device / enhanced machine type communication (eMTC) device / narrowband-internet of things (NB-IoT) device. The first device may be, for example, a terminal device such as mobile phone.

[30] Technical solutions of implementations may be applied to various communication systems, for example, a global system of mobile communication (GSM), a code division multiple access (CDMA) system, a wideband code division multiple access (WCDMA) system, a general packet radio service (GPRS) system, a long term evolution (LTE) system, an LTE frequency division duplex (FDD) system, an LTE time division duplex (LTE-TDD) system, a universal mobile telecommunication system (UMTS), a worldwide interoperability for microwave access (WiMAX) communication system, a 5^{th} generation (5G) system, or a new radio (NR) system.

[31] The terminal of implementations may refer to a UE, an access terminal, a subscriber unit, a subscriber station, a mobile station, a remote station, a remote terminal, a mobile device, a user terminal, a terminal, a wireless communication device, a user agent, or a user device. The terminal may be a cellular radio telephone, a cordless telephone, a session initiation protocol (SIP) telephone, a wireless local loop (WLL) station, a personal digital assistant (PDA), a handheld device with wireless communication functions, a computing device, other processing devices coupled with a wireless modem, a relay device, an in-vehicle device, a wearable device, a terminal in a 5G network, a terminal in a future evolved public land mobile network (PLMN), or the like, and the disclosure is not limited in this regard.

[32] The network device of implementations may be a device that communicates with the terminal. The network device may be a network element of a core network (CN). The network device may be a base transceiver station (BTS) in the GSM or in the CDMA system, or may be a NodeB (NB) in the WCDMA system, or may be an evolved Node B (eNB or eNodeB) in the LTE system, or may be a radio controller in a cloud radio access network (CRAN). Alternatively, the network device may be a relay device, an access point, an in-vehicle device, a wearable device, a network device in the 5G network, or a network device in a future evolved PLMN, an antenna panel or a group of antenna panels (including multiple antenna panels) of a base station in the 5G system, or may be a network node forming a gNB or a transmission point, such as a baseband unit (BBU) or a distributed unit (DU), which is not limited herein.

[33] In some deployments, the gNB may include a centralized unit (CU) and a DU. The gNB may further include an active antenna unit (AAU). The CU implements some functions of the gNB, and the DU implements some other functions of the gNB. For example, the CU is

second QoS parameter is configured through PDU session signaling.

[74] In some implementations, before the first device receives the mapping between the first QoS parameter and the second QoS parameter from the network device, the following can be performed. If no PDU session for a service of the second device is detected by the first device, the first device transmits a PDU session establishment request to the network device. The first device receives the mapping between the first QoS parameter and the second QoS parameter from the network device (for example, session management function (SMF)) as follows. The first device receives a PDU session establishment response transmitted by the network device, where the PDU session establishment response contains the mapping between the first QoS parameter and the second QoS parameter.

[75] Accordingly, before the network device transmits the mapping between the first QoS parameter and the second QoS parameter to the first device, the following can be performed. The network device receives a PDU session establishment request from the first device, where the PDU session establishment request is transmitted by the first device when no PDU session for a service of the second device is detected by the first device. The network device transmits the mapping between the first QoS parameter and the second QoS parameter to the first device as follows. The network device transmits a PDU session establishment response to the first device, where the PDU session establishment response contains the mapping between the first QoS parameter and the second QoS parameter.

[76] In some implementations, the PDU session establishment request contains a relay indication. The relay indication is used for indicating to the network device that the PDU session can be used for transmitting relayed data.

[77] The PDU session establishment request may further contain a DNN and a single-network slice selection assistance information (S-NSSAI).

[78] In this implementation, a PDU session that has been established between the network device and the first device may include one or more Uu QoS flows. The PC5 QoS-Uu QoS mapping may include QoS flow descriptions that are in one-to-one correspondence with Uu QoS flows, which may be represented by QoS flow description information element shown in table 3. QoS flow description IEI represents QoS flow description information element identifier, length of QoS flow description contents represent a length of QoS flow description contents, QoS flow description 1 represents a QoS flow description of Uu QoS flow 1, QoS flow description 2

represents a QoS flow description of Uu QoS flow 2, octet represents a byte number of an octet field, and so forth.

