

CLAIMS

What is claimed is:

1. A data transmission method, applied to a terminal device, and comprising:
 - obtaining interface information of an external device communication protocol and a 3rd-generation partnership project 3GPP network protocol; and
 - receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network;
 - wherein the interface information comprises at least one of the following:
 - a media access control MAC protocol data unit PDU of the external device communication protocol is used as a packet data convergence protocol PDCP service data unit SDU of a first network protocol to receive or send the data;
 - a data radio bearer DRB identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol;
 - an evolved packet system EPS bearer identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; or
 - a PDCP entity identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; and
 - the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:
 - sending, by a MAC layer entity of the external device communication protocol stack, a MAC PDU to a PDCP layer entity of a first network protocol stack; and/or
 - receiving, by a MAC layer entity of the external device communication protocol stack, a PDCP SDU sent by a PDCP layer entity of a first network protocol stack;
 - and/or,
 - wherein the interface information comprises at least one of the following:
 - a MAC PDU of the external device communication protocol is used as a service data adaptation protocol SDAP SDU of a second network protocol to receive or send the data;
 - a DRB identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;
 - a PDU session identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;
 - a quality of service QoS flow identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or

an SDAP entity identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by a MAC layer entity of the external device communication protocol stack, a MAC PDU to an SDAP layer entity of a second network protocol stack; and/or

receiving, by a MAC layer entity of the external device communication protocol stack, an SDAP SDU sent by an SDAP layer entity of a second network protocol stack.

2. The method according to claim 1, wherein the external device communication protocol comprises any one of the following:

a wireless fidelity WiFi communication protocol;

a bluetooth protocol; or

a wired local area network communication protocol.

~~3. The method according to claim 1 or 2, wherein the interface information comprises at least one of the following:~~

~~a media access control MAC protocol data unit PDU of the external device communication protocol is used as a packet data convergence protocol PDCP service data unit SDU of a first network protocol to receive or send the data;~~

~~a data radio bearer DRB identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol;~~

~~an evolved packet system EPS bearer identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; or~~

~~a PDCP entity identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; and~~

~~the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:~~

~~sending, by a MAC layer entity of the external device communication protocol stack, a MAC PDU to a PDCP layer entity of a first network protocol stack; and/or~~

~~receiving, by a MAC layer entity of the external device communication protocol stack, a PDCP SDU sent by a PDCP layer entity of a first network protocol stack.~~

3. A data transmission method, applied to a terminal device, and comprising:

obtaining interface information of an external device communication protocol and a 3rd-generation partnership project 3GPP network protocol; and

receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network;

4. ~~The method according to claim 1 or 2,~~ wherein the interface information comprises at least one of the following:

a physical layer PHY SDU ~~or a MAC PDU~~ of the external device communication protocol is used as a PDCP SDU of a first network protocol to receive or send the data;

a DRB identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol;

an EPS bearer identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; or

a PDCP entity identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by a PHY layer entity of the external device communication protocol stack, a PHY SDU ~~or a MAC PDU~~ to a PDCP layer entity of a first network protocol stack; and/or

receiving, by a PHY layer entity of the external device communication protocol stack, a PDCP SDU sent by a PDCP layer entity of a first network protocol stack;

and/or,

wherein the interface information comprises at least one of the following:

a PHY SDU of the external device communication protocol is used as an SDAP SDU of a second network protocol to receive or send the data;

a DRB identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;

a PDU session identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or

a QoS flow identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or an SDAP entity identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by a PHY layer entity of the external device communication protocol stack, a PHY

SDU to an SDAP layer entity of a second network protocol stack; and/or

receiving, by a PHY layer entity of the external device communication protocol stack, an SDAP SDU sent by an SDAP layer entity of a second network protocol stack.

5. The method according to claim 1 or 2, wherein the interface information comprises at least one of the following:

~~a MAC PDU of the external device communication protocol is used as a service data adaptation protocol SDAP SDU of a second network protocol to receive or send the data;~~

~~a DRB identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;~~

~~a PDU session identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;~~

~~a quality of service QoS flow identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or~~

~~an SDAP entity identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; and~~

~~the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:~~

~~sending, by a MAC layer entity of the external device communication protocol stack, a MAC PDU to an SDAP layer entity of a second network protocol stack; and/or~~

~~receiving, by a MAC layer entity of the external device communication protocol stack, an SDAP SDU sent by an SDAP layer entity of a second network protocol stack.~~

6. The method according to claim 1 or 2, wherein the interface information comprises at least one of the following:

~~a PHY SDU or a MAC PDU of the external device communication protocol is used as an SDAP SDU of a second network protocol to receive or send the data;~~

~~a DRB identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;~~

~~a PDU session identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or~~

~~a QoS flow identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or an SDAP entity identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; and~~

~~the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an~~

~~air interface protocol stack of a 3GPP network comprises:~~

~~sending, by a PHY layer entity of the external device communication protocol stack, a PHY SDU or a MAC PDU to an SDAP layer entity of a second network protocol stack; and/or~~

