City of New York, State of New York, County of New York

I, Jason Nevius, am fluent in the Chinese and English Languages, I have been translating documents for over [15] years. I am competent to translate from Chinese to English.

I hereby certify that the following is, to the best of my knowledge and belief, a true and accurate translation of the attached "WO2017132848A1" from Chinese into English. I hereby declare that all statements made herein of my own knowledge are true and correct under penalty of perjury and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of the Title 18 of the United States Code.

[JASON NEVIUS]

3rd day of June, 2024.

(12) International Application Published under the Patent Cooperation Treaty

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
August 10, 2017 (08/10/2017)

WIPO | PCT

(10) International Publication No.
WO 2017/132848 A1

(51) **International Patent Classification No.:**
H04W 16/10 (01/2009)

(21) **International application number:** PCT/CN2016/073234

(22) **International application date:** February 2, 2016 (02/02/2016)

(25) **Language used for application:** Chinese

(26) **Language used for publication:** Chinese

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(81) **Designated countries** (unless otherwise specified, all available types of national protection are requested) AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, 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.

(84) **Designated countries** (unless otherwise specified, all available types of regional protection are requested): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasia (AM, AZ, BY, KG, KZ, RU, TJ, TM), Europe (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations according to Rule 4.17:

1. Relating to the applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)).

This international publication:

1. Includes international search reports (Article 21(3) of the Treaty).

(54) **Title of invention:** A TTI Configuration Method, Device, and System

(54) **Title of invention:** A TTI Configuration Method, Device, and System

(57) Abstract: Disclosed are a TTI configuration method, device and system, relating to the field of wireless communications, and used for solving the problem that there is no method for configuring a short TTI. The TTI configuration method comprises: a network device receiving TTI request information, wherein the TTI request information indicates a TTI length requested for use; and in response to the TTI request information, sending TTI indication information, wherein the TTI indication information contains at least one piece of the following information: a TTI length allocated by the network device, effective moment information, initial symbol position information, and enabled confirmation information about the TTI length. The embodiments of the present invention are applied to LTE communications.

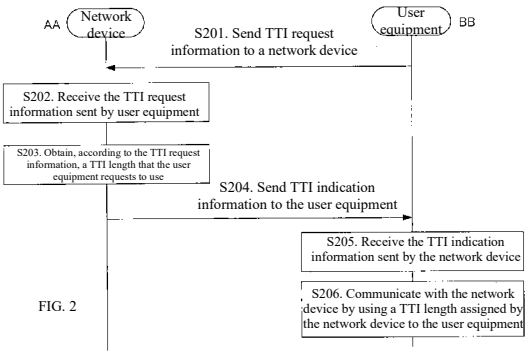


FIG. 2

S201 SENDING TTI REQUEST INFORMATION TO A NETWORK DEVICE
S202 RECEIVING THE TTI REQUEST INFORMATION SENT BY A USER EQUIPMENT
S203 ACCORDING TO THE TTI REQUEST INFORMATION, OBTAINING A TTI LENGTH REQUESTED BY THE USER EQUIPMENT FOR USE
S204 SENDING TTI INDICATION INFORMATION TO THE USER EQUIPMENT
S205 RECEIVING THE TTI INDICATION INFORMATION SENT BY THE NETWORK DEVICE
S206 COMMUNICATING WITH THE NETWORK DEVICE HAVING THE TTI LENGTH ALLOCATED, BY THE NETWORK DEVICE, TO THE USER EQUIPMENT
AA NETWORK DEVICE
BB USER EQUIPMENT

(57) Abstract: The present disclosure relates to a TTI configuration method, a device, and a system relating to the field of wireless communication so as to resolve a problem that there is no method for configuring a short TTI. The TTI configuration method includes: receiving, by a network device, TTI request information, wherein the TTI request information indicates a TTI length requested to be used; and responding to the TTI request information, and sending TTI indication information, wherein the TTI indication information includes at least one of the following types of information: a TTI length assigned by the network device, effective moment information, start symbol location information, and enabling confirm information of the TTI length. Embodiments of the present disclosure are applied to LTE communication.

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A TTI Configuration Method, Device, and System

Technical Field

The present invention relates to the field of wireless communication and particularly to a TTI configuration method, device, and system.

Background Art

In a conventional Long Term Evolution (LTE) communication protocol, a transmission time interval (TTI) is a basic time unit in time domain of LTE radio resources and has a standard time length that is 1 ms (hereinafter referred to as a "TTI of 1 ms").

Currently, research is being carried on use of a TTI of a shorter time length (having a shorter time length than that of the TTI of 1 ms, hereinafter referred to as a "short TTI") in an LTE system. Compared with use of the TTI of 1 ms, the use of the short TTI has the following benefits: In one aspect, after a TTI length is reduced, a round trip transmission delay of a single packet is reduced accordingly, so as to be quite helpful to a rapid increase of a window length at a slow start stage of TCP, and a data throughput at the slow start stage can be obviously increased. Therefore, after the TTI length is reduced, a transmission delay of a small packet can be obviously reduced. In another aspect, in a case of the short TTI, a HARQ feedback and a CSI feedback are both faster, so that a better link adaptation characteristic can be obtained.

In a subsequent continuous evolution process of the LTE protocol, the short TTI is introduced, and meanwhile, to be compatible with the TTI of 1 ms, TTIs of a plurality of time lengths coexist. Therefore, it is inevitable to confront a problem of how to configure the short TTI, that is, how an evolved node base station (eNB) instructs user equipment (UE) to use a short TTI resource and how the UE uses the short TTI resource. Currently, in the prior art, there is no method for configuring the short TTI.

Summary of the Invention

Embodiments of the present disclosure provide a TTI configuration method, a device, and a system, so as to resolve a problem that there is no method for configuring a short TTI.

To achieve the foregoing objective, the following technical solutions are used in the embodiments of the present disclosure:

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According to a first aspect, a TTI configuration method is provided, specifically including the following steps:

receiving, by a network device, TTI request information sent by user equipment, wherein the TTI request information indicates a TTI length requested to be used;

responding, by the network device, to the TTI request information, and sending TTI indication information to the user equipment, wherein the TTI indication information includes at least one of the following types of information:

a TTI length assigned by the network device to the user equipment, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

In this implementation, the user equipment sends the TTI request information to the network device, wherein the TTI request information indicates the TTI length that the user equipment requests to use; the network device receives the TTI request information sent by the user equipment; the network device obtains, according to the TTI request information, the TTI length that the user equipment requests to use; the network device sends the TTI indication information to the user equipment, wherein the TTI indication information includes at least one of the following types of information: a TTI length assigned by the network device to the user equipment, effective moment information, start symbol location information, and enabling confirm information of the TTI length; and the user equipment communicates with the network device by using the TTI length assigned by the network device to the user equipment and/or an effective moment and/or a start symbol location. The user equipment requests from the network device to use a TTI length, wherein the TTI length includes a short TTI, and the network device assigns a corresponding TTI length for the request of the user equipment, so as to resolve a problem that there is no method for configuring a short TTI.

With reference to the first aspect, in a first possible implementation, before the receiving, by a network device, TTI request information sent by user equipment, the method includes:

broadcasting, by the network device, a TTI length supported by the network device to the user equipment.

With reference to the first aspect, in a second possible implementation, the responding to the TTI request information includes:

obtaining, according to information content of the TTI request information, the TTI length that the user equipment requests to use, wherein the information content of the TTI

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request information corresponds to the TTI length that the user equipment requests to use.

With reference to the first aspect, in a third possible implementation, the responding to the TTI request information includes:

obtaining, according to a resource occupied by the TTI request information, the TTI length that the user equipment requests to use, wherein the occupied resource corresponds to the TTI length that the user equipment requests to use.

With reference to the second possible implementation of the first aspect, in a fourth possible implementation,

the receiving, by a network device, of TTI request information sent by user equipment includes:

receiving, by the network device, a random access preamble sent by the user equipment, wherein the random access preamble indicates the TTI length requested to be used;

the responding to the TTI request information includes:

obtaining, according to the random access preamble, the TTI length requested to be used;

the sending of TTI indication information to the user equipment includes:

sending a random access response message to the user equipment, wherein the TTI indication information is indicated in the random access response message.

In this implementation, in a random access process, the UE indicates, by using a random access preamble, a TTI length requested by the UE, and an eNB indicates, by using a random access response message, a TTI length assigned to the UE for the request, so as to configure a TTI by using the random access preamble in the random access process, and resolve a problem that there is no method for configuring a short TTI.

With reference to the fourth possible implementation of the first aspect, in a fifth possible implementation, the indicating the TTI indication information in the random access response message includes:

indicating the TTI indication information by adding a byte to the random access response message;

or

indicating the TTI indication information by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

With reference to the third possible implementation of the first aspect, in a sixth possible implementation,

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the receiving, by a network device, of TTI request information sent by user equipment includes:

receiving, by the network device, a random access preamble of the user equipment on a preset time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length that the user equipment requests to use;

the obtaining, according to a resource occupied by the TTI request information, of the TTI length that the user equipment requests to use includes:

obtaining, according to the preset time-frequency resource occupied by the random access preamble, the TTI length that the user equipment requests to use.

In this implementation, in a random access process, the UE indicates, by using a resource occupied by a random access preamble, a TTI length requested by the UE, and an eNB indicates, by using a random access response message, a TTI length assigned to the UE for the request, so as to configure a TTI by using the resource occupied by the random access preamble in the random access process, and resolve a problem that there is no method for configuring a short TTI.

With reference to the third possible implementation of the first aspect, in a seventh possible implementation,

the receiving, by a network device, of TTI request information sent by user equipment includes:

receiving, by the network device, scheduling request information sent by the user equipment on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to the TTI length requested to be used;

the obtaining, according to a resource occupied by the TTI request information, of the TTI length requested to be used includes:

obtaining, according to a preset time-frequency resource occupied by the scheduling request information, the TTI length requested to be used.

In this implementation, in a scheduling request process, the UE indicates, by using a preset scheduling request resource occupied by scheduling request information, a TTI length requested by the UE, and an eNB indicates, by using an uplink scheduling grant message, a TTI length assigned to the UE for the request, so as to configure a TTI in the scheduling request process of the user equipment, and resolve a problem that there is no method for configuring a short TTI.

With reference to the second possible implementation of the first aspect, in an eighth possible implementation,

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the receiving, by a network device, of TTI request information sent by user equipment includes:

receiving, by the network device, a buffer status report message sent by the user equipment, wherein a value of one or more reserved bits of the buffer status report message indicates the TTI length that the user equipment requests to use;

the obtaining, according to information content of the TTI request information, of the TTI length requested to be used includes:

obtaining, according to the value of the one or more reserved bits of the buffer status report message, the TTI length requested to be used.

In this implementation, in a buffer status report process, the UE indicates, by using a value of one or more reserved bits of a buffer status report message, a TTI length requested by the UE, and an eNB indicates, by using an uplink scheduling grant message, a TTI length assigned to the UE for the request, so as to configure a TTI in the buffer status report process of the UE, and resolve a problem that there is no method for configuring a short TTI.

With reference to the second possible implementation of the first aspect, in a ninth possible implementation,

the receiving, by a network device, of TTI request information sent by user equipment includes:

receiving, by the network device, a MAC CE sent by the user equipment, wherein an uplink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the requested TTI length;

the obtaining, according to information content of the TTI request information, of the TTI length requested to be used includes:

obtaining, according to the message header and the message body of the MAC CE, the TTI length requested to be used;

the sending of TTI indication information to the user equipment includes:

sending a MAC CE to the user equipment, wherein a downlink LCID value in a message header of the MAC CE indicates that a type of the MAC CE is TTI indication information, and a message body of the MAC CE includes the TTI indication information.

In this implementation, the UE indicates, by using a message header and a message body of a MAC CE, a TTI length requested by the UE, and an eNB indicates, by using the MAC CE, a TTI length assigned to the UE for the request, and extends the MAC CE to

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which a BSR message belongs to configure a TTI, so as to resolve a problem that there is no method for configuring a short TTI.

With reference to the second possible implementation of the first aspect, in a tenth possible implementation,

the receiving, by a network device, of TTI request information sent by user equipment includes:

receiving, by the network device, an RRC connection setup request message sent by the user equipment, wherein a TTI related information element of the RRC connection setup request message indicates the TTI length requested to be used;

the obtaining, according to information content of the TTI request information, of the TTI length requested to be used includes:

obtaining, according to the TTI related information element of the RRC connection setup request message, the TTI length requested to be used;

the sending of TTI indication information to the user equipment includes:

sending an RRC connection setup message or an RRC reconfiguration message to the user equipment, wherein the RRC connection setup message or the RRC reconfiguration message includes the TTI indication information.

In this implementation, in an RRC connection setup process, the UE indicates, by using a TTI related information element of an RRC connection setup request message, a TTI length requested by the UE, and an eNB indicates, by using an RRC connection reconfiguration message, a TTI length assigned to the UE for the request, so as to configure a TTI in the RRC connection setup process, and resolve a problem that there is no method for configuring a short TTI.

With reference to the second possible implementation of the first aspect, in an eleventh possible implementation,

the sending of TTI indication information to the user equipment includes:

sending a handover command message to the user equipment, wherein the handover command message includes the TTI indication information.

In this implementation, in a handover preparation stage, a source eNB may add, to a handover request message sent to a target eNB, an indication indicating that the UE has a short TTI communication capability, the target eNB adds TTI indication information to a handover confirm message sent to the source eNB, and the source eNB sends a handover command message to the UE, wherein the handover command message includes the TTI indication information, and the TTI indication information includes a TTI length assigned

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by the eNB to the UE, so as to configure a TTI in the handover preparation stage, and resolve a problem that there is no method for configuring a short TTI.

According to a second aspect, a TTI configuration method is provided, specifically including the following steps:

sending, by user equipment, TTI request information to a network device, wherein the TTI request information indicates a TTI length that the user equipment requests to use;

receiving TTI indication information sent by the network device, wherein the TTI indication information includes at least one of the following types of information:

a TTI length assigned to the user equipment, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

In this implementation, the user equipment sends the TTI request information to the network device, wherein the TTI request information indicates the TTI length that the user equipment requests to use; the network device receives the TTI request information sent by the user equipment; the network device obtains, according to the TTI request information, the TTI length that the user equipment requests to use; the network device sends the TTI indication information to the user equipment, wherein the TTI indication information includes at least one of the following types of information: a TTI length assigned by the network device to the user equipment, effective moment information, start symbol location information, and enabling confirm information of the TTI length; and the user equipment communicates with the network device by using the TTI length assigned by the network device to the user equipment and/or an effective moment and/or a start symbol location. The user equipment requests from the network device to use a TTI length, wherein the TTI length includes a short TTI, and the network device assigns a corresponding TTI length for the request of the user equipment, so as to resolve a problem that there is no method for configuring a short TTI.

With reference to the second aspect, in a first possible implementation, before the sending, by user equipment, TTI request information to a network device, the method includes:

receiving a TTI length supported by the network device.

With reference to the second aspect, in a second possible implementation, the indicating, by the TTI request information, the TTI length that the user equipment requests to use includes:

indicating, by using information content of the TTI request information, the TTI length that the user equipment requests to use, wherein the information content of the TTI

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request information corresponds to the TTI length that the user equipment requests to use.

With reference to the second aspect, in a third possible implementation, the indicating, by the TTI request information, of the TTI length that the user equipment requests to use includes:

indicating, by using a resource occupied by the TTI request information, the TTI length that the user equipment requests to use, wherein the occupied resource corresponds to the TTI length that the user equipment requests to use.

With reference to the second possible implementation of the second aspect, in a fourth possible implementation,

the sending, by user equipment, of TTI request information to a network device includes:

sending, by the user equipment, a random access preamble to the network device, wherein the random access preamble indicates the TTI length that the user equipment requests to use;

the receiving of TTI indication information sent by the network device includes:

receiving a random access response message sent by the network device, wherein the TTI indication information is indicated in the random access response message.

In this implementation, in a random access process, the UE indicates, by using a random access preamble, a TTI length requested by the UE, and an eNB indicates, by using a random access response message, a TTI length assigned to the UE for the request, so as to configure a TTI by using the random access preamble in the random access process, and resolve a problem that there is no method for configuring a short TTI.

With reference to the fourth possible implementation of the second aspect, in a fifth possible implementation, the indicating of the TTI indication information in the random access response message includes:

indicating the TTI indication information by adding a byte to the random access response message;

or

indicating the TTI indication information by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

With reference to the third possible implementation of the second aspect, in a sixth possible implementation,

the sending, by user equipment, of TTI request information to a network device includes:

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sending, by the user equipment, a random access preamble on a preset time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length that the user equipment requests to use;

the receiving of TTI indication information sent by the network device includes:

receiving a random access response message sent by the network device, wherein the random access response message includes the TTI indication information.