Table 3

QoS flow description IEI	octet 1
Length of QoS flow description contents	octet 2 octet 3
QoS flow description 1	octet 4 octet u
QoS flow description 2	octet u+1 octet v
...	octet v+1 octet w
QoS flow description n	octet w+1 octet x

[79] Taking a field of which the byte number is octet 4~octet U as an example, a possible format of the field may be the QoS flow description shown in table 4.

Table 4: QoS flow description

8	7	6	5	4	3	2	1	
0 Spare	0 Spare	QFI						octet 4
Operation code			0 Spare	0 Spare	0 Spare	0 Spare	0 Spare	octet 5
0 Spare	E	Number of parameters						octet 6
Parameter list								octet 7* octet u*

[80] Horizontal numbers represent bit numbers, vertical numbers represent byte numbers, operation code represents an operation code, number of parameters represents a parameter ID, and parameter list represents a list of parameters. A possible format of the parameters list field is the parameter list shown in table 5.

Table 5: Parameter list

device transmits first capability indication information to the network device, where the first capability indication information is used for indicating that the first device supports a relay service.

[92] Accordingly, before the network device transmits the mapping between the first QoS parameter and the second QoS parameter, the following can be performed. The network device receives the first capability indication information from the first device, where the first capability indication information is used for indicating that the first device supports a relay service.

[93] The first capability indication information may be, for example, one bit in 5G mobility management (MM) capability indication information, where 1 indicates “support”, and 0 indicates “not support”.

[94] In this implementation, the first device reports its capability information to a network side. As such, the network device can promptly transmit configuration information directionally, which is possible to improve efficiency in QoS parameter configuration.

[95] In some implementations, the first device transmits the first capability indication information to the network device as follows. The first device transmits the first capability indication information to the network device (for example, access and mobility management function (AMF)) during network registration.

[96] Accordingly, the first capability indication information is transmitted by the first device during network registration.

[97] During network registration, the relay UE may report to the network device that the relay UE can act as a relay UE.

[98] In other implementations, the first device transmits the first capability indication information to the network device as follows. The first device transmits the first capability indication information to the network device (for example, SMF or PCF) after network registration.

[99] Accordingly, the first capability indication information is transmitted by the first device after network registration.

[100] After network registration, the relay UE may notify the network device that the relay UE can act as a relay UE.

[101] In some implementations, the first device transmits the first capability indication information to the network device as follows. The first device transmits the first capability

indication information to the network device (for example, SMF or PCF) after the first device establishes a first connection with the second device.

[102] Accordingly, the first capability indication information is transmitted by the first device after the first device establishes the first connection with the second device.

[103] The first device may broadcast or multicast by using D2D technology, or establish a sidelink (also referred to as using a PC5 interface) for one-to-one communication (unicast). The first connection is a PC5 link.

[104] After a PC5 link is established between the first device and the second device, the relay UE notifies the network device. The relay UE may notify an AMF, and then the AMF notifies a PCF.

[105] In some implementations, the method further includes the following. The first device establishes an association between the first QoS flow and the second QoS flow according to the mapping between the first QoS parameter and the second QoS parameter.

[106] For example, an ID of a PC5 QoS flow using PQI 21 is 21, an ID of a Uu QoS flow using 5QI 1 is 1, and PC5 QoS flow 21 corresponds to Uu QoS flow 1. When DL data reaches the relay UE through Uu QoS flow 1, the relay UE first determines a PC5 link of a remote UE corresponding to the DL data, and then uses PC5 QoS flow 21 in the PC5 link to transmit data to the remote UE. For UL data transmission, a process similar to the above process is adopted.

[107] Such association establishment may take place after the relay UE receives the mapping.

[108] In this implementation, the first device establishes the association between the first QoS flow and the second QoS flow according to the mapping obtained. As such, the first device can use the first QoS flow and the second QoS flow for information relay service between the second device and the network device.

