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**(71) Applicant: GUANGDONG OPPO MOBILE
TELECOMMUNICATIONS CORP., LTD.** [CN/CN];

No. 18 Haibin Road, Wusha, Chang'an, Dongguan,
Guangdong 523860 (CN)

(72) Inventor: SHI, Cong; No. 18 Haibin Road, Wusha,
Chang'an, Dongguan, Guangdong 523860 (CN)

**(74) Agent: CHINA PAT INTELLECTUAL
PROPERTY OFFICE;** 2nd Floor, Zhongguancun
Intellectual Property Building Block B, No. 21 Haidian
South Road Haidian District Beijing 100080 (CN)

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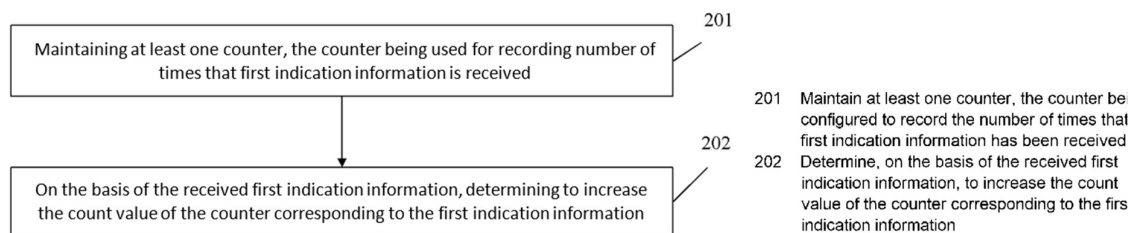


FIG. 2

(57) Abstract: Disclosed in the present invention are a counting method, a terminal device, a chip, a computer readable storage medium, a computer program product and a computer program. The method comprises: maintaining at least one counter, the counter being configured to record the number of times that first indication information has been received; determining, on the basis of the received first indication information, to increase the count value of the counter corresponding to the first indication information.

(57) Abstract: The present invention discloses a counting method, a terminal device, a chip, a computer-readable storage medium, a computer program product, and a computer program. The method comprises: maintaining at least one counter, the counter being used for recording the number of times that first indication information has been received; and, on the basis of the received first indication information, determining to increase the count value of the counter corresponding to the first indication information.

Counting Method, Terminal Device, and Apparatus

Technical Field

The present invention relates to the technical field of information processing and particularly relates to a counting method, a terminal device, a chip, a computer-readable storage medium, a computer program product, and a computer program.

Background Art

When Listen Before Talk (LBT) fails, the power ramping counter in a random-access channel (RACH) process will not increment, but it is necessary to continue discussing whether a preamble sequence transmission counter must increment. In NR-U, because the terminal device operates in an unlicensed frequency band, it is possible that the channel cannot be seized due to channel uncertainty, that is, an LBT failure occurs, which may affect the performance of uplink transmission.

Summary of the Invention

To solve the technical problem described above, embodiments of the present invention provide a counting method, a terminal device, a chip, a computer-readable storage medium, a computer program product, and a computer program.

In a first aspect, embodiments of the present invention provide a counting method, applied to a terminal device, comprising:

maintaining at least one counter, the counter being used for recording the number of times that first indication information has been received; and

on the basis of the received first indication information, determining to increase the count value of the counter corresponding to the first indication information.

In a second aspect, embodiments of the present invention provide a terminal device, comprising:

a processing unit, maintaining at least one counter, the counter being used for recording the number of times that first indication information has been received; and on the basis of the received first indication information, determining to increase the count value of the counter corresponding to the first indication information.

In a third aspect, provided is a terminal device, comprising a processor and a storage device. The storage device is used for storing a computer program, and the processor is used for invoking and running the computer program stored in the storage device to execute the method in the described first aspect or various implementations thereof.

In a fourth aspect, provided is a chip, which is used for implementing the method in the above-described first aspect or various implementations thereof.

Specifically, the chip comprises: a processor, which is used for invoking and running the computer program from the storage device, causing the device equipped with the chip to execute the method in either one of the described first aspect and second aspect or the various implementations thereof.

In a fifth aspect, provided is a computer-readable storage medium, which is used for storing a computer program, the computer program causing the computer to execute the method in the described first aspect or various implementations thereof.

In a sixth aspect, provided is a computer program product, comprising a computer program instruction, the computer program instruction

causing the computer to execute the method in the described first aspect or various implementations thereof.

In a seventh aspect, provided is a computer program, which, when run on a computer, causes the computer to execute the method in the described first aspect or various implementations thereof.

In the technical solutions of embodiments of the present invention, by maintaining counters, the count values of the counters are determined on the basis of corresponding first indication information. Thus, it is possible, when a certain quantity of counters is reached, to perform corresponding control processing, thereby causing an uplink transmission to occupy the channel and ensuring uplink transmission performance.

10 **Brief Description of the Drawings**

FIG. 1 is a first schematic diagram of a communication system architecture provided by embodiments of the present application.

FIG. 2 is a schematic flowchart of a counting method provided by embodiments of the present application.

15 FIG. 3 is a structural schematic diagram of the constitution of a terminal device provided by embodiments of the present invention.

FIG. 4 is a structural schematic diagram of the constitution of a communication device provided by embodiments of the present invention.

20 FIG. 5 is a schematic block diagram of a chip provided by embodiments of the present application.

FIG. 6 is a second schematic diagram of a communication system architecture provided by embodiments of the present application.

Detailed Description of the Preferred Embodiments

25 Below, in conjunction with the accompanying drawings of the embodiments of the present application, the technical solutions of embodiments of the present application will be described. Obviously, the described embodiments are some of the embodiments of the present application and are not all of the embodiments. On the basis of the embodiments of the present application, all other embodiments obtained by a person skilled in the art without the exercise of inventive skill shall fall within the scope of protection of the present application.

30 The technical solutions of embodiments of the present application can be applied to various communication systems, such as: Global System for Mobile Communications (GSM) system, Code-Division Multiple Access (CDMA) system, Wideband Code-Division Multiple Access (WCDMA) system, General Packet Radio Service (GPRS), Long-Term Evolution (LTE) system, LTE Frequency-Division Duplexing (FDD) system, LTE Time-Division Duplexing (TDD), Universal Mobile
35 Telecommunications System (UMTS), Worldwide Interoperability for Microwave Access (WiMAX) communication system, or 5G system, etc.

40 For example, the communication system 100 used in embodiments of the present application may be as shown in FIG. 1. The communication system 100 may comprise a network device 110, and the network device 110 may be a device that communicates with a terminal device 120 (alternatively referred to as a communication terminal or a terminal). The network device 110 can provide communication coverage for a specific geographic area and can communicate with terminal devices located in the coverage area. Optionally, the network device 110 may be a network device (Base Transceiver Station, BTS) in a GSM system or CDMA system,

may also be a network device (NodeB, NB) in a WCDMA system, and may also be an evolutionary network device (Evolved Node B, eNB or eNodeB) in the LTE system, or a wireless controller in a Cloud Radio Access Network (CRAN); alternatively, the network device may be a mobile switching center, a relay station, an access point, a vehicle-mounted device, a wearable device, a hub, a switch, a network bridge, a router, a network-side device in a 5G network, or a network device in a future evolved Public Land Mobile Network (PLMN), etc.

The communication system 100 also comprises at least one terminal device 120 located within the coverage area of the network device 110. As used herein, "terminal device" comprises, but is not limited to, connection via: a wired line, such as via a Public Switched Telephone Network (PSTN), Digital Subscriber Line (DSL), digital cable, or direct cable connection; and/or another data connection/network; and/or via a wireless interface, such as for cellular networks, wireless local area networks (WLAN), digital television networks such as DVB-H networks, satellite networks, and AM-FM broadcast transmitters; and/or an apparatus of another terminal device configured to receive/send communication signals; and/or an Internet of Things (IoT) device. A terminal device arranged to communicate via a wireless interface may be referred to as a "wireless communication terminal," "wireless terminal," or "mobile terminal." Examples of mobile terminals include, but are not limited to: satellite or cellular telephones; Personal Communication System (PCS) terminals that can combine cellular radiotelephone with data processing, fax, and data communication capabilities; PDAs that may comprise a radiotelephone, pager, internet/intranet access, web browser, notepad, calendar, and/or Global Positioning System (GPS) receiver; and conventional laptop and/or palmtop receivers or other electronic apparatuses comprising radiotelephone transceivers. A terminal device may refer to an access terminal, user equipment (terminal equipment), user unit, user station, mobile station, mobile platform, remote station, remote terminal, mobile device, user terminal, terminal, wireless communication device, user agent, or user apparatus. An access terminal may be a cellular telephone, a cordless telephone, a Session Initiation Protocol (SIP) telephone, a Wireless Local Loop (WLL) station, a Personal Digital Assistant (PDA), a handheld device having a wireless communication function, a computing device or other processing device connected to a wireless modem, a vehicle-mounted device, a wearable device, a terminal device in a 5G network, or a terminal device in a future evolved PLMN, etc.

Optionally, terminal devices 120 may perform Device-to-Device (D2D) communication with each other.

Optionally, a 5G system or a 5G network may also be referred to as a New Radio (NR) system or an NR network.

FIG. 1 is an exemplary illustration of a network device and two terminal devices. Optionally, the communication system 100 may comprise a plurality of network devices, and each network device may, within its coverage area, comprise another quantity of terminal devices. The embodiments of the present application do not impose any limitation in that regard.

Optionally, the communication system 100 may also comprise other network entities, such as a network controller and a mobility management entity. The embodiments of the present application do not impose any limitation in that regard.

It should be understood that devices having communication functionality in a network/system in embodiments of the present application may be referred to as communication devices. Taking the communication system 100 shown in FIG. 1 as an example, the communication devices may comprise a network device 110 and a terminal device 120 having communication functionality;

the network device 110 and the terminal device 120 may be the specific devices described above, the details of which will not be repeated here. The communication devices may also comprise other devices in the communication system 100, such as network controllers, mobility management entities, and other network entities. The embodiments of the present application do not impose any limitation in that regard.

It should be understood that the terms "system" and "network" are often used interchangeably herein. In the present text, the term "and/or" is merely a description of the relationship between related objects and represents that there may be three types of relationship; for example, A and/or B may represent three situations: A exists alone, A and B coexist, and B exists alone. In addition, the character "/" in the present text generally represents that there is an "or" relationship between the objects before and after it.

In order to understand the features and technical content of embodiments of the present invention in more detail, the implementation of embodiments of the present invention will be described in detail below with reference to the attached drawings. The attached drawings are for illustrative purposes only and are not intended to limit the embodiments of the present invention.

Embodiment 1

An embodiment of the present invention provides a counting method applicable to a terminal device, as shown in FIG. 2, comprising:

step 201: maintaining at least one counter, the counter being used for recording the number of times that first indication information has been received; and

step 202: on the basis of the received first indication information, determining to increase the count value of the counter corresponding to the first indication information.

Here, the first indication information is used for indicating one of the following: LBT failure, LBT success, SR transmission failure, preamble sequence transmission failure, and uplink data transmission failure.

That is to say, in the event of an LBT failure, the first indication information sent by a physical layer (PHY) can be received, the first indication information being used for indicating LBT failure; alternatively, if LBT is successful, an LBT failure can also be determined by way of the received first indication information; alternatively, the occurrence of an SR transmission failure in uplink transmission can be determined by way of the first indication information; alternatively, a preamble sequence transmission failure or uplink data transmission failure can be determined by way of the first indication information. It should be understood that the first indication information sent via the physical layer may also be information received from the network side and transmitted to the MAC layer or RRC layer via the physical layer, after which the RRC layer or MAC layer maintains the global counter and/or at least one counter for at least one uplink transmission.

It should be noted that in the aforementioned step 202, determining, on the basis of the received first indication information, to increase the count value of the counter corresponding to the first indication information may comprise: regardless of the content of the received first indication information, increasing the count value of the counter corresponding to the first indication information; and

alternatively, when it is determined that the first indication information is used for indicating at least one of an LBT failure, an SR transmission failure, a preamble sequence transmission failure, and an uplink data transmission failure, determining to increase the count value of the counter.

In addition, the manner in which LBT is triggered may comprise one of the following: an uplink PUCCH transmitting a scheduling request SR or HARQ feedback; an uplink PUSCH transmitting data; or initiation of a RACH process. That is to say, the LBT process may be triggered by an uplink transmission such as PUCCH, PUSCH, or a random-access channel.

Regarding the aforementioned steps 201 and 202, the at least one counter includes: a global counter and/or at least one counter for at least one uplink transmission.

Specifically, the following scenarios may be used for explanation:

Scenario 1: In this scenario, at least one counter is a global counter.

In this scenario, determining, on the basis of the received first indication information, to increase the count value of the counter corresponding to the first indication information comprises: on the basis of the received first indication information, determining to increase the count value of the global counter.

That is, the information that can be included in the aforementioned first indication information indicates that the count value of the global counter will be increased regardless of which type of uplink transmission fails.

Further, in this scenario, the global timer of the corresponding configured global counter is obtained. Specifically, a global timer corresponding to the global counter may be configured for the terminal device by the network side.

After said obtaining a configured global timer corresponding to the global counter, the method also comprises: when the first indication information has been received, starting or restarting the global timer.

That is to say, the condition for starting or restarting the global timer is: receiving the first indication information. To explain further, upon receiving an indication from the network side that an uplink transmission has failed for the terminal device, the global counter value is increased by 1 and, at the same time, the global timer is started or restarted; that is, when the global timer is not running, the global timer may be started on the basis of the first indication information, and when the global timer has started timing, the global timer may be restarted on the basis of the first indication information.

The global timer can be used for controlling the situation in which the count value of the global counter has not changed for a long period of time; for example, if the count value of the global counter has currently not increased for a long period of time, that is to say, if there has been no uplink channel preemption operation for a long period of time, then the next time that uplink transmission is performed again and fails, the count will be increased on the basis of the count value of the global counter that was originally recorded; however, this causes performance issues in uplink transmission. By adding the global timer, it is possible to reset the global counter when the global timer times out. Thus, when the count value of the global counter has not changed for a very long period of time, it is possible to restart the counting of the global counter.

The method also comprises: when the global counter reaches a preset threshold value, the Radio Resource Control (RRC) layer triggers one of the following processes: RRC connection re-establishment; Secondary Cell Group (SCG)–Radio Link Failure (RLF) processing; and RRC reconfiguration.

Therein, the RRC reconfiguration may be at least one of the following: reconfiguring the uplink BWP, or reconfiguring PRACH resources, reconfiguring PUCCH resources, reconfiguring PUSCH resources, reconfiguring the uplink carrier, etc. The SCG–RLF process is to suspend all Signaling Radio Bearers (SRB) and Data Radio Bearers (DRB) of the SCG, reset the SCG Media Access Control (MAC) address entity, and report the number of LBT failures to the network via an MCG.

The preset threshold value may be a threshold value that is set according to actual conditions; for example, it may be set to 10; of course, it may also be set to other values, which will not be enumerated here.

Therein, when initiating RRC connection re-establishment and initiating a connection re-establishment request to the network side, the connection re-establishment request includes: the number of LBT failures, and/or an event that triggers LBT.

That is to say, if the RRC re-establishment process is initiated, the terminal may further report to the network in a re-establishment request message: number of LBT failures, and/or: the event that initiated the LBT,

such as the PUCCH sending an SR triggering LBT, uplink data transmission triggering LBT, or RACH triggering LBT, etc.

In this scenario, the global counter may be maintained at the MAC layer of the terminal device; for example, the physical layer indicates the LBT failures to the MAC, and the MAC layer triggers the execution of the aforementioned action. Alternatively, it may also be maintained at the RRC layer; for example, the physical layer indicates the LBT failures to an RRC, and the RRC triggers the execution of the aforementioned action.

Scenario 2: In this scenario, at least one counter is at least one counter for at least one uplink transmission.

This differs from Scenario 1 in that: this scenario can maintain one or a plurality of counters, and the same or different counters can be maintained for different uplink transmissions, that is, a corresponding counter may be maintained for each uplink transmission, or a counter may be maintained for a first portion of the uplink transmissions and another counter maintained for the remainder of the uplink transmissions.

In this scenario, determining, on the basis of the received first indication information, to increase the count value of the counter corresponding to the first indication information comprises: on the basis of the received first indication information, determining to increase the count value of at least a portion of the counters among the at least one counter.