In this implementation, in a random access process, the UE indicates, by using a resource occupied by a random access preamble, a TTI length requested by the UE, and an eNB indicates, by using a random access response message, a TTI length assigned to the UE for the request, so as to configure a TTI by using the resource occupied by the random access preamble in the random access process, and resolve a problem that there is no method for configuring a short TTI.

With reference to the third possible implementation of the second aspect, in a seventh possible implementation,

the sending, by user equipment, of TTI request information to a network device includes:

sending, by the user equipment, scheduling request information to the network device on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to the TTI length that the user equipment requests to use.

In this implementation, in a scheduling request process, the UE indicates, by using a preset scheduling request resource occupied by scheduling request information, a TTI length requested by the UE, and an eNB indicates, by using an uplink scheduling grant message, a TTI length assigned to the UE for the request, so as to configure a TTI in the scheduling request process of the user equipment, and resolve a problem that there is no method for configuring a short TTI.

With reference to the second possible implementation of the second aspect, in an eighth possible implementation,

the sending, by user equipment, of TTI request information to a network device includes:

sending, by the user equipment, a buffer status report message to the network device, wherein a value of one or more reserved bits of the buffer status report message indicates the TTI length that the user equipment requests to use.

In this implementation, in a buffer status report process, the UE indicates, by using a value of one or more reserved bits of a buffer status report message, a TTI length

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requested by the UE, and an eNB indicates, by using an uplink scheduling grant message, a TTI length assigned to the UE for the request, so as to configure a TTI in the buffer status report process of the UE, and resolve a problem that there is no method for configuring a short TTI.

With reference to the second possible implementation of the second aspect, in a ninth possible implementation,

the sending, by user equipment, of TTI request information to a network device includes:

sending, by the user equipment, a MAC CE to the network device, wherein an uplink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the requested TTI length;

the receiving of TTI indication information sent by the network device includes:

receiving a MAC CE sent by the network device, wherein a downlink LCID value in a message header of the MAC CE indicates that a type of the MAC CE is TTI indication information, and a message body of the MAC CE includes the TTI indication information.

In this implementation, the UE indicates, by using a message header and a message body of a MAC CE, a TTI length requested by the UE, and an eNB indicates, by using the MAC CE, a TTI length assigned to the UE for the request, and extends the MAC CE to which a BSR message belongs to configure a TTI, so as to resolve a problem that there is no method for configuring a short TTI.

With reference to the second possible implementation of the second aspect, in a tenth possible implementation,

the sending, by user equipment, of TTI request information to a network device includes:

sending, by the user equipment, an RRC connection setup request message to the network device, wherein a TTI related information element of the RRC connection setup request message indicates the TTI length that the user equipment requests to use;

the receiving of TTI indication information sent by the network device includes:

receiving an RRC connection setup message or an RRC reconfiguration message sent by the network device, wherein the RRC connection setup message or the RRC reconfiguration message includes the TTI indication information.

In this implementation, in an RRC connection setup process, the UE indicates, by using a TTI related information element of an RRC connection setup request message, a

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TTI length requested by the UE, and an eNB indicates, by using an RRC connection reconfiguration message, a TTI length assigned to the UE for the request, so as to configure a TTI in the RRC connection setup process, and resolve a problem that there is no method for configuring a short TTI.

With reference to the second possible implementation of the second aspect, in an eleventh possible implementation,

the receiving of TTI indication information sent by the network device includes:

receiving a handover command message sent by the network device, wherein the handover command message includes the TTI indication information.

In this implementation, in a handover preparation stage, a source eNB may add, to a handover request message sent to a target eNB, an indication indicating that the UE has a short TTI communication capability, the target eNB adds TTI indication information to a handover confirm message sent to the source eNB, and the source eNB sends a handover command message to the UE, wherein the handover command message includes the TTI indication information, and the TTI indication information includes a TTI length assigned by the eNB to the UE, so as to configure a TTI in the handover preparation stage, and resolve a problem that there is no method for configuring a short TTI.

According to a third aspect, a network device is provided, including:

a receiving unit, used for receiving TTI request information sent by user equipment, wherein the TTI request information indicates a TTI length requested to be used;

a sending unit, used for responding to the TTI request information received by the receiving unit, and sending TTI indication information to the user equipment, wherein the TTI indication information includes at least one of the following types of information:

a TTI length assigned by the network device, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

With reference to the third aspect, in a first possible implementation,

the sending unit is further used for: before the receiving unit receives the TTI request information, broadcasting a TTI length supported by the network device to the user equipment.

With reference to the third aspect, in a second possible implementation, the network device further includes:

a processing unit, used for obtaining, according to information content of the TTI request information, the TTI length requested to be used, wherein the information content of the TTI request information corresponds to the TTI length requested to be used.

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With reference to the third aspect, in a third possible implementation, the network device further includes:

a processing unit, used for obtaining, according to a resource occupied by the TTI request information, the TTI length requested to be used, wherein the occupied resource corresponds to the TTI length requested to be used.

With reference to the second possible implementation of the third aspect, in a fourth possible implementation,

the receiving unit is further used for receiving a random access preamble sent by the user equipment, wherein the random access preamble indicates the TTI length requested to be used;

the processing unit is further used for obtaining, according to the random access preamble, the TTI length requested to be used;

the sending unit is further used for sending a random access response message to the user equipment, wherein the TTI indication information is indicated in the random access response message.

With reference to the fourth possible implementation of the third aspect, in a fifth possible implementation, the sending unit is further used for:

indicating the TTI indication information by adding a byte to the random access response message;

or

indicating the TTI indication information by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

With reference to the third possible implementation of the third aspect, in a sixth possible implementation,

the receiving unit is further used for receiving a random access preamble sent by the user equipment on a preset time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length requested to be used;

the processing unit is further used for obtaining, according to the preset time-frequency resource occupied by the random access preamble, the TTI length requested to be used;

the sending unit is further used for sending a random access response message to the user equipment, wherein the random access response message includes the TTI indication information.

With reference to the third possible implementation of the third aspect, in a seventh

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possible implementation,

the receiving unit is further used for receiving scheduling request information sent by the user equipment on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to the TTI length requested to be used;

the processing unit is further used for obtaining, according to a preset time-frequency resource occupied by the scheduling request information, the TTI length requested to be used.

With reference to the second possible implementation of the third aspect, in an eighth possible implementation,

the receiving unit is further used for receiving a buffer status report message sent by the user equipment, wherein a value of one or more reserved bits of the buffer status report message indicates the TTI length requested to be used;

the processing unit is further used for obtaining, according to the value of the one or more reserved bits of the buffer status report message, the TTI length requested to be used.

With reference to the second possible implementation of the third aspect, in a ninth possible implementation,

the receiving unit is further used for receiving a MAC CE sent by the user equipment, wherein an uplink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the requested TTI length;

the processing unit is further used for obtaining, according to the message header and the message body of the MAC CE, the TTI length requested to be used;

the sending unit is further used for sending a MAC CE to the user equipment, wherein a downlink LCID value in a message header of the MAC CE indicates that a type of the MAC CE is TTI indication information, and a message body of the MAC CE includes the TTI indication information.

With reference to the second possible implementation of the third aspect, in a tenth possible implementation,

the receiving unit is further used for receiving an RRC connection setup request message sent by the user equipment, wherein a TTI related information element of the RRC connection setup request message indicates the TTI length requested to be used;

the processing unit is further used for obtaining, according to the TTI related information element of the RRC connection setup request message, the TTI length requested to be used;

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the sending unit is further used for sending an RRC connection setup message or an RRC reconfiguration message to the user equipment, wherein the RRC connection setup message or the RRC reconfiguration message includes the TTI indication information.

With reference to the second possible implementation of the third aspect, in an eleventh possible implementation,

the sending unit is further used for sending a handover command message to the user equipment, wherein the handover command message includes the TTI indication information.

The network device provided in this embodiment of the present disclosure can be used for performing the method according to the first aspect or any possible implementation of the first aspect. Therefore, for a technical effect that can be achieved by the network device, refer to a technical effect of the positioning method according to the first aspect or any possible implementation of the first aspect. Details are not described herein again.

According to a fourth aspect, user equipment is provided, including:

a sending unit, used for sending TTI request information to a network device, wherein the TTI request information indicates a TTI length that the user equipment requests to use;

a receiving unit, used for receiving TTI indication information sent by the network device, wherein the TTI indication information includes at least one of the following types of information:

a TTI length assigned to the user equipment, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

With reference to the fourth aspect, in a first possible implementation,

the receiving unit is further used for: before the sending unit sends the TTI request information to the network device, receiving a TTI length supported by the network device.

With reference to the fourth aspect, in a second possible implementation, the user equipment further includes:

a processing unit, used for causing information content of the TTI request information to indicate the TTI length that the user equipment requests to use, wherein the information content of the TTI request information corresponds to the TTI length that the user equipment requests to use.

With reference to the fourth aspect, in a third possible implementation, the user

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equipment further includes:

a processing unit, used for causing a resource occupied by the TTI request information to indicate the TTI length that the user equipment requests to use, wherein the occupied resource corresponds to the TTI length that the user equipment requests to use.

With reference to the second possible implementation of the fourth aspect, in a fourth possible implementation,

the sending unit is further used for sending a random access preamble to the network device, wherein the random access preamble indicates the TTI length that the user equipment requests to use;

the receiving unit is further used for receiving a random access response message sent by the network device, wherein the TTI indication information is indicated in the random access response message.

With reference to the fourth possible implementation of the fourth aspect, in a fifth possible implementation, the processing unit is further used for:

indicating the TTI indication information by adding a byte to the random access response message;

or

indicating the TTI indication information by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

With reference to the third possible implementation of the fourth aspect, in a sixth possible implementation,

the sending unit is further used for sending a random access preamble to the network device on a preset time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length that the user equipment requests to use;

the receiving unit is further used for receiving a random access response message sent by the network device, wherein the random access response message includes the TTI indication information.

With reference to the third possible implementation of the fourth aspect, in a seventh possible implementation,

the sending unit is further used for sending scheduling request information to the network device on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to the TTI length that the user equipment requests to use.

With reference to the second possible implementation of the fourth aspect, in an eighth possible implementation,

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the sending unit is further used for sending a buffer status report message to the network device, wherein a value of one or more reserved bits of the buffer status report message indicates the TTI length that the user equipment requests to use.

With reference to the second possible implementation of the fourth aspect, in a ninth possible implementation,

the sending unit is further used for sending a MAC CE to the network device, wherein an uplink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the requested TTI length;

the receiving unit is further used for receiving a MAC CE sent by the network device, wherein a downlink LCID value in a message header of the MAC CE indicates that a type of the MAC CE is TTI indication information, and a message body of the MAC CE includes the TTI indication information.

With reference to the second possible implementation of the fourth aspect, in a tenth possible implementation,

the sending unit is further used for sending an RRC connection setup request message to the network device, wherein a TTI related information element of the RRC connection setup request message indicates the TTI length that the user equipment requests to use;

the receiving unit is further used for receiving an RRC connection setup message or an RRC reconfiguration message sent by the network device, wherein the RRC connection setup message or the RRC reconfiguration message includes the TTI indication information.

With reference to the second possible implementation of the fourth aspect, in an eleventh possible implementation,

the receiving unit is further used for receiving a handover command message sent by the network device, wherein the handover command message includes the TTI indication information.

The user equipment provided in this embodiment of the present disclosure can be used for performing the method according to the second aspect or any possible implementation of the second aspect. Therefore, for a technical effect that can be achieved by the user equipment, refer to a technical effect of the positioning method according to the second aspect or any possible implementation of the second aspect. Details are not described herein again.

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According to a fifth aspect, a network device is provided, including: a processor, a first interface circuit, a second interface circuit, a memory, and a bus, wherein the processor, the first interface circuit, and the memory are connected by using the bus and communicate with each other; and the processor is used for executing program code in the memory to control the first interface circuit and the second interface circuit to perform the method provided in the first aspect or a possible implementation in the first aspect.

Optionally, the processor may be used for performing a function of the processing unit in the third aspect or a possible implementation in the third aspect.

The first interface circuit is used for performing a function of the receiving unit in the third aspect or a possible implementation in the third aspect.

The second interface unit is used for performing a function of the sending unit in the third aspect or a possible implementation in the third aspect.

The network device provided in this embodiment of the present disclosure can be used for performing the method according to the first aspect or any possible implementation of the first aspect. Therefore, for a technical effect that can be achieved by the network device, refer to a technical effect of the positioning method according to the first aspect or any possible implementation of the first aspect. Details are not described herein again.

According to a sixth aspect, user equipment is provided, including: a processor, a first interface circuit, a second interface circuit, a memory, and a bus, wherein the processor, the first interface circuit, the second interface circuit, and the memory are connected by using the bus and communicate with each other, and the processor is used for executing a program in the memory to control the first interface circuit and the second interface circuit to perform the method provided in the second aspect or a possible implementation in the second aspect.

Optionally, the processor may be used for performing a function of the processing unit in the fourth aspect or a possible implementation in the fourth aspect.

The first interface circuit is used for performing a function of the sending unit in the fourth aspect or a possible implementation in the fourth aspect.

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The second interface unit is used for performing a function of the receiving unit according to the fourth aspect or the possible implementations of the fourth aspect.

The user equipment provided in this embodiment of the present disclosure can be used for performing the method according to the second aspect or any possible implementation of the second aspect. Therefore, for a technical effect that can be achieved by the user equipment, refer to a technical effect of the positioning method according to the second aspect or any possible implementation of the second aspect. Details are not described herein again.

According to a seventh aspect, a communications system is provided, including the eNB according to any one of the third aspect or the possible implementations of the third aspect, and the UE according to any one of the fourth aspect or the possible implementations of the fourth aspect;

or including the eNB according to the fifth aspect, and the UE according to the sixth aspect.

The communications system provided in this embodiment of the present disclosure includes the eNB according to the third aspect or the possible implementations in the third aspect, and the UE according to the fourth aspect or the possible implementations in the fourth aspect; or includes the eNB according to the fifth aspect, and the UE according to the sixth aspect. Therefore, for a technical effect that can be achieved by the communications system, refer to the technical effects of the eNB and the UE. Details are not described herein again.

Description of Accompanying Drawings

To describe the technical solutions in the embodiments of the present disclosure or in the prior art more clearly, the following briefly describes the accompanying drawings required for describing the embodiments. Apparently, the accompanying drawings in the following description show merely some embodiments of the present disclosure, and a person of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

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FIG. 1 is a schematic structural diagram of a communications system according to an embodiment of the present disclosure;

FIG. 2 is a schematic flowchart of a TTI configuration method according to an embodiment of the present disclosure;

FIG. 3 is a schematic flowchart of configuring a TTI by using a random access preamble in a random access process according to an embodiment of the present disclosure;

FIG. 4 is a schematic structural diagram of a MAC PDU of a random access response message according to an embodiment of the present disclosure;

FIG. 5 is a schematic structural diagram of a random access response message according to an embodiment of the present disclosure;

FIG. 6 is a schematic flowchart of configuring a TTI by using a resource occupied by a random access preamble in a random access process according to an embodiment of the present disclosure;

FIG. 7 is a schematic flowchart of configuring a TTI in a scheduling request process according to an embodiment of the present disclosure;

FIG. 8 is a schematic flowchart of configuring a TTI in a buffer status report process according to an embodiment of the present disclosure;

FIG. 9 is a schematic structural diagram of a message header of a BSR according to an embodiment of the present disclosure;

FIG. 10 is a schematic flowchart of extending a MAC CE to which a BSR message belongs to configure a TTI according to an embodiment of the present disclosure;

FIG. 11 is a schematic flowchart of configuring a TTI in an RRC connection setup process according to an embodiment of the present disclosure;

FIG. 12 is a schematic flowchart of configuring a TTI in a handover preparation stage according to an embodiment of the present disclosure;

FIG. 13 is a schematic structural diagram of a network device according to an embodiment of the present disclosure;

FIG. 14 is a schematic structural diagram of another network device according to an embodiment of the present disclosure;

FIG. 15 is a schematic structural diagram of user equipment according to an embodiment of the present disclosure;

FIG. 16 is a schematic structural diagram of another user equipment according to an embodiment of the present disclosure;

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FIG. 17 is a schematic structural diagram of still another network device according to an embodiment of the present disclosure;

FIG. 18 is a schematic structural diagram of still another user equipment according to an embodiment of the present disclosure.

Specific Embodiments

The technical solutions in the embodiments of the present disclosure will be clearly and completely described below with reference to the accompanying drawings of the embodiments of the present disclosure. Obviously, the described embodiments are only part of the embodiments of the present disclosure and not all of the embodiments. Based on the embodiments in the present disclosure, all other embodiments obtained by those skilled in the art without creative labor are within the scope of protection of the present disclosure.

