terminal device.

FIG. 5 is an interaction flowchart of a method for transmitting uplink data according to an embodiment of the disclosure. As illustrated in FIG. 5, before 210, the method may further include 260 and 230 may be replaced with 232 and 233. The terminal device may determine transmission information of the terminal device according to the parameter indication information, here, the transmission information includes at least one of the number of transmission layers or a physical resource configuration manner for the terminal device. Moreover, the terminal device determines the uplink multiple access manner according to the transmission information.

CLAIMS

1. A method for uplink data transmission, comprising:

receiving, by a terminal device, Downlink Control Information (DCI) sent by a network device;

determining, by the terminal device, that an uplink multiple access manner for the terminal device is Discrete Fourier Transformation Spread Orthogonal Frequency Division Multiplexing (DFT-S-OFDM) or Cyclic Prefix Orthogonal Frequency Division Multiplexing (CP-OFDM), according to a first DCI format and a second DCI format of the DCI, wherein the first DCI format is different from the second DCI format, and the first DCI format and the second DCI format correspond to different control information lengths; and

transmitting, by the terminal device, uplink data according to the uplink multiple access manner DFT-S-OFDM or CP-OFDM.

2. The method of claim 1, wherein determining, by the terminal device, that the uplink multiple access manner for the terminal device is DFT-S-OFDM or CP-OFDM, according to the first DCI format and the second DCI format of the DCI comprises:

determining, by the terminal device, that the uplink multiple access manner for the terminal device is DFT-S-OFDM or CP-OFDM, according to the first DCI format and the second DCI format of the DCI and correspondences between the first DCI format and an uplink multiple access manner and between the second DCI format and an uplink multiple access manner.

3. The method of any one of claims 1-2, wherein transmitting, by the terminal device, the uplink data according to the uplink multiple access manner DFT-S-OFDM or CP-OFDM comprises:

responsive to it is determined by the terminal device that the uplink multiple access manner is DFT-S-OFDM, performing, by the terminal device, a Discrete Fourier Transformation (DFT) on the uplink data and transmitting in an uplink data channel the uplink data on which the DFT has been performed.

4. The method of any one of claims 1-2, wherein transmitting, by the terminal device, the uplink data according to the uplink multiple access manner DFT-S-OFDM or CP-OFDM comprises:

responsive to it is determined by the terminal device that the uplink multiple access manner is CP-OFDM, forbidding, by the terminal device, performing a DFT on the uplink data and transmitting in an uplink data channel the uplink data on which no DFT has been performed.

5. The method of any one of claims 1-4, wherein transmitting, by the terminal device, the uplink data according to the uplink multiple access manner DFT-S-OFDM or CP-OFDM comprises:

determining, by the terminal device, a target uplink data channel structure according to the uplink multiple access manner and correspondences between uplink multiple access manners and uplink data channel structures; and

transmitting, by the terminal device, the uplink data according to the target uplink data channel structure.

6. The method of claim 5, wherein the uplink data channel structure comprises at least one of:

a resource location of DMRS for the uplink data channel, a DMRS sequence for the uplink data channel, a transmission manner for the uplink data in the uplink data channel, a time-domain resource occupied by the uplink data channel, or a frequency-domain resource occupied by the uplink data channel.

7. A method for uplink data transmission, comprising:

sending, by a network device, Downlink Control Information (DCI) to a terminal device, a first DCI format and a second DCI format of the DCI being different, the first DCI format and the second DCI format corresponding to different control information lengths, and the first DCI format and the second DCI format of the DCI being used by the terminal device to determine that an uplink multiple access manner for the terminal device is Discrete Fourier Transformation Spread Orthogonal Frequency Division Multiplexing (DFT-S-OFDM) or Cyclic Prefix Orthogonal

Frequency Division Multiplexing (CP-OFDM); and

receiving, by the network device, uplink data transmitted by the terminal device according to the uplink multiple access manner.