Specifically, the at least one counter for at least one uplink transmission at least includes at least one of the following: a first counter for an SR; a second counter for a PUSCH; and a third counter for an RACH.

That is, this scenario at least comprises at least one of the three counters described above; of course, it should be understood that the described three counters are merely examples and that in actual processing, if there are more uplink transmissions, then more counters may be maintained; the above is not an exhaustive list. It should also be noted that in actual processing, there may be one or a plurality of uplink transmissions corresponding to one counter; for example, two counters may be set, a fourth counter may be configured for SR and PUCCH, and a fifth counter configured for RACH. More counters may be a sixth counter corresponding to the preamble sequence and used in the RACH process for recording the number of times the preamble sequence is retransmitted. When the RACH process is triggered, the corresponding sixth counter is initialized to 1. When no RAR has been received in the RAR window or a contention conflict is not resolved, the preamble counter is incremented by 1. A seventh counter may also be included for recording beam failure instances indicated to the MAC layer by the physical layer, and its initial value is 0.

Accordingly, explanation is based on the three counters described above, wherein determining, on the basis of the received first indication information, to increase the count value of at least a portion of the counters among the at least one counter comprises: comprising at least one of the following:

when the first indication information is of an LBT failure corresponding to an SR transmission, increasing the count value of the first counter;

when the first indication information is of an LBT failure corresponding to a PUSCH transmission, increasing the count value of the second counter; and

when the first indication information is of an LBT failure corresponding to an RACH, increasing the count value of the third counter.

That is, the information included in the aforementioned first indication information indicates that the count value of the corresponding counter will be increased regardless of which type of uplink transmission fails. Of course, it should also be understood that, when several uplink transmissions correspond to the same counter, such as the fourth counter being configured for SR and PUCCH, when configuring the fifth counter for RACH, if the first indication information indicates that the LBT of the SR transmission fails or the LBT of the PUSCH transmission fails, then the count value of the fourth counter may be increased, and when the first indication information is of an LBT failure corresponding to an RACH, the count value of the fifth counter may be increased. The above are merely examples, and in actual processing there may be situations in which other uplink transmissions correspond to one counter;

the preceding is not an exhaustive list.

Further, in this scenario, a corresponding first timer, second timer, and third timer are configured for a first counter for SR, a second counter for PUSCH, and a third counter for RACH, respectively. They may be different timers configured by the network side. It should be noted that different timers are configured for different counters; that is to say, different timers are configured for at least one counter of at least one uplink transmission; of course, the timer durations of different timers may be the same or different.

After obtaining the configured timers, the method also comprises: when the uplink transmission corresponding to the received first indication information fails, it is possible to restart or start the corresponding timer.

Specifically, the method also comprises one of the following:

when the received first indication information is of an LBT failure corresponding to an SR transmission, starting or restarting the first timer;

when the received first indication information is of an LBT failure corresponding to a PUSCH transmission, starting or restarting the second timer; and

when the received first indication information is of an LBT failure corresponding to an RACH, starting or restarting the third timer.

That is to say, the global timer can be used for controlling the situation in which the count value of a counter has not changed for a long period of time; for example, if the count value of a counter has currently not increased for a long period of time, that is to say, if there has been no uplink channel preemption operation for a long period of time, then the next time that uplink transmission is performed again and fails, the count will be increased on the basis of the count value of the counter that was originally recorded; however, this causes performance issues in uplink transmission. By adding a timer, it is possible to reset the counter when the timer times out. Thus, when the count value of the counter has not changed for a very long period of time, it is possible to restart the counting of the counter.

The method also comprises: configuring at least one threshold value for the at least one counter for at least one uplink transmission.

When the count value of a counter among the at least one counter exceeds a corresponding threshold value, at least a portion of the following processing is executed:

notifying the RRC layer to trigger RRC re-establishment;

notifying the RRC layer to trigger RRC reconfiguration;

notifying the RRC layer to release all configured PUCCH resources;

notifying the RRC layer to release all SRSes;

clearing all configured downlink scheduling resources and uplink grant resources;

initiating an RACH process;

notifying the network side of the number of LBT failures; and

notifying the network side of an event that triggers LBT.

Therein, the RRC reconfiguration may be at least one of the following: reconfiguring the uplink BWP, or reconfiguring PRACH resources, reconfiguring PUCCH resources, reconfiguring PUSCH resources, reconfiguring the uplink carrier, etc. The SCG-RLF process is

to suspend all Signaling Radio Bearers (SRB) and Data Radio Bearers (DRB) of the SCG, reset the SCG Media Access Control (MAC) address entity, and report the number of LBT failures to the network via an MCG.

The threshold value may be a threshold value that is set according to actual conditions; for example, it may be set to 10; of course, it may also be set to other values, which will not be enumerated here.

Therein, when initiating RRC connection re-establishment and initiating a connection re-establishment request to the network side, the connection re-establishment request comprises: the number of LBT failures, and/or an event that triggers LBT.

It should be noted that in this scenario, different processing may be set for different counters; for example, for the first counter, it is possible to set the count value such that, when it exceeds the threshold value, the RRC layer is notified to trigger RRC reconfiguration, the RRC layer is notified to release all configured PUCCH resources, the RRC layer is notified to release all SRs, and all configured downlink scheduling resources and uplink grant resources are cleared. The second counter may be set such that, when its count value exceeds the threshold value, the RRC layer is notified to trigger RRC reconfiguration. The third counter may be set such that, when its count value exceeds the threshold value, the RRC layer is notified to release all SRs and all configured downlink scheduling resources and uplink grant resources are cleared. It should be understood that while different processing may be set for different counters, it is, of course, also possible to set the same processing, and the above is not an exhaustive description.

In this scenario, the global counter may be maintained at the MAC layer of the terminal device; for example, the physical layer indicates LBT failure to the MAC, and the MAC layer triggers the execution of the aforementioned action. Alternatively, it may also be maintained at the RRC layer; for example, the physical layer indicates an LBT failure to an RRC, and the RRC triggers the execution of the aforementioned action.

Lastly, in view of the aforementioned Scenarios 1 and 2, it should also be noted that a global counter and at least one counter for at least one uplink transmission may be maintained simultaneously; for example, there may be the situation in which a global counter for global uplink transmission may be maintained; of course, it is also possible to maintain one counter for one or several uplink transmissions, or to maintain a counter for each uplink transmission among the one or several uplink transmissions. That is to say, the aforementioned Scenarios 1 and 2 may coexist; when they coexist, processing is done in the manner of the described scenarios, respectively, the details of which will not be repeated here.

Hence, by using the described solution, it is possible to maintain a counter and thereby determine the count value of the counter on the basis of the corresponding first indication information. Thus, it is possible, when a certain quantity of counters is reached, to perform corresponding control processing, thereby enabling an uplink transmission to occupy the channel, thus ensuring uplink transmission performance.

Embodiment 2

Embodiments of the present invention provide a terminal device, as shown in FIG. 3, comprising:

a processing unit 31, maintaining at least one counter, the counter being used for recording the number of times that first indication information has been received and, on the basis of the received first indication information, determining to increase the count value of the counter corresponding to the first indication information.

Here, the first indication information is used for indicating one of the following: an LBT failure, LBT success, SR transmission failure, preamble sequence transmission failure, and uplink data transmission failure.

That is to say, in the event of an LBT failure, first indication information sent by a physical layer (PHY) can be received,

the first indication information being used for indicating an LBT failure; alternatively, if LBT is successful, an LBT failure can also be determined by way of the received first indication information; alternatively, the occurrence of an SR transmission failure in uplink transmission can be determined by way of the first indication information; alternatively, a preamble sequence transmission failure or uplink data transmission failure can be determined by way of the first indication information. It should be understood that the first indication information sent by the physical layer may also be information received from the network side and transmitted to the MAC layer or RRC layer via the physical layer, after which the RRC layer or MAC layer maintains the global counter and/or at least one counter for at least one uplink transmission.

It should be noted that the processing unit 31, on the basis of the received first indication information, determining to increase the count value of the counter corresponding to the first indication information may comprise: regardless of the content of the received first indication information, increasing the count value of the counter corresponding to the first indication information; and

alternatively, when it is determined that the first indication information is used for indicating at least one of an LBT failure, SR transmission failure, preamble sequence transmission failure, and uplink data transmission failure, determining to increase the count value of the counter.

In addition, the manner in which LBT is triggered may comprise one of the following: an uplink PUCCH transmitting scheduling request SR or HARQ feedback; an uplink PUSCH transmitting data; and initiation of an RACH process. That is to say, the LBT process may be triggered by an uplink transmission such as PUCCH, PUSCH, or a random-access channel.

The at least one counter includes: a global counter, and/or at least one counter for at least one uplink transmission.

Specifically, the following scenarios may be used for explanation:

Scenario 1: In this scenario, at least one counter is a global counter.

In this scenario, the processing unit 31, on the basis of the received first indication information, determines to increase the count value of the global counter.

That is, the information that can be included in the aforementioned first indication information indicates that the count value of the global counter will be increased regardless of which type of uplink transmission fails.

Further, in this scenario, the terminal device also comprises a communication unit 32, which also obtains a configured global timer corresponding to the global counter. Specifically, the global timer corresponding to the global counter may be configured for the terminal device by the network side.

After said obtaining a configured global timer corresponding to the global counter, the processing unit 31, upon receiving the first indication information, starts or restarts the global timer.

That is to say, the condition for starting or restarting the global timer is: receiving the first indication information. To explain further, when an indication that an uplink transmission has failed for the terminal device has been received from the network side, the global counter value is increased by 1 and, at the same time, the global timer is started or restarted; that is, when the global timer is not running, the global timer may be started on the basis of the first indication information; and when the global timer has started timing, the global timer may be restarted on the basis of the first indication information.

The global timer can be used for controlling the situation in which the count value of the global counter has not changed for a long period of time; for example, if the count value of the global counter has currently not increased for a long period of time, that is to say, if there has been no uplink channel preemption operation for a long period of time, then the next time that uplink transmission is performed again and fails, the count will be increased

on the basis of the count value of the global counter that was originally recorded; however, this causes performance issues in uplink transmission. By adding the global timer, it is possible to reset the global counter when the global timer times out. Thus, when the count value of the global counter has not changed for a very long period of time, it is possible to restart the counting of the global counter.

5 With regard to the processing unit 31, when the global counter reaches a preset threshold value, the Radio Resource Control (RRC) layer triggers one of the following processes: RRC connection re-establishment; Secondary Cell Group (SCG)–Radio Link Failure (RLF) processing; and RRC reconfiguration.

10 Therein, the RRC reconfiguration may be at least one of the following: reconfiguring the uplink BWP, or reconfiguring PRACH resources, reconfiguring PUCCH resources, reconfiguring PUSCH resources, reconfiguring the uplink carrier, etc. The SCG–RLF process is to suspend all Signaling Radio Bearers (SRB) and Data Radio Bearers (DRB) of the SCG, reset the SCG Media Access Control (MAC) address entity, and report the number of LBT failures to the network via an MCG.

15 The preset threshold value may be a threshold value that is set according to actual conditions; for example, it may be set to 10; of course, it may also be set to other values, which will not be enumerated here.

20 Therein, the processing unit 31, when initiating RRC connection re-establishment, initiates, by the communication unit 32, a connection re-establishment request to the network side; the connection re-establishment request comprises: the number of LBT failures, and/or an event that triggers LBT.

25 That is to say, if the RRC re-establishment process is initiated, the terminal may further report to the network in a re-establishment request message: the number of LBT failures, and/or: the event that initiated the LBT, such as the PUCCH sending an SR triggering LBT, uplink data transmission triggering LBT, or RACH triggering LBT, etc.

30 In this scenario, the global counter may be maintained at the MAC layer of the terminal device; for example, the physical layer indicates the LBT failures to the MAC, and the MAC layer triggers the execution of the aforementioned action. Alternatively, it may also be maintained at the RRC layer; for example, the physical layer indicates the LBT failures to an RRC, and the RRC triggers the execution of the aforementioned action.

Scenario 2: In this scenario, at least one counter is at least one counter for at least one uplink transmission.

35 This differs from Scenario 1 in that: this scenario can maintain one or a plurality of counters, and the same or different counters can be maintained for different uplink transmissions; that is to say, a corresponding counter may be maintained for each uplink transmission, or a counter may be maintained for a first portion of the uplink transmissions and another counter maintained for the remainder of the uplink transmissions.

40 In this scenario, the processing unit 31, on the basis of the received first indication information, determines to increase the count value of at least a portion of the counters among the at least one counter.

Specifically, the at least one counter for at least one uplink transmission at least comprises at least one of the following: a first counter for an SR; a second counter for a PUSCH; and a third counter for an RACH.

45 That is, this scenario at least comprises at least one of the three counters described above; of course, it should be understood that the described three counters are merely examples and in actual processing, if there are more uplink transmissions, then more counters may be maintained; the above is not an exhaustive list. It should also be noted that, in actual processing, there may be one or a plurality of uplink transmissions corresponding to one counter; for example, two counters may be set, a fourth counter may be configured for the SR and PUCCH,

and a fifth counter configured for the RACH. More counters may be a sixth counter corresponding to the preamble sequence and used in the RACH process for recording the number of times the preamble sequence is retransmitted. When the RACH process is triggered, the corresponding sixth counter is initialized to 1. When no RAR has been received in the RAR window or a contention conflict is not resolved, the preamble counter is incremented by 1. A seventh counter may also be included for recording the beam failure instance indicated to the MAC layer by the physical layer, and its initial value is 0.

Accordingly, explanation is based on the three counters described above, wherein, in determining, on the basis of the received first indication information, to increase the count value of at least a portion of the counters among the at least one counter, the processing unit 31 executes at least one of the following:

when the first indication information is of an LBT failure corresponding to an SR transmission, increasing the count value of the first counter;

when the first indication information is of an LBT failure corresponding to a PUSCH transmission, increasing the count value of the second counter; and

when the first indication information is of an LBT failure corresponding to an RACH, increasing the count value of the third counter.

That is, the information that can be included in the described first indication information indicates that the count value of the corresponding counter will be increased regardless of which type of uplink transmission fails. Of course, it should also be understood that when several uplink transmissions correspond to the same counter, for example, when the fourth counter is configured for the SR and PUCCH, and the fifth counter configured for the RACH, if the first indication information indicates that the LBT of the SR transmission fails or the LBT of the PUSCH transmission fails, then the count value of the fourth counter may be increased; and when the first indication information is of an LBT failure corresponding to an RACH, the count value of the fifth counter may be increased. The above are merely examples and, in actual processing, there may be situations in which other uplink transmissions correspond to one counter, which will not be elaborated here.

Further, in this scenario, a corresponding first timer, second timer, and third timer are configured for a first counter for SR, second counter for PUSCH, and third counter for RACH, respectively. They may be different timers configured by the network side. It should be noted that different timers are configured for different counters; that is to say, different timers are configured for at least one counter of at least one uplink transmission; of course, the timer duration of different timers may be the same or different.

After obtaining the configured timers, the processing unit 31, if the uplink transmission corresponding to the received first indication information fails, may restart or start the corresponding timer.

Specifically, the processing unit 31 also executes one of the following:

when the received first indication information is of an LBT failure corresponding to an SR transmission, starting or restarting the first timer;

when the received first indication information is of an LBT failure corresponding to a PUSCH transmission, starting or restarting the second timer; and

when the received first indication information is of an LBT failure corresponding to an RACH, starting or restarting the third timer.

That is to say, the global timer can be used for controlling the situation in which the count value of a counter has not changed for a long period of time; for example, if the count value of a counter has currently not increased for a long period of time, that is to say, if there has been no uplink channel preemption operation for a long period of time, then the next time that uplink transmission is performed again and fails, the count will be increased on the basis of the count value of the counter that was originally recorded; however, this causes performance issues in uplink transmission.

By adding a timer, it is possible to reset a counter when the timer times out. Thus, when the count value of the counter has not changed for a very long period of time, it is possible to restart the counting of the counter.

5 The processing unit 31 configures at least one threshold value for the at least one counter for at least one uplink transmission.

The processing unit 31, when the count value of a counter among the at least one counter exceeds a corresponding threshold value, executes at least a portion of the following processing:

- notifying the RRC layer to trigger RRC re-establishment;
- notifying the RRC layer to trigger RRC reconfiguration;
- 10 notifying the RRC layer to release all configured PUCCH resources;
- notifying the RRC layer to release all SRSes;
- clearing all configured downlink scheduling resources and uplink grant resources;
- initiating an RACH process;
- notifying the network side of the number of LBT failures; and
- 15 notifying the network side of an event that triggers LBT.