Terms such as “component,” “module,” and “system,” etc., used in this application are used to indicate computer related entities. The computer-related entities may be hardware, firmware, combinations of hardware and software, software, or software in running. For example, a component may be, but is not limited to: a process that runs on a processor, a processor, an object, an executable file, a thread of execution, a program, and/or a computer. As an example, both a computing device and an application that runs on the computing device may be components. One or more components may reside within a process and/or a thread of execution, and a component may be located on one computer and/or distributed between two or more computers. In addition, these components may be executed from various computer-readable media that have various data structures. These components may communicate by using a local and/or remote process and according to, for example, a signal having one or more data packets (for example, data from one component, wherein the component interacts with another component in a local system or a distributed system, and/or interacts with other systems via a network such as the Internet by using a signal.)

Moreover, various aspects are described in this application with reference to a wireless network device, the wireless network device may be a base station, and the base station may be used for communicating with one or more user equipment, or may be used for communicating with one or more base stations (for example, communicate with a macro base station and a micro base station such as an access point) that have some functions of user equipment. The wireless network device may further be user equipment, and the user equipment may be used for communicating with (for example, be in D2D

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communication with) one or more user equipment, or may be used for communicating with one or more base stations. User equipment may be further referred to as a user terminal, and may include some or all of functions of a system, a user unit, a user station, a mobile station, a mobile wireless terminal, a mobile device, a node, a device, a remote station, a remote terminal, a terminal, a wireless communications device, a wireless communications apparatus, or a user agent. The user equipment may be a cellular phone, a cordless telephone set, a session initiation protocol (SIP) phone, a smartphone, a wireless local loop (WLL) station, a personal digital assistant (PDA), a laptop computer, a handheld communications device, a handheld computing device, a satellite radio device, a wireless modem card, and/or other processing devices used for communicating on a wireless system. The base station may further be referred to as an access point, a node, a node B, an evolved NodeB (eNB), or another network entity, and may include some or all of functions of the foregoing network entity. The base station may communicate with a wireless terminal by using an air interface. The communication maybe performed by using one or more sectors. The base station may serve as a router between a wireless terminal and a remaining part of an access network by converting a received frame of the air interface into an IP packet, wherein the access network includes an Internet Protocol (IP) network. The base station may further coordinate management of an attribute of the air interface, and may further be a gateway between a wired network and a wireless network.

All aspects, embodiments, or features are presented in this application by describing a system that may include a plurality of devices, components, modules, and the like. It should be appreciated and understood that, each system may include another device, component, module, and the like, and/or may not include all devices, components, modules, and the like discussed with reference to the accompanying drawings. In addition, a combination of these solutions maybe used.

In addition, the word “example” in the embodiments of the present disclosure is used to represent giving an example, an illustration, or a description. Any embodiment or design scheme described as an “example” in this application should not be explained as being more preferred or having more advantages than another embodiment or design scheme. Exactly, “for example” is used to present a concept in a specific manner.

In the embodiments of the present disclosure, one of information, signal, message, or channel may be used sometimes. It should be noted that expressed meanings are consistent when differences are not emphasized. One of “of,” “relevant,” or

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"corresponding" may be used sometimes, and it should be noted that, if a difference among "of," "relevant," and "corresponding" is not emphasized, meanings expressed by "of," "relevant," and "corresponding" are consistent.

A network architecture and a service scenario that are described in the embodiments of the present disclosure are intended to describe the technical solutions in the embodiments of the present disclosure more clearly, and do not constitute any limitation to the technical solutions provided in the embodiments of the present disclosure. A person of ordinary skill in the art may learn that with evolution of network architectures and appearance of new service scenarios, the technical solutions provided in the embodiments of the present disclosure are also applicable to similar technical problems.

The embodiments of the present disclosure may be applied to a time division duplexing (TDD) scenario, and may also be applicable to a frequency division duplexing (FDD) scenario.

The embodiments of the present disclosure are described in dependence on a 4G network scenario in a wireless communications network. It should be noted that, solutions in the embodiments of the present disclosure may further be applied to another wireless communications network, and a corresponding name may also be replaced with a name of a corresponding function in another wireless communications network.

To be compatible with a TTI of 1 ms and a short TTI, in the embodiments of the present disclosure, indications are performed by using different TTI lengths. A symbol number may be used as a unit of a TTI length. For example, a TTI of 1 ms is divided into two slots, each slot includes seven symbols (ordinary cyclic prefix) or six symbols (extended cyclic prefix). Therefore, a TTI length of the TTI of 1 ms has a symbol number of 12 or 14, and correspondingly, a TTI length of a short TTI may have a symbol number of two, seven, or the like. A time length may also be used as a unit of a TTI length. For example, the TTI length of the TTI of 1 ms may be 1 ms, and the TTI length of the short TTI may be 0.1 ms, 0.5 ms, or the like.

Referring to FIG. 1, FIG. 1 is a schematic structural diagram of a TTI configuration system according to an embodiment of the present disclosure. The TTI configuration system includes: a network device and user equipment, wherein the network device is described by using an eNB (11) as an example, and the user equipment is described by using UE (12) as an example. The UE (12) applies to the eNB (11) for use of a TTI resource, and the eNB (11) notifies the UE (12) of the TTI resource assigned to the UE (12).

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An embodiment of the present disclosure provides a TTI configuration method, and referring to FIG. 2, the method includes the following steps:

S201. User equipment sends TTI request information to a network device, so that the network device obtains, according to the TTI request information, a TTI length that the user equipment requests to use, wherein the TTI request information indicates the TTI length that the user equipment requests to use.

The user equipment sends the TTI request information to the network device to request to use short TTIs of one or more TTI lengths. For a system supporting a plurality of short TTI lengths, a needed TTI length may be indicated in a request message; and for a system supporting only one short TTI length, the TTI request information may also be only a request message, to directly indicate requesting a short TTI supported by the system. Moreover, it is required that the user equipment needs to have a corresponding short TTI communication capability.

S202. The network device receives the TTI request information sent by the user equipment, wherein the TTI request information indicates the TTI length that the user equipment requests to use.

S203. The network device obtains, according to the TTI request information, the TTI length that the user equipment requests to use.

Optionally, step S203 specifically includes the following step:

S203a. The network device may obtain, according to information content of the TTI request information, the TTI length that the user equipment requests to use, wherein the information content of the TTI request information corresponds to the TTI length that the user equipment requests to use;

or

S203b. The network device may obtain, according to a resource occupied by the TTI request information, the TTI length that the user equipment requests to use, wherein the resource occupied by the TTI request information corresponds to the TTI length that the user equipment requests to use.

S204. The network device sends TTI indication information to the user equipment, wherein the TTI indication information includes at least one of the following types of information: a TTI length assigned by the network device to the user equipment, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

The network device finally determines, for one or more TTI lengths that the user

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equipment requests to use, and according to whether the network device supports a corresponding TTI length, and usage of each TTI length in a current wireless network, a TTI length assigned to the user equipment, and sends the assigned TTI length and enabling confirm information of the TTI length to the user equipment by using the TTI indication information. Additionally, the network device determines, according to usage of a time-frequency resource, effective moment information and start symbol location information of communication performed by the user equipment by using the assigned TTI length, and sends the information to the user equipment by using the TTI indication information likewise.

S205. The user equipment receives the TTI indication information sent by the network device.

S206. The user equipment communicates with the network device at an effective moment and/or a start symbol location by using the TTI length assigned by the network device to the user equipment.

According to the TTI configuration method provided in this embodiment of the present disclosure, the user equipment sends the TTI request information to the network device, wherein the TTI request information indicates the TTI length that the user equipment requests to use; the network device receives the TTI request information sent by the user equipment; the network device obtains, according to the TTI request information, the TTI length that the user equipment requests to use; the network device sends the TTI indication information to the user equipment, wherein the TTI indication information includes at least one of the following types of information: a TTI length assigned by the network device to the user equipment, effective moment information, start symbol location information, and enabling confirm information of the TTI length; and the user equipment communicates with the network device by using the TTI length assigned by the network device to the user equipment and/or an effective moment and/or a start symbol location. The user equipment requests from the network device to use a TTI length, wherein the TTI length includes a short TTI, and the network device assigns a corresponding TTI length for the request of the user equipment, so as to resolve a problem that there is no method for configuring a short TTI.

The above TTI configuration method is described below with reference to a specific application scenario.

In a possible implementation, a TTI is configured by using a random access preamble in a random access process, and referring to FIG. 3, the configuration includes

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the following steps:

S301. An eNB broadcasts a TTI length supported by the eNB.

S302. The UE receives the TTI length that is supported by the eNB and that is broadcast by the eNB.

Step S301 and step S302 are used by the UE to send, in the following steps, TTI request information according to the TTI length supported the eNB and a TTI length supported by the UE, so as to improve a success rate of communicating with the eNB by using a corresponding TTI length. Certainly, steps S301 and S302 are optional steps.

S303. The UE sends a random access preamble to the eNB, wherein the random access preamble indicates a TTI length that the UE requests to use.

There are a total of 64 preambles available for a physical layer, and the preambles are divided into two parts: competitive access preambles and dedicated access preambles, wherein an information element numberOfRA-Preambles is used to indicate a quantity of competitive access preambles. If numberOfRA-Preambles is configured to be 64, it indicates that there is no dedicated access preamble, and all preambles are competitive access preambles. If numberOfRA-Preambles is configured to be less than 64, an index of the competitive access preambles is [0, numberOfRA-Preambles - 1], and an index of the dedicated access preambles is [numberOfRA-Preambles, 63].

On the premise that numberOfRA-Preambles is configured to be less than 64, that is, on the premise that a dedicated access preamble exists, the dedicated access preamble is mapped by using a method as follows:

If a system supports only a TTI length, for example, supports only a TTI length of two symbols, an information element numberOfRA-Preambles-2symbolTTI may be defined to indicate mapping of a dedicated access preamble of the TTI length of two symbols, and a preamble located in a range [numberOfRA-Preambles, numberOfRAPreambles+numberOfRA-Preambles-2symbolTTI-1] is dedicated to indication of the TTI length of two symbols. When the UE selects a preamble in this range and sends the preamble, it indicates that the UE intends to use a TTI of a length of two symbols in a subsequent transmission process. If the system supports a plurality of TTI lengths, a plurality of lengths may be added to perform indication. For example, an information element numberOfRA-Preambles-1symbolTTI is defined to indicate mapping of a dedicated access preamble of a TTI length of one symbol, and numberOfRA-Preambles-7symbolTTI indicates mapping of a dedicated access preamble of a TTI length of seven symbols. Correspondingly, preamble ranges corresponding to

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various TTIs of lengths may be in an ascending sequence. For example, a preamble in a range [numberOfRA-Preambles, numberOfRA-Preambles+numberOfRA-Preambles-1symbolTTI-1] is dedicated to indication of a TTI length of one symbol, and a preamble in a range [numberOfRA-Preambles+numberOfRA-Preambles-1symbolTTI, numberOfRA-Preambles+numberOfRA-Preambles-1symbolTTI+numberOfRA-Preambles-7symbolTTI-1] is dedicated to indication of a TTI length of seven symbols. Certainly, arrangement may also be performed in another preconfigured sequence.

S304. The eNB receives the random access preamble sent by the UE.

S305. The eNB obtains, according to the random access preamble, the TTI length that the UE requests to use.

For a specific method in which the eNB performs mapping according to the random access preamble to obtain the TTI length that the UE requests to use, refer to step S303.

S306. The eNB sends a random access response message (abbreviated as “RAR”) to the UE, wherein the random access response message includes TTI indication information, and the TTI indication information includes at least one of the following types of information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

Optionally, step S306 may specifically include: sending, by the eNB, the random access response message to the UE, wherein the TTI indication information is indicated by adding a byte to the random access response message.

Specifically, referring to FIG. 4, FIG. 4 shows a structure of a media access control (MAC) protocol data unit (PDU) of a random access response message. It may be learned from the foregoing that, a MAC PDU of the random access response message includes random access response messages of a plurality of UEs, and all these UEs send preambles on a same random access time-frequency resource. Wherein, referring to FIG. 5, in a random access response message of a single UE, a message header includes a preamble index (R in FIG. 5, abbreviated as “RAPID”), and a message body includes a timing advance (timing advanced command in FIG.5), an uplink scheduling grant (UL Grant or uplink grant in FIG.5), and a temporary C-RNTI (Temporary C-RNTI in FIG.5).

In a system supporting different TTI lengths, a related indication needs to be added to the random access response message, and the related indication may include ,but is not limited to, TTI enabling information, a TTI length, and subframe start location information, wherein the subframe start location information includes a start subframe

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number and a symbol index in a subframe. For example, the TTI enabling information occupies 1 bit, the TTI length occupies 3 bits (for example, there are eight TTI lengths, and optionally, values 1 to 7 respectively correspond to TTIs of lengths of one to seven symbols), and the subframe start location information occupies 4 bits (optionally, used to indicate a start symbol location at which the UE begins to perform data transmission by using an assigned TTI length). Therefore, compared with a random access response message of a TTI of 1 ms in the prior art, there is totally one more byte.

For a method for configuring a TTI according to mapping between a dedicated access preamble and different TTI lengths, UE of a regular TTI of 1 ms and UE of a short TTI may send preambles on a same time-frequency resource. Therefore, in random access response messages, random access response messages of the two user equipment may coexist. In a regular random access response message addressing mechanism, message bodies of users are all six bytes, and addressing needs to be performed according to only a length. However, if configuration of a short TTI exists, a length of a message body of the UE of the short TTI may be seven bytes. Therefore, to keep an addressing manner of the UE of the regular TTI of 1 ms unchanged, in the random access response messages, a random access response message of the UE of the regular TTI of 1 ms needs to be placed in front, and a random access response message of the UE of the short TTI needs to be placed behind. For the UE of the short TTI, which UEs are UEs of the regular TTI of 1 ms and which UEs are UEs of the short TTI are first identified by using RAPIDs. Then, in addressing of a random access response message, UE of the regular TTI of 1 ms performs addressing according to 6 bytes, and UE of the short TTI performs addressing according to 7 bytes.

Additionally, optionally, step S306 may specifically further include: sending, by the eNB, the random access response message to the UE, wherein the TTI indication information is indicated by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

Specifically, a data amount of a message body of the random access response message is not increased, instead, the TTI indication information is indicated by reusing other information bits. For example, an uplink scheduling grant message of 20 bits (a UL Grant in FIG. 5) includes the following messages:

1) Hopping flag— occupying 1 bit.

2) Resource block assignment indication (fixed size resource block assignment)—occupying 10 bits.

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3) Modulation and demodulation scheme indication (truncated modulation and coding scheme)—occupying 4 bits.

4) Power control indication (transmission power control (TPC)) command for scheduled physical uplink shared channel (PUSCH) —occupying 3 bits.

5) Uplink delay sending indication (uplink delay (UL)) — occupying 1 bit.

6) Channel state information request indication (channel state information (CSI) request)—occupying 1 bit.

In the foregoing information, 2), 3), and 4) are mandatory items, and 1), 5), and 6) are optional items. Therefore, information of 3 bits of 1), 5), and 6) may be reused, that is, a combination of these 3 bits is used as TTI indication information. Moreover, because a size of the message body of the random access response message is not changed, all users perform addressing according to 6 bytes, and the random access response message of the UE of the regular TTI of 1 ms does not need to be placed in front of the random access response message of the UE of the short TTI.

S307. The UE receives the random access response message sent by the eNB, wherein the random access response message includes the TTI indication information, and the TTI indication information includes at least one of the following types of information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm information of the TTI length, wherein the subframe start location information includes a start subframe number and a symbol index in a subframe.

S308. The UE begins to communicate with the eNB at an effective moment and/or a start symbol location by using the TTI length assigned by the eNB to the UE.

According to the TTI configuration method provided in this embodiment of the present disclosure, in a random access process, the UE indicates, by using a random access preamble, a TTI length requested by the UE, and an eNB indicates, by using a random access response message, a TTI length assigned to the UE for the request, wherein the TTI length includes a short TTI, so as to resolve a problem that there is no method for configuring a short TTI.

In a possible implementation, a TTI is configured by using a resource occupied by a random access preamble in a random access process, and referring to FIG. 6, the configuration includes the following steps:

S601. The UE sends a random access preamble to an eNB on a preset time-frequency resource, wherein the preset time-frequency resource corresponds to a

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TTI length that the UE requests to use.

In an LTE system, a random access time-frequency resource is determined according to the following two parameters: prach-ConfigIndex and prach-FrequencyOffset, wherein prach-ConfigIndex indicates a time domain frame number and a subframe number at which the random access resource is located, and prach-FrequencyOffset indicates a frequency domain resource block (RB) start location of the random access resource in a subframe.