8. The method of claim 7, wherein receiving, by the network device, the uplink data transmitted by the terminal device according to the uplink multiple access manner comprises:

receiving, by the network device, the uplink data transmitted by terminal device according to a target uplink data channel structure, the target uplink data channel structure being determined by the terminal device according to the uplink multiple access manner and correspondences between uplink multiple access manners and uplink data channel structures.

9. The method of claim 8, wherein the uplink data channel structure comprises at least one of:

a resource location of DMRS for the uplink data channel, a DMRS sequence for the uplink data channel, a transmission manner for the uplink data in the uplink data channel, a time-domain resource occupied by the uplink data channel, or a frequency-domain resource occupied by the uplink data channel.

10. A terminal device, comprising:

a receiving unit, configured to receive Downlink Control Information (DCI) sent by a network device;

a determination unit, configured to determine that an uplink multiple access manner for the terminal device is Discrete Fourier Transformation Spread Orthogonal Frequency Division Multiplexing (DFT-S-OFDM) or Cyclic Prefix Orthogonal Frequency Division Multiplexing (CP-OFDM), according to a first DCI format and a second DCI format of the DCI received by the receiving unit, wherein the first DCI format is different from the second DCI format, and the first DCI format and the second DCI format correspond to different control information lengths; and

a sending unit, configured to transmit uplink data according to the uplink multiple access manner DFT-S-OFDM or CP-OFDM determined by the determination unit.

11. The terminal device of claim 10, wherein the determination unit is specifically configured to:

determine that the uplink multiple access manner for the terminal device is DFT-S-OFDM or CP-OFDM, according to the first DCI format and the second DCI format of the DCI and correspondences between the first DCI format and an uplink multiple access manner and between the second DCI format and an uplink multiple access manner.

12. The terminal device of any one of claims 10-11, wherein the sending unit is specifically configured to:

responsive to it is determined that the uplink multiple access manner is DFT-S-OFDM, perform a Discrete Fourier Transformation (DFT) on the uplink data and transmit in an uplink data channel the uplink data on which the DFT has been performed.

13. The terminal device of any one of claims 10-11, wherein the sending unit is specifically configured to:

responsive to it is determined that the uplink multiple access manner is CP-OFDM, forbid performing a DFT on the uplink data and transmit in an uplink data channel the uplink data on which no DFT has been performed.

14. The terminal device of any one of claims 10-13, wherein the sending unit is specifically configured to:

determine a target uplink data channel structure according to the uplink multiple access manner and correspondences between uplink multiple access manners and uplink data channel structures; and

transmit the uplink data according to the target uplink data channel structure.

15. The terminal device of claim 14, wherein the uplink data channel structure comprises at least one of:

a resource location of DMRS for the uplink data channel, a DMRS sequence for the uplink data channel, a transmission manner for the uplink data in the uplink data channel, a time-domain resource occupied by the uplink data channel, or a frequency-domain resource occupied by the uplink data channel.

16. A network device, comprising:

a sending unit, configured to send Downlink Control Information (DCI) to a terminal device, a first DCI format and a second DCI format of the DCI being different, the first DCI format and the second DCI format corresponding to different control information lengths, and the first DCI format and the second DCI format of the DCI being used by the terminal device to determine that an uplink multiple access manner for the terminal device is Discrete Fourier Transformation Spread Orthogonal Frequency Division Multiplexing (DFT-S-OFDM) or Cyclic Prefix Orthogonal Frequency Division Multiplexing (CP-OFDM); and

a receiving unit, configured to receive uplink data transmitted by the terminal device according to the uplink multiple access manner.

17. The network device of claim 16, wherein the receiving unit is specifically configured to:

receive the uplink data transmitted by terminal device according to a target uplink data channel structure, the target uplink data channel structure being determined by the terminal device according to the uplink multiple access manner and correspondences between uplink multiple access manners and uplink data channel structures.

18. The network device of claim 17, wherein the uplink data channel structure comprises at least one of:

a resource location of DMRS for the uplink data channel, a DMRS sequence for the uplink data channel, a transmission manner for the uplink data in the uplink data channel, a time-domain resource occupied by the uplink data channel, or a frequency-domain resource occupied by the uplink data channel.