Therein, the RRC reconfiguration may be at least one of the following: reconfiguring the uplink BWP, or reconfiguring PRACH resources, reconfiguring PUCCH resources, reconfiguring PUSCH resources, reconfiguring the uplink carrier, etc. The SCG-RLF process is to suspend all Signaling Radio Bearers (SRB) and Data Radio Bearers (DRB) of the SCG, reset the SCG Media Access Control (MAC) address entity, and report the number of LBT failures to the network via an MCG.

The threshold value may be a threshold value that is set according to actual conditions; for example, it may be set to 10; of course, it may also be set to other values, which will not be enumerated here.

25 Therein, when initiating RRC connection re-establishment and initiating a connection re-establishment request to the network side, the connection re-establishment request includes: the number of LBT failures, and/or an event that triggers LBT.

It should be noted that, in this scenario, different processing may be set for different counters; for example, for the first counter, it is possible to set the count value such that when it exceeds the threshold value, the RRC layer is notified to trigger RRC reconfiguration, the RRC layer is notified to release all configured PUCCH resources, the RRC layer is notified to release all SRSes, and all configured downlink scheduling resources and uplink grant resources are cleared. The second counter may be set such that, when its count value exceeds the threshold value, the RRC layer is notified to trigger RRC reconfiguration. The third counter may be set such that, when its count value exceeds the threshold value, the RRC layer is notified to release all SRSes, and all configured downlink scheduling resources and uplink grant resources are cleared. It should be understood that while different processing may be set for different counters, it is, of course, also possible to set the same processing, and the above is not an exhaustive description.

40 In this scenario, the global counter may be maintained at the MAC layer of the terminal device; for example, the physical layer indicates an LBT failure to the MAC, and the MAC layer triggers the execution of the aforementioned action. Alternatively, it may also be maintained at the RRC layer; for example, the physical layer indicates an LBT failure to an RRC, and the RRC triggers the execution of the aforementioned action.

Lastly, in view of the aforementioned Scenarios 1 and 2, it should also be noted that a global counter and at least one counter for at least one uplink transmission may be maintained simultaneously; for example, there may be the situation in which a global counter for global uplink transmission may be maintained; of course, it is also possible to maintain one counter for one or several uplink transmissions, or to maintain a counter for each uplink transmission among the one or several uplink transmissions. That is to say, the aforementioned Scenarios 1 and 2 may coexist; when they coexist, processing is done in the manner of the described scenarios, respectively, the details of which will not be given here.

Hence, by using the described solution, it is possible to maintain a counter and thereby determine the count value of the counter on the basis of the corresponding first indication information. Thus, it is possible, when a certain quantity of counters is reached, to perform the corresponding control processing, thereby enabling an uplink transmission to occupy the channel, thus ensuring uplink transmission performance.

FIG. 4 is a structural schematic diagram of a communication device provided by embodiments of the present application; the communication device may be the aforementioned terminal device or network device of the present embodiment. The communication device 400 shown in FIG. 4 comprises a processor 410, which can invoke and run a computer program from a storage device to implement the method of embodiments of the present application.

Optionally, as shown in FIG. 4, the communication device 400 may also comprise a storage device 420. Therein, the processor 410 can invoke and run a computer program from the storage device to implement the method of embodiments of the present application.

Therein, the storage device 420 may be a separate device independent of the processor 410 or may be integrated into the processor 410.

Optionally, as shown in FIG. 4, the communication device 400 may also comprise a transceiver 430, and the processor 410 can control the transceiver 430 to communicate with other devices and, specifically, can send information or data to other devices or receive information or data sent by other devices.

Therein, the transceiver 430 may comprise a transmitter and a receiver. The transceiver 430 may further comprise an antenna, and the quantity of antennas may be one or more than one.

Optionally, the communication device 400 may specifically be a network device according to embodiments of the present application, and the communication device 400 can implement corresponding processes implemented by network devices in the various methods of embodiments of the present application; for the sake of brevity, a detailed description thereof will not be given here.

Optionally, the communication device 400 may specifically be a terminal device or network device according to embodiments of the present application, and the communication device 400 can implement corresponding processes implemented by mobile terminals/terminal devices in the various methods of embodiments of the present application; for the sake of brevity, a detailed description thereof will not be given here.

FIG. 5 is a schematic block diagram of a chip according to embodiments of the present application. The chip 500 shown in FIG. 5 comprises a processor 510, and the processor 510 can invoke and run a computer program from a storage device to implement the method of embodiments of the present application.

Optionally, as shown in FIG. 5, the chip 500 may also comprise a storage device 520. Therein, the processor 510 can invoke and run a computer program from a storage device to implement the method of embodiments of the present application.

Therein, the storage device 520 may be a separate device independent of the processor 510 and may be integrated into the processor 510.

Optionally, the chip 500 may also comprise an input interface 530. Therein, the processor 510 can control the input interface 530 to communicate with other devices or chips and, specifically, can obtain information or data sent by other devices or

chips.

Optionally, the chip 500 may also comprise an output interface 540. Therein, the processor 510 can control the output interface 540 to communicate with other devices or chips and, specifically, can output information or data to other devices or chips.

Optionally, the chip is applicable to network devices in embodiments of the present application, and the chip can implement corresponding processes implemented by network devices in the various methods of embodiments of the present application; for the sake of brevity, a detailed description thereof will not be given here.

Optionally, the chip is applicable to terminal devices in embodiments of the present application, and the chip can implement corresponding processes implemented by terminal devices in the various methods of embodiments of the present application; for the sake of brevity, a detailed description thereof will not be given here.

It should be understood that the chip mentioned in embodiments of the present application may also be called a system level chip, system on chip, SoC, or system-on-a-chip, etc.

FIG. 6 is a schematic block diagram of a communication system 600 provided by embodiments of the present application. As shown in FIG. 6, the communication system 600 comprises a terminal device 610 and a network device 620.

Therein, the terminal device 610 may be used for implementing the corresponding functions implemented by the terminal device in the described method, and the network device 620 may be used for implementing the corresponding functions implemented by the network device in the described method; for the sake of brevity, a detailed description thereof will not be given here.

It should be understood that the processor of embodiments of the present application may be an integrated circuit chip capable of processing signals. In the process of implementation, each step of the described method of the embodiments can be completed by an integrated logic circuit of hardware in a processor or an instruction in the form of software. The aforementioned processor may be 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 device, a discrete gate or transistor logic device, or discrete hardware component and can implement or execute the various methods, steps, and logic block diagrams disclosed in embodiments of the present application. The general-purpose processor may be a microprocessor, or the processor may be any conventional processor or the like. The steps of the method disclosed by embodiments of the present application can be directly represented as being executed by a hardware decoding processor, or can be executed by a combination of hardware and software modules in a decoding processor. The software module may be located in random-access memory, flash memory, read-only memory, programmable read-only memory or electrically erasable programmable read-only memory, a register, or other storage medium known in the art. The storage medium is located in the storage device, and the processor reads the information in the storage device and, in combination with its hardware, completes the steps of the described method.

It is understood that the storage device in embodiments of the present application may be volatile memory or non-volatile memory, or may comprise both volatile and non-volatile memory. Therein, the non-volatile memory may be Read-Only Memory (ROM), Programmable Read-Only Memory (Programmable ROM, PROM), Erasable Programmable Read-Only Memory (EPROM), Electrically Erasable Programmable Read-Only Memory (Electrically EPROM, EEPROM), or flash memory. The volatile memory may be Random-Access Memory (RAM), used as external cache. By way of exemplary, but not restrictive, illustration, many forms of RAM are available, such as Static Random-Access Memory (Static RAM, SRAM), Dynamic Random-Access Memory (Dynamic RAM, DRAM), Synchronous Dynamic Random-Access Memory (Synchronous DRAM, SDRAM), Double Data Rate Synchronous Dynamic Random-Access Memory (Double Data Rate SDRAM, DDR SDRAM),

Enhanced Synchronous Dynamic Random-Access Memory (Enhanced SDRAM, ESDRAM), SynchLink Dynamic Random-Access Memory (SynchLink DRAM, SLDRAM), and Direct Rambus Random-Access Memory (Direct Rambus RAM, DR RAM). It should be noted that the storage devices of the systems and methods described herein are intended to include, without being limited to, those and any other suitable types of memory.

It should be understood that the storage devices listed above are illustrated as exemplary, but not restrictive; for example, the storage device in embodiments of the present application may also be Static Random-Access Memory (static RAM, SRAM), Dynamic Random-Access Memory (Dynamic RAM, DRAM), Synchronous Dynamic Random-Access Memory (Synchronous DRAM, SDRAM), Double Data Rate Synchronous Dynamic Random-Access Memory (Double Data Rate SDRAM, DDR SDRAM), Enhanced Synchronous Dynamic Random-Access Memory (Enhanced SDRAM, ESDRAM), SynchLink Dynamic Random-Access Memory (SynchLink DRAM, SLDRAM), Direct Rambus Random-Access Memory (Direct Rambus RAM, DR RAM), and the like. That is to say, the storage devices in embodiments of the present application are intended to include, without being limited to, those and any other suitable types of memory.

Embodiments of the present application also provide a computer-readable storage medium, used for storing a computer program.

Optionally, the computer-readable storage medium is applicable to a network device in embodiments of the present application, and the computer program causes the computer to execute the corresponding processes implemented by the network device in the various methods of embodiments of the present application; for the sake of brevity, a detailed description thereof will not be given here.

Optionally, the computer-readable storage medium is applicable to a terminal device in embodiments of the present application, and the computer program causes the computer to execute the corresponding processes implemented by the mobile terminal/terminal device in the various methods of embodiments of the present application; for the sake of brevity, a detailed description thereof will not be given here.

Embodiments of the present application also provide a computer program product, comprising a computer program instruction.

Optionally, the computer program product is applicable to network devices in embodiments of the present application, and the computer program instruction causes the computer to execute the corresponding processes implemented by the network device in the various methods of embodiments of the present application; for the sake of brevity, a detailed description thereof will not be given here.

Optionally, the computer program product is applicable to a mobile terminal/terminal device in embodiments of the present application, and the computer program instruction causes the computer to execute the corresponding processes implemented by the mobile terminal/terminal device in the various methods of embodiments of the present application; for the sake of brevity, it will not be detailed here.

Embodiments of the present application also provide a computer program.

Optionally, the computer program may be used in a network device in embodiments of the present application; when the computer program is run on a computer, the computer executes the corresponding processes implemented by the network device in the various methods of embodiments of the present application; for the sake of brevity, a detailed description thereof will not be given here.

Optionally, the computer program is applicable to a mobile terminal/terminal device in embodiments of the present application; when the computer program is run on a computer, the computer executes the corresponding processes implemented by the mobile terminal/terminal device in the various methods of embodiments of the present application; for the sake of brevity, it will not be detailed here.

A person skilled in the art will appreciate that the various units and algorithm steps of each example described in the embodiments disclosed herein can be implemented in electronic hardware, or in a combination of computer software and electronic hardware.

Whether those functions are executed by hardware or software will depend on the specific application and design constraint conditions of the technical solution. A person of specialized technical skill could use different methods to implement the described functions for each specific application. However, such implementations should not be considered to be beyond the scope of the present application.

5 A person skilled in the art can clearly understand that, for the sake of convenience and brevity of the descriptions, the specific working processes of the systems, apparatuses, and units described above can refer to the corresponding processes in the aforementioned method embodiments, and a detailed description thereof will not be given here.

10 In several embodiments provided by the present application, it should be understood that the disclosed systems, apparatuses, and methods, may be achieved in other ways. For example, the apparatus embodiments described above are merely illustrative; for example, the division of units is merely a division into logical functions, and there may be other ways of division in actual implementation; for example, a plurality of units or components may be combined or may be integrated into another system, or some features may be ignored or not executed. Another point is that
15 the mutual couplings, direct couplings, or communication connections between what is shown or discussed may be by some interfaces, indirect couplings, or communication connections of apparatuses or units, which can be electrical, mechanical, or another form.

The units described as separate components may or may not be physically separate; components displayed as units may or may not be physical units, that is, they may be located in one
20 place or may be distributed to multiple network units. Some or all of the units may be selected according to actual requirements to achieve the purpose of the solution of the present embodiment.

In addition, each functional unit in each embodiment of the present application may be integrated into a processing unit, or may be such that each unit exists separately physically, or may be such that two or more units are integrated into one unit.

25 The described functions, if implemented in the form of a software function unit and sold or used as an independent product, can be stored on a computer-readable storage medium. On the basis of that understanding, the technical solution of the present application, in its essence or, in other words, the portion that contributes to the prior art, or a portion of that technical solution, may be embodied in the form of a software product; the computer software product is stored on a storage
30 medium and comprises several instructions used for causing a computer device (which may be a personal computer, server, or network device, etc.) to execute all or some of the steps of the method described by each of the embodiments of the present application. The aforementioned storage medium comprises: various media that can store program code, such as USB flash drives, mobile hard disks, Read-Only Memory (ROM), Random-Access Memory (RAM), magnetic disks or optical disks, etc.

35 What is described above is only a specific implementation of the present application, but the scope of protection of the present application is not limited thereby, and any person skilled in the present technical field could, within the technical scope disclosed by the present application, easily conceive of changes or substitutions, all of which shall fall within the scope of protection of the present application. Therefore, the scope of protection of the present application shall be the scope of
40 protection of the claims.

CLAIMS

1. A counting method, applied to a terminal device, comprising:
maintaining at least one counter, the counter being used for recording the number of times that
first indication information has been received; and
on the basis of the received first indication information, determining to increase the count value of
the counter corresponding to the first indication information.
2. The method of claim 1, wherein the first indication information is used for indicating one of the
following:
an LBT failure, an LBT success, an SR transmission failure, a preamble sequence transmission
failure, and an uplink data transmission failure.
3. The method of claim 2, wherein the method also comprises:
on the basis of one of the following, triggering the execution of LBT;
an uplink PUCCH transmitting a scheduling request SR or HARQ feedback;
an uplink PUSCH transmitting data; and
initiation of an RACH process.
4. The method of any one of claims 1–3, wherein the at least one counter includes: a global counter and/or
at least one counter for at least one uplink transmission.
5. The method of claim 4, wherein said determining, on the basis of the received first indication
information, to increase the count value of the counter corresponding to the first indication information
comprises:
on the basis of the received first indication information, determining to increase the count value of
the global counter;
and/or, on the basis of the received first indication information, determining to increase the count
value of at least a portion of the counters among the at least one counter.
6. The method of claim 4 or 5, wherein the method also comprises:
obtaining a configured global timer corresponding to the global counter;
and/or, obtaining at least one timer configured corresponding to the at least one counter for at least
one uplink transmission.
7. The method of claim 6, wherein after said obtaining a configured global timer corresponding to the
global counter, the method also comprises:
upon receiving the first indication information, starting or restarting the global timer.
8. The method of claim 7, wherein, after said starting or restarting the global timer, the method also
comprises:
when the global timer times out, resetting the global counter.
9. The method of any one of claims 4–8, wherein the method also comprises:
when the global counter reaches a preset threshold value, the radio resource control (RRC) layer
triggering one of the following processes:
RRC connection re-establishment; secondary cell group SCG–radio link failure RLF processing;
and RRC reconfiguration.
10. The method of claim 9, wherein the method also comprises:
when initiating RRC connection re-establishment, initiating a connection re-establishment request
to the network side; and
wherein the connection re-establishment request comprises: the number of LBT failures, and/or an
event that triggers LBT.
11. The method of claim 4, wherein the at least one counter for at least one uplink transmission at least
comprises at least one of the following: a first counter for an SR; a second counter for a PUSCH; and a
third counter for an RACH.
12. The method of claim 11, wherein said determining, on the basis of the received first indication
information, to increase the count value of at least a portion of the counters among the at least one counter
comprises at least one of the following:
when the first indication information is of an LBT failure corresponding to an SR transmission,
increasing the count value of the first counter;
when the first indication information is of an LBT failure corresponding to a PUSCH
transmission, increasing the count value of the second counter; and

when the first indication information is of an LBT failure corresponding to an RACH, increasing the count value of the third counter.

13. The method of claim 11, wherein:

5 the first counter for an SR, the second counter for a PUSCH, and the third counter for an RACH are configured to have a corresponding first timer, second timer, and third timer, respectively.