In a time domain distinguishing solution, different prach-ConfigIndexes may be configured for different TTI lengths, and the UE accesses the eNB by using different random access time domain resources, that is, it indicates that a corresponding TTI length is requested to be used. According to Table 5.7.1-2 in 3GPP TS36.211, physical random access channel (PRACH) Configuration Index (PRACH configuration index) and Subframe number (for details, refer to Table 1) are mainly used, and different prach-ConfigIndexes (referring to PRACH Configuration Indexes in Table 1) indicate time domain locations of different random access resources. Therefore, time domain locations corresponding to different TTI lengths only need to be configured to not overlap. For example, when prach-ConfigIndex of a regular TTI length of 1 ms is configured to be 3, it indicates that a subframe index (referring to Subframe numbers in Table 1) at which a random access resource occurs is 1; when prach-ConfigIndex-1symbolTTI corresponding to a TTI of a length of 1 symbol is configured to be 4, it indicates that a subframe index at which a random access resource occurs is 4; and when prach-ConfigIndex-1symbolTTI corresponding to a TTI of a length of 7 symbols is configured to be 5, it indicates that a subframe index at which a random access resource occurs is 7, and the rest can be deduced by analogy.

TABLE 1

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PRACH Configuration Index	Preamble Format	System frame number	Subframe number	PRACH Configuration Index	Preamble Format	System frame number	Subframe number
0	0	Even	1	32	2	Even	1
1	0	Even	4	33	2	Even	4
2	0	Even	7	34	2	Even	7
3	0	Any	1	35	2	Any	1
4	0	Any	4	36	2	Any	4
5	0	Any	7	37	2	Any	7
6	0	Any	1, 6	38	2	Any	1, 6
7	0	Any	2 ,7	39	2	Any	2 ,7
8	0	Any	3, 8	40	2	Any	3, 8
9	0	Any	1, 4, 7	41	2	Any	1, 4, 7
10	0	Any	2, 5, 8	42	2	Any	2, 5, 8
11	0	Any	3, 6, 9	43	2	Any	3, 6, 9
12	0	Any	0, 2, 4, 6, 8	44	2	Any	0, 2, 4, 6, 8
13	0	Any	1, 3, 5, 7, 9	45	2	Any	1, 3, 5, 7, 9
14	0	Any	0, 1, 2, 3, 4, 5, 6, 7, 8, 9	46	N/A	N/A	N/A
15	0	Even	9	47	2	Even	9
16	1	Even	1	48	3	Even	1
17	1	Even	4	49	3	Even	4
18	1	Even	7	50	3	Even	7
19	1	Any	1	51	3	Any	1
20	1	Any	4	52	3	Any	4
21	1	Any	7	53	3	Any	7
22	1	Any	1, 6	54	3	Any	1, 6
23	1	Any	2 ,7	55	3	Any	2 ,7
24	1	Any	3, 8	56	3	Any	3, 8
25	1	Any	1, 4, 7	57	3	Any	1, 4, 7
26	1	Any	2, 5, 8	58	3	Any	2, 5, 8
27	1	Any	3, 6, 9	59	3	Any	3, 6, 9
28	1	Any	0, 2, 4, 6, 8	60	N/A	N/A	N/A
29	1	Any	1, 3, 5, 7, 9	61	N/A	N/A	N/A
30	N/A	N/A	N/A	62	N/A	N/A	N/A
31	1	Even	9	63	3	Even	9

In the above table, PRACH Configuration Index indicates a PRACH configuration index; Preamble Format indicates a preamble format, and this parameter has a total of five effective formats: 0, 1, 2, 3, and 4, or is N/A (not applicable); system frame number indicates a system frame number, wherein a parameter Even indicates an even number, Any indicates that odd and even numbers are both applicable, and N/A indicates not applicable; and Subframe number indicates a subframe number that has totally ten effective values: 0 to 9, or is N/A (not applicable).

In a frequency domain location distinguishing solution, different prach-FrequencyOffsets may be configured for different TTI lengths, and the UE accesses the eNB by using different random access frequency domain resources, that is, it indicates that a corresponding TTI length is requested to be used. Because each random access

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resource fixedly occupies six RBs, an interval of prach-FrequencyOffsets corresponding to different TTI lengths needs to be greater than six RBs. For example, in a case of a bandwidth of 20 M, a total quantity of RBs is 100, prach-FrequencyOffsets corresponding to a regular TTI length may be configured to be 50, prach-FrequencyOffset-1symbolTTI corresponding to a TTI of a length of 1 symbol may be configured to be 56, and prach-FrequencyOffset-7 symbo1TTI corresponding to a TTI of a length of 7 symbols may be configured to be 62.

S602. The eNB receives the random access preamble sent by the UE on the preset time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length that the UE requests to use.

S603. The eNB obtains, according to the preset time-frequency resource occupied by the random access preamble, the TTI length that the UE requests to use, wherein the resource occupied by the random access preamble corresponds to the TTI length that the UE requests to use.

For a specific method for obtaining, according to the resource occupied by the random access preamble, the TTI length that the UE requests to use, refer to step S601.

S604. The eNB sends a random access response message to the UE, wherein the random access response message includes TTI indication information, and the TTI indication information includes at least one of the following types of information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

S605. The UE receives the random access response message sent by the eNB, wherein the random access response message includes the TTI indication information.

After a dedicated time-frequency resource is used, UEs sending a preamble on a same time-frequency resource all intend to use a TTI of a same length. Therefore, message bodies of the UEs in random access response messages all have a same length, and no addressing problem exists again.

S606. The UE begins to communicate with the eNB at an effective moment and/or a start symbol location by using the TTI length assigned by the eNB to the UE.

A person skilled in the art may understand that, the foregoing plurality of methods for configuring a TTI in the random access process may be combined, that is, dedicated time-frequency resources are first assigned for a short TTI, and all users applying for short TTI configuration are designated, by using prach-ConfigIndex-shortTTI or prach-FrequencyOffset-short TTI, to send preambles on these resources. Moreover, in

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these dedicated time-frequency resources, because compatibility with UE of the regular TTI length of 1 ms is not considered again, all 64 preambles maybe grouped, and there are more preambles available for each TTI length.

According to the TTI configuration method provided in this embodiment of the present disclosure, in a random access process, the UE indicates, by using are source occupied by a random access preamble, a TTI length requested by the UE, and the eNB indicates, by using a random access response message, a TTI length assigned to the UE for the request, wherein the TTI length includes a short TTI, so as to resolve a problem that there is no method for configuring a short TTI.

In another possible implementation, a TTI is configured in a UE scheduling request (abbreviated as "SR") process, and referring to FIG. 7, the configuration includes the following steps:

S701. The UE sends scheduling request information to an eNB on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to a TTI length that the UE requests to use.

An SR resource is configured by an information element SchedulingRequestConfig in a system RRC (Radio Resource Control Protocol) connection setup message, wherein the information element, SchedulingRequestConfig, includes two values: sr-ConfigIndex and sr-PUCCH-ResourceIndex. sr-ConfigIndex indicates a period and a subframe location of the SR resource, and sr-PUCCH-ResourceIndex indicates an SR resource index number in a subframe. On this basis, different sr-ConfigIndexes and/or different sr-PUCCH-ResourceIndexes may be designated for different TTI lengths. A user sends an SR to the eNB by using a dedicated SR resource, and it indicates that the user intends to use a TTI of a corresponding length.

S702. The eNB receives the scheduling request information sent by the UE on the preset scheduling request resource, wherein the preset scheduling request resource corresponds to the TTI length that the UE requests to use.

S703. The eNB obtains, according to the preset scheduling request resource occupied by the scheduling request information, the TTI length that the UE requests to use, wherein the preset scheduling request resource occupied by the scheduling request information corresponds to the TTI length that the UE requests to use.

For a specific method for obtaining, according to the preset scheduling request resource occupied by the scheduling request information, the TTI length that the UE requests to use, refer to step S701.

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S704. The eNB sends an uplink scheduling grant message to the UE, wherein the uplink scheduling grant message includes TTI indication information, wherein the TTI indication information includes at least one of the following types of information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

S705. The UE receives the uplink scheduling grant message sent by the eNB, wherein the uplink scheduling grant message includes the TTI indication information.

S706. The UE begins to communicate with the eNB at an effective moment and/or a start symbol location by using the TTI length assigned by the eNB to the UE.

According to the TTI configuration method provided in this embodiment of the present disclosure, in a scheduling request process, the UE indicates, by using a preset scheduling request resource occupied by scheduling request information, a TTI length requested by the UE, and the eNB indicates, by using an uplink scheduling grant message, a TTI length assigned to the UE for the request, wherein the TTI length includes a short TTI, so as to resolve a problem that there is no method for configuring a short TTI.

In another possible implementation, a TTI is configured in a UE buffer status report (abbreviated as “BSR”) process, and referring to FIG. 8, the configuration includes the following steps:

S801. UE sends a buffer status report message to an eNB, wherein a value of one or more reserved bits of the buffer status report message indicates a TTI length that the UE requests to use.

Specifically, the UE sends a BSR to the eNB, to indicate how much data in a current buffer of the UE needs to be sent, and the eNB sends an uplink scheduling grant to the UE accordingly. Referring to FIG. 9, FIG. 9 shows a message header of a BSR. One or more reserved bits (R in FIG. 9) of the message header of the BSR may be set to 1, to indicate that the current BSR message includes a TTI use request, and moreover, an indication of a TTI length intended to be used may be added to a message body of the BSR.

S802. The eNB receives the buffer status report message sent by the UE, wherein the value of the one or more reserved bits of the buffer status report message indicates the TTI length that the UE requests to use.

S803. The eNB obtains, according to the value of the one or more reserved bits of the buffer status report message, the TTI length that the UE requests to use, wherein the value of the one or more reserved bits of the buffer status report message corresponds to the TTI length that the UE requests to use. For a specific method, refer to step S801.

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S804. The eNB sends an uplink scheduling grant message to the UE, wherein the uplink scheduling grant message includes TTI indication information, and the TTI indication information includes at least one of the following types of information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

S805. The UE receives the uplink scheduling grant message sent by the eNB, wherein the uplink scheduling grant message includes the TTI indication information.

S806. The UE begins to communicate with the eNB at an effective moment and/or a start symbol location by using the TTI length assigned by the eNB to the UE.

According to the TTI configuration method provided in this embodiment of the present disclosure, in a buffer status report process, the UE indicates, by using a value of one or more reserved bits of a buffer status report message, a TTI length requested by the UE, and the eNB indicates, by using an uplink scheduling grant message, a TTI length assigned to the UE for the request, wherein the TTI length includes a short TTI, so as to resolve a problem that there is no method for configuring a short TTI.

In still another possible implementation, a MAC CE to which a BSR message belongs is extended to configure a TTI, and referring to FIG. 10, the configuration includes the following steps:

S1001. The UE sends a MAC CE (control element) to an eNB, wherein an uplink idle LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the requested TTI length.

Specifically, the BSR is one type of MAC CE, and may be further extended, that is, a new MAC CE is designed and sent by the UE to the eNB, to indicate the TTI request information. The MAC CE includes a message header and a message body. A format of the message header is a regular MAC CE header format, and only a different value needs to be used for an LCID (logical channel identifier) in the format to indicate that a type of the MAC CE is the TTI request information. According to the description of section 6.2 of 3GPP TS36.321, a current range of uplink idle LCID values is from 01100 to 10101, and any one of the value may be selected from this range. The message body of the MAC CE includes specific content of the TTI request information, and for example, indicates the requested TTI length.

S1002. The eNB receives the MAC CE sent by the UE, wherein the uplink idle LCID value in the message header of the MAC CE indicates that the type of the MAC CE is the

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TTI request information, and the message body of the MAC CE indicates the requested TTI length.

S1003. The eNB obtains, according to the message header and the message body of the MAC CE, the TTI length that the UE requests to use. For a specific manner, refer to step S1001.

S1004. The eNB sends a MAC CE to the UE, wherein a downlink idle LCID in a message header of the MAC CE indicates that a type of the MAC CE is TTI indication information, and a message body of the MAC CE includes at least one of the following types of information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm information of the TTI length, wherein the subframe start location information includes a start subframe number and a symbol index in a subframe.

Specifically, the eNB sends the MAC CE to the UE, a current range of downlink idle LCID values in the message header of the MAC CE is from 01011 to 11001, and any one of the values may be selected from this range to indicate that the type of the MAC CE is the TTI indication information. The message body of the MAC CE includes a TTI length assigned by the eNB to the UE and possibly needed subframe start location information, wherein the subframe start location information includes a start subframe number and a symbol index in a subframe.

S1005. The UE receives the MAC CE sent by the eNB, wherein the downlink idle LCID in the message header of the MAC CE indicates that the type of the MAC CE is the TTI indication information, and the message body of the MAC CE includes at least one of the following types of information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm information of the TTI length, wherein the subframe start location information includes a start subframe number and a symbol index in a subframe.

S1006. The UE begins to communicate with the eNB at an effective moment and/or a start symbol location by using the TTI length assigned by the eNB to the UE.

According to the TTI configuration method provided in this embodiment of the present disclosure, the UE indicates, by using a message header and a message body of a MAC CE, a TTI length requested by the UE, and the eNB indicates, by using the MAC CE, a TTI length assigned to the UE for the request, wherein the TTI length includes a short TTI, so as to resolve a problem that there is no method for configuring a short TTI.

In still another possible implementation, a TTI is configured in an RRC connection

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setup process, and referring to FIG. 11, the configuration includes the following steps:

S1101. The UE sends an RRC connection setup request message to an eNB, wherein a TTI related information element of the RRC connection setup request message indicates a TTI length that the UE requests to use.

Specifically, in an uplink direction, the UE may add a TTI request information related information element to the RRC connection setup request, and the TTI request information related information element includes a TTI length intended to be used.

S1102. The eNB receives the RRC connection setup request message sent by the UE, wherein the TTI related information element of the RRC connection setup request message indicates the TTI length that the UE requests to use.

S1103. The eNB obtains, according to the TTI related information element of the RRC connection setup request message, the TTI length that the UE requests to use, wherein the TTI related information element of the RRC connection setup request message corresponds to the TTI length that the UE requests to use. For a specific method, refer to step S1101.

S1104. Send an RRC connection reconfiguration message to the UE, wherein the RRC connection reconfiguration message includes TTI indication information, the TTI indication information includes a TTI length assigned by the eNB to the UE, and specifically, the TTI indication information includes at least one of the following types of information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm information of the TTI length, wherein the subframe start location information includes a start subframe number and a symbol index in a subframe.

Specifically, in a downlink direction, the eNB may add a TTI indication information related information element to the RRC connection reconfiguration message, and the TTI indication information related information element includes the TTI length assigned to the UE and/or the subframe start location information, wherein the subframe start location information includes a start subframe number and a symbol index in a subframe.

S1105. The UE receives the RRC connection reconfiguration message sent by the eNB, wherein the RRC connection reconfiguration message includes the TTI indication information, the TTI indication information includes the TTI length assigned by the eNB to the UE, and specifically, the TTI indication information includes at least one of the following types of information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm

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information of the TTI length, wherein the subframe start location information includes a start subframe number and a symbol index in a subframe.

S1106. The UE begins to communicate with the eNB at an effective moment and/or a start symbol location by using the TTI length assigned by the eNB to the UE.

According to the TTI configuration method provided in this embodiment of the present disclosure, in an RRC connection setup process, the UE indicates, by using a TTI related information element of an RRC connection setup request message, a TTI length requested by the UE ,and the eNB indicates, by using an RRC connection reconfiguration message, a TTI length assigned to the UE for the request, wherein the TTI length includes a short TTI, so as to resolve a problem that there is no method for configuring a short TTI.

In yet another possible implementation, a TTI is configured in a handover preparation stage, and referring to FIG. 12, the configuration includes the following steps:

S1201. The UE sends TTI request information to a source eNB, so that the source eNB obtains, according to the TTI request information, a TTI length that the UE requests to use, wherein the TTI request information indicates the TTI length that the UE requests to use.

The UE sends the TTI request information to the source eNB to request to use one or more TTI lengths. Therefore, both a TTI of 1 ms and a short TTI may be included. Moreover, it is required that the UE needs to have a corresponding short TTI communication capability.

S1202. The source eNB receives the TTI request information sent by the UE, wherein the TTI request information indicates the TTI length that the UE requests to use.

S1203. The source eNB obtains, according to the TTI request information, the TTI length that the UE requests to use, and obtains a short TTI communication capability that the UE has.

In the above step S1201 to step S1203, the source eNB obtains, by using any TTI configuration method provided in the embodiments of the present disclosure, the TTI length that the UE requests to use. Because the UE sends the TTI request information according to a supporting capability of the UE, it is equivalent that the source eNB obtains the short TTI communication capability that the UE has.