~~receiving, by a PHY layer entity of the external device communication protocol stack, an SDAP SDU sent by an SDAP layer entity of a second network protocol stack.~~

4. A data transmission method, applied to a terminal device, and comprising:

obtaining interface information of an external device communication protocol and a 3rd-generation partnership project 3GPP network protocol; and

receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network;

7. The method according to claim 1 or 2, wherein the interface information comprises at least one of the following:

an internet protocol IP PDU of the external device communication protocol is used as a PDCP SDU of a first network protocol to receive or send the data;

a DRB identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; or

an EPS bearer identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; or

a PDCP entity identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by an IP layer entity of the external device communication protocol stack, an IP PDU to a PDCP layer entity of a first network protocol stack; and/or

receiving, by an IP layer entity of the external device communication protocol stack, a PDCP SDU sent by a PDCP layer entity of a first network protocol stack;

and/or,

wherein the interface information comprises at least one of the following:

an IP PDU of the external device communication protocol is used as an SDAP SDU of a second network protocol to receive or send the data;

a DRB identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;

a PDU session identifier of a second network protocol corresponding to data or a data flow of

the external device communication protocol; or

a QoS flow identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or

an SDAP entity identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by an IP layer entity of the external device communication protocol stack, an IP PDU to an SDAP layer entity of a second network protocol stack; and/or

receiving, by an IP layer entity of the external device communication protocol stack, an SDAP SDU sent by an SDAP layer entity of a second network protocol stack.

5. A data transmission method, applied to a terminal device, and comprising:

obtaining interface information of an external device communication protocol and a 3rd-generation partnership project 3GPP network protocol; and

receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network;

~~8. The method according to claim 1 or 2, wherein the interface information comprises at least one of the following:~~

~~a robust header compression ROHC SDU or an IP PDU of the external device communication protocol is used as a PDCP SDU of a first network protocol to receive or send the data;~~

~~a DRB identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; or~~

~~an EPS bearer identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; or~~

~~a PDCP entity identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; and~~

~~the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:~~

~~sending, by an ROHC layer entity of the external device communication protocol stack, an ROHC SDU or an IP PDU to a PDCP layer entity of a first network protocol stack; and/or~~

~~receiving, by an ROHC layer entity of the external device communication protocol stack, a~~

PDCP SDU sent by a PDCP layer entity of a first network protocol stack;

and/or,

wherein the interface information comprises at least one of the following:

an ROHC SDU of the external device communication protocol is used as an SDAP SDU of a second network protocol to receive or send the data;

a DRB identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;

a PDU session identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;

a QoS flow identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or

an SDAP entity identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by an ROHC layer entity of the external device communication protocol stack, an ROHC SDU to an SDAP layer entity of a second network protocol stack; and/or

receiving, by an ROHC layer entity of the external device communication protocol stack, an SDAP SDU sent by an SDAP layer entity of a second network protocol stack.

9. The method according to claim 1 or 2, wherein the interface information comprises at least one of the following:

~~an IP PDU of the external device communication protocol is used as an SDAP SDU of a second network protocol to receive or send the data;~~

~~a DRB identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;~~

~~a PDU session identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or~~

~~a QoS flow identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or~~

~~an SDAP entity identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; and~~

~~the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:~~

~~sending, by an IP layer entity of the external device communication protocol stack, an IP PDU to an SDAP layer entity of a second network protocol stack; and/or~~

~~receiving, by an IP layer entity of the external device communication protocol stack, an SDAP SDU sent by an SDAP layer entity of a second network protocol stack.~~

10. The method according to claim 1 or 2, wherein the interface information comprises at least one of the following:

~~an ROHC SDU or an IP PDU of the external device communication protocol is used as an SDAP SDU of a second network protocol to receive or send the data;~~

~~a DRB identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;~~

~~a PDU session identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;~~

~~a QoS flow identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or~~

~~an SDAP entity identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; and~~

~~the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:~~

~~sending, by an ROHC layer entity of the external device communication protocol stack, an ROHC SDU or an IP PDU to an SDAP layer entity of a second network protocol stack; and/or~~

~~receiving, by an ROHC layer entity of the external device communication protocol stack, an SDAP SDU sent by an SDAP layer entity of a second network protocol stack.~~

11. A terminal device, comprising:

an obtaining module, configured to obtain interface information of an external device communication protocol and a 3rd-generation partnership project 3GPP network protocol; and

a second protocol entity, wherein the second protocol entity is a protocol entity corresponding to an air interface protocol stack of a 3GPP network of the terminal device; and

a first protocol entity, wherein the first protocol entity is a protocol entity corresponding to a communication protocol stack of an external device of the terminal device, and is configured to receive or send data according to interface information by using the second protocol entity;

wherein the terminal device further comprises at least one of the following items (I)-(VIII):

