Claims:

1. A data transmission method, comprising:

sending, by a network device, downlink information to a terminal device through multiple downlinks;

generating, by the network device, first indication information and sending, by the network device, the terminal device the first indication information by using a Radio Resource Control (RRC) signaling, wherein the first indication information is used for indicating the terminal device to send multiple pieces of uplink information on multiple uplink channels in a time division multiplexing mode or the first indication information is used for indicating the terminal device to send the multiple pieces of uplink information on a first uplink channel of the multiple uplink channels, wherein the multiple pieces of uplink information correspond to the multiple downlinks;

sending, by the network device, an uplink (UL) grant message to the terminal device by using Downlink Control Information (DCI); and

receiving, by the network device, the multiple pieces of uplink information sent by the terminal device, comprising:

when the first indication information is used for indicating the terminal device to send the multiple pieces of uplink information on multiple uplink channels in the time division multiplexing mode, receiving the multiple pieces of uplink information sent by the terminal device on a Physical Uplink Control Channel (PUCCH), wherein the multiple pieces of uplink information comprise acknowledgement/non-acknowledgement information corresponding to each downlink in the multiple downlinks,

when the first indication information is used for indicating the terminal device to send the multiple pieces of uplink information on the first uplink channel of the multiple uplink channels, receiving the multiple pieces of uplink information sent by the terminal device on a Physical Uplink Shared Channel (PUSCH), wherein the multiple pieces of uplink information comprise the uplink data and the acknowledgement/non-acknowledgement information corresponding to each downlink in the multiple downlinks.

2. A network device, comprising a processor and a transceiver, wherein,

the transceiver is configured to send downlink information to a terminal device through multiple downlinks;

the processor is configured to generate first indication information, wherein the first indication information is used for indicating the terminal device to send multiple pieces of uplink information on multiple uplink channels in a time division multiplexing mode or the first indication information is used for indicating the terminal device to send the multiple pieces of uplink information on a first uplink channel of the multiple uplink channels, wherein the multiple pieces of uplink information correspond to the multiple downlinks; and

the transceiver is further configured to:

send the terminal device the first indication information by using a Radio Resource Control (RRC) signaling;

send an uplink (UL) grant message to the terminal device by using Downlink Control Information (DCI); and

receive the multiple pieces of uplink information sent by the terminal device, comprising:

when the first indication information is used for indicating the terminal device to send the multiple pieces of uplink information on multiple uplink channels in the time division multiplexing mode, receive the multiple pieces of uplink information sent by the terminal device on a Physical Uplink Control Channel (PUCCH), wherein the multiple pieces of uplink information comprises acknowledgement/non-acknowledgement information corresponding to each downlink in the multiple downlinks,

when the first indication information is used for indicating the terminal device to send the multiple pieces of uplink information on the first uplink channel of the multiple uplink channels, receive the multiple pieces of uplink information sent by the terminal device on a Physical Uplink Shared Channel (PUSCH), wherein the multiple pieces of uplink information comprise the uplink data and the acknowledgement/non-acknowledgement information corresponding to each downlink in the multiple downlinks.

3. The network device according to claim 2, wherein the processor is further configured to:

generate the first indication information according to interaction capabilities between multiple Transmission Reception Points (TRPs) corresponding to the multiple downlinks and report information of the terminal device.

4. The network device according to claim 3, wherein the report information comprises at least one piece of the following information:

capability information indicating whether the terminal device supports to send the multiple pieces of uplink information on the multiple uplink channels, information about a Multiple-Input Multiple-Output (MIMO) capability of the terminal device, level information of the terminal device, and a Power Headroom Report (PHR) of the terminal device.

5. The network device according to any one of claims 2-4, wherein the transceiver is further configured to:

send first Downlink Control Information (DCI) to the terminal device, wherein the first DCI comprises the first indication information.

6. The network device according to claim 5, wherein the transceiver is further configured to:

send the first DCI to the terminal device on a control channel corresponding to each downlink in the multiple downlinks; or send the first DCI to the terminal device on a control channel corresponding to a first downlink of the multiple downlinks.

7. A terminal device, comprising a transceiver, wherein,

the transceiver is configured to receive downlink information sent by a network device through multiple downlinks;

the transceiver is further configured to receive first indication information sent by the network device by using a Radio Resource Control (RRC) signaling, wherein the first indication information is used for indicating the terminal device to send multiple pieces of uplink information on multiple uplink channels in a time division multiplexing mode or the first indication information is used for indicating the terminal device to send the multiple pieces of uplink information on a first uplink channel of the multiple uplink channels, wherein the multiple pieces of uplink information correspond to the multiple downlinks;

the transceiver is further configured to receive an uplink (UL) grant message sent by the network device by using Downlink Control Information (DCI); and

the transceiver is further configured to send the multiple pieces of uplink information to the network device according to the first indication information, comprising:

when the first indication information is used for indicating the terminal device to send the multiple pieces of uplink information on multiple uplink channels in the time division multiplexing mode, send the multiple pieces of uplink information to the network device on a Physical Uplink Control Channel (PUCCH), wherein the multiple

pieces of uplink information comprises acknowledgement/non-acknowledgement information corresponding to each downlink in the multiple downlinks,

when the first indication information is used for indicating the terminal device to send the multiple pieces of uplink information on the first uplink channel of the multiple uplink channels, send the multiple pieces of uplink information to the network device on a Physical Uplink Shared Channel (PUSCH), wherein the multiple pieces of uplink information comprise the uplink data and the acknowledgement/non-acknowledgement information corresponding to each downlink in the multiple downlinks.

8. The terminal device according to claim 7, wherein the transceiver is further configured to:

receive first Downlink Control Information (DCI) sent by the network device, wherein the first DCI comprises the first indication information.

9. The terminal device according to claim 8, wherein the transceiver is further configured to: receive the first DCI sent by the network device on a control channel corresponding to any downlink of the multiple downlinks; or receive the first DCI sent by the network device on a control channel corresponding to a first downlink of the multiple downlinks.

10. The method according to claim 1, wherein generating, by the network device, the first indication information comprises:

generating the first indication information according to interaction capabilities between multiple beams corresponding to the multiple downlinks.

11. The method according to claim 1, wherein sending, by the network device, the UL grant message to the terminal device by using the DCI comprises:

sending the DCI to the terminal device on a control channel corresponding to a second downlink of the multiple downlinks.

12. The method according to claim 1, wherein sending, by the network device, the UL grant message to the terminal device by using the DCI comprises:

selecting at least one downlink in the multiple downlinks; and

sending the DCI to the terminal device on the selected at least one downlink.

13. The method according to claim 1, wherein generating the first indication information comprises:

generating the first indication information according to at least one piece of the following

information:

interaction capabilities between multiple Transmission Reception Points (TRPs) corresponding to the multiple downlinks, interaction capabilities between multiple beams corresponding to the multiple downlinks, interaction capabilities between multiple cells to which the multiple TRPs belong, interaction capabilities between multiple cells to which the multiple beams belong, report information of the terminal device, service information of the multiple downlinks, and network load information.

14. The method according to claim 13, wherein the report information comprises at least one piece of the following information:

capability information indicating whether the terminal device supports to send the multiple pieces of uplink information on the multiple uplink channels, information about a Multiple-Input Multiple-Output (MIMO) capability of the terminal device, level information of the terminal device, and a Power Headroom Report (PHR) of the terminal device.

15. The method according to claim 1, wherein sending, by the network device, the UL grant message to the terminal device by using the DCI comprises:

sending the DCI to the terminal device on a control channel corresponding to each downlink in the multiple downlinks; or

sending the DCI to the terminal device on a control channel corresponding to a second downlink of the multiple downlinks; or

selecting at least one downlink in the multiple downlinks, and sending the DCI to the terminal device on the at least one downlink.

16. The network device according to claim 2, wherein the transceiver is further configured to:

send the DCI to the terminal device on a control channel corresponding to a second downlink of the multiple downlinks.

17. The network device according to claim 2, wherein the transceiver is further configured to:

select at least one downlink in the multiple downlinks; and

send the DCI to the terminal device on the at least one downlink.

18. The terminal device according to claim 7, wherein the first indication information is generated according to interaction capabilities between multiple Transmission Reception Points

(TRPs) corresponding to the multiple downlinks.

19. The terminal device according to claim 7, wherein the transceiver is further configured to:

receive the DCI sent by the network device on a control channel corresponding to a second downlink of the multiple downlinks.

20. The terminal device according to claim 7, wherein the transceiver is further configured to:

receive the DCI sent by the network device on at least one downlink in the multiple downlinks.