S1204. The source eNB may add, to a handover request message sent to a target eNB, an indication indicating that the UE has the short TTI communication capability.

S1205. The target eNB adds TTI indication information to a handover confirm message sent to the source eNB, wherein the TTI indication information includes a TTI

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length assigned by the eNB to the UE, and specifically, the TTI indication information includes at least one of the following types of information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm information of the TTI length, wherein the subframe start location information includes a start subframe number and a symbol index in a subframe.

If the target eNB accepts the handover request, a TTI length and possibly needed subframe start location information may be indicated to the source eNB in the handover confirm message.

S1206. The source eNB sends a handover command message to the UE, wherein the handover command message includes the TTI indication information, the TTI indication information includes the TTI length assigned by the eNB to the UE, and specifically, the TTI indication information includes at least one of the following types of information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm information of the TTI length, wherein the subframe start location information includes a start subframe number and a symbol index in a subframe.

S1207. The UE receives the handover command message sent by the source eNB, wherein the handover command message includes the TTI indication information, and the TTI indication information includes at least one of the following types of information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm information of the TTI length, wherein the subframe start location information includes a start subframe number and a symbol index in a subframe.

S1208. The UE begins to communicate with the target eNB at an effective moment and/or a start symbol location by using the TTI length assigned by the target eNB to the UE.

According to the TTI configuration method provided in this embodiment of the present disclosure, in a handover preparation stage, a source eNB may add, to a handover request message sent to a target eNB, an indication indicating that the UE has a short TTI communication capability, the target eNB adds TTI indication information to a handover confirm message sent to the source eNB, and the source eNB sends a handover command message to the UE, wherein the handover command message includes the TTI indication information, and the TTI indication information includes a TTI length assigned by the eNB to the UE, wherein the TTI length includes a short TTI, so as to resolve a problem

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that there is no method for configuring a short TTI.

An embodiment of the present disclosure provides a network device, used for performing the foregoing TTI configuration method. Referring to FIG. 13, the network device includes:

a receiving unit (1301), used for receiving TTI request information sent by user equipment, wherein the TTI request information indicates a TTI length requested to be used;

a sending unit (1302), used for responding to the TTI request information received by the receiving unit (1301), and send TTI indication information to the user equipment, wherein the TTI indication information includes at least one of the following types of information:

a TTI length assigned by the network device to the user equipment, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

Optionally, in a possible implementation, the sending unit (1302) is further used for: before the receiving unit (1301) receives the TTI request information sent by the user equipment, broadcasting a TTI length supported by the network device.

Optionally, referring to FIG. 14, the network device further includes:

a processing unit (1303), used for obtaining, according to information content of the TTI request information, the TTI length that the user equipment requests to use, wherein the information content of the TTI request information corresponds to the TTI length that the user equipment requests to use;

or optionally, a processing unit (1303), used for obtaining, according to a resource occupied by the TTI request information sent by the user equipment, the TTI length that the user equipment requests to use, wherein the occupied resource corresponds to the TTI length that the user equipment requests to use.

Optionally, in a possible implementation, the receiving unit (1301) is further used for receiving a random access preamble sent by the user equipment, wherein the random access preamble indicates the TTI length that the user equipment requests to use;

the processing unit (1303) is further used for obtaining, according to the random access preamble, the TTI length that the user equipment requests to use;

the sending unit (1302) is further used for sending a random access response message to the user equipment, wherein the TTI indication information is indicated in the random access response message.

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Optionally, in a possible implementation, the sending unit (1302) is further used for:

indicating the TTI indication information by adding a byte to the random access response message;

or

indicating the TTI indication information by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

Optionally, in a possible implementation,

the receiving unit (1301) is further used for receiving a random access preamble sent by the user equipment on a preset time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length that the user equipment requests to use;

the processing unit (1303) is further used for obtaining, according to the preset time-frequency resource occupied by the random access preamble, the TTI length requested to be used;

the sending unit (1302) is further used for sending a random access response message to the user equipment, wherein the random access response message includes the TTI indication information.

Optionally, in a possible implementation,

the receiving unit (1301) is further used for receiving scheduling request information sent by the user equipment on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to the TTI length that the user equipment requests to use;

the processing unit (1303) is further used for obtaining, according to a preset time-frequency resource occupied by the scheduling request information sent by the user equipment, the TTI length that the user equipment requests to use.

Optionally, in a possible implementation,

the receiving unit (1301) is further used for receiving a buffer status report message sent by the user equipment, wherein a value of one or more reserved bits of the buffer status report message indicates the TTI length that the user equipment requests to use;

the processing unit (1303) is further used for obtaining, according to the value of the one or more reserved bits of the buffer status report message, the TTI length that the user equipment requests to use.

Optionally, in a possible implementation,

the receiving unit (1301) is further used for receiving a MAC CE, wherein an uplink

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LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the TTI length requested by the user equipment;

the processing unit (1303) is further used for obtaining, according to the message header and the message body of the MAC CE, the TTI length that the user equipment requests to use;

the sending unit (1302) is further used for sending a MAC CE to the user equipment, wherein a downlink LCID value in a message header of the MAC CE indicates that a type of the MAC CE is TTI indication information, and a message body of the MAC CE includes the TTI indication information.

Optionally, in a possible implementation,

the receiving unit (1301) is further used for receiving an RRC connection setup request message sent by the user equipment, wherein a TTI related information element of the RRC connection setup request message indicates the TTI length that the user equipment requests to use;

the processing unit (1303) is further used for obtaining, according to the TTI related information element of the RRC connection setup request message, the TTI length that the user equipment requests to use;

the sending unit (1302) is further used for sending an RRC connection setup message or an RRC reconfiguration message to the user equipment, wherein the RRC connection setup message or the RRC reconfiguration message includes the TTI indication information.

Optionally, in a possible implementation,

the sending unit (1302) is further used for sending a handover command message to the user equipment, wherein the handover command message includes the TTI indication information.

It should be noted that, in this embodiment, the sending unit (1302) may be an interface circuit that has a sending function on an eNB, such as a transmitter or an information sending interface; and the receiving unit (1301) may be an interface circuit that has a receiving function on the eNB, such as a receiver or an information receiving interface. The processing unit (1303) may be an independently disposed processor, may be integrated in a processor of the eNB, or may be stored in a memory of the eNB in a form of program code, and a processor of the eNB invokes the program code and performs

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a function of the processing unit (1303). The processor herein may be a central processing unit (abbreviated as “CPU”) or an application-specific integrated circuit (abbreviated as “ASIC”), or may be one or more integrated circuits configured to implement this embodiment of the present disclosure.

The network device in this embodiment of the present disclosure may be used for performing the foregoing method process. Therefore, for a technical effect that can be achieved, also refer to the foregoing method embodiment. Details are not described herein again in this embodiment of the present disclosure.

An embodiment of the present disclosure provides user equipment, used for performing the foregoing TTI configuration method. Referring to FIG. 15, the user equipment includes:

a sending unit (1501), used for sending TTI request information to a network device, wherein the TTI request information indicates a TTI length that the user equipment requests to use;

a receiving unit (1502), used for receiving TTI indication information sent by the network device, wherein the TTI indication information includes at least one of the following types of information:

a TTI length assigned to the user equipment, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

Optionally, in a possible implementation,

the receiving unit (1502) is further used for: before the sending unit (1501) sends the TTI request information, receiving a TTI length supported by the network device.

Optionally, referring to FIG. 16, the user equipment further includes:

a processing unit (1503), used for indicating, by using information content of the TTI request information, the TTI length that the user equipment requests to use, wherein the

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information content of the TTI request information corresponds to the TTI length that the user equipment requests to use;

or optionally, a processing unit (1503), used for indicating, by using a resource occupied by the TTI request information, the TTI length that the user equipment requests to use, wherein the occupied resource corresponds to the TTI length that the user equipment requests to use.

Optionally, in a possible implementation,

the sending unit (1501) is further used for sending a random access preamble to the network device, wherein the random access preamble indicates the TTI length that the user equipment requests to use;

the receiving unit (1502) is further used for receiving a random access response message sent by the network device, wherein the TTI indication information is indicated in the random access response message.

Optionally, in a possible implementation, the processing unit (1503) is further used for:

indicating the TTI indication information by adding a byte to the random access response message;

or

indicating the TTI indication information by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

Optionally, in a possible implementation,

the sending unit (1501) is further used for sending a random access preamble to the network device on a preset time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length that the user equipment requests to use;

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the receiving unit (1502) is further used for receiving a random access response message sent by the network device, wherein the random access response message includes the TTI indication information.

Optionally, in a possible implementation,

the sending unit (1501) is further used for sending scheduling request information to the network device on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to the TTI length that the user equipment requests to use.

Optionally, in a possible implementation,

the sending unit (1501) is further used for sending a buffer status report message to the network device, wherein a value of one or more reserved bits of the buffer status report message indicates the TTI length that the user equipment requests to use.

Optionally, in a possible implementation,

the sending unit (1501) is further used for sending a MAC CE to the network device, wherein an uplink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the requested TTI length;

the receiving unit (1502) is further used for receiving a MAC CE sent by the network device, wherein a downlink LCID value in a message header of the MAC CE indicates that a type of the MAC CE is TTI indication information, and a message body of the MAC CE includes the TTI indication information.

Optionally, in a possible implementation,

the sending unit (1501) is further used for sending an RRC connection setup request message to the network device, wherein a TTI related information element of the RRC connection setup request message indicates the TTI length that the user equipment

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requests to use;

the receiving unit (1502) is further used for receiving an RRC connection setup message or an RRC reconfiguration message sent by the network device, wherein the RRC connection setup message or the RRC reconfiguration message includes the TTI indication information.

Optionally, in a possible implementation,

the receiving unit (1502) is further used for receiving a handover command message sent by the network device, wherein the handover command message includes the TTI indication information.

It should be noted that, in this embodiment, the sending unit (1501) may be an interface circuit that has a sending function on the UE, such as a transmitter or an information sending interface; and the receiving unit (1502) may be an interface circuit that has a receiving function on the UE, such as a receiver or an information receiving interface. The processing unit (1503) may be an independently disposed processor, may be integrated in a processor of the UE, or may be stored in a memory of the UE in a form of program code, and a processor of the UE invokes the program code and performs a function of the processing unit (1503). The processor herein may be a central processing unit (abbreviated as “CPU”) or an application-specific integrated circuit (abbreviated as “ASIC”), or may be one or more integrated circuits configured to implement this embodiment of the present disclosure.

The user equipment in this embodiment of the present disclosure may be used for performing the foregoing method process. Therefore, for a technical effect that can be achieved, also refer to the foregoing method embodiment. Details are not described herein again in this embodiment of the present disclosure.

Referring to FIG. 17, an embodiment of the present disclosure provides a network device, used for implementing the foregoing TTI configuration method. The apparatus may be an eNB, and may include: a processor (1701), a first interface circuit (1702), a second interface circuit (1703), a memory (1704), and a bus (1705). The processor (1701),

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the first interface circuit (1702), the second interface circuit (1703), and the memory (1704) are connected by using the bus (1705) and communicate with each other.

It should be noted that the processor (1701) herein may be one processor, or may be a general term of a plurality of processing elements. For example, the processor may be a central processing unit (CPU), may be an application-specific integrated circuit (ASIC), or may be one or more integrated circuits configured to implement this embodiment of the present disclosure, for example, one or more microprocessors (like a digital signal processor (abbreviated as “DSP”)), or one or more field programmable gate arrays (abbreviated as “FPGA”) .

The memory (1704) may be one storage apparatus, or may be a general term of a plurality of storage elements, and is used for storing executable program code, or parameters, data, and the like required for running of an access network management device. Moreover, the memory (1704) may include a random access memory (abbreviated as “RAM”), and may also include a non-volatile memory (abbreviated as “NVRAM”) such as a magnetic disk storage or a flash memory (Flash).

The bus (1705) may be an industry standard architecture (abbreviated as “ISA”) bus, a peripheral component interconnect (abbreviated as “PCI”) bus, or an extended industry standard architecture (abbreviated as “EISA”) bus, or the like. The bus (1705) may be classified into an address bus, a data bus, a control bus, and the like. For convenience of representation, only one bold line is configured for representation in FIG. 17, but it does not indicate that there is only one bus or one type of bus.

The processor (1701) is used for executing a program in the memory, so as to perform the method provided in the foregoing method embodiment with reference to the first interface circuit (1702) and the second interface circuit (1703).

Specifically, the processor (1701) is used for executing a program in the memory, so as to perform a function of the processing unit of the eNB in the foregoing embodiment.

The first interface circuit (1702) is used for performing a function of the receiving unit of the eNB in the foregoing embodiment.

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The second interface unit (1703) is used for performing a function of the sending unit of the eNB in the foregoing embodiment.

The network device in this embodiment of the present disclosure may be used for performing the foregoing method process. Therefore, for a technical effect that can be achieved, also refer to the foregoing method embodiment. Details are not described herein again in this embodiment of the present disclosure.

Referring to FIG. 18, an embodiment of the present disclosure provides user equipment, used for implementing the foregoing TTI configuration method. The apparatus may be an eNB, and may include: a processor (1801), a first interface circuit (1802), a second interface circuit (1803), a memory (1804), and a bus (1805). The processor (1801), the first interface circuit (1802), the second interface circuit (1803), and the memory (1804) are connected by using the bus (1805) and communicate with each other.

It should be noted that the processor (1801) herein may be one processor, or may be a general term of a plurality of processing elements. For example, the processor may be a central processing unit (CPU), may be an application-specific integrated circuit (ASIC), or may be one or more integrated circuits configured to implement this embodiment of the present disclosure, for example, one or more microprocessors (like a digital signal processor (abbreviated as “DSP”), or one or more field programmable gate arrays (abbreviated as “FPGA”) .

The memory (1804) may be one storage apparatus, or may be a general term of a plurality of storage elements, and is used for storing executable program code, or parameters, data, and the like required for running of an access network management device. Moreover, the memory (1804) may include a random access memory (abbreviated as “RAM”), and may also include a non-volatile memory (abbreviated as “NVRAM”) such as a magnetic disk storage or a flash memory (Flash).

The bus (1805) may be an industry standard architecture (abbreviated as “ISA”) bus, a peripheral component interconnect (abbreviated as “PCI”) bus, an extended industry standard architecture (abbreviated as “EISA”) bus, or the like. The bus (1805) may be classified into an address bus, a data bus, a control bus, and the like. For convenience of representation, only one bold line is configured for representation in FIG. 18, but it does not indicate that there is only one bus or one type of bus.

The processor (1801) is used for executing a program in the memory, so as to perform

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the method provided in the foregoing method embodiment with reference to the first interface circuit (1802) and the second interface circuit (1803).

Specifically, the processor (1801) is used for executing a program in the memory to perform a function of the processing unit of the eNB in the foregoing embodiment.

The first interface circuit (1802) is used for performing a function of the sending unit of the UE in the foregoing embodiment.

The second interface unit (1803) is used for performing a function of the receiving unit of the UE in the foregoing embodiment.

The user equipment in this embodiment of the present disclosure may be used for performing the foregoing method process. Therefore, for a technical effect that can be achieved, also refer to the foregoing method embodiment. Details are not described herein again in this embodiment of the present disclosure.

It should be understood that sequence numbers of the foregoing processes do not mean execution sequences in various embodiments of the present disclosure. The execution sequences of the processes should be determined according to functions and internal logic of the processes, and should not be construed as any limitation on the implementation processes of the embodiments of the present disclosure.

A person of ordinary skill in the art may be aware that, in combination with the examples described in the embodiments disclosed in this specification, units and algorithm steps may be implemented by electronic hardware or a combination of computer software and electronic hardware. Whether the functions are performed by hardware or software depends on particular applications and design constraint conditions of the technical solutions. A person skilled in the art may use different methods to implement the described functions for each particular application, but it should not be considered that the implementation goes beyond the scope of the present disclosure.

It may be clearly understood by a person skilled in the art that, for the purpose of convenient and brief description, for a detailed working process of the foregoing system, apparatus, and unit, refer to a corresponding process in the foregoing method embodiments, and details are not described herein again.

In the several embodiments provided in the present application, it should be understood that the disclosed system, device, and method may be implemented in other manners. For example, the described device embodiment is merely an example. For example, the unit division is merely logical function division and may be other division in actual implementation. For example, a plurality of units or components may be combined

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or integrated into another system, or some features may be ignored or not performed. In addition, the displayed or discussed mutual couplings or direct couplings or communication connections may be implemented through some interfaces. The indirect couplings or communication connections between the devices or units may be implemented in electronic, mechanical, or other forms.