14. The method of claim 13, wherein the method also comprises one of the following:

when the received first indication information is of an LBT failure corresponding to an SR transmission, starting or restarting the first timer;
 10 when the received first indication information is of an LBT failure corresponding to a PUSCH transmission, starting or restarting the second timer; and
 when the received first indication information is of an LBT failure corresponding to an RACH, starting or restarting the third timer.

15. The method of any one of claims 11–14, wherein the method also comprises:

15 configuring at least one threshold value for the at least one counter for at least one uplink transmission.

16. The method of claim 15, wherein the method also comprises:

when the count value of a counter among the at least one counter exceeds a corresponding threshold value, executing at least a portion of the following processing:
 notifying the RRC layer to trigger RRC re-establishment;
 20 notifying the RRC layer to trigger RRC reconfiguration;
 notifying the RRC layer to release all configured PUCCH resources;
 notifying the RRC layer to release all SRs;
 clearing all configured downlink scheduling resources and uplink grant resources;
 initiating an RACH process;
 25 notifying the network side of the number of LBT failures; and
 notifying the network side of an event that triggers LBT.

17. A terminal device, comprising:

a processing unit, maintaining at least one counter, the counter being used for recording the number of times that first indication information has been received and, on the basis of the
 30 received first indication information, determining to increase the count value of the counter corresponding to the first indication information.

18. The terminal device of claim 17, wherein the first indication information is used for indicating one of the following:

35 an LBT failure, an LBT success, an SR transmission failure, a preamble sequence transmission failure, and an uplink data transmission failure.

19. The terminal device of claim 18, wherein the processing unit, on the basis of one of the following, triggers the execution of LBT:

an uplink PUCCH transmitting a scheduling request SR or HARQ feedback;
 an uplink PUSCH transmitting data; and
 40 initiation of an RACH process.

20. The terminal device of any one of claims 17–19, wherein the at least one counter includes: a global counter, and/or at least one counter for at least one uplink transmission.

21. The terminal device of claim 20, wherein:

45 the processing unit, on the basis of the received first indication information, determines to increase the count value of the global counter;
 and/or, on the basis of the received first indication information, determining to increase the count value of at least a portion of the counters among the at least one counter.

22. The terminal device of claim 20 or 21, wherein the terminal device also comprises:

a communication unit, which obtains a configured global timer corresponding to the global
 50 counter;
 and/or, obtains at least one timer configured corresponding to the at least one counter for at least

one uplink transmission.

23. The terminal device of claim 22, wherein the processing unit, upon receiving the first indication information, starts or restarts the global timer.
24. The terminal device of claim 23, wherein the processing unit, when the global timer times out, resets the global counter.
25. The terminal device of any one of claims 20–24, wherein the processing unit, when the global counter reaches a preset threshold value, controls the RRC layer to trigger one of the following:
 - RRC connection re-establishment; secondary cell group SCG–radio link failure RLF processing; RRC reconfiguration.
26. The terminal device of claim 25, wherein:
 - the processing unit, when initiating RRC connection re-establishment, controls the communication unit to initiate a connection re-establishment request to the network side;
 - wherein the connection re-establishment request comprises: the number of LBT failures, and/or an event that triggers LBT.
27. The terminal device of claim 20, wherein the at least one counter for at least one uplink transmission at least comprises at least one of the following: a first counter for an SR; a second counter for a PUSCH; a third counter for an RACH.
28. The terminal device of claim 27, wherein the processing unit comprises at least one of the following:
 - when the first indication information is of an LBT failure corresponding to an SR transmission, increasing the count value of the first counter;
 - when the first indication information is of an LBT failure corresponding to a PUSCH transmission, increasing the count value of the second counter; and
 - when the first indication information is of an LBT failure corresponding to an RACH, increasing the count value of the third counter.
29. The terminal device according to claim 27, wherein the processing unit, for the first counter for an SR, the second counter for a PUSCH, and the third counter for an RACH, configures a corresponding first timer, second timer, and third timer, respectively.
30. The terminal device of claim 29, wherein the processing unit executes one of the following:
 - when the received first indication information is of an LBT failure corresponding to an SR transmission, starting or restarting the first timer;
 - when the received first indication information is of an LBT failure corresponding to a PUSCH transmission, starting or restarting the second timer; and
 - when the received first indication information is of an LBT failure corresponding to an RACH, starting or restarting the third timer.
31. The terminal device of any one of claims 27–30, wherein the processing unit configures at least one threshold value for the at least one counter for at least one uplink transmission.
32. The terminal device of claim 31, wherein the processing unit, when the count value of a counter among the at least one counter exceeds a corresponding threshold value, executes at least a portion of the following processing:
 - notifying the RRC layer to trigger RRC re-establishment;
 - notifying the RRC layer to trigger RRC reconfiguration;
 - notifying the RRC layer to release all configured PUCCH resources;
 - notifying the RRC layer to release all SRSeS;
 - clearing all configured downlink scheduling resources and uplink grant resources;
 - initiating an RACH process;
 - notifying the network side of the number of LBT failures; and
 - notifying the network side of an event that triggers LBT.
33. A terminal device, comprising: a processor, and a storage device used for storing a computer program capable of being executed on the processor:
 - wherein the storage device is used for storing the computer program, and the processor is used for invoking and running the computer program stored in the storage device to execute the steps of the method of any one of claims 1–16.

34. A chip, comprising: a processor, which is used for invoking and running the computer program from the storage device, causing the device equipped with the chip to execute the method of any one of claims 1–16.
- 5 35. A computer-readable storage medium, the computer-readable storage medium being used for storing a computer program, and the computer program causing a computer to execute the steps of the method of any one of claims 1–16.
36. A computer program product, comprising a computer program instruction, the computer program instruction causing a computer to execute the method of any one of claims 1–16.
- 10 37. A computer program, the computer program causing a computer to execute the method of any one of claims 1–16.

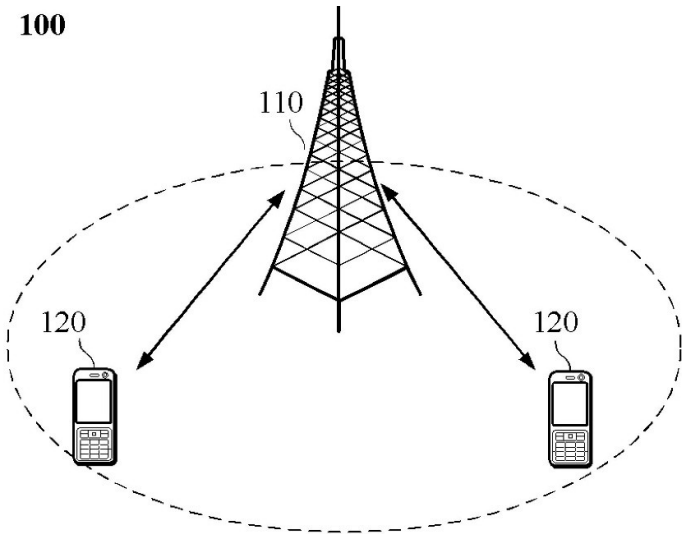


FIG. 1

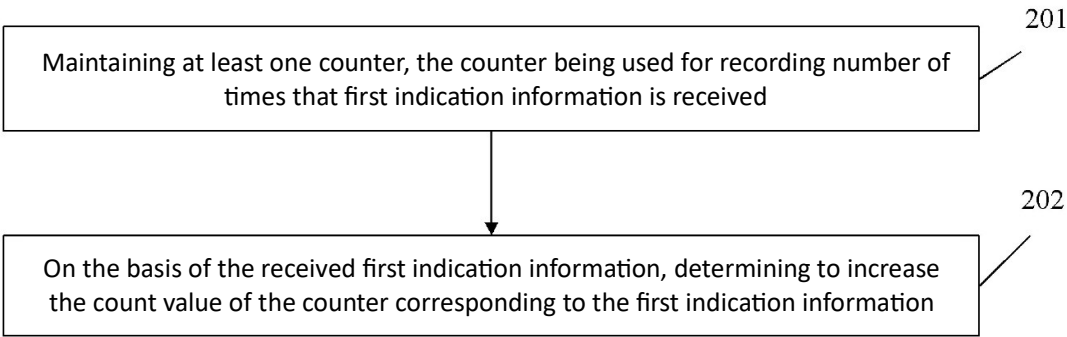


FIG. 2



FIG. 3

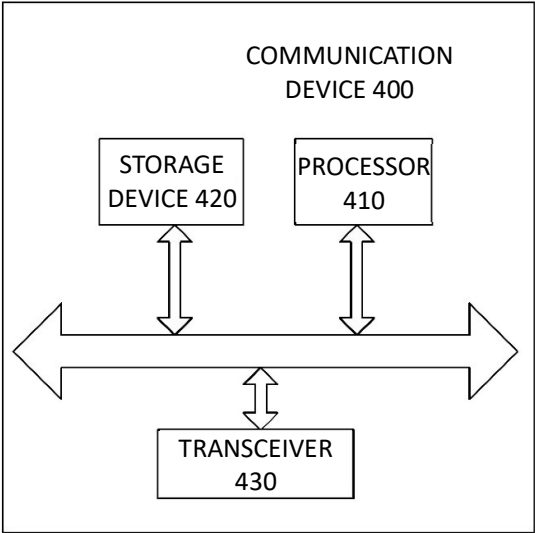


FIG. 4

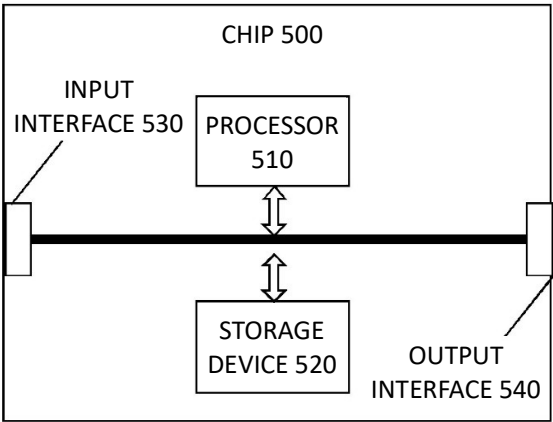


FIG. 5

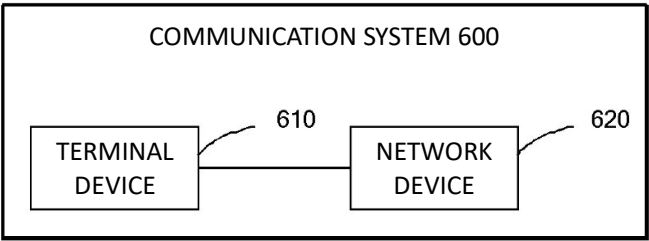
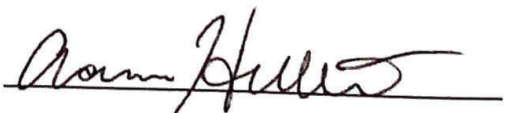


FIG. 6

I, Aaron Hebenstreit, declare as follows:

1. I am over 21 years of age and am competent to make this declaration.
2. I am a native speaker of English.
3. I am fluent in Chinese.
4. I have 10 years of experience translating Chinese to English.
5. I translated the attached patent document "WO2020087369A1" from Chinese to English.
6. I certify that the translation of the document "WO2020087369A1" is, to the best of my knowledge, a true and accurate translation from Chinese to English.
7. In signing this declaration, I understand that the translation and this declaration may be filed as evidence in a contested case. I acknowledge that I may be subject to cross-examination within the United States.
8. I declare under penalty of perjury that all statements made herein are true and accurate to the best of my knowledge and belief, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed: July 8, 2025

By: 
Aaron Hebenstreit

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(71) 申请人: **OPPO 广东移动通信有限公司 (GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.)** [CN/CN]; 中国广东省东莞市长安镇乌沙海滨路 18 号, Guangdong 523860 (CN)。

(72) 发明人: **石聪(SHI, Cong)**; 中国广东省东莞市长安镇乌沙海滨路18号, Guangdong 523860 (CN)。

(74) 代理人: 北京派特恩知识产权代理有限公司(**CHINA PAT INTELLECTUAL PROPERTY OFFICE**); 中国北京市海淀区海淀南路21号中关村知识产权大厦B座2层, Beijing 100080 (CN)。

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MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW。

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本国际公布:

— 包括国际检索报告(条约第21条(3))。

(54) **Title:** COUNTING METHOD, TERMINAL DEVICE, AND APPARATUS

(54) 发明名称: 一种计数方法、终端设备及装置

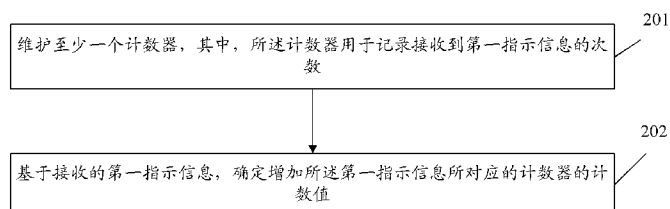


图 2

201 Maintain at least one counter, the counter being configured to record the number of times that first indication information has been received
202 Determine, on the basis of the received first indication information, to increase the count value of the counter corresponding to the first indication information

(57) **Abstract:** Disclosed in the present invention are a counting method, a terminal device, a chip, a computer readable storage medium, a computer program product and a computer program. The method comprises: maintaining at least one counter, the counter being configured to record the number of times that first indication information has been received; determining, on the basis of the received first indication information, to increase the count value of the counter corresponding to the first indication information.

(57) **摘要:** 本发明公开了一种计数方法、终端设备、芯片、计算机可读存储介质、计算机程序产品以及计算机程序, 其中方法包括: 维护至少一个计数器, 其中, 所述计数器用于记录接收到第一指示信息的次数; 基于接收的第一指示信息, 确定增加所述第一指示信息所对应的计数器的计数值。

一种计数方法、终端设备及装置

技术领域

本发明涉及信息处理技术领域，尤其涉及一种计数方法、终端设备、芯片、计算机可读存储介质、计算机程序产品以及计算机程序。

5 背景技术

当先听后发（LBT, Listen Before Talk）失败时，即随机接入信道（RACH, Random Access Channel）流程中功率攀升计数器不会累加，但是需要继续讨论是否 PREAMBLE 前导序列传输计数器是否需要累加。在 NR-U 中，由于终端设备工作在非授权频带，就有可能由于信道的不确定性会抢占不到信道，即发生 LBT 失败，这样就可能会影响上行发送的性能。

发明内容

为解决上述技术问题，本发明实施例提供了一种计数方法、终端设备、芯片、计算机可读存储介质、计算机程序产品以及计算机程序。

15 第一方面，本发明实施例提供了一种计数方法，应用于终端设备，包括：
维护至少一个计数器，其中，所述计数器用于记录接收到第一指示信息的次数；
基于接收的第一指示信息，确定增加所述第一指示信息所对应的计数器的计数值。

第二方面，本发明实施例提供了一种终端设备，包括：
处理单元，维护至少一个计数器，其中，所述计数器用于记录接收到第一指示信息的次数；基于接收的第一指示信息，确定增加所述第一指示信息所对应的计数器的计数
20 值。

第三方面，提供了一种终端设备，包括处理器和存储器。该存储器用于存储计算机程序，该处理器用于调用并运行该存储器中存储的计算机程序，执行上述第一方面或其各实现方式中的方法。

第四方面，提供了一种芯片，用于实现上述第一方面或其各实现方式中的方法。
25 具体地，该芯片包括：处理器，用于从存储器中调用并运行计算机程序，使得安装有该芯片的设备执行如上述第一方面至第二方面中的任一方面或其各实现方式中的方法。

第五方面，提供了一种计算机可读存储介质，用于存储计算机程序，该计算机程序使得计算机执行上述第一方面或其各实现方式中的方法。

30 第六方面，提供了一种计算机程序产品，包括计算机程序指令，该计算机程序指令

使得计算机执行上述第一方面或其各实现方式中的方法。

第七方面，提供了一种计算机程序，当其在计算机上运行时，使得计算机执行上述第一方面或其各实现方式中的方法。

本发明实施例的技术方案，通过维护计数器，基于对应的第一指示信息来确定计数器的计数值。如此，就能够在通过计数器的计数器达到一定的数量的时候，进行相应的控制处理，从而使得上行传输能够抢到信道，进而保证了上行传输的性能。