(I) wherein the interface information comprises at least one of the following:

a media access control MAC protocol data unit PDU of the external device communication protocol is used as a packet data convergence protocol PDCP service data unit SDU of a first

network protocol to receive or send the data;

a data radio bearer DRB identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol;

an evolved packet system EPS bearer identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; or

a PDCP entity identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by a MAC layer entity of the external device communication protocol stack, a MAC PDU to a PDCP layer entity of a first network protocol stack; and/or

receiving, by a MAC layer entity of the external device communication protocol stack, a PDCP SDU sent by a PDCP layer entity of a first network protocol stack;

(II) wherein the interface information comprises at least one of the following:

a MAC PDU of the external device communication protocol is used as a service data adaptation protocol SDAP SDU of a second network protocol to receive or send the data;

a DRB identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;

a PDU session identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;

a quality of service QoS flow identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or

an SDAP entity identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by a MAC layer entity of the external device communication protocol stack, a MAC PDU to an SDAP layer entity of a second network protocol stack; and/or

receiving, by a MAC layer entity of the external device communication protocol stack, an SDAP SDU sent by an SDAP layer entity of a second network protocol stack;

(III) wherein the interface information comprises at least one of the following:

a physical layer PHY SDU of the external device communication protocol is used as a PDCP SDU of a first network protocol to receive or send the data;

a DRB identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol;

an EPS bearer identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; or

a PDCP entity identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by a PHY layer entity of the external device communication protocol stack, a PHY SDU to a PDCP layer entity of a first network protocol stack; and/or

receiving, by a PHY layer entity of the external device communication protocol stack, a PDCP SDU sent by a PDCP layer entity of a first network protocol stack;

(IV) wherein the interface information comprises at least one of the following:

a PHY SDU of the external device communication protocol is used as an SDAP SDU of a second network protocol to receive or send the data;

a DRB identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;

a PDU session identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or

a QoS flow identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or an SDAP entity identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by a PHY layer entity of the external device communication protocol stack, a PHY SDU to an SDAP layer entity of a second network protocol stack; and/or

receiving, by a PHY layer entity of the external device communication protocol stack, an SDAP SDU sent by an SDAP layer entity of a second network protocol stack;

(V) wherein the interface information comprises at least one of the following:

an internet protocol IP PDU of the external device communication protocol is used as a PDCP SDU of a first network protocol to receive or send the data;

a DRB identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; or

an EPS bearer identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; or

a PDCP entity identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by an IP layer entity of the external device communication protocol stack, an IP PDU to a PDCP layer entity of a first network protocol stack; and/or

receiving, by an IP layer entity of the external device communication protocol stack, a PDCP SDU sent by a PDCP layer entity of a first network protocol stack;

(VI) wherein the interface information comprises at least one of the following:

an IP PDU of the external device communication protocol is used as an SDAP SDU of a second network protocol to receive or send the data;

a DRB identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;

a PDU session identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or

a QoS flow identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or

an SDAP entity identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by an IP layer entity of the external device communication protocol stack, an IP PDU to an SDAP layer entity of a second network protocol stack; and/or

receiving, by an IP layer entity of the external device communication protocol stack, an SDAP SDU sent by an SDAP layer entity of a second network protocol stack;

(VII) wherein the interface information comprises at least one of the following:

a robust header compression ROHC SDU of the external device communication protocol is used as a PDCP SDU of a first network protocol to receive or send the data;

a DRB identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; or

an EPS bearer identifier of a first network protocol corresponding to data or a data flow of the

external device communication protocol; or

a PDCP entity identifier of a first network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by an ROHC layer entity of the external device communication protocol stack, an ROHC SDU to a PDCP layer entity of a first network protocol stack; and/or

receiving, by an ROHC layer entity of the external device communication protocol stack, a PDCP SDU sent by a PDCP layer entity of a first network protocol stack;

(VIII) wherein the interface information comprises at least one of the following:

an ROHC SDU of the external device communication protocol is used as an SDAP SDU of a second network protocol to receive or send the data;

a DRB identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;

a PDU session identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol;

a QoS flow identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; or

an SDAP entity identifier of a second network protocol corresponding to data or a data flow of the external device communication protocol; and

the receiving or sending, by a first protocol entity of an external device communication protocol stack, data according to the interface information through a second protocol entity of an air interface protocol stack of a 3GPP network comprises:

sending, by an ROHC layer entity of the external device communication protocol stack, an ROHC SDU to an SDAP layer entity of a second network protocol stack; and/or

receiving, by an ROHC layer entity of the external device communication protocol stack, an SDAP SDU sent by an SDAP layer entity of a second network protocol stack.

427. The terminal device according to claim 446, wherein the external device communication protocol comprises any one of the following:

a wireless fidelity WiFi communication protocol;

a bluetooth protocol; or

a wired local area network communication protocol.

438. A terminal device, comprising a memory, a processor, and a computer program stored in the memory and capable of running on the processor, wherein when the computer program is

executed by the processor, the steps of the data transmission method according to any one of claims 1 to ~~10~~5 are implemented.

~~149~~. A computer-readable storage medium, storing a computer program, wherein when the computer program is executed by a processor, the steps of the data transmission method according to any one of claims 1 to ~~10~~5 are implemented.