The units described as separate parts may or may not be physically separate, and parts displayed as units may or may not be physical units, may be located in one position, or may be distributed on a plurality of network units. Some or all of the units may be selected according to actual requirements to achieve the objectives of the solutions of the embodiments.

In addition, functional units in the embodiments of the present disclosure may be integrated into one processing unit, or each of the units may exist alone physically, or two or more units are integrated into one unit.

When the functions are implemented in the form of a software functional unit and sold or used as an independent product, the functions may be stored in a computer-readable storage medium. Based on such an understanding, the technical solutions of the present disclosure essentially, or the part contributing to the prior art, or some of the technical solutions may be implemented in a form of a software product. The computer software product is stored in a storage medium, and includes several instructions for instructing a computer device (which may be a personal computer, a server, or a network device) to perform all or some of the steps of the methods described in the embodiments of the present disclosure. The foregoing storage medium includes: any medium that can store program code, such as a USB flash drive, a removable hard disk, a read-only memory (abbreviated as “ROM”), a random access memory (abbreviated as “RAM”), a magnetic disk, or an optical disc.

The foregoing descriptions are merely specific implementations of the present disclosure, but are not intended to limit the protection scope of the present disclosure. Any variation or replacement readily figured out by a person skilled in the art within the technical scope disclosed in the present disclosure shall fall within the protection scope of the present disclosure. Therefore, the protection scope of the present disclosure shall be subject to the protection scope of the claims.

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Claims

1. A TTI configuration method, characterized in that it includes:

receiving, by a network device, TTI request information, wherein the TTI request information indicates a TTI length requested to be used;

responding to the TTI request information, and sending TTI indication information, wherein the TTI indication information includes at least one of the following types of information:

a TTI length assigned by the network device, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

2. The TTI configuration method according to Claim 1, characterized in that before receiving, by a network device, of TTI request information, it includes:

broadcasting, by the network device, a TTI length supported by the network device.

3. The TTI configuration method according to Claim 1, characterized in that the responding to the TTI request information includes:

obtaining, according to the information content of the TTI request information, the TTI length requested to be used, wherein the information content of the TTI request information corresponds to the TTI length requested to be used.

4. The TTI configuration method according to Claim 1, characterized in that the responding to the TTI request information includes:

obtaining, according to a resource occupied by the TTI request information, the TTI length requested to be used, wherein the occupied resource corresponds to the TTI length requested to be used.

5. The TTI configuration method according to Claim 3, characterized in that the receiving, by a network device, of TTI request information, includes:

receiving, by the network device, a random access preamble, wherein the random access preamble indicates the TTI length requested to be used;

the responding to the TTI request information includes:

obtaining, according to the random access preamble, the TTI length requested to be used;

the sending of TTI indication information, includes:

sending a random access response message, wherein the TTI indication information is indicated in the random access response message.

6. The TTI configuration method according to Claim 5, characterized in that the indicating of the TTI indication information in the random access response message

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includes:

indicating the TTI indication information by adding a byte to the random access response message;

or

indicating the TTI indication information by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

7. The TTI configuration method according to Claim 4, characterized in that

the receiving, by a network device, of TTI request information includes:

receiving, by the network device, a random access preamble on a preset time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length requested to be used;

obtaining, according to a resource occupied by the TTI request information, the TTI length requested to be used includes:

obtaining, according to the preset time-frequency resource occupied by the random access preamble, the TTI length requested to be used;

the sending of TTI indication information includes:

sending a random access response message, wherein the random access response message includes the TTI indication information.

8. The TTI configuration method according to Claim 4, characterized in that

the receiving, by a network device, of TTI request information includes:

receiving, by the network device, scheduling request information on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to the length of TTI requested to be used;

obtaining, according to a resource occupied by the TTI request information, the TTI length requested to be used includes:

obtaining, according to a preset time-frequency resource occupied by the scheduling request information, the TTI length requested to be used.

9. The TTI configuration method according to Claim 3, characterized in that it includes:

the receiving, by a network device, of TTI request information, which includes:

receiving, by the network device, a buffer status report message, wherein a value of one or more reserved bits of the buffer status report message indicates the TTI length that the user equipment requests to use;

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obtaining, according to the information content of the TTI request information, the TTI length requested to be used, which includes:

obtaining, according to the value of the one or more reserved bits of the buffer status report message, the TTI length requested to be used.

10. The TTI configuration method according to Claim 3, characterized in that it includes:

the receiving, by a network device, of TTI request information, which includes:

receiving, by the network device, a MAC CE, wherein an uplink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the requested TTI length;

obtaining, according to the information content of the TTI request information, the TTI length requested to be used, which includes:

obtaining, according to the message header and message body of the MAC CE, the TTI length requested to be used;

the sending of TTI indication information, which includes:

sending a MAC CE, wherein a downlink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the TTI indication information;

11. The TTI configuration method according to Claim 3, characterized in that it includes:

the receiving, by a network device, of TTI request information, which includes:

receiving, by the network device, an RRC connection setup request message, wherein a TTI related information element of the RRC connection setup request message indicates the TTI length requested to be used;

obtaining, according to the information content of the TTI request information, the TTI length requested to be used, which includes:

obtaining, according to the TTI related information element of the RRC connection setup request message, the TTI length requested to be used;

the sending of TTI indication information, which includes:

sending an RRC connection setup message or an RRC reconfiguration message, wherein the RRC connection setup message or the RRC reconfiguration message includes the TTI indication information.

12. The TTI configuration method according to Claim 3, characterized in that it includes:

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the sending of TTI indication information, which includes:

sending a handover command message, wherein the handover command message includes the TTI indication information.

13. A TTI configuration method, characterized in that it includes:

sending, by user equipment, TTI request information, with the TTI request information indicating the TTI length that the user equipment requests to use;

receiving TTI indication information, wherein the TTI indication information includes at least one of the following types of information:

a TTI length assigned to the user equipment, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

14. The TTI configuration method according to Claim 13, characterized in that before sending, by user equipment, the TTI request information, it includes:

receiving a supported TTI length.

15. The TTI configuration method according to Claim 13, characterized in that the indicating, by the TTI request information, of the TTI length that the user equipment requests to use includes:

indicating, by the information content of the TTI request information, the TTI length that the user equipment requests to use, wherein the information content of the TTI request information corresponds to the TTI length that the user equipment requests to use.

16. The TTI configuration method according to Claim 13, characterized in that the indicating, by TTI request information, of the TTI length that the user equipment requests to use includes:

indicating, by using a resource occupied by the TTI request information, the TTI length that the user equipment requests to use, wherein the occupied resource corresponds to the TTI length that the user equipment requests to use.

17. The TTI configuration method according to Claim 15, characterized in that

the sending, by user equipment, of TTI request information includes:

the sending, by user equipment, of a random access preamble, wherein the random access preamble indicates the TTI length that the user equipment requests to use;

the receiving of TTI indication information, which includes:

receiving a random access response message, wherein the TTI indication information is indicated in the random access response message.

18. The TTI configuration method according to Claim 17, characterized in that indicating the TTI indicator information in the random access response message includes:

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indicating the TTI indication information by adding a byte to the random access response message;

or

indicating the TTI indication information by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

19. The TTI configuration method according to Claim 16, characterized in that

the sending, by user equipment, of TTI request information includes:

sending, by the user equipment, a random access preamble on a preset time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length that the user equipment requests to use;

the receiving of TTI indication information, which includes:

receiving a random access response message, wherein the random access response message includes the TTI indication information.

20. The TTI configuration method according to Claim 16, characterized in that

the sending, by user equipment, of TTI request information includes:

sending, by the user equipment, scheduling request information on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to the length of TTI that the user equipment requests to use.

21. The TTI configuration method according to Claim 15, characterized in that it includes:

the sending, by user equipment, of TTI request information, which includes:

sending, by the user equipment, a buffer status report message, wherein a value of one or more reserved bits of the buffer status report message indicates the TTI length that the user equipment requests to use;

22. The TTI configuration method according to Claim 15, characterized in that it includes:

the sending, by user equipment, of TTI request information, which includes:

sending, by the user equipment, a MAC CE, wherein an uplink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the requested TTI length;

the receiving of TTI indication information, which includes:

receiving a MAC CE, wherein a downlink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE includes the TTI indication information.

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23. The TTI configuration method according to Claim 15, characterized in that it includes:

the sending, by user equipment, of TTI request information, which includes:

sending, by the user equipment, an RRC connection setup request message, wherein a TTI related information element of the RRC connection setup request message indicates the TTI length that the user equipment requests use;

the receiving of TTI indication information sent by the network device, which includes:

receiving an RRC connection setup message or an RRC reconfiguration message, wherein the RRC connection setup message or the RRC reconfiguration message includes the TTI indication information.

24. The TTI configuration method according to Claim 15, characterized in that it includes:

the receiving of TTI indication information, which includes:

receiving a handover command message, wherein the handover command message includes the TTI indication information.

25. A network device, characterized in that it includes:

a receiving unit for receiving TTI request information, wherein the TTI request information indicates a length of TTI requested to be used;

a sending unit for sending TTI indication information in response to the TTI request information received by the receiving unit, wherein the TTI indication information includes at least one of the following types of information:

a TTI length assigned by the network device, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

26. The network device according to Claim 25, characterized in that

the sending unit is further used to broadcast the TTI length supported by the network device before the receiving unit receives the TTI request information.

27. The network device according to Claim 25, characterized in that the network device further includes:

a processing unit, used for obtaining, according to information content of the TTI request information, the TTI length requested to be used, wherein the information content of the TTI request information corresponds to the TTI length requested to be used.

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28. The network device according to Claim 25, characterized in that the network device further includes:

a processing unit, used for obtaining, according to a resource occupied by the TTI request information, the TTI length requested to be used, wherein the occupied resource corresponds to the TTI length requested to be used.

29. The network device according to Claim 27, characterized in that

the receiving unit is further used for receiving a random access preamble, wherein the random access preamble indicates the TTI length requested to be used;

the processing unit is further used for obtaining, according to the random access preamble, the TTI length requested to be used;

the sending unit is further used for sending a random access response message, wherein the TTI indication information is indicated in the random access response message.

30. The network device according to Claim 29, characterized in that the sending unit is further used for:

indicating the TTI indication information by adding a byte to the random access response message;

or

indicating the TTI indication information by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

31. The network device according to Claim 28, characterized in that

the receiving unit is further used for receiving a random access preamble on a preset time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length requested to be used;

the processing unit is further used for obtaining, according to the preset time-frequency resource occupied by the random access preamble, the TTI length requested to be used;

the sending unit is further used for sending a random access response message, wherein the random access response message includes the TTI indication information.

32. The network device according to Claim 28, characterized in that

the receiving unit is further used for receiving scheduling request information on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to the TTI length requested to be used;

the processing unit is further used for obtaining, according to a preset time-frequency

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resource occupied by the scheduling request information, the TTI length requested to be used.

33. The network device according to Claim 27, characterized in that it includes:

the receiving unit, further used for receiving a buffer status report message, wherein a value of one or more reserved bits of the buffer status report message indicates the TTI length requested to be used;

the processing unit is further used for obtaining, according to the value of the one or more reserved bits of the buffer status report message, the TTI length requested to be used.

34. The network device according to Claim 27, characterized in that it includes:

the receiving unit, further used for receiving a MAC CE, wherein an uplink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the requested TTI length;

the processing unit is further used for obtaining, according to the message header and the message body of the MAC CE, the TTI length requested to be used;

the sending unit is further used for sending a MAC CE, wherein a downlink LCID value in a message header of the MAC CE indicates that a type of the MAC CE is TTI indication information, and a message body of the MAC CE includes the TTI indication information.

35. The network device according to Claim 27, characterized in that it includes:

the receiving unit, further used for receiving an RRC connection setup request message, wherein a TTI related information element of the RRC connection setup request message indicates the TTI length requested to be used;

the processing unit is further used for obtaining, according to the TTI related information element of the RRC connection setup request message, the TTI length requested to be used;

the sending unit is further used for sending an RRC connection setup message or an RRC reconfiguration message, wherein the RRC connection setup message or the RRC reconfiguration message includes the TTI indication information.

36. The network device according to Claim 27, characterized in that it includes:

the sending unit, further used for sending a handover command message, wherein the handover command message includes the TTI indication information.

37. A user equipment, characterized in that it includes:

a sending unit, used for sending TTI request information to a network device, wherein

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the TTI request information indicates a TTI length that the user equipment requests to use;

a receiving unit, used for receiving TTI indication information, wherein the TTI indication information includes at least one of the following types of information:

a TTI length assigned to the user equipment, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

38. The user equipment according to Claim 37, characterized in that:

the receiving unit is further used for, before the sending unit sends the TTI request information, receiving a supported TTI length.

39. The user equipment according to Claim 37, characterized in that the user equipment further includes:

a processing unit, used for causing information content of the TTI request information to indicate the TTI length that the user equipment requests to use, wherein the information content of the TTI request information corresponds to the TTI length that the user equipment requests to use.

40. The user equipment according to Claim 37, characterized in that the user equipment further includes:

a processing unit, used for causing a resource occupied by the TTI request information to indicate the TTI length that the user equipment requests to use, wherein the occupied resource corresponds to the TTI length that the user equipment requests to use.

41. The user equipment according to Claim 39, characterized in that

the sending unit is further used for sending a random access preamble, wherein the random access preamble indicates the TTI length that the user equipment requests to use;

the receiving unit is further used for receiving a random access response message, wherein the TTI indication information is indicated in the random access response message.

42. The user equipment according to Claim 41, characterized in that the processing unit is further used for:

indicating the TTI indication information by adding a byte to the random access response message;

or

indicating the TTI indication information by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

43. The user equipment according to Claim 40, characterized in that

the sending unit is further used for sending a random access preamble on a preset

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time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length that the user equipment requests to use;

the receiving unit is further used for receiving a random access response message, wherein the random access response message includes the TTI indication information.

44. The user equipment according to Claim 40, characterized in that

the sending unit is further used for sending scheduling request information on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to the TTI length that the user equipment requests to use.

45. The user equipment according to Claim 39, characterized in that it includes:

the sending unit, further used for sending a buffer status report message, wherein a value of one or more reserved bits of the buffer status report message indicates the TTI length that the user equipment requests to use.

46. The user equipment according to Claim 39, characterized in that it includes:

the sending unit, further used for sending a MAC CE, wherein an uplink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the requested TTI length;

the receiving unit is further used for receiving a MAC CE, wherein a downlink LCID value in a message header of the MAC CE indicates that a type of the MAC CE is TTI indication information, and a message body of the MAC CE includes the TTI indication information.

47. The user equipment according to Claim 39, characterized in that it includes:

the sending unit, further used for sending an RRC connection setup request message, wherein a TTI related information element of the RRC connection setup request message indicates the TTI length that the user equipment requests to use;

the receiving unit is further used for receiving an RRC connection setup message or an RRC reconfiguration message, wherein the RRC connection setup message or the RRC reconfiguration message includes the TTI indication information.

48. The user equipment according to Claim 39, characterized in that it includes:

the receiving unit, further used for receiving a handover command message, wherein the handover command message includes the TTI indication information.

49. A network device, characterized in that it includes a processor, a first interface circuit, a second interface circuit, a memory, and a bus, wherein the processor, the first interface circuit, the second interface circuit, and the memory are connected by using the bus and communicate with each other, and the processor is used for executing a program

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in the memory to control the first interface circuit and the second interface circuit to perform the following operations:

the first interface circuit is used for receiving TTI request information, wherein the TTI request information indicates a TTI length requested to be used;

the second interface circuit is used for responding to the TTI request information received by the first interface circuit, and sending TTI indication information to the user equipment, wherein the TTI indication information includes at least one of the following types of information:

a TTI length assigned by the network device, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

50. The network device according to Claim 49, characterized in that

the second interface circuit is further used for, before the receiving unit receives the TTI request information, broadcast a TTI length supported by the network device.

51. The network device according to Claim 49, characterized in that the processor is further used for:

obtaining, according to the information content of the TTI request information, the TTI length requested to be used, wherein the information content of the TTI request information corresponds to the TTI length requested to be used.

52. The network device according to Claim 49, characterized in that the processor is further used for:

obtaining, according to a resource occupied by the TTI request information, the TTI length requested to be used, wherein the occupied resource corresponds to the TTI length requested to be used.

53. The network device according to Claim 51, characterized in that

the first interface circuit is further used for receiving a random access preamble, wherein the random access preamble indicates the TTI length requested to be used;

the second interface circuit is further used for obtaining, according to the random access preamble, the TTI length requested to be used;

the sending unit is further used for sending a random access response message, wherein the TTI indication information is indicated in the random access response message.