附图说明

图 1 是本申请实施例提供的一种通信系统架构的示意性图一；

10 图 2 是本申请实施例提供的一种计数方法流程示意图；

图 3 为本发明实施例提供的一种终端设备组成结构示意图；

图 4 为本发明实施例提供的一种通信设备组成结构示意图；

图 5 是本申请实施例提供的一种芯片的示意性框图；

图 6 是本申请实施例提供的一种通信系统架构的示意性图二。

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具体实施方式

下面将结合本申请实施例中的附图，对本申请实施例中的技术方案进行描述，显然，所描述的实施例是本申请一部分实施例，而不是全部的实施例。基于本申请中的实施例，本领域普通技术人员在没有做出创造性劳动前提下所获得的所有其他实施例，都属于本申请保护的范围。

20

本申请实施例的技术方案可以应用于各种通信系统，例如：全球移动通讯（Global System of Mobile communication, GSM）系统、码分多址（Code Division Multiple Access, CDMA）系统、宽带码分多址（Wideband Code Division Multiple Access, WCDMA）系统、通用分组无线业务（General Packet Radio Service, GPRS）、长期演进（Long Term Evolution, LTE）系统、LTE 频分双工（Freq 终端设备 ncy Division Duplex, FDD）系统、LTE 时分双工（Time Division Duplex, TDD）、通用移动通信系统（Universal Mobile Telecommunication System, UMTS）、全球互联微波接入（Worldwide Interoperability for Microwave Access, WiMAX）通信系统或 5G 系统等。

25

示例性的，本申请实施例应用的通信系统 100 可以如图 1 所示。该通信系统 100 可以包括网络设备 110，网络设备 110 可以是与终端设备 120（或称为通信终端、终端）通信的设备。网络设备 110 可以为特定的地理区域提供通信覆盖，并且可以与位于该覆盖区域内的终端设备进行通信。可选地，该网络设备 110 可以是 GSM 系统或 CDMA 系

30

统中的网络设备 (Base Transceiver Station, BTS), 也可以是 WCDMA 系统中的网络设备 (NodeB, NB), 还可以是 LTE 系统中的演进型网络设备 (Evolutional Node B, eNB 或 eNodeB), 或者是云无线接入网络 (Cloud Radio Access Network, CRAN) 中的无线控制器, 或者该网络设备可以为移动交换中心、中继站、接入点、车载设备、可穿戴设备、集线器、交换机、网桥、路由器、5G 网络中的网络侧设备或者未来演进的公共陆地移动网络 (Public Land Mobile Network, PLMN) 中的网络设备等。

该通信系统 100 还包括位于网络设备 110 覆盖范围内的至少一个终端设备 120。作为在此使用的“终端设备”包括但不限于经由有线线路连接, 如经由公共交换电话网络 (Public Switched Telephone Networks, PSTN)、数字用户线路 (Digital Subscriber Line, DSL)、数字电缆、直接电缆连接; 和/或另一数据连接/网络; 和/或经由无线接口, 如, 针对蜂窝网络、无线局域网(Wireless Local Area Network, WLAN)、诸如 DVB-H 网络的数字电视网络、卫星网络、AM-FM 广播发送器; 和/或另一终端设备的被设置成接收/发送通信信号的装置; 和/或物联网 (Internet of Things, IoT) 设备。被设置成通过无线接口通信的终端设备可以被称为“无线通信终端”、“无线终端”或“移动终端”。移动终端的示例包括但不限于卫星或蜂窝电话; 可以组合蜂窝无线电电话与数据处理、传真以及数据通信能力的个人通信系统 (Personal Communications System, PCS) 终端; 可以包括无线电电话、寻呼机、因特网/内联网接入、Web 浏览器、记事簿、日历以及/或全球定位系统 (Global Positioning System, GPS) 接收器的 PDA; 以及常规膝上型和/或掌上型接收器或包括无线电电话收发器的其它电子装置。终端设备可以指接入终端、用户设备 (User Equipment, 终端设备)、用户单元、用户站、移动站、移动台、远方站、远程终端、移动设备、用户终端、终端、无线通信设备、用户代理或用户装置。接入终端可以是蜂窝电话、无绳电话、会话启动协议 (Session Initiation Protocol, SIP) 电话、无线本地环路 (Wireless Local Loop, WLL) 站、个人数字处理 (Personal Digital Assistant, PDA)、具有无线通信功能的手持设备、计算设备或连接到无线调制解调器的其它处理设备、车载设备、可穿戴设备、5G 网络中的终端设备或者未来演进的 PLMN 中的终端设备等。

可选地, 终端设备 120 之间可以进行终端直连 (Device to Device, D2D) 通信。

可选地, 5G 系统或 5G 网络还可以称为新无线 (New Radio, NR) 系统或 NR 网络。

图 1 示例性地示出了一个网络设备和两个终端设备, 可选地, 该通信系统 100 可以包括多个网络设备并且每个网络设备的覆盖范围内可以包括其它数量的终端设备, 本申请实施例对此不做限定。

可选地, 该通信系统 100 还可以包括网络控制器、移动管理实体等其他网络实体, 本申请实施例对此不作限定。

应理解, 本申请实施例中网络/系统中具有通信功能的设备可称为通信设备。以图 1 示出的通信系统 100 为例, 通信设备可包括具有通信功能的网络设备 110 和终端设备

120, 网络设备 110 和终端设备 120 可以为上文所述的具体设备, 此处不再赘述; 通信设备还可包括通信系统 100 中的其他设备, 例如网络控制器、移动管理实体等其他网络实体, 本申请实施例中对此不做限定。

应理解, 本文中术语“系统”和“网络”在本文中常被可互换使用。本文中术语“和/或”, 仅仅是一种描述关联对象的关联关系, 表示可以存在三种关系, 例如, A 和/或 B, 可以表示: 单独存在 A, 同时存在 A 和 B, 单独存在 B 这三种情况。另外, 本文中字符“/”, 一般表示前后关联对象是一种“或”的关系。

为了能够更加详尽地了解本发明实施例的特点与技术内容, 下面结合附图对本发明实施例的实现进行详细阐述, 所附附图仅供参考说明之用, 并非用来限定本发明实施例。

实施例一、

本发明实施例提供了一种计数方法, 应用于终端设备, 如图 2 所示, 包括:

步骤 201: 维护至少一个计数器, 其中, 所述计数器用于记录接收到第一指示信息的次数;

步骤 202: 基于接收的第一指示信息, 确定增加所述第一指示信息所对应的计数器的计数值。

这里, 所述第一指示信息用于指示以下之一: LBT 失败、LBT 成功、SR 传输失败、前导序列传输失败、上行数据传输失败。

也就是说, 可以在发生 LBT 失败的时候, 可以接收物理层 (PHY) 发来的第一指示信息, 该第一指示信息用于指示 LBT 失败; 或者, 当 LBT 成功的时候, 也可以通过接收到的第一指示信息确定 LBT 失败; 或者, 可以通过第一指示信息来确定上行传输中发生 SR 传输失败; 或者, 可以通过第一指示信息确定前导序列传输失败或上行数据传输失败。需要理解的是, 物理层发来第一指示信息还可以为从网络侧接收到的信息, 通过物理层传输给 MAC 层或 RRC 层, 然后由 RRC 层或 MAC 层来维护全局计数器和/或至少一个针对上行传输的至少一个计数器。

需要指出的是, 前述步骤 202 中, 基于接收的第一指示信息, 确定增加所述第一指示信息所对应的计数器的计数值; 可以包括有: 不论接收到的第一指示信息包含的内容, 均增加第一指示信息所对应的计数器的计数值;

或者, 可以当确定第一指示信息用于指示 LBT 失败、SR 传输失败、前导序列传输失败、上行数据传输失败中的至少之一时, 确定增加计数器的计数值。

另外, 关于 LBT 的触发方式, 可以包括以下之一: 上行 PUCCH 传输调度请求 SR 或 HARQ 的反馈; 上行 PUSCH 传输数据; RACH 过程的发起。也就是说, 通过 PUCCH、PUSCH 或者随机接入信道这些上行传输, 可以触发 LBT 过程。

关于前述步骤 201 以及步骤 202 中, 所述至少一个计数器, 包含: 全局计数器, 和/或, 针对至少一种上行传输的至少一个计数器。

具体的, 可以分为以下几种场景进行说明:

场景 1、本场景中至少一种计数器为一个全局计数器。

这种场景中，所述基于接收的第一指示信息，确定增加所述第一指示信息所对应的计数器的计数值，包括：基于接收的第一指示信息，确定增加所述全局计数器的计数值。

也就是上述第一指示信息中能够包含的信息中指示了不论哪种上行传输发生失败都会增加全局计数器的计数值。

进一步地，本场景中，还会获取配置的对应全局计数器的全局定时器。具体来说，可以为通过网络侧为终端设备配置与全局计数器对应的全局定时器。

所述获取配置的对应全局计数器的全局定时器之后，所述方法还包括：当接收到第一指示信息时，启动或重启所述全局定时器。

也就是说，全局定时器的启动或者重启的条件为，接收到第一指示信息。进一步解释来说，当接收到网络侧为终端设备指示某一个上行传输发生失败的时候，全局计数器的计数值加 1，同时将全局定时器开启或者重启；即，当全局定时器没有运行的时候，可以基于第一指示信息开启全局定时器，当全局定时器已经开始计时的时候，可以基于第一指示信息重启全局定时器。

该全局定时器能够用于控制全局计数器长期没有发生计数值改变的情况，比如，若当前长期没有增加全局计数器的计数值，也就是说长期没有进行上行信道抢占等操作的时候，若下一次要再次进行上行传输且发生失败的时候，就会在原来记录的全局计数器的计数值的基础之上累积进行计数，但是，这样就会导致上行传输发生性能有问题。通过添加全局定时器，就可以当所述全局定时器超时，重置全局计数器。这样，就能够在很长一段时间内没有改变全局计数器的计数值的时候，能够重新开始对全局计数器进行计数。

所述方法还包括：当所述全局计数器达到预设门限值时，由无线资源控制（RRC，Radio Resource Control）层触发以下处理之一：RRC 连接重建；辅小区群组（SCG，Secondary Cell Group）-无线链路失败（RLF，Radio Link Failure）处理；RRC 重配置。

其中，所述 RRC 重配置可以为以下至少之一：重配置上行 BWP，或者重配置 PRACH 资源，重配置 PUCCH 资源，重配置 PUSCH 资源，重配置上行载波等。SCG-RLF 流程，即暂停所有 SCG 的 SRB（Signalling radio bearers，信令无线承载）和 DRB（Data Radio Bearer，数据无线承载），重置 SCG MAC（Media Access Control Address，媒体访问控制）实体，并通过 MCG 想网络上报 LBT 失败次数。

所述预设门限值可以为根据实际情况设置的门限值，比如，可以设置为 10，当然还可以设置为其他数值，这里不进行穷举。

其中，当发起 RRC 连接重建时，向网络侧发起连接重建请求；所述连接重建请求包括：LBT 失败次数，和/或，触发 LBT 的事件。

也就是说，如果发起了 RRC 重建流程，终端进一步可以在重建请求消息中向网络上报：LBT 失败次数，和/或：发起 LBT 的事件，比如由于 PUCCH 发送 SR 触发

LBT，上行数据发送触发 LBT 或者 RACH 触发 LBT 等。

本场景中，所述全局计数器可以在终端设备的 MAC 层维护，比如，物理层将 LBT 失败指示给 MAC，由 MAC 层触发执行前述行为。或者，还可以在 RRC 层维护，比如，物理层将 LBT 失败指示给 RRC，由 RRC 触发执行前述行为。

5 场景 2、本场景中至少一种计数器为针对至少一种上行传输的至少一个计数器。

与场景 1 不同在于，本场景能够维护一个或更多个计数器，并且针对不同的上行传输可以维护相同或不同的计数器，也就是说，可以针对每一个上行传输维护一个对应的计数器，也可以为针对上行传输中的第一部分上行传输维护一个计数器，针对上行传输的剩余部分维护另一个计数器。

10 这种场景中，所述基于接收的第一指示信息，确定增加所述第一指示信息所对应的计数器的计数值，包括：基于接收的第一指示信息，确定增加所述至少一个计数器中的至少部分计数器的计数值。

具体来说，所述针对至少一种上行传输的至少一种计数器，至少包括以下至少之一：针对 SR 的第一计数器；针对 PUSCH 的第二计数器；针对 RACH 的第三计数器。

15 也就是，本场景中至少包括有上述三个计数器中的至少一个，当然需要理解的是，上述三个计数器仅为示例，实际处理中，若存在更多的上行传输还可以维护更多的计数器，只是不再穷举。还需要指出的是，实际处理中，可能存在某一个或多个上行传输对应一个计数器，比如，可以设置两个计数器，可以为针对 SR、PUCCH 配置第四计数器，针对 RACH 配置第五计数器。更多的计数器，可以为前导序列对应的第六计数器，用于
20 在 RACH 流程中，记录前导序列重传了多少次的。当 RACH 流程触发时，对应的第六计数器被初始化为 1。当在 RAR 窗口中没有收到 RAR 或者竞争冲突没有解决时，preamble 计数器加 1。还可以包括记录物理层指示给 MAC 层的 beam failure instance 的第七计数器，其初始值为 0。

相应的，基于上述三种计数器来进行说明，所述基于接收的第一指示信息，确定增加
25 所述至少一个计数器中的至少部分计数器的计数值，包括：包括以下至少之一：

当所述第一指示信息为对应 SR 传输的 LBT 失败时，增加所述第一计数器的计数值；

当所述第一指示信息为对应 PUSCH 传输的 LBT 失败时，增加所述第二计数器的计数值；

当所述第一指示信息为对应 RACH 的 LBT 失败时，增加所述第三计数器的计数值。

30 也就是上述第一指示信息中包含的信息中指示哪种上行传输发生失败都会增加相应计数器的计数值。当然，还需要理解的是，当某几个上行传输对应同一个计数器的時候，比如，针对 SR、PUCCH 配置第四计数器，针对 RACH 配置第五计数器的時候，可以当第一指示信息为指示 SR 传输的 LBT 失败或 PUSCH 传输的 LBT 失败的時候，增加第四计数器的计数值；以及当第一指示信息为对应 RACH 的 LBT 失败時，增加第五
35 计数器的计数值。前述仅为示例，实际处理中可以存在其他的上行传输对应一个计数器

的情况，这里不穷举。

进一步地，本场景中，还会所述针对 SR 的第一计数器；针对 PUSCH 的第二计数器；针对 RACH 的第三计数器，分别配置对应的第一定时器、第二定时器以及第三定时器。可以为由网络侧为其配置的不同的定时器，需要指出的是，针对不同的计数器会配置不同的定时器，也就是说，针对至少一种上行传输的至少一个计数器分别配置不同的定时器，当然，不同的定时器的定时时长可以相同也可以不同。

所述获取配置的定时器之后，所述方法还包括：当接收到第一指示信息所对应的上行传输失败时，可以重启或启动对应的定时器。

具体的，所述方法还包括以下之一：

10 当接收到第一指示信息为对应 SR 传输的 LBT 失败时，启动或重启所述第一定时器；
当接收到所述第一指示信息为对应 PUSCH 传输的 LBT 失败时，启动或重启所述第二定时器；

当接收到所述第一指示信息为对应 RACH 的 LBT 失败时，启动或重启所述第三定时器。

15 也就是说，该全局定时器能够用于控制某一个计数器长期没有发生计数值改变的情况，比如，若当前长期没有增加某一个计数器的计数值，也就是说长期没有进行上行信道抢占等操作的时候，若下一次要再次进行上行传输且发生失败的时候，就会在原来记录的某一个计数器的计数值的基础之上累积进行计数，但是，这样就会导致上行传输发生性能有问题。通过添加某一个定时器，就可以当所述某一个定时器超时，重置某一个计数器。这样，就能够在很长一段时间内没有改变某一个计数器的计数值的时候，能够重新开始对某一个计数器进行计数。

所述方法还包括：所述针对至少一种上行传输的至少一个计数器，配置至少一个门限值。

25 当所述至少一个计数器中存在计数器的计数值超过对应的门限值时，执行以下处理中的至少部分：

通知 RRC 层触发 RRC 重建：

通知 RRC 层触发 RRC 重配置：

通知 RRC 层释放所有与配置 PUCCH 资源：

通知 RRC 层释放所有 SRS：

30 清除所有配置的下行分配资源和上行授权资源：

发起 RACH 流程：

通知网络侧 LBT 失败次数；

通知网络侧触发 LBT 的事件。

其中，所述 RRC 重配置可以为以下至少之一：重配置上行 BWP，或者重配置 PRACH 资源，重配置 PUCCH 资源，重配置 PUSCH 资源，重配置上行载波等。SCG-RLF 流程，

