

WHAT IS CLAIMED IS:

1. A data transmission method for direct communication, performed by a first terminal, comprising:

transmitting, ~~by a first terminal~~, sidelink data to a second terminal through a sidelink according to downlink control information (DCI) transmitted by an access network device;

receiving, ~~by the first terminal~~, sidelink hybrid auto repeat request (HARQ) feedback information fed back by the second terminal in a second time-frequency resource through a physical sidelink feedback channel (PSFCH), the sidelink HARQ feedback information being configured to indicate a receiving state corresponding to the sidelink data; and

reporting, ~~by the first terminal~~, the sidelink HARQ feedback information to the access network device;

wherein, reporting the sidelink HARQ feedback information to the access network device, comprises:

reporting the sidelink HARQ feedback information to the access network device in a first time-frequency resource through a physical uplink control channel (PUCCH);

wherein, the first time-frequency resource comprises: a PUCCH resource preconfigured to be used by the first terminal for reporting the sidelink HARQ feedback; or a PUCCH resource mapped according to a third time-frequency resource used for transmitting the DCI transmitted by the access network device; and the second time-frequency resource comprises: a PSFCH resource mapped by the second terminal according to a fourth time-frequency resource used for transmitting the sidelink data.

2. The method of claim 1, ~~wherein, reporting the sidelink HARQ feedback information to the access network device, comprises:~~

~~reporting the sidelink HARQ feedback information to the access network device in a first time-frequency resource through a physical uplink control channel (PUCCH).~~

32. The method of claim 12, wherein, the first time-frequency resource further comprises ~~one~~ of following parameters:

a PUCCH resource preconfigured for transmitting uplink HARQ feedback information of downlink data; ~~;~~

~~a PUCCH resource preconfigured to be used by the first terminal for reporting the sidelink HARQ feedback; or~~

~~a PUCCH resource mapped according to a third time-frequency resource used for transmitting the information transmitted by the access network device.~~

4. The method of claim 1, wherein, ~~receiving sidelink HARQ feedback information fed back by the second terminal, comprises:~~

~~receiving the sidelink HARQ feedback information fed back by the second terminal in a second time-frequency resource through a physical sidelink feedback channel PSFCH.~~

53. The method of claim 14, wherein, the second time-frequency resource further comprises ~~one of the following parameters:~~

a PSFCH resource preconfigured to be used by the second terminal for transmitting the sidelink HARQ feedback to the first terminal;

~~a PSFCH resource mapped by the second terminal according to a fourth time-frequency resource used for transmitting the sidelink data;~~

a PSFCH resource mapped by the second terminal according to the first time-frequency resource used by the first terminal for reporting the sidelink HARQ feedback information; or

a PSFCH resource configured by the first terminal ~~or~~ and the second terminal according to the first time-frequency resource and a preset timing relationship.

64. The method of claim ~~2~~ or 41, further comprising:

determining data transmission parameters indicated by the access network device in an explicit manner or an implicit manner, the data transmission parameters being configured to indicate the first time-frequency resource and/or the second time-frequency resource, ~~or the first time-frequency resource and second time-frequency resource.~~

75. The method of claim ~~46~~, wherein, the data transmission parameters configured to indicate the first time-frequency resource and the second time-frequency resource are carried by the ~~information DCI transmitted by the access network device~~, and the method further comprises:

transmitting the data transmission parameter configured to indicate the second time-frequency resource to the second terminal.

86. The method of claim ~~64~~, wherein, the data transmission parameters comprise at least one of following parameters:

a first physical resource indicator, configured to represent a time domain and/or frequency domain resource, ~~a frequency domain resource, or the time domain resource and the frequency domain resource~~ used by the first terminal for reporting the sidelink HARQ feedback information;

a first feedback timing indicator, configured to represent a time interval between the sidelink data transmission and reporting the corresponding sidelink HARQ feedback information by the first terminal;

a second physical resource indicator, configured to represent a time domain and/or frequency domain resource, ~~a frequency domain resource, or the time domain resource and the frequency~~

~~domain resource, wherein the time domain resource and the frequency domain resource are used by the second terminal for transmitting the sidelink HARQ feedback information; or~~

a second feedback timing indicator, configured to represent a time interval between the sidelink data transmission and feeding back the corresponding sidelink HARQ feedback information by the second terminal.