54. The network device according to Claim 53, characterized in that the second interface circuit is further used for:

indicating the TTI indication information by adding a byte to the random access

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response message;

or

indicating the TTI indication information by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

55. The network device according to Claim 52, characterized in that

the first interface circuit is further used for receiving a random access preamble on a preset time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length requested to be used;

the processor is further used for obtaining, according to the preset time-frequency resource occupied by the random access preamble, the TTI length requested to be used;

the second interface circuit is further used for sending a random access response message, wherein the random access response message includes the TTI indication information.

56. The network device according to Claim 52, characterized in that

the first interface circuit is further used for receiving scheduling request information on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to the TTI length requested to be used;

the processor is further used for obtaining, according to a preset time-frequency resource occupied by the scheduling request information, the TTI length requested to be used.

57. The network device according to Claim 51, characterized in that it includes:

the first interface circuit, further used for receiving a buffer status report message, wherein a value of one or more reserved bits of the buffer status report message indicates the TTI length requested to be used;

the processing unit is further used for obtaining, according to the value of the one or more reserved bits of the buffer status report message, the TTI length requested to be used.

58. The network device according to Claim 51, characterized in that it includes:

the first interface circuit, further used for receiving a MAC CE, wherein an uplink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the requested TTI length;

the processor is further used for obtaining, according to the message header and the message body of the MAC CE, the TTI length requested to be used;

the second interface circuit is further used for sending a MAC CE, wherein a

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downlink LCID value in a message header of the MAC CE indicates that a type of the MAC CE is TTI indication information, and a message body of the MAC CE includes the TTI indication information.

59. The network device according to Claim 51, characterized in that it includes:

the first interface circuit, further used for receiving an RRC connection setup request message, wherein a TTI related information element of the RRC connection setup request message indicates the TTI length requested to be used;

the processor is further used for obtaining, according to the TTI related information element of the RRC connection setup request message, the TTI length requested to be used;

the second interface circuit is further used for sending an RRC connection setup message or an RRC reconfiguration message, wherein the RRC connection setup message or the RRC reconfiguration message includes the TTI indication information.

60. The network device according to Claim 51, characterized in that it includes:

the second interface circuit, further used for sending a handover command message, wherein the handover command message includes the TTI indication information.

61. A user equipment, characterized in that it includes a processor, a first interface circuit, a second interface circuit, a memory, and a bus, wherein the processor, the first interface circuit, the second interface circuit, and the memory are connected by using the bus and communicate with each other, and the processor is used for executing a program in the memory to control a first interface circuit and a second interface circuit to perform the following operations:

the first interface circuit is used for sending TTI request information, wherein the TTI request information indicates a TTI length that the user equipment requests to use;

the second interface circuit is used for receiving TTI indication information, wherein the TTI indication information includes at least one of the following types of information:

a TTI length assigned to the user equipment, effective moment information, start symbol location information, and enabling confirm information of the TTI length.

62. The user equipment according to Claim 61, characterized in that

the second interface circuit is further used for, before the sending unit sends the TTI request information, receiving a supported TTI length.

63. The user equipment according to Claim 61, characterized in that the processor is further used for:

causing information content of the TTI request information to indicate the TTI length

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that the user equipment requests to use, wherein the information content of the TTI request information corresponds to the TTI length that the user equipment requests to use.

64. The user equipment according to Claim 61, characterized in that the processor is further used for:

causing a resource occupied by the TTI request information to indicate the TTI length that the user equipment requests to use, wherein the occupied resource corresponds to the TTI length that the user equipment requests to use.

65. The user equipment according to Claim 63, characterized in that

the first interface circuit is further used for sending a random access preamble, wherein the random access preamble indicates the TTI length that the user equipment requests to use;

the second interface circuit is further used for receiving a random access response message, wherein the TTI indication information is indicated in the random access response message.

66. The user equipment according to Claim 65, characterized in that the processor is further used for:

indicating the TTI indication information by adding a byte to the random access response message;

or

indicating the TTI indication information by reusing one or more optional bits of an uplink scheduling grant message in the random access response message.

67. The user equipment according to Claim 64, characterized in that

the first interface circuit is further used for sending a random access preamble on a preset time-frequency resource, wherein the preset time-frequency resource corresponds to the TTI length that the user equipment requests to use;

the second interface circuit is further used for receiving a random access response message, wherein the random access response message includes the TTI indication information.

68. The user equipment according to Claim 64, characterized in that

the first interface circuit is further used for sending scheduling request information on a preset scheduling request resource, wherein the preset scheduling request resource corresponds to the TTI length that the user equipment requests to use.

69. The user equipment according to Claim 63, characterized in that it includes:

the first interface circuit, further used for sending a buffer status report message,

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wherein a value of one or more reserved bits of the buffer status report message indicates the TTI length that the user equipment requests to use.

70. The user equipment according to Claim 63, characterized in that it includes:

the first interface circuit, further used for sending a MAC CE, wherein an uplink LCID value in a message header of the MAC CE indicates that the type of the MAC CE is TTI request information, and a message body of the MAC CE indicates the requested TTI length;

the second interface circuit is further used for receiving a MAC CE, wherein a downlink LCID value in a message header of the MAC CE indicates that a type of the MAC CE is TTI indication information, and a message body of the MAC CE includes the TTI indication information.

71. The user equipment according to Claim 63, characterized in that it includes:

the first interface circuit, further used for sending an RRC connection setup request message, wherein a TTI related information element of the RRC connection setup request message indicates the TTI length requested to be used;

the second interface circuit is further used for receiving an RRC connection setup message or an RRC reconfiguration message, wherein the RRC connection setup message or the RRC reconfiguration message includes the TTI indication information.

72. The user equipment according to Claim 63, characterized in that it includes:

the second interface circuit, further used for receiving a handover command message, wherein the handover command message includes the TTI indication information.

73. A communications system, including the network device according to any one of Claims 25 to 36 and the user equipment according to any one of Claims 37 to 48;

or

including the network device according to any one of Claims 49 to 60 and the user equipment according to any one of Claims 61 to 72.

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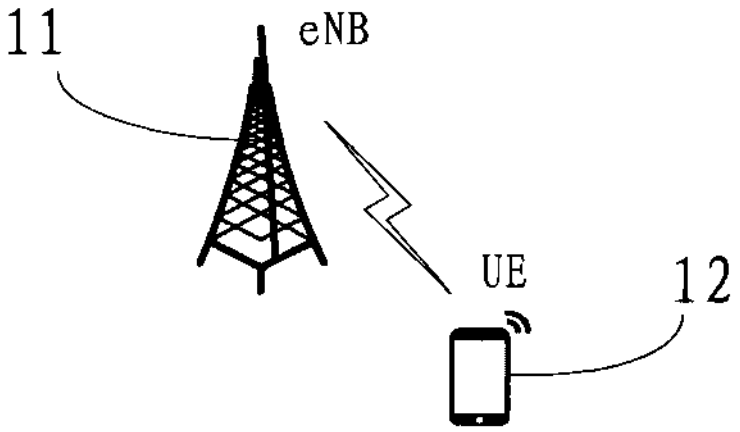


FIG. 1

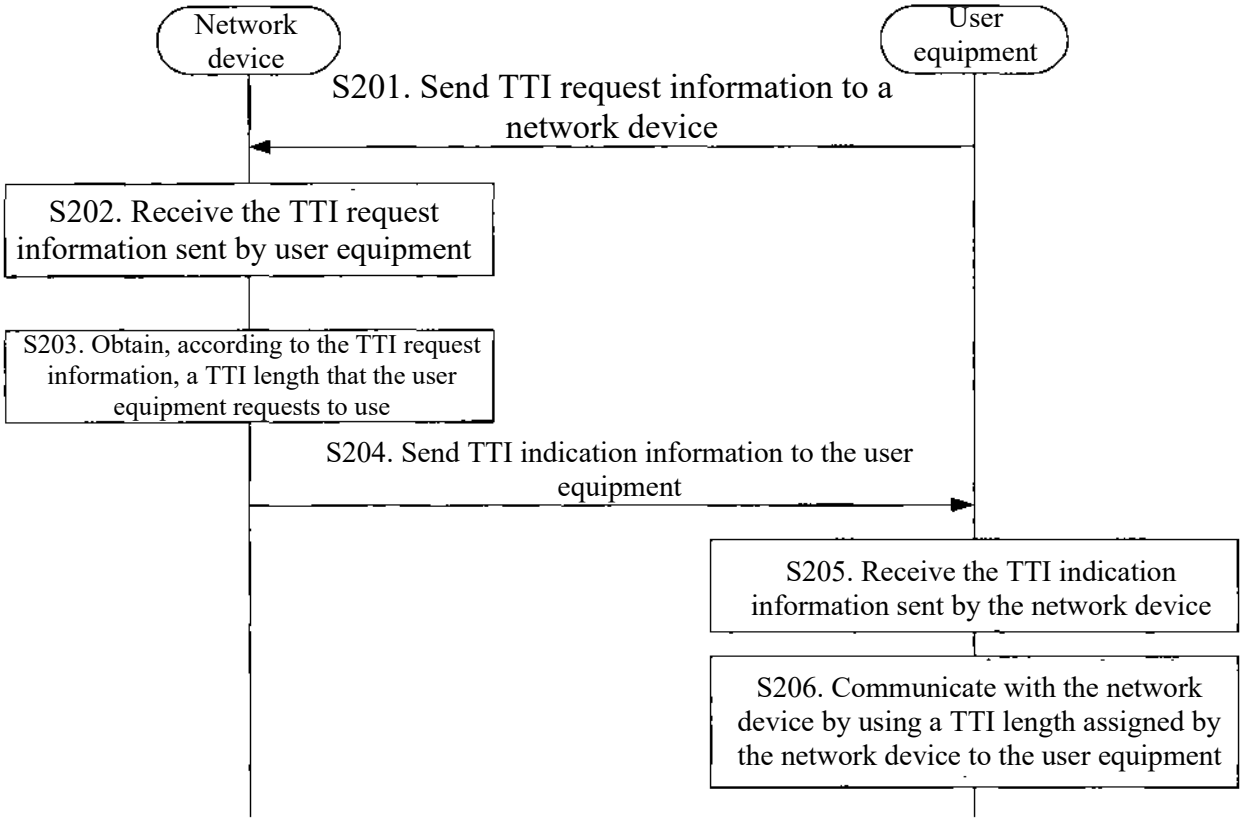


FIG. 2

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Samsung Electronics Co., Ltd. v. Asus Technology Licensing Inc.
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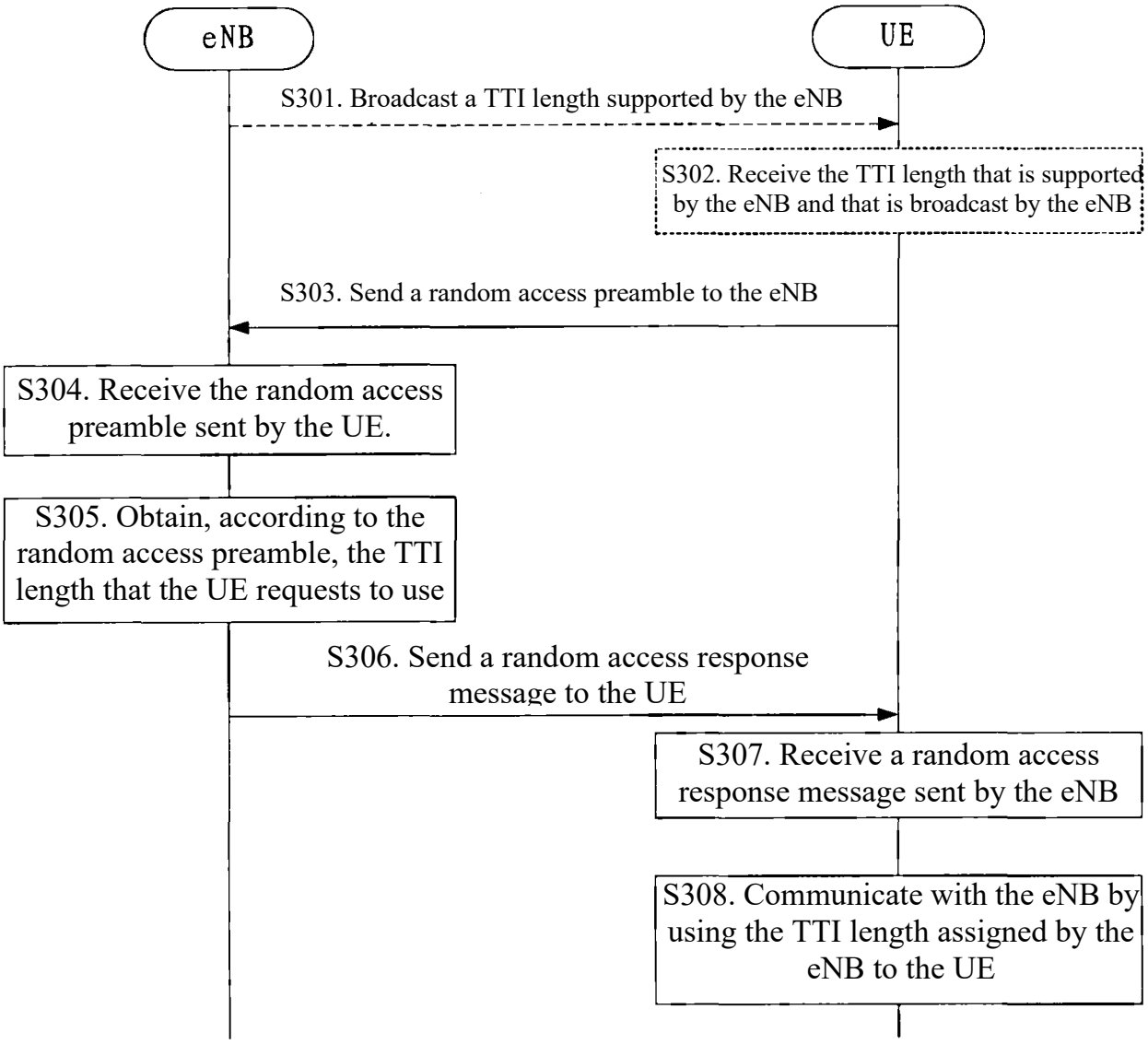

eNB
UE
S301. Broadcast a TTI length supported by the eNB
S302. Receive the TTI length that is supported by the eNB and that is broadcast by the eNB
S303. Send a random access preamble to the eNB
S304. Receive the random access preamble sent by the UE.
S305. Obtain, according to the random access preamble, the TTI length that the UE requests to use
S306. Send a random access response message to the UE
S307. Receive a random access response message sent by the eNB
S308. Communicate with the eNB by using the TTI length assigned by the eNB to the UE

FIG. 3

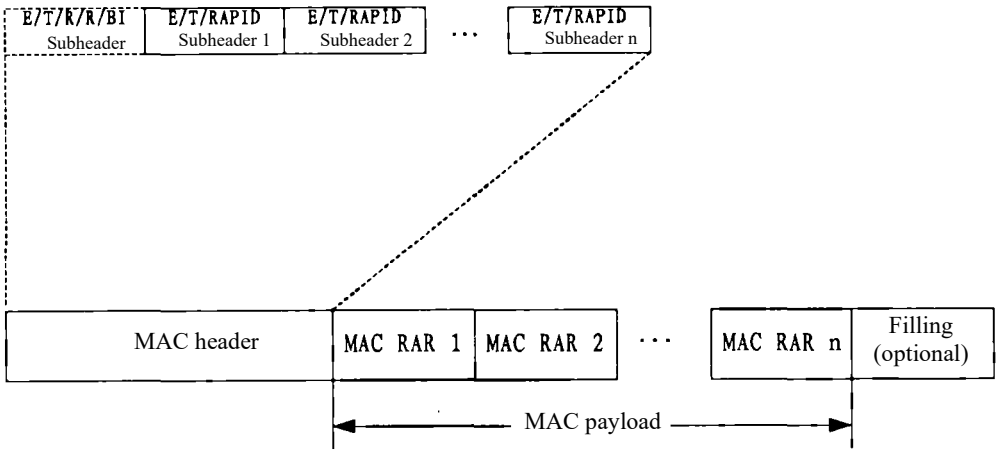

E/T/R/R/BI Subheader
E/T/RAPID Subheader 1
E/T/RAPID Subheader 2
E/T/RAPID Subheader n
MAC header
MAC RAR 1
MAC RAR 2
MAC RAR n
Filling (optional)
MAC payload