即暂停所有 SCG 的 SRB (Signaling radio bearers, 信令无线承载)和 DRB (Data Radio Bearer, 数据无线承载), 重置 SCG MAC (Media Access Control Address, 媒体访问控制)实体, 并通过 MCG 想网络上报 LBT 失败次数。

所述门限值可以为根据实际情况设置的门限值, 比如, 可以设置为 10, 当然还可以
5 设置为其他数值, 这里不进行穷举。

其中, 当发起 RRC 连接重建立时, 向网络侧发起连接重建立请求; 所述连接重建立请求包括: LBT 失败次数, 和/或, 触发 LBT 的事件。

需要指出的是, 本场景中, 可以针对不同的计数器设置不同的处理, 比如, 针对第一计数器, 可以设置计数值超过门限值时候, 执行通知 RRC 层触发 RRC 重配置: 通知
10 RRC 层释放所有与配置 PUCCH 资源: 通知 RRC 层释放所有 SRS: 清除所有配置的下行分配资源和上行授权资源。针对第二计数器, 可以设置当计数值超过门限值时候, 执行通知 RRC 层触发 RRC 重配置的处理。针对第三计数器, 可以设置计数值超过门限值的时候, 执行通知 RRC 层释放所有 SRS, 以及清除所有配置的下行分配资源和上行授权资源的处理。需要理解的是, 针对不同的计数器设置不同的处理, 当然也可以设置相
15 同的处理, 只是这里不再穷举。

本场景中, 所述全局计数器可以在终端设备的 MAC 层维护, 比如, 物理层将 LBT 失败指示给 MAC, 由 MAC 层触发执行前述行为。或者, 还可以在 RRC 层维护, 比如, 物理层将 LBT 失败指示给 RRC, 由 RRC 触发执行前述行为。

最后, 结合前述场景 1、2, 还需要说明的是, 可以同时维护全局计数器、以及针对
20 至少一个上行传输的至少一个计数器; 比如, 可以有一种情况, 当前可以维护针对全局上行传输的全局计数器, 当然, 还可以维护针对其中某一个或某几个上行传输的一个计数器, 或者, 还可以维护针对某一个或某几个上行传输中每一个上行传输的计数器。也就是说, 前述场景 1、2 可以同时存在, 同时存在的时候, 分别基于前述场景中的方式处理, 不再赘述。

25 可见, 通过采用上述方案, 就能够通过维护计数器, 基于对应的第一指示信息来确定计数器的计数值。如此, 就能够在通过计数器的计数器达到一定的数量的时候, 进行相应的控制处理, 从而使得上行传输能够抢到信道, 进而保证了上行传输的性能。

实施例二、

本发明实施例提供了一种终端设备, 如图 3 所示, 包括:

30 处理单元 31, 维护至少一个计数器, 其中, 所述计数器用于记录接收到第一指示信息的次数; 基于接收的第一指示信息, 确定增加所述第一指示信息所对应的计数器的计数值。

这里, 所述第一指示信息用于指示以下之一: LBT 失败、LBT 成功、SR 传输失败、前导序列传输失败、上行数据传输失败。

35 也就是说, 可以在发生 LBT 失败的时候, 可以接收物理层 (PHY) 发来的第一指

示信息，该第一指示信息用于指示 LBT 失败；或者，当 LBT 成功的时候，也可以通过接收到的第一指示信息确定 LBT 失败；或者，可以通过第一指示信息来确定上行传输中发生 SR 传输失败；或者，可以通过第一指示信息确定前导序列传输失败或上行数据传输失败。需要理解的是，物理层发来第一指示信息还可以为从网络侧接收到的信息，
5 通过物理层传输给 MAC 层或 RRC 层，然后由 RRC 层或 MAC 层来维护全局计数器和/或至少一个针对上行传输的至少一个计数器。

需要指出的是，处理单元 31，基于接收的第一指示信息，确定增加所述第一指示信息所对应的计数器的计数值；可以包括有：不论接收到的第一指示信息包含的内容，均增加第一指示信息所对应的计数器的计数值；

10 或者，可以当确定第一指示信息用于指示 LBT 失败、SR 传输失败、前导序列传输失败、上行数据传输失败中的至少之一时，确定增加计数器的计数值。

另外，关于 LBT 的触发方式，可以包括以下之一：上行 PUCCH 传输调度请求 SR 或 HARQ 的反馈；上行 PUSCH 传输数据；RACH 过程的发起。也就是说，通过 PUCCH、PUSCH 或者随机接入信道这些上行传输，可以触发 LBT 过程。

15 所述至少一个计数器，包含：全局计数器，和/或，针对至少一种上行传输的至少一个计数器。

具体的，可以分为以下几种场景进行说明：

场景 1、本场景中至少一种计数器为一个全局计数器。

20 这种场景中，所述处理单元 31，基于接收的第一指示信息，确定增加所述全局计数器的计数值。

也就是上述第一指示信息中能够包含的信息中指示了不论哪种上行传输发生失败都会增加全局计数器的计数值。

进一步地，本场景中，所述终端设备还包括通信单元 32，还会获取配置的对应全局计数器的全局定时器。具体来说，可以为通过网络侧为终端设备配置与全局计数器对应的全局定时器。
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所述获取配置的对应全局计数器的全局定时器之后，所述处理单元 31，当接收到第一指示信息时，启动或重启所述全局定时器。

也就是说，全局定时器的启动或者重启的条件为，接收到第一指示信息。进一步解释来说，当接收到网络侧为终端设备指示某一个上行传输发生失败的时候，全局计数器的计数值加 1，同时将全局定时器开启或者重启；即，当全局定时器没有运行的时候，
30 可以基于第一指示信息开启全局定时器，当全局定时器已经开始计时的时候，可以基于第一指示信息重启全局定时器。

该全局定时器能够用于控制全局计数器长期没有发生计数值改变的情况，比如，若当前长期没有增加全局计数器的计数值，也就是说长期没有进行上行信道抢占等操作的时候，若下一次要再次进行上行传输且发生失败的时候，就会在原来记录的全局计数器
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的计数值的基础之上累积进行计数，但是，这样就会导致上行传输发生性能有问题。通过添加全局定时器，就可以当所述全局定时器超时时，重置全局计数器。这样，就能够在很长一段时间内没有改变全局计数器的计数值的时候，能够重新开始对全局计数器进行计数。

5 所述处理单元 31，当所述全局计数器达到预设门限值时，由无线资源控制（RRC，Radio Resource Control）层触发以下处理之一：RRC 连接重建立；辅小区群组（SCG，Secondary Cell Group）-无线链路失败（RLF，Radio Link Failure）处理；RRC 重配置。

其中，所述 RRC 重配置可以为以下至少之一：重配置上行 BWP，或者重配置 PRACH 资源，重配置 PUCCH 资源，重配置 PUSCH 资源，重配置上行载波等。SCG-RLF 流程，
10 即暂停所有 SCG 的 SRB（Signalling radio bearers，信令无线承载）和 DRB（Data Radio Bearer，数据无线承载），重置 SCG MAC（Media Access Control Address，媒体访问控制）实体，并通过 MCG 想网络上报 LBT 失败次数。

所述预设门限值可以为根据实际情况设置的门限值，比如，可以设置为 10，当然还可以设置为其他数值，这里不进行穷举。

15 其中，处理单元 31，当发起 RRC 连接重建立时，通过通信单元 32 向网络侧发起连接重建立请求；所述连接重建立请求包括：LBT 失败次数，和/或，触发 LBT 的事件。

也就是说，如果发起了 RRC 重建立流程，终端进一步可以在重建立请求消息中向网络上报：LBT 失败次数，和/或：发起 LBT 的事件，比如由于 PUCCH 发送 SR 触发 LBT，上行数据发送触发 LBT 或者 RACH 触发 LBT 等。

20 本场景中，所述全局计数器可以在终端设备的 MAC 层维护，比如，物理层将 LBT 失败指示给 MAC，由 MAC 层触发执行前述行为。或者，还可以在 RRC 层维护，比如，物理层将 LBT 失败指示给 RRC，由 RRC 触发执行前述行为。

场景 2、本场景中至少一种计数器为针对至少一种上行传输的至少一个计数器。

与场景 1 不同在于，本场景能够维护一个或更多个计数器，并且针对不同的上行传输可以维护相同或不同的计数器，也就是说，可以针对每一个上行传输维护一个对应的计数器，也可以为针对上行传输中的第一部分上行传输维护一个计数器，针对上行传输的剩余部分维护另一个计数器。

这种场景中，所述处理单元 31，基于接收的第一指示信息，确定增加所述至少一个计数器中的至少部分计数器的计数值。

30 具体来说，所述针对至少一种上行传输的至少一种计数器，至少包括以下至少之一：针对 SR 的第一计数器；针对 PUSCH 的第二计数器；针对 RACH 的第三计数器。

也就是，本场景中至少包括有上述三个计数器中的至少一个，当然需要理解的是，上述三个计数器仅为示例，实际处理中，若存在更多的上行传输还可以维护更多的计数器，只是不再穷举。还需要指出的是，实际处理中，可能存在某一个或多个上行传输对应一个计数器，比如，可以设置两个计数器，可以为针对 SR、PUCCH 配置第四计数器，
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针对 RACH 配置第五计数器。更多的计数器，可以为前导序列对应的第六计数器，用于在 RACH 流程中，记录前导序列重传了多少次的。当 RACH 流程触发时，对应的第六计数器被初始化为 1。当在 RAR 窗口中没有收到 RAR 或者竞争冲突没有解决时，preamble 计数器加 1。还可以包括记录物理层指示给 MAC 层的 beam failure instance 的第七计数器，其初始值为 0。

相应的，基于上述三种计数器来进行说明，所述基于接收的第一指示信息，确定增加所述至少一个计数器中的至少部分计数器的计数值，处理单元 31，执行以下至少之一：

当所述第一指示信息为对应 SR 传输的 LBT 失败时，增加所述第一计数器的计数值；

当所述第一指示信息为对应 PUSCH 传输的 LBT 失败时，增加所述第二计数器的计数值；

当所述第一指示信息为对应 RACH 的 LBT 失败时，增加所述第三计数器的计数值。

也就是上述第一指示信息中包含的信息中指示哪种上行传输发生失败都会增加相应计数器的计数值。当然，还需要理解的是，当某几个上行传输对应同一个计数器的時候，比如，针对 SR、PUCCH 配置第四计数器，针对 RACH 配置第五计数器的時候，可以当第一指示信息为指示 SR 传输的 LBT 失败或 PUSCH 传输的 LBT 失败的時候，增加第四计数器的计数值；以及当第一指示信息为对应 RACH 的 LBT 失败时，增加第五计数器的计数值。前述仅为示例，实际处理中可以存在其他的上行传输对应一个计数器的情况，这里不穷举。

进一步地，本场景中，还会所述针对 SR 的第一计数器；针对 PUSCH 的第二计数器；针对 RACH 的第三计数器，分别配置对应的第一定时器、第二定时器以及第三定时器。可以由网络侧为其配置的不同的定时器，需要指出的是，针对不同的计数器会配置不同的定时器，也就是说，针对至少一种上行传输的至少一个计数器分别配置不同的定时器，当然，不同的定时器的定时时长可以相同也可以不同。

所述获取配置的定时器之后，所述处理单元 31，当接收到第一指示信息所对应的上行传输失败时，可以重启或启动对应的定时器。

具体的，所述处理单元 31，还执行以下之一：

当接收到第一指示信息为对应 SR 传输的 LBT 失败时，启动或重启所述第一定时器；

当接收到所述第一指示信息为对应 PUSCH 传输的 LBT 失败时，启动或重启所述第二定时器；

当接收到所述第一指示信息为对应 RACH 的 LBT 失败时，启动或重启所述第三定时器。

也就是说，该全局定时器能够用于控制某一个计数器长期没有发生计数值改变的情况，比如，若当前长期没有增加某一个计数器的计数值，也就是说长期没有进行上行信道抢占等操作的時候，若下一次要再次进行上行传输且发生失败的時候，就会在原来记录的某一个计数器的计数值的基础之上累积进行计数，但是，这样就会导致上行传输发

生性能有问题。通过添加某一个定时器，就可以当所述某一个定时器超时时，重置某一个计数器。这样，就能够在很长一段时间内没有改变某一个计数器的计数值的时候，能够重新开始对某一个计数器进行计数。

所述处理单元 31，所述针对至少一种上行传输的至少一个计数器，配置至少一个门限值。

处理单元 31，当所述至少一个计数器中存在计数器的计数值超过对应的门限值时，执行以下处理中的至少部分：

通知 RRC 层触发 RRC 重建立：

通知 RRC 层触发 RRC 重配置：

10 通知 RRC 层释放所有与配置 PUCCH 资源：

通知 RRC 层释放所有 SRS：

清除所有配置的下行分配资源和上行授权资源：

发起 RACH 流程：

通知网络侧 LBT 失败次数；

15 通知网络侧触发 LBT 的事件。

其中，所述 RRC 重配置可以为以下至少之一：重配置上行 BWP，或者重配置 PRACH 资源，重配置 PUCCH 资源，重配置 PUSCH 资源，重配置上行载波等。SCG-RLF 流程，即暂停所有 SCG 的 SRB（Signaling radio bearers，信令无线承载）和 DRB（Data Radio Bearer，数据无线承载），重置 SCG MAC（Media Access Control Address，媒体访问控制）实体，并通过 MCG 想网络上报 LBT 失败次数。

所述门限值可以为根据实际情况设置的门限值，比如，可以设置为 10，当然还可以设置为其他数值，这里不进行穷举。

其中，当发起 RRC 连接重建立时，向网络侧发起连接重建立请求；所述连接重建立请求包括：LBT 失败次数，和/或，触发 LBT 的事件。

25 需要指出的是，本场景中，可以针对不同的计数器设置不同的处理，比如，针对第一计数器，可以设置计数值超过门限值时候，执行通知 RRC 层触发 RRC 重配置：通知 RRC 层释放所有与配置 PUCCH 资源：通知 RRC 层释放所有 SRS：清除所有配置的下行分配资源和上行授权资源。针对第二计数器，可以设置当计数值超过门限值时候，执行通知 RRC 层触发 RRC 重配置的处理。针对第三计数器，可以设置计数值超过门限值的时候，执行通知 RRC 层释放所有 SRS，以及清除所有配置的下行分配资源和上行授权资源的处理。需要理解的是，针对不同的计数器设置不同的处理，当然也可以设置相同的处理，只是这里不再穷举。

30 本场景中，所述全局计数器可以在终端设备的 MAC 层维护，比如，物理层将 LBT 失败指示给 MAC，由 MAC 层触发执行前述行为行为。或者，还可以在 RRC 层维护，比如，物理层将 LBT 失败指示给 RRC，由 RRC 触发执行前述行为。

最后，结合前述场景 1、2，还需要说明的是，可以同时维护全局计数器、以及针对至少一个上行传输的至少一个计数器；比如，可以有一种情况，当前可以维护针对全局上行传输的全局计数器，当然，还可以维护针对其中某一个或某几个上行传输的一个计数器，或者，还可以维护针对某一个或某几个上行传输中每一个上行传输的计数器。也就是说，前述场景 1、2 可以同时存在，同时存在的时候，分别基于前述场景中的方式处理，不再赘述。

可见，通过采用上述方案，就能够通过维护计数器，基于对应的第一指示信息来确定计数器的计数值。如此，就能够在通过计数器的计数器达到一定的数量的时候，进行相应的控制处理，从而使得上行传输能够抢到信道，进而保证了上行传输的性能。

图 4 是本申请实施例提供的一种通信设备 400 示意性结构图，通信设备可以为本实施例前述的终端设备或者网络设备。图 4 所示的通信设备 400 包括处理器 410，处理器 410 可以从存储器中调用并运行计算机程序，以实现本申请实施例中的方法。

可选地，如图 4 所示，通信设备 400 还可以包括存储器 420。其中，处理器 410 可以从存储器 420 中调用并运行计算机程序，以实现本申请实施例中的方法。

其中，存储器 420 可以是独立于处理器 410 的一个单独的器件，也可以集成在处理器 410 中。

可选地，如图 4 所示，通信设备 400 还可以包括收发器 430，处理器 410 可以控制该收发器 430 与其他设备进行通信，具体地，可以向其他设备发送信息或数据，或接收其他设备发送的信息或数据。