[109] In some implementations, before the first device establishes the association between the first QoS flow and the second QoS flow according to the mapping between the first QoS parameter and the second QoS parameter, the method further includes the following. The first device obtains first data to-be-transmitted.

[110] The association establishment may take place when the relay UE detects the arrival of data.

[111] In this implementation, the first device triggers establishment of the association once

to implement the above functions, a terminal includes hardware structures and/or software modules for performing respective functions. Those of ordinary skill in the art will appreciate that units and algorithmic operations of various examples described in connection with implementations herein can be implemented by hardware or by a combination of hardware and computer software. Whether these functions are performed by means of hardware or hardware driven by computer software depends on the application and the design constraints of the associated technical solution. Those skilled in the art may use different methods with regard to each particular application to implement the described functionality, but such methods should not be regarded as lying beyond the scope of the disclosure.

[162] Division of functional units of the terminal may be implemented according to the above method implementations. For example, various functional units may be in one-to-one correspondence with each function, or two or more functions may be integrated into one processing unit. The integrated unit may be implemented in the form of hardware, or may be implemented in the form of software program module. Division of units in implementations herein is illustrative and is only a division of logical functions, and there may exist other manners of division in practice.

[163] If the integrated unit is adopted, FIG. 5 is a block diagram illustrating functional units of an apparatus for QoS parameter configuration provided in implementations of the disclosure. The apparatus 500 for QoS parameter configuration is applicable to a first device. The apparatus 500 includes a processing unit 502 and a communicating unit 503. The processing unit 502 is configured to control and manage operations of the terminal. For example, the processing unit 502 is configured for the terminal to perform operations at step 2a02 illustrated in FIG. 2A and/or other processes described in the technical solutions of implementations. The communicating unit 503 is configured for the terminal to communicate with other devices. The terminal may further include a storage unit 501. The storage unit 501 is configured to store program codes and data of the terminal.

[164] The processing unit 502 may be a processor or a controller and may be, for example, a CPU, a general-purpose processor, a digital signal processor (DSP), an application-specific integrated circuit (ASIC), a field programmable gate array (FPGA), or other programmable logic devices, transistor logic devices, hardware components, or a combination thereof. Various exemplary logic blocks, modules, and circuits disclosed in implementations can be implemented

or executed. The processor may also be a combination for implementing computing functions, for example, one or more microprocessors, a combination of DSP and microprocessor, or the like. The communicating unit 503 may be a communication interface, a transceiver, a transceiver circuit, etc. The storage unit 501 may be a memory. When the processing unit 502 is the processor, the communicating unit 503 is the communication interface, and the storage unit 501 is the memory, the terminal of implementations may be the first device illustrated in FIG. 3.

[165] The processing unit 502 is configured to perform any one of the operations performed by the terminal in the foregoing method implementations. In addition, when performing data transmission such as transmitting, the processing unit 502 can invoke the communicating unit 503 to perform such an operation, which will be elaborated below.

[166] The processing unit 502 is configured to obtain, via the communicating unit 503, a mapping between a first QoS parameter and a second QoS parameter. The first QoS parameter is applied to a first QoS flow, and the second QoS parameter is applied to a second QoS flow. The first QoS flow is a QoS flow between a first device and a network device, and the second QoS flow is a QoS flow between the first device and a second device.

[167] In some implementations, the first QoS parameter includes a 5QI, and the second QoS parameter includes a PQI.

[168] In other implementations, the first QoS parameter includes an identifier of the first QoS flow, and the second QoS parameter includes an identifier of the second QoS flow, where the identifier is an ID or an index.

[169] In some implementations, in terms of obtaining, via the communicating unit 503, the mapping between the first QoS parameter and the second QoS parameter, the processing unit 502 is configured to receive, via the communicating unit 503, the mapping between the first QoS parameter and the second QoS parameter from the network device.

[170] In some implementations, the mapping between the first QoS parameter and the second QoS parameter is configured through UE policy signaling.