FIG. 4

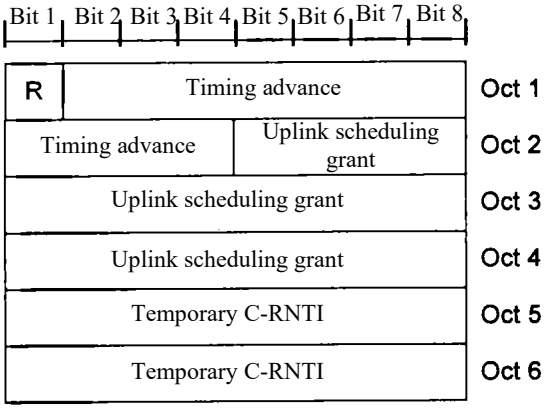


FIG. 5

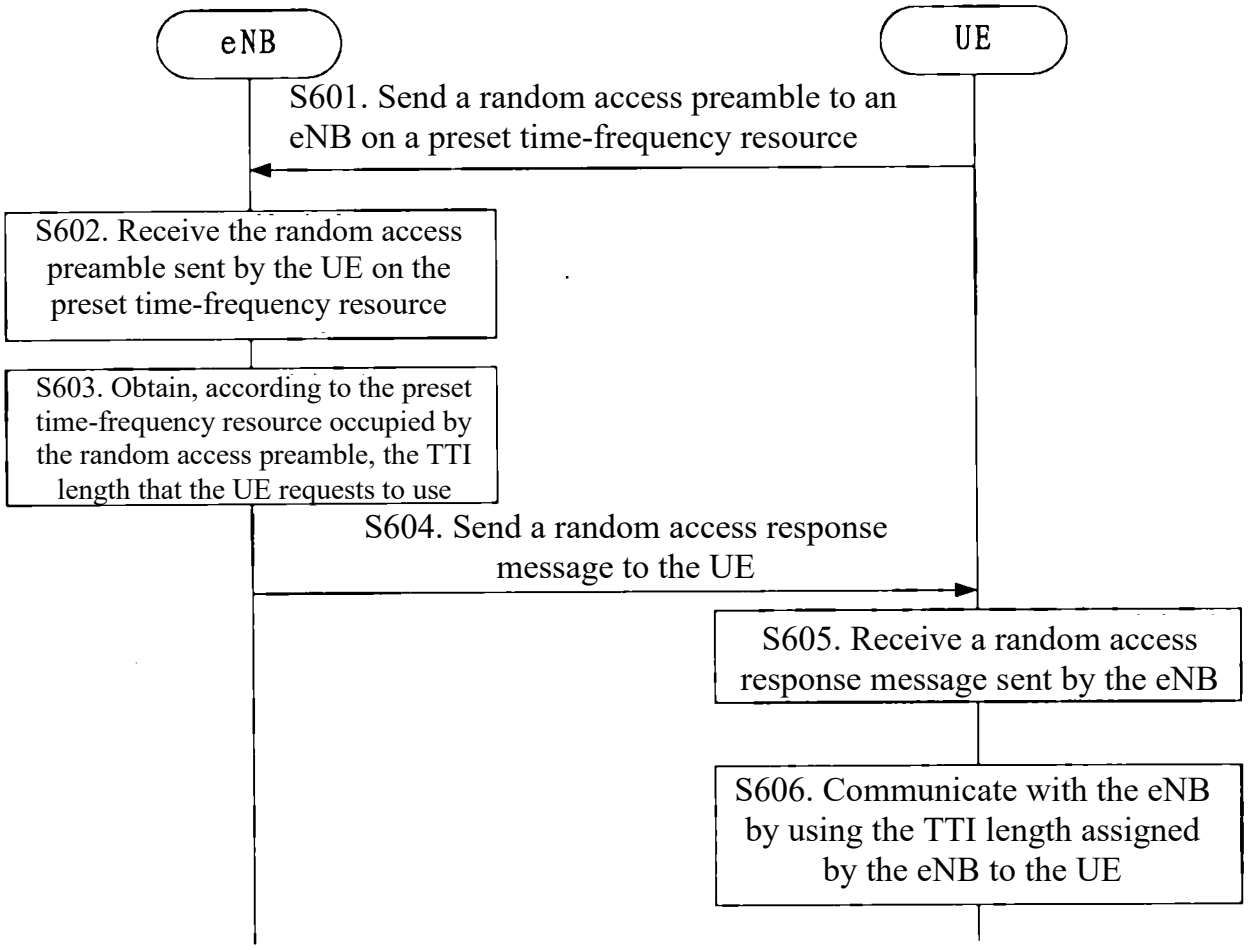


FIG. 6

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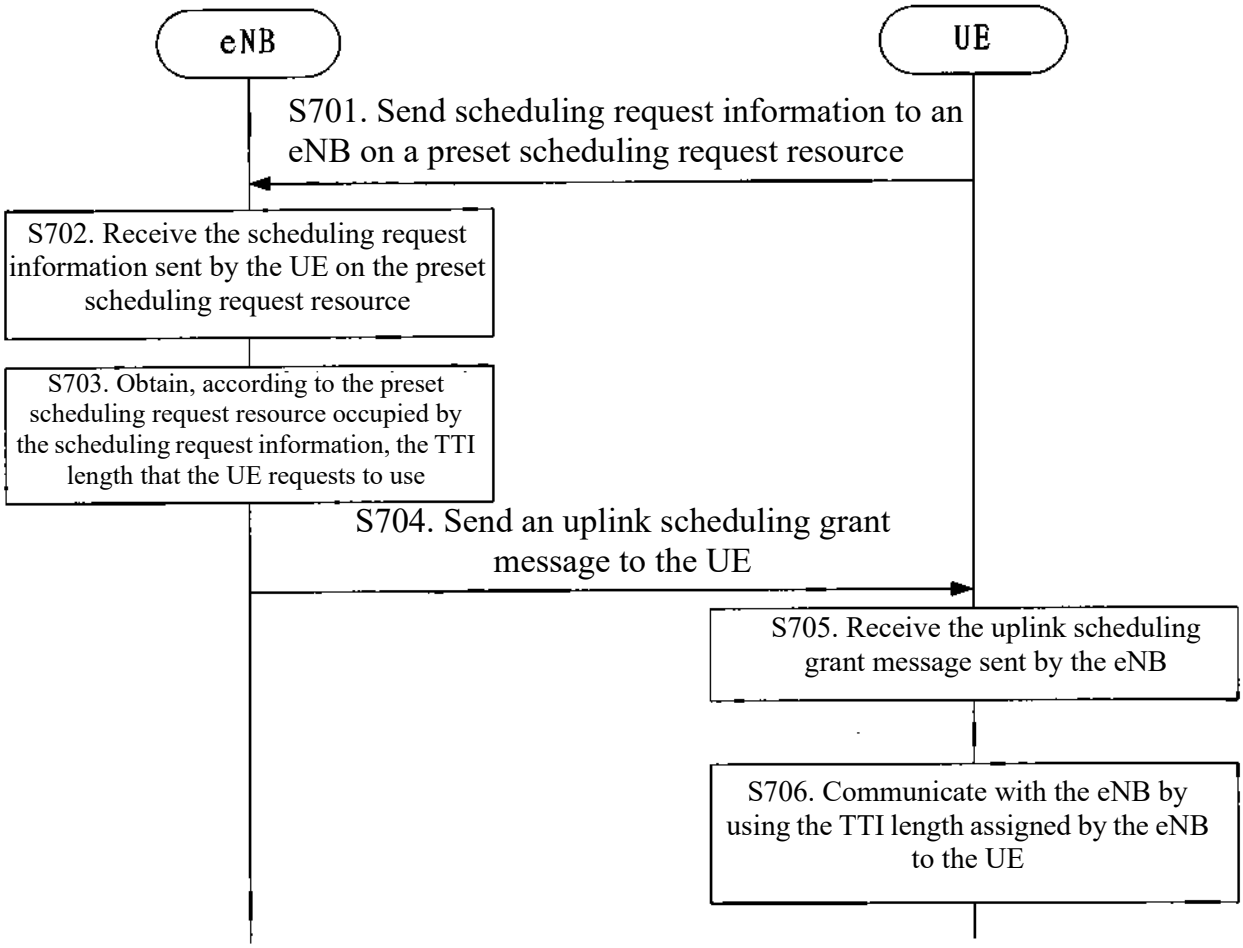

eNB
UE
S701. Send scheduling request information to an eNB on a preset scheduling request resource
S702. Receive the scheduling request information sent by the UE on the preset scheduling request resource
S703. Obtain, according to the preset scheduling request resource occupied by the scheduling request information, the TTI length that the UE requests to use
S704. Send an uplink scheduling grant message to the UE
S705. Receive the uplink scheduling grant message sent by the eNB
S706. Communicate with the eNB by using the TTI length assigned by the eNB to the UE

FIG. 7

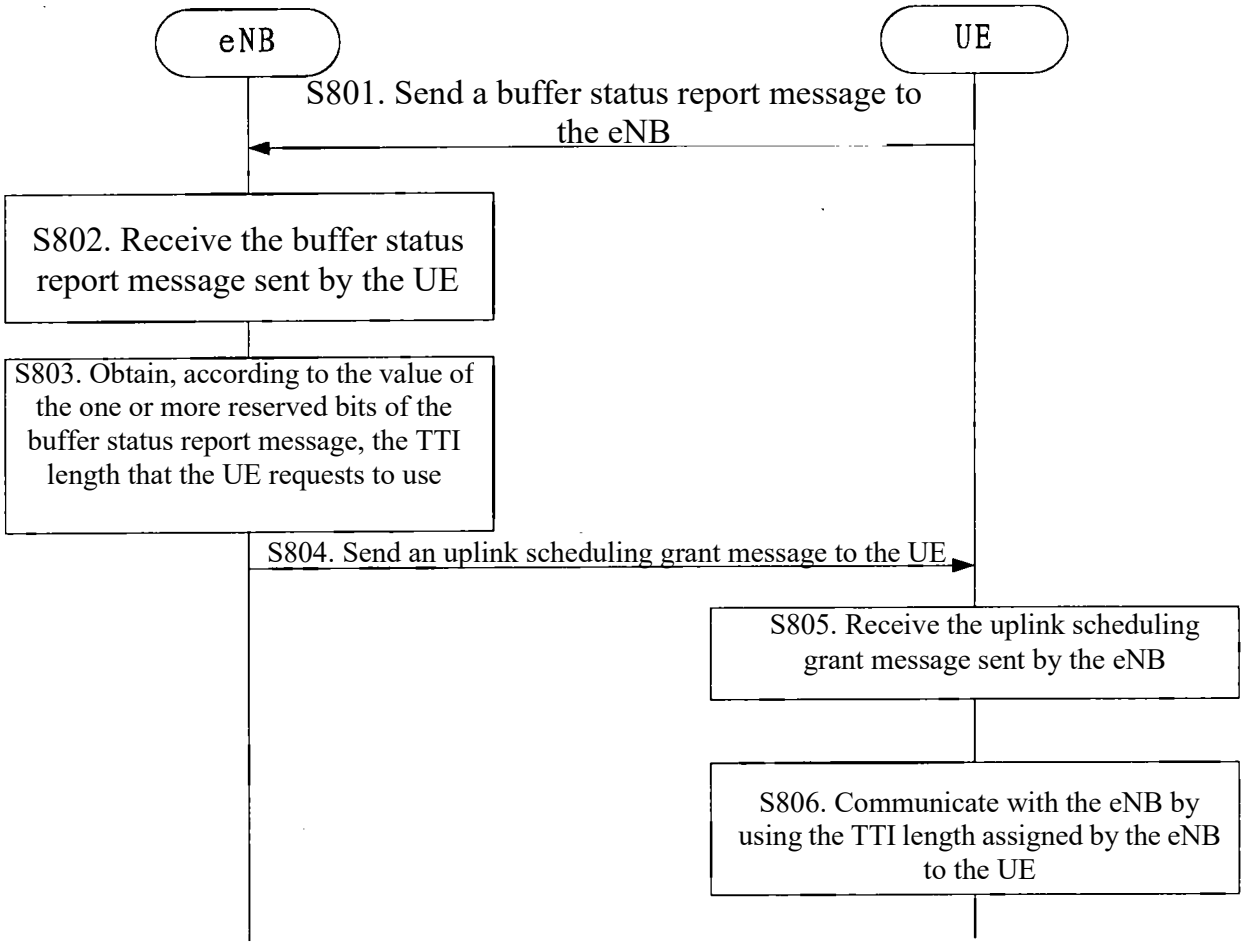
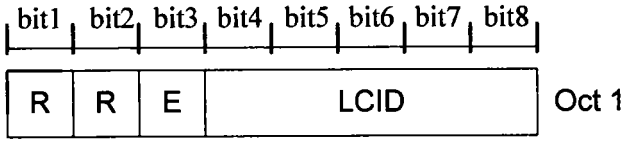


FIG. 8



R/R/E/LCID subheader

FIG. 9

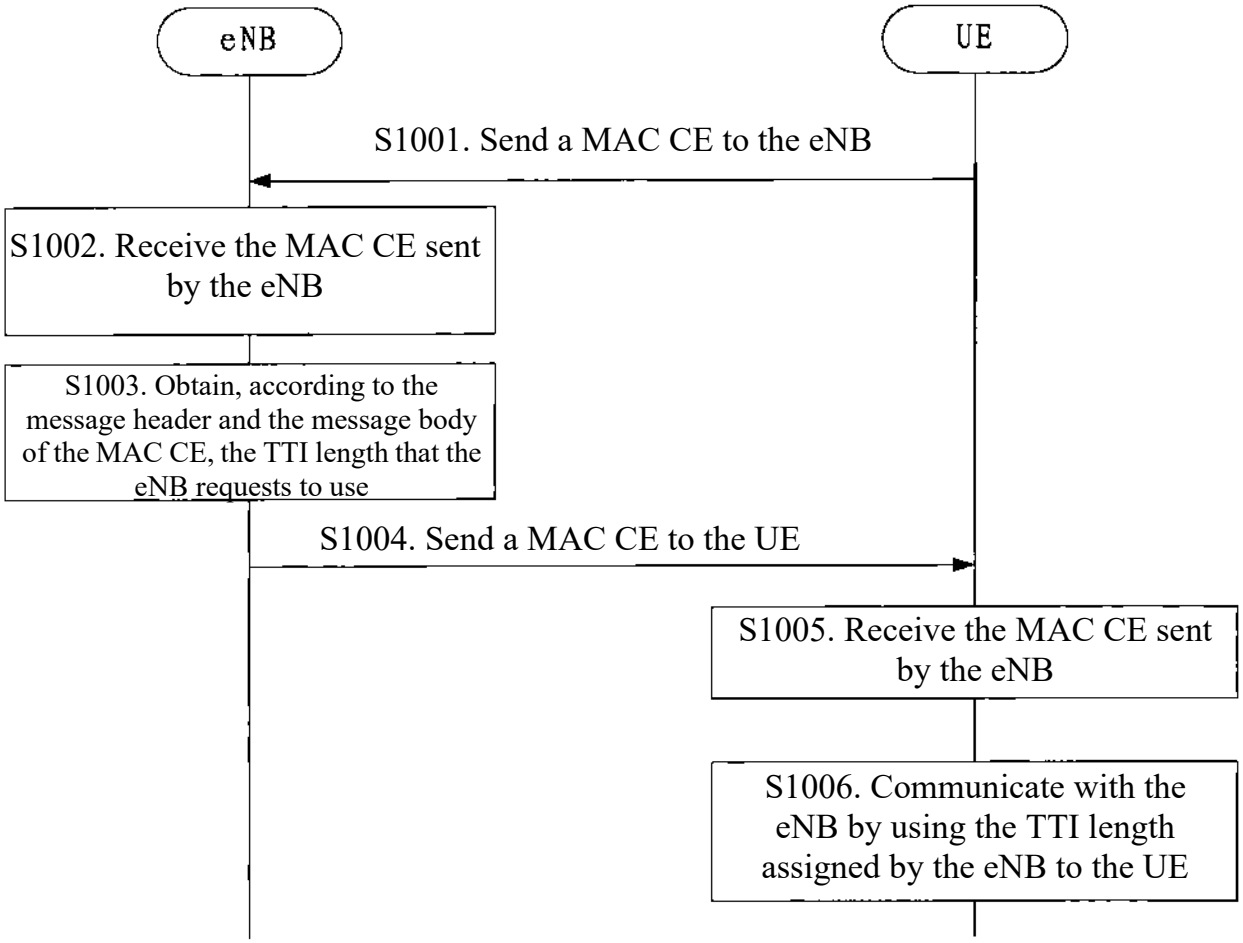

eNB
UE
S1001. Send a MAC CE to the eNB
S1002. Receive the MAC CE sent by the eNB
S1003. Obtain, according to the message header and the message body of the MAC CE, the TTI length that the eNB requests to use
S1004. Send a MAC CE to the UE
S1005. Receive the MAC CE sent by the eNB
S1006. Communicate with the eNB by using the TTI length assigned by the eNB to the UE

FIG. 10