其中，收发器 430 可以包括发射机和接收机。收发器 430 还可以进一步包括天线，天线的数量可以为一个或多个。

可选地，该通信设备 400 具体可为本申请实施例的网络设备，并且该通信设备 400 可以实现本申请实施例的各个方法中由网络设备实现的相应流程，为了简洁，在此不再赘述。

可选地，该通信设备 400 具体可为本申请实施例的终端设备、或者网络设备，并且该通信设备 400 可以实现本申请实施例的各个方法中由移动终端/终端设备实现的相应流程，为了简洁，在此不再赘述。

图 5 是本申请实施例的芯片的示意性结构图。图 5 所示的芯片 500 包括处理器 510，处理器 510 可以从存储器中调用并运行计算机程序，以实现本申请实施例中的方法。

可选地，如图 5 所示，芯片 500 还可以包括存储器 520。其中，处理器 510 可以从存储器 520 中调用并运行计算机程序，以实现本申请实施例中的方法。

其中，存储器 520 可以是独立于处理器 510 的一个单独的器件，也可以集成在处理器 510 中。

可选地，该芯片 500 还可以包括输入接口 530。其中，处理器 510 可以控制该输入接口 530 与其他设备或芯片进行通信，具体地，可以获取其他设备或芯片发送的信息或

数据。

可选地，该芯片 500 还可以包括输出接口 540。其中，处理器 510 可以控制该输出接口 540 与其他设备或芯片进行通信，具体地，可以向其他设备或芯片输出信息或数据。

可选地，该芯片可应用于本申请实施例中的网络设备，并且该芯片可以实现本申请
5 实施例的各个方法中由网络设备实现的相应流程，为了简洁，在此不再赘述。

可选地，该芯片可应用于本申请实施例中的终端设备，并且该芯片可以实现本申请实施例的各个方法中由终端设备实现的相应流程，为了简洁，在此不再赘述。

应理解，本申请实施例提到的芯片还可以称为系统级芯片，系统芯片，芯片系统或片上系统芯片等。

10 图 6 是本申请实施例提供的一种通信系统 600 的示意性框图。如图 6 所示，该通信系统 600 包括终端设备 610 和网络设备 620。

其中，该终端设备 610 可以用于实现上述方法中由终端设备实现的相应的功能，以及该网络设备 620 可以用于实现上述方法中由网络设备实现的相应的功能为了简洁，在此不再赘述。

15 应理解，本申请实施例的处理器可能是一种集成电路芯片，具有信号的处理能力。在实现过程中，上述方法实施例的各步骤可以通过处理器中的硬件的集成逻辑电路或者软件形式的指令完成。上述的处理器可以是通用处理器、数字信号处理器 (Digital Signal Processor, DSP)、专用集成电路 (Application Specific Integrated Circuit, ASIC)、现成可编程门阵列 (Field Programmable Gate Array, FPGA) 或者其他可编程逻辑器件、分
20 立门或者晶体管逻辑器件、分立硬件组件。可以实现或者执行本申请实施例中的公开的各方法、步骤及逻辑框图。通用处理器可以是微处理器或者该处理器也可以是任何常规的处理器等。结合本申请实施例所公开的方法的步骤可以直接体现为硬件译码处理器执行完成，或者用译码处理器中的硬件及软件模块组合执行完成。软件模块可以位于随机存储器，闪存、只读存储器，可编程只读存储器或者电可擦写可编程存储器、寄存器等
25 本领域成熟的存储介质中。该存储介质位于存储器，处理器读取存储器中的信息，结合其硬件完成上述方法的步骤。

可以理解，本申请实施例中的存储器可以是易失性存储器或非易失性存储器，或可包括易失性和非易失性存储器两者。其中，非易失性存储器可以是只读存储器 (Read-Only Memory, ROM)、可编程只读存储器 (Programmable ROM, PROM)、可
30 擦除可编程只读存储器 (Erasable PROM, EPROM)、电可擦除可编程只读存储器 (Electrically EPROM, EEPROM) 或闪存。易失性存储器可以是随机存取存储器 (Random Access Memory, RAM)，其用作外部高速缓存。通过示例性但不是限制性说明，许多形式的 RAM 可用，例如静态随机存取存储器 (Static RAM, SRAM)、动态随机存取存储器 (Dynamic RAM, DRAM)、同步动态随机存取存储器 (Synchronous DRAM, SDRAM)、双倍数据速率同步动态随机存取存储器 (Double Data Rate SDRAM, DDR
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SDRAM)、增强型同步动态随机存取存储器(Enhanced SDRAM, ESDRAM)、同步连接动态随机存取存储器(Synchlink DRAM, SLDRAM)和直接内存总线随机存取存储器(Direct Rambus RAM, DR RAM)。应注意,本文描述的系统和方法的存储器旨在包括但不限于这些和任意其它适合类型的存储器。

5 应理解,上述存储器为示例性但不是限制性说明,例如,本申请实施例中的存储器还可以是静态随机存取存储器(static RAM, SRAM)、动态随机存取存储器(dynamic RAM, DRAM)、同步动态随机存取存储器(synchronous DRAM, SDRAM)、双倍数据速率同步动态随机存取存储器(double data rate SDRAM, DDR SDRAM)、增强型同步动态随机存取存储器(enhanced SDRAM, ESDRAM)、同步连接动态随机存取存储器(synch link DRAM, SLDRAM)以及直接内存总线随机存取存储器(Direct Rambus RAM, DR RAM)等等。也就是说,本申请实施例中的存储器旨在包括但不限于这些和任意其它适合类型的存储器。

本申请实施例还提供了一种计算机可读存储介质,用于存储计算机程序。

15 可选的,该计算机可读存储介质可应用于本申请实施例中的网络设备,并且该计算机程序使得计算机执行本申请实施例的各个方法中由网络设备实现的相应流程,为了简洁,在此不再赘述。

可选地,该计算机可读存储介质可应用于本申请实施例中的终端设备,并且该计算机程序使得计算机执行本申请实施例的各个方法中由移动终端/终端设备实现的相应流程,为了简洁,在此不再赘述。

20 本申请实施例还提供了一种计算机程序产品,包括计算机程序指令。

可选的,该计算机程序产品可应用于本申请实施例中的网络设备,并且该计算机程序指令使得计算机执行本申请实施例的各个方法中由网络设备实现的相应流程,为了简洁,在此不再赘述。

25 可选地,该计算机程序产品可应用于本申请实施例中的移动终端/终端设备,并且该计算机程序指令使得计算机执行本申请实施例的各个方法中由移动终端/终端设备实现的相应流程,为了简洁,在此不再赘述。

本申请实施例还提供了一种计算机程序。

30 可选的,该计算机程序可应用于本申请实施例中的网络设备,当该计算机程序在计算机上运行时,使得计算机执行本申请实施例的各个方法中由网络设备实现的相应流程,为了简洁,在此不再赘述。

可选地,该计算机程序可应用于本申请实施例中的移动终端/终端设备,当该计算机程序在计算机上运行时,使得计算机执行本申请实施例的各个方法中由移动终端/终端设备实现的相应流程,为了简洁,在此不再赘述。

35 本领域普通技术人员可以意识到,结合本文中所公开的实施例描述的各示例的单元及算法步骤,能够以电子硬件、或者计算机软件和电子硬件的结合来实现。这些功能究

竟以硬件还是软件方式来执行，取决于技术方案的特定应用和设计约束条件。专业技术人员可以对每个特定的应用来使用不同方法来实现所描述的功能，但是这种实现不应认为超出本申请的范围。

所属领域的技术人员可以清楚地了解到，为描述的方便和简洁，上述描述的系统、装置和单元的具体工作过程，可以参考前述方法实施例中的对应过程，在此不再赘述。

在本申请所提供的几个实施例中，应该理解到，所揭露的系统、装置和方法，可以通过其它的方式实现。例如，以上所描述的装置实施例仅仅是示意性的，例如，所述单元的划分，仅仅为一种逻辑功能划分，实际实现时可以有另外的划分方式，例如多个单元或组件可以结合或者可以集成到另一个系统，或一些特征可以忽略，或不执行。另一点，所显示或讨论的相互之间的耦合或直接耦合或通信连接可以是通过一些接口，装置或单元的间接耦合或通信连接，可以是电性，机械或其它的形式。

所述作为分离部件说明的单元可以是或者也可以不是物理上分开的，作为单元显示的部件可以是或者也可以不是物理单元，即可以位于一个地方，或者也可以分布到多个网络单元上。可以根据实际的需要选择其中的部分或者全部单元来实现本实施例方案的目的。

另外，在本申请各个实施例中的各功能单元可以集成在一个处理单元中，也可以是各个单元单独物理存在，也可以两个或两个以上单元集成在一个单元中。

所述功能如果以软件功能单元的形式实现并作为独立的产品销售或使用，可以存储在一个计算机可读取存储介质中。基于这样的理解，本申请的技术方案本质上或者说对现有技术做出贡献的部分或者该技术方案的部分可以以软件产品的形式体现出来，该计算机软件产品存储在一个存储介质中，包括若干指令用以使得一台计算机设备（可以是个人计算机，服务器，或者网络设备等）执行本申请各个实施例所述方法的全部或部分步骤。而前述的存储介质包括：U盘、移动硬盘、只读存储器（Read-Only Memory, ROM）、随机存取存储器（Random Access Memory, RAM）、磁碟或者光盘等各种可以存储程序代码的介质。

以上所述，仅为本申请的具体实施方式，但本申请的保护范围并不局限于此，任何熟悉本技术领域的技术人员在本申请揭露的技术范围内，可轻易想到变化或替换，都应涵盖在本申请的保护范围之内。因此，本申请的保护范围应所述以权利要求的保护范围为准。

权利要求书

1、一种计数方法，应用于终端设备，包括：

维护至少一个计数器，其中，所述计数器用于记录接收到第一指示信息的次数；
基于接收的第一指示信息，确定增加所述第一指示信息所对应的计数器的计数值。

2、根据权利要求1所述的方法，其中，所述第一指示信息用于指示以下之一：
LBT失败、LBT成功、SR传输失败、前导序列传输失败、上行数据传输失败。

3、根据权利要求2所述的方法，其中，所述方法还包括：

基于以下之一，触发执行LBT：

上行PUCCH传输调度请求SR或HARQ的反馈；

上行PUSCH传输数据；

RACH过程的发起。

4、根据权利要求1-3任一项所述的方法，其中，所述至少一个计数器，包含：全局计数器，和/或，针对至少一种上行传输的至少一个计数器。

5、根据权利要求4所述的方法，其中，所述基于接收的第一指示信息，确定增加所述第一指示信息所对应的计数器的计数值，包括：

基于接收的第一指示信息，确定增加所述全局计数器的计数值；

和/或，基于接收的第一指示信息，确定增加所述至少一个计数器中的至少部分计数器的计数值。

6、根据权利要求4或5所述的方法，其中，所述方法还包括：

获取配置的对应全局计数器的全局定时器；

和/或，获取配置的与所述针对至少一种上行传输的至少一个计数器对应的至少一个定时器。

7、根据权利要求6所述的方法，其中，所述获取配置的对应全局计数器的全局定时器之后，所述方法还包括：

当接收到第一指示信息时，启动或重启所述全局定时器。

8、根据权利要求7所述的方法，所述启动或重启所述全局定时器之后，所述方法还包括：

当所述全局定时器超时时，重置全局计数器。

9、根据权利要求4-8任一项所述的方法，其中，所述方法还包括：

当所述全局计数器达到预设门限值时，由无线资源控制RRC层触发以下处理之一：
RRC连接重建；辅小区群SCG-无线链路失败RLF处理；RRC重配置。

10、根据权利要求9所述的方法，其中，所述方法还包括：

当发起RRC连接重建时，向网络侧发起连接重建请求；

其中，所述连接重建请求包括：LBT失败次数，和/或，触发LBT的事件。

11、根据权利要求4所述的方法，其中，所述针对至少一种上行传输的至少一种计数器，至少包括以下至少之一：针对SR的第一计数器；针对PUSCH的第二计数器；针对RACH的第三计数器。

12、根据权利要求11所述的方法，其中，所述基于接收的第一指示信息，确定增加所述至少一个计数器中的至少部分计数器的计数值，包括以下至少之一：

当所述第一指示信息为对应SR传输的LBT失败时，增加所述第一计数器的计数值；

当所述第一指示信息为对应PUSCH传输的LBT失败时，增加所述第二计数器的计数值；

当所述第一指示信息为对应 RACH 的 LBT 失败时,增加所述第三计数器的计数值。

13、根据权利要求 11 所述的方法,其中,

所述针对 SR 的第一计数器;针对 PUSCH 的第二计数器;针对 RACH 的第三计数器,分别配置对应的第一定时器、第二定时器以及第三定时器。

14、根据权利要求 13 所述的方法,其中,所述方法还包括以下之一:

当接收到第一指示信息为对应 SR 传输的 LBT 失败时,启动或重启所述第一定时器;

当接收到所述第一指示信息为对应 PUSCH 传输的 LBT 失败时,启动或重启所述第二定时器;

当接收到所述第一指示信息为对应 RACH 的 LBT 失败时,启动或重启所述第三定时器。

15、根据权利要求 11-14 任一项所述的方法,其中,所述方法还包括:

所述针对至少一种上行传输的至少一个计数器,配置至少一个门限值。

16、根据权利要求 15 所述的方法,其中,所述方法还包括:

当所述至少一个计数器中存在计数器的计数值超过对应的门限值时,执行以下处理中的至少部分:

通知 RRC 层触发 RRC 重建:

通知 RRC 层触发 RRC 重配置:

通知 RRC 层释放所有与配置 PUCCH 资源:

通知 RRC 层释放所有 SRS:

清除所有配置的下行分配资源和上行授权资源:

发起 RACH 流程:

通知网络侧 LBT 失败次数;

通知网络侧触发 LBT 的事件。

17、一种终端设备,包括:

处理单元,维护至少一个计数器,其中,所述计数器用于记录接收到第一指示信息的次数;基于接收的第一指示信息,确定增加所述第一指示信息所对应的计数器的计数值。

18、根据权利要求 17 所述的终端设备,其中,所述第一指示信息用于指示以下之一:

LBT 失败、LBT 成功、SR 传输失败、前导序列传输失败、上行数据传输失败。

19、根据权利要求 18 所述的终端设备,其中,所述处理单元,基于以下之一,触发执行 LBT:

上行 PUCCH 传输调度请求 SR 或 HARQ 的反馈;

上行 PUSCH 传输数据;

RACH 过程的发起。

20、根据权利要求 17-19 任一项所述的终端设备,其中,所述至少一个计数器,包含:全局计数器,和/或,针对至少一种上行传输的至少一个计数器。

21、根据权利要求 20 所述的终端设备,其中,所述处理单元,基于接收的第一指示信息,确定增加所述全局计数器的计数值;

和/或,基于接收的第一指示信息,确定增加所述至少一个计数器中的至少部分计数器的计数值。

22、根据权利要求 20 或 21 所述的终端设备,其中,所述终端设备还包括:

通信单元,获取配置的对应全局计数器的全局定时器;

和/或,获取配置的与所述针对至少一种上行传输的至少一个计数器对应的至少一个

定时器。

23、根据权利要求 22 所述的终端设备，其中，所述处理单元，当接收到第一指示信息时，启动或重启所述全局定时器。

24、根据权利要求 23 所述的终端设备，其中，所述处理单元，当所述全局定时器超时时，重置全局计数器。

25、根据权利要求 20-24 任一项所述的终端设备，其中，所述处理单元，当所述全局计数器达到预设门限值时，控制由 RRC 层触发以下处理之一：

RRC 连接重建；辅小区群 SCG-无线链路失败 RLF 处理；RRC 重配置。

26、根据权利要求 25 所述的终端设备，其中，所述处理单元，当发起 RRC 连接重建时，控制通过通信单元向网络侧发起连接重建请求；

其中，所述连接重建请求包括：LBT 失败次数，和/或，触发 LBT 的事件。

27、根据权利要求 20 所述的终端设备，其中，所述针对至少一种上行传输的至少一种计数器，至少包括以下至少之一：针对 SR 的第一计数器；针对 PUSCH 的第二计数器；针对 RACH 的第三计数器。

28、根据权利要求 27 所述的终端设备，其中，所述处理单元，包括以下至少之一：当所述第一指示信息为对应 SR 传输的 LBT 失败时，增加所述第一计数器的计数值；当所述第一指示信息为对应 PUSCH 传输的 LBT 失败时，增加所述第二计数器的计数值；