[171] In some implementations, in terms of receiving, via the communicating unit 503, the mapping between the first QoS parameter and the second QoS parameter from the network device, the processing unit 502 is configured to receive, via the communicating unit 503, the UE policy signaling from the network device, where the UE policy signaling contains the mapping between the first QoS parameter and the second QoS parameter.

[178] In some implementations, in terms of transmitting, via the communicating unit 503, the first capability indication information to the network device, the processing unit 502 is configured to transmit, via the communicating unit 503, the first capability indication information to the network device during network registration.

[179] In other implementations, in terms of transmitting, via the communicating unit 503, the first capability indication information to the network device, the processing unit 502 is configured to transmit, via the communicating unit 503, the first capability indication information to the network device after network registration.

[180] In other implementations, in terms of transmitting, via the communicating unit 503, the first capability indication information to the network device, the processing unit 502 is configured to transmit, via the communicating unit 503, the first capability indication information to the network device after the first device establishes a first connection with the second device.

[181] In some implementations, the processing unit 502 is further configured to establish an association between the first QoS flow and the second QoS flow according to the mapping between the first QoS parameter and the second QoS parameter.

[182] In some implementations, the processing unit 502 is further configured to obtain, via the communicating unit 503, first data to-be-transmitted, before establishing the association between the first QoS flow and the second QoS flow according to the mapping between the first QoS parameter and the second QoS parameter.

[183] If an integrated unit is adopted, FIG. 6 is a block diagram illustrating functional units of an apparatus for QoS parameter configuration provided in other implementations of the disclosure. The apparatus 600 for QoS parameter configuration is applicable to a network device. The apparatus 600 includes a processing unit 602 and a communicating unit 603. The processing unit 602 is configured to control and manage operations of the network device. For example, the processing unit 602 is configured for the network device to perform operations at step 2a01 illustrated in FIG. 2A and/or other processes described in the technical solutions of implementations. The communicating unit 603 is configured for the network device to communicate with other devices. The network device may further include a storage unit 601. The storage unit 601 is configured to store program codes and data of the network device.

[184] The processing unit 602 may be a processor or a controller and may be, for example,

a CPU, a general-purpose processor, a DSP, an ASIC, an FPGA, or other programmable logic devices, transistor logic devices, hardware components, or a combination thereof. Various exemplary logic blocks, modules, and circuits disclosed in implementations can be implemented or executed. The processor may also be a combination for implementing computing functions, for example, one or more microprocessors, a combination of DSP and microprocessor, or the like. The communicating unit 603 may be a communication interface, a transceiver, a transceiver circuit, etc. The storage unit 601 may be a memory. When the processing unit 602 is the processor, the communicating unit 603 is the communication interface, and the storage unit 601 is the memory, the network device of implementations may be the network device illustrated in FIG. 4.

[185] The processing unit 602 configured to transmit, via the communicating unit 603, a mapping between a first QoS parameter and a second QoS parameter. The first QoS parameter is applied to a first QoS flow, and the second QoS parameter is applied to a second QoS flow. The first QoS flow is a QoS flow between a first device and the network device, and the second QoS flow is a QoS flow between the first device and a second device.

[186] In some implementations, the first QoS parameter includes a 5QI, and the second QoS parameter includes a PQI.

[187] In other implementations, the first QoS parameter includes an identifier of the first QoS flow, and the second QoS parameter includes an identifier of the second QoS flow, where the identifier is an ID or an index.

[188] In some implementations, in terms of transmitting, via the communicating unit 603, the mapping between the first QoS parameter and the second QoS parameter, the processing unit 602 is configured to transmit, via the communicating unit 603, the mapping between the first QoS parameter and the second QoS parameter to the first device.

[189] In some implementations, the mapping between the first QoS parameter and the second QoS parameter is configured through UE policy signaling.

[190] In some implementations, in terms of transmitting, via the communicating unit 603, the mapping between the first QoS parameter and the second QoS parameter to the first device, the processing unit 602 is configured to transmit, via the communicating unit 603, the UE policy signaling to the first device, where the UE policy signaling contains the mapping between the first QoS parameter and the second QoS parameter.

[191] In other implementations, the mapping between the first QoS parameter and the