97. The method of claim 12, further comprising:

receiving a first configuration signaling transmitted by the access network device, the first configuration signaling being configured to indicate a first time interval set and/or, a PUCCH resource set, ~~or the first time interval set and the PUCCH resource set, wherein the PUCCH resource set and the first time interval set are~~ corresponding to the sidelink HARQ feedback information;

wherein, the PUCCH resource set comprises a plurality of PUCCH resources configured to report the sidelink HARQ feedback information, and the first time interval set comprises configured time intervals between the sidelink data transmission and reporting the corresponding sidelink HARQ feedback information by the first terminal.

~~408~~. The method of claim 97, wherein, the first configuration signaling is a first radio resource control (RRC) signaling, the first RRC signaling comprising a first newly added field and a second newly added field, the first newly added field being configured to indicate the PUCCH resource set, and the second newly added field being configured to indicate the first time interval set.

449. The method of claim 41, further comprising:

receiving a second configuration signaling transmitted by the access network device, the second configuration signaling being configured to indicate a second time interval set and/or, a PSFCH resource set, ~~or the second time interval set and the PSFCH resource set, wherein the second time interval set and the PSFCH resource set are~~ corresponding to the sidelink HARQ feedback information;

wherein, the PSFCH resource set comprises a plurality of PSFCH resources configured to report the sidelink HARQ feedback information, and the second time interval set comprises configured time intervals between the sidelink data transmission and feeding back the corresponding sidelink HARQ feedback information by the second terminal.

~~4210~~. The method of claim 449, wherein, the second configuration signaling is a second radio resource control (RRC) signaling, the second RRC signaling comprising a third newly added field and a fourth newly added field, the third newly added field being configured to indicate the PSFCH resource set, and the fourth newly added field being configured to indicate the second time interval set.

~~1311~~. A data transmission method for direct communication, performed by an access network device, comprising:

~~transmitting, by an access network device, downlink control information (DCI) to a first terminal, the DCI information being configured to instruct the first terminal to transmit sidelink data to a second terminal through a sidelink, receive-receiving sidelink hybrid auto repeat request (HARQ) feedback information fed back by the second-first terminal in a first time-frequency resource through a physical uplink control channel (PUCCH), the sidelink HARQ feedback information being configured to indicate a receiving state corresponding to the sidelink data, and report the sidelink HARQ feedback information to the access network device;~~

~~receiving, by the access network device, the sidelink HARQ feedback information reported by the first terminal;~~

~~wherein, the first time-frequency resource comprises: a PUCCH resource preconfigured to be used by the first terminal for reporting the sidelink HARQ feedback; or a PUCCH resource mapped according to a third time-frequency resource used for transmitting the DCI transmitted.~~

~~12. The method of claim 11, wherein, the first time-frequency resource further comprises: a PUCCH resource preconfigured for transmitting uplink HARQ feedback information of downlink data.~~

~~14. The method of claim 13, wherein, receiving the sidelink HARQ feedback information reported by the first terminal, comprises:~~

~~receiving the sidelink HARQ feedback information transmitted by the first terminal in a first time-frequency resource through a physical uplink control channel (PUCCH).~~

~~1513~~. The method of claim ~~1311~~, further comprising:

~~indicating data transmission parameters to the first terminal in an explicit manner or an implicit manner, the data transmission parameters being configured to indicate the first time-frequency resource and/or, the a second time-frequency resource, or the first time-frequency resource and the second time-frequency resource.~~

~~1614~~. The method of claim ~~1513~~, wherein, the data transmission parameters configured to indicate the first time-frequency resource and the second time-frequency resource are carried by the ~~information DCI transmitted by the access network device~~, and the ~~information transmitted by the access network device~~ DCI is configured to instruct the first terminal to transmit the data transmission parameter configured to indicate the second time-sequence resource to the second terminal.