当所述第一指示信息为对应 RACH 的 LBT 失败时，增加所述第三计数器的计数值。

29、根据权利要求 27 所述的终端设备，其中，所述处理单元，针对 SR 的第一计数器；针对 PUSCH 的第二计数器；针对 RACH 的第三计数器，分别配置对应的第一定时器、第二定时器以及第三定时器。

30、根据权利要求 29 所述的终端设备，其中，所述处理单元，执行以下之一：

当接收到第一指示信息为对应 SR 传输的 LBT 失败时，启动或重启所述第一定时器；当接收到所述第一指示信息为对应 PUSCH 传输的 LBT 失败时，启动或重启所述第二定时器；

当接收到所述第一指示信息为对应 RACH 的 LBT 失败时，启动或重启所述第三定时器。

31、根据权利要求 27-30 任一项所述的终端设备，其中，所述处理单元，所述针对至少一种上行传输的至少一个计数器，配置至少一个门限值。

32、根据权利要求 31 所述的终端设备，其中，所述处理单元，当所述至少一个计数器中存在计数器的计数值超过对应的门限值时，执行以下处理中的至少部分：

通知 RRC 层触发 RRC 重建；

通知 RRC 层触发 RRC 重配置；

通知 RRC 层释放所有与配置 PUCCH 资源；

通知 RRC 层释放所有 SRS；

清除所有配置的下行分配资源和上行授权资源；

发起 RACH 流程；

通知网络侧 LBT 失败次数；

通知网络侧触发 LBT 的事件。

33、一种终端设备，包括：处理器和用于存储能够在处理器上运行的计算机程序的存储器，

其中，该存储器用于存储计算机程序，所述处理器用于调用并运行所述存储器中存储的计算机程序，执行如权利要求 1-16 任一项所述方法的步骤。

34、一种芯片，包括：处理器，用于从存储器中调用并运行计算机程序，使得安装有
有所述芯片的设备执行如权利要求 1-16 中任一项所述的方法。

35、一种计算机可读存储介质，所述计算机可读存储介质用于存储计算机程序，所
述计算机程序使得计算机执行如权利要求 1-16 任一项所述方法的步骤。

5 36、一种计算机程序产品，包括计算机程序指令，该计算机程序指令使得计算机执
行如权利要求 1-16 中任一项所述的方法。

37、一种计算机程序，所述计算机程序使得计算机执行如权利要求 1-16 中任一项
所述的方法。

10

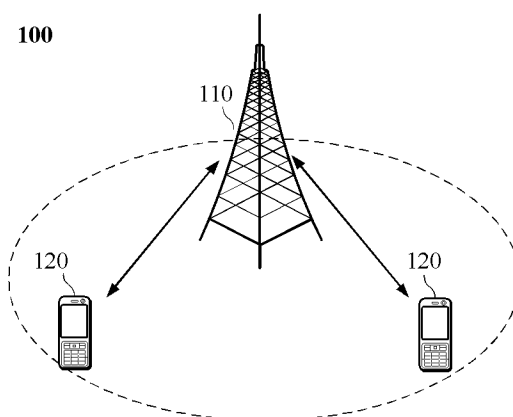


图 1

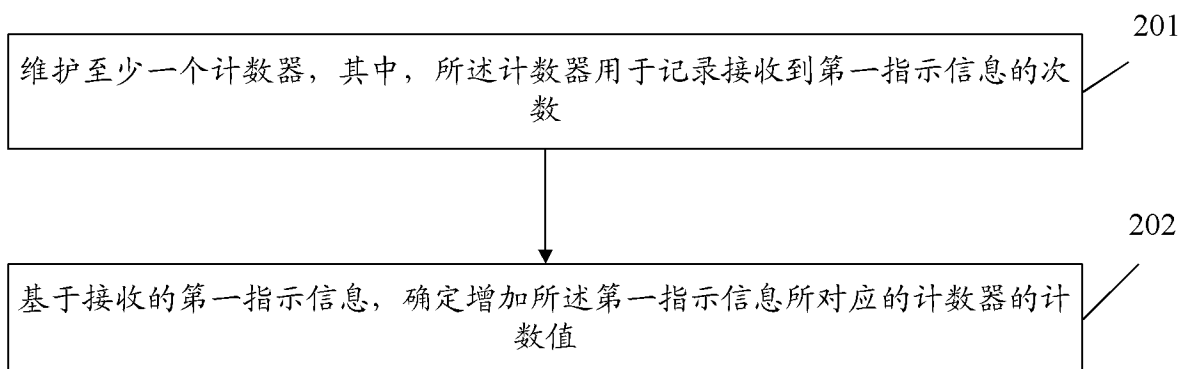


图 2

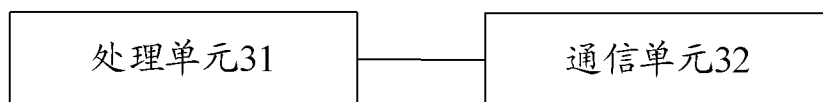


图 3

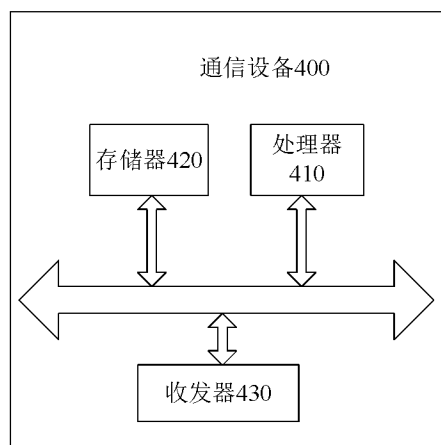


图 4

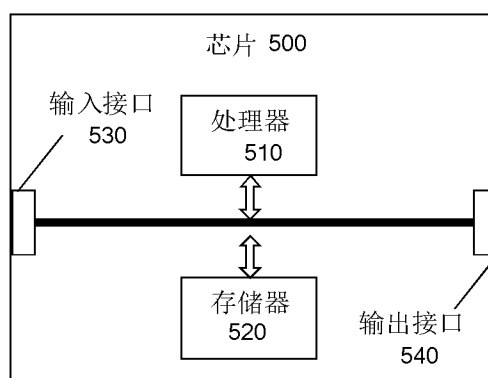


图 5

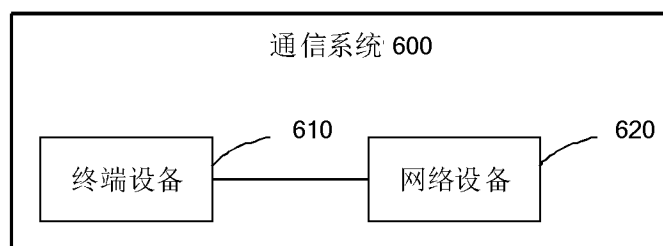


图 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2018/113118

A. CLASSIFICATION OF SUBJECT MATTER

H04W 74/08(2009.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04W74/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

USTXT; EPTXT; CNTXT; CNABS; WOTXT; VEN; CNKI: 计数器, 计时器, 基站, 终端, 全局, 先听后发, 随机接入信道, counter, timer, base station, terminal, global, listen before talk, random access channel

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 102396288 A (INTERDIGITAL PATENT HOLDINGS, INC.) 28 March 2012 (2012-03-28) description, paragraphs 37-42, 172-176, 242, and 243, and figures 1-4	1, 4-10, 17, 20-26, 33-37
Y	CN 102396288 A (INTERDIGITAL PATENT HOLDINGS, INC.) 28 March 2012 (2012-03-28) description, paragraphs 37-42, 172-176, 242, and 243, and figures 1-4	2, 3, 11-16, 18, 19, and 27-32
Y	CN 102067704 A (LG ELECTRONICS INC.) 18 May 2011 (2011-05-18) description, paragraphs 67-75, and figure 7	2, 3, 11-16, 18, 19, 27-32
A	CN 101848495 A (ZTE CORPORATION) 29 September 2010 (2010-09-29) entire document	1-37
A	CN 102595603 A (DATANG MOBILE COMMUNICATIONS EQUIPMENT CO., LTD.) 18 July 2012 (2012-07-18) entire document	1-37
A	US 2016345362 A1 (NEWRACOM INC) 24 November 2016 (2016-11-24) entire document	1-37

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

16 July 2019

Date of mailing of the international search report

01 August 2019

Name and mailing address of the ISA/CN

National Intellectual Property Administration, PRC (ISA/CN)
No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088
China

Facsimile No. (86-10)62019451

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2018/113118

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	102396288	A	28 March 2012	US	2017048736	A1	16 February 2017
				US	9510386	B2	29 November 2016
				WO	2010105148	A1	16 September 2010
				US	2011021154	A1	27 January 2011
				TW	201404057	A	16 January 2014
				HK	1168234	A1	26 February 2016
				EP	2407002	A1	18 January 2012
				US	10271232	B2	23 April 2019
				TW	I497932	B	21 August 2015
				KR	20150036818	A	07 April 2015
				KR	101605998	B1	23 March 2016
				TW	I502907	B	01 October 2015
				CN	102396288	B	13 May 2015
				US	8711709	B2	29 April 2014
				TW	201126932	A	01 August 2011
				KR	20130088174	A	07 August 2013
				US	2014233396	A1	21 August 2014
				CN	104902569	A	09 September 2015
				KR	20110134475	A	14 December 2011
				KR	101457754	B1	03 November 2014
				CN	104902569	B	17 August 2018
				HK	1168234	A0	21 December 2012
CN	102067704	A	18 May 2011	JP	5295365	B2	18 September 2013
				JP	2011524141	A	25 August 2011
				KR	100980919	B1	07 September 2010
				CA	2725771	A1	23 December 2009
				CA	2725771	C	02 February 2016
				CN	102067704	B	06 August 2014
				KR	20090131650	A	29 December 2009
				IN	201004482	P2	28 January 2011
				US	2013265866	A1	10 October 2013
				WO	2009154413	A3	25 March 2010
				US	9900916	B2	20 February 2018
				US	9265070	B2	16 February 2016
				IN	309895	B	29 March 2019
				AU	2009261045	B	08 August 2013
				US	2015181623	A1	25 June 2015
				VN	26222	A	25 May 2011
				US	2017223736	A1	03 August 2017
				US	2011205908	A1	25 August 2011
				US	2016262047	A1	08 September 2016
				US	9661527	B2	23 May 2017
				US	8477634	B2	02 July 2013
				WO	2009154413	A2	23 December 2009
				AU	2009261045	A1	23 December 2010
CN	101848495	A	29 September 2010	CN	101848495	B	31 August 2016
				WO	2010108406	A1	30 September 2010
CN	102595603	A	18 July 2012	CN	102595603	B	30 July 2014
US	2016345362	A1	24 November 2016	None			

国际检索报告

国际申请号

PCT/CN2018/113118

A. 主题的分类

H04W 74/08(2009.01)i

按照国际专利分类(IPC)或者同时按照国家分类和IPC两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

H04W74/-

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称, 和使用的检索词(如使用))

USTXT;EPTXT;CNTXT;CNABS;WOTXT;VEN;CNKI:计数器, 计时器, 基站, 终端, 全局, 先听后发, 随机接入信道, counter, timer, base station, terminal, global, listen before talk, random access channel

C. 相关文件

类 型*	引用文件, 必要时, 指明相关段落	相关的权利要求
X	CN 102396288 A (交互数字专利控股公司) 2012年 3月 28日 (2012 - 03 - 28) 说明书第37-42、172-176、242-243段及图1-4	1、4-10、17、 20-26、33-37
Y	CN 102396288 A (交互数字专利控股公司) 2012年 3月 28日 (2012 - 03 - 28) 说明书第37-42、172-176、242-243段及图1-4	2-3、11-16、 18-19、27-32
Y	CN 102067704 A (LG电子株式会社) 2011年 5月 18日 (2011 - 05 - 18) 说明书第67-75段及图7	2-3、11-16、 18-19、27-32
A	CN 101848495 A (中兴通讯股份有限公司) 2010年 9月 29日 (2010 - 09 - 29) 全文	1-37
A	CN 102595603 A (大唐移动通信设备有限公司) 2012年 7月 18日 (2012 - 07 - 18) 全文	1-37
A	US 2016345362 A1 (NEWRACOM INC) 2016年 11月 24日 (2016 - 11 - 24) 全文	1-37

☐ 其余文件在C栏的续页中列出。☒ 见同族专利附件。

* 引用文件的具体类型:

“A” 认为不特别相关的表示了现有技术一般状态的文件

“E” 在国际申请日的当天或之后公布的在先申请或专利

“L” 可能对优先权要求构成怀疑的文件, 或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件 (如具体说明的)

“O” 涉及口头公开、使用、展览或其他方式公开的文件

“P” 公布日先于国际申请日但迟于所要求的优先权日的文件

“T” 在申请日或优先权日之后公布, 与申请不相抵触, 但为了理解发明之理论或原理的在后文件

“X” 特别相关的文件, 单独考虑该文件, 认定要求保护的发明不是新颖的或不具有创造性

“Y” 特别相关的文件, 当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时, 要求保护的发明不具有创造性

“&” 同族专利的文件

国际检索实际完成的日期

2019年 7月 16日

国际检索报告邮寄日期

2019年 8月 1日

ISA/CN的名称和邮寄地址

中国国家知识产权局 (ISA/CN)
中国北京市海淀区蓟门桥西土城路6号 100088

传真号 (86-10)62019451

受权官员

夏雪

电话号码 86-(20)-28950718

表 PCT/ISA/210 (第2页) (2015年1月)

国际检索报告
关于同族专利的信息

国际申请号

PCT/CN2018/113118

检索报告引用的专利文件			公布日 (年/月/日)	同族专利			公布日 (年/月/日)
CN	102396288	A	2012年 3月 28日	US	2017048736	A1	2017年 2月 16日
				US	9510386	B2	2016年 11月 29日
				WO	2010105148	A1	2010年 9月 16日
				US	2011021154	A1	2011年 1月 27日
				TW	201404057	A	2014年 1月 16日
				HK	1168234	A1	2016年 2月 26日
				EP	2407002	A1	2012年 1月 18日
				US	10271232	B2	2019年 4月 23日
				TW	I497932	B	2015年 8月 21日
				KR	20150036818	A	2015年 4月 7日
				KR	101605998	B1	2016年 3月 23日
				TW	I502907	B	2015年 10月 1日
				CN	102396288	B	2015年 5月 13日
				US	8711709	B2	2014年 4月 29日
				TW	201126932	A	2011年 8月 1日
				KR	20130088174	A	2013年 8月 7日
				US	2014233396	A1	2014年 8月 21日
				CN	104902569	A	2015年 9月 9日
				KR	20110134475	A	2011年 12月 14日
				KR	101457754	B1	2014年 11月 3日
				CN	104902569	B	2018年 8月 17日
				HK	1168234	A0	2012年 12月 21日
CN	102067704	A	2011年 5月 18日	JP	5295365	B2	2013年 9月 18日
				JP	2011524141	A	2011年 8月 25日
				KR	100980919	B1	2010年 9月 7日
				CA	2725771	A1	2009年 12月 23日
				CA	2725771	C	2016年 2月 2日
				CN	102067704	B	2014年 8月 6日
				KR	20090131650	A	2009年 12月 29日
				IN	201004482	P2	2011年 1月 28日
				US	2013265866	A1	2013年 10月 10日
				WO	2009154413	A3	2010年 3月 25日
				US	9900916	B2	2018年 2月 20日
				US	9265070	B2	2016年 2月 16日
				IN	309895	B	2019年 3月 29日
				AU	2009261045	B	2013年 8月 8日
				US	2015181623	A1	2015年 6月 25日
				VN	26222	A	2011年 5月 25日
				US	2017223736	A1	2017年 8月 3日
				US	2011205908	A1	2011年 8月 25日
				US	2016262047	A1	2016年 9月 8日
				US	9661527	B2	2017年 5月 23日
				US	8477634	B2	2013年 7月 2日
				WO	2009154413	A2	2009年 12月 23日
				AU	2009261045	A1	2010年 12月 23日
CN	101848495	A	2010年 9月 29日	CN	101848495	B	2016年 8月 31日
				WO	2010108406	A1	2010年 9月 30日
CN	102595603	A	2012年 7月 18日	CN	102595603	B	2014年 7月 30日
US	2016345362	A1	2016年 11月 24日	无			

表 PCT/ISA/210 (同族专利附件) (2015年1月)