~~15~~. The method of claim 13, wherein, the second time-frequency resource comprises:

a PSFCH resource preconfigured to be used by the second terminal for transmitting the

sidelink HARQ feedback to the first terminal;

a PSFCH resource mapped by the second terminal according to a fourth time-frequency resource used for transmitting the sidelink data;

a PSFCH resource mapped by the second terminal according to the first time-frequency resource used by the first terminal for reporting the sidelink HARQ feedback information; or

a PSFCH resource configured by the first terminal or the second terminal according to the first time-frequency resource and a preset timing relationship.

16. The method of claim 13, wherein, the data transmission parameters comprise at least one of:

a first physical resource indicator, configured to represent a time domain and/or frequency domain resource used by the first terminal for reporting the sidelink HARQ feedback information;

a first feedback timing indicator, configured to represent a time interval between the sidelink data transmission and reporting the corresponding sidelink HARQ feedback information by the first terminal;

a second physical resource indicator, configured to represent a time domain and/or frequency domain resource used by the second terminal for transmitting the sidelink HARQ feedback information; or

a second feedback timing indicator, configured to represent a time interval between the sidelink data transmission and feeding back the corresponding sidelink HARQ feedback information by the second terminal.

17. The method of claim 13, further comprising:

transmitting a first configuration signaling to the first terminal, the first configuration signaling being configured to indicate a first time interval set and/or a PUCCH resource set corresponding to the sidelink HARQ feedback information; ~~a first time interval set, a PUCCH resource set, or the first time interval set and the PUCCH resource set, wherein the first time interval set and the PUCCH resource set are corresponding to the sidelink HARQ feedback information;~~

wherein, the PUCCH resource set comprises a plurality of PUCCH resources configured to report the sidelink HARQ feedback information, and the first time interval set comprises configured time intervals between the sidelink data transmission and reporting the corresponding sidelink HARQ feedback information by the first terminal.

18. The method of claim 17, wherein, the first configuration signaling is a first radio resource control (RRC) signaling, the first RRC signaling comprising a first newly added field and a second newly added field, the first newly added field being configured to indicate the PUCCH resource

set, and the second newly added field being configured to indicate the first time interval set.

1819. The method of claim 1311, further comprising:

transmitting a second configuration signaling to the first terminal and/or; the second terminal,
or the first terminal and the second terminal, the second configuration signaling being configured
to indicate a second time interval set and/or a PSFCH resource set corresponding to the sidelink
HARQ feedback information; a second time interval set, a PSFCH resource set, or the second time
interval set and the PSFCH resource set, wherein the second time interval set and the PSFCH
resource set are corresponding to the sidelink HARQ feedback information;

wherein, the PSFCH resource set comprises a plurality of PSFCH resources configured to
report the sidelink HARQ feedback information, and the second time interval set comprises
configured time intervals between the sidelink data transmission and feeding back the
corresponding sidelink HARQ feedback information by the second terminal.

20. The method of claim 19, wherein, the second configuration signaling is a second radio
resource control (RRC) signaling, the second RRC signaling comprising a third newly added field
and a fourth newly added field, the third newly added field being configured to indicate the PSFCH
resource set, and the fourth newly added field being configured to indicate the second time interval
set.

19. A terminal, comprising: —

a processor;

a transceiver connected to the processor;

a memory configured to store instructions executable by the processor;

wherein, the processor is configured to load and execute the executable instructions to
implement the method of any one of claims 1 to 12.

20. An access network device, comprising: —

a processor;

a transceiver connected to the processor;

a memory configured to store instructions executable by the processor;

wherein, the processor is configured to load and execute executable the instructions to
implement the method of any one of claims 13 to 18.

21. A terminal, comprising: —

a processor;

a transceiver connected to the processor;

a memory configured to store instructions executable by the processor;

wherein, the processor is configured to load and execute the executable instructions to

implement the method of any one of claims 1 to 10.

22. An access network device, comprising:

a processor;

a transceiver connected to the processor;

a memory configured to store instructions executable by the processor;

wherein, the processor is configured to load and execute executable the instructions to
implement the method of any one of claims 11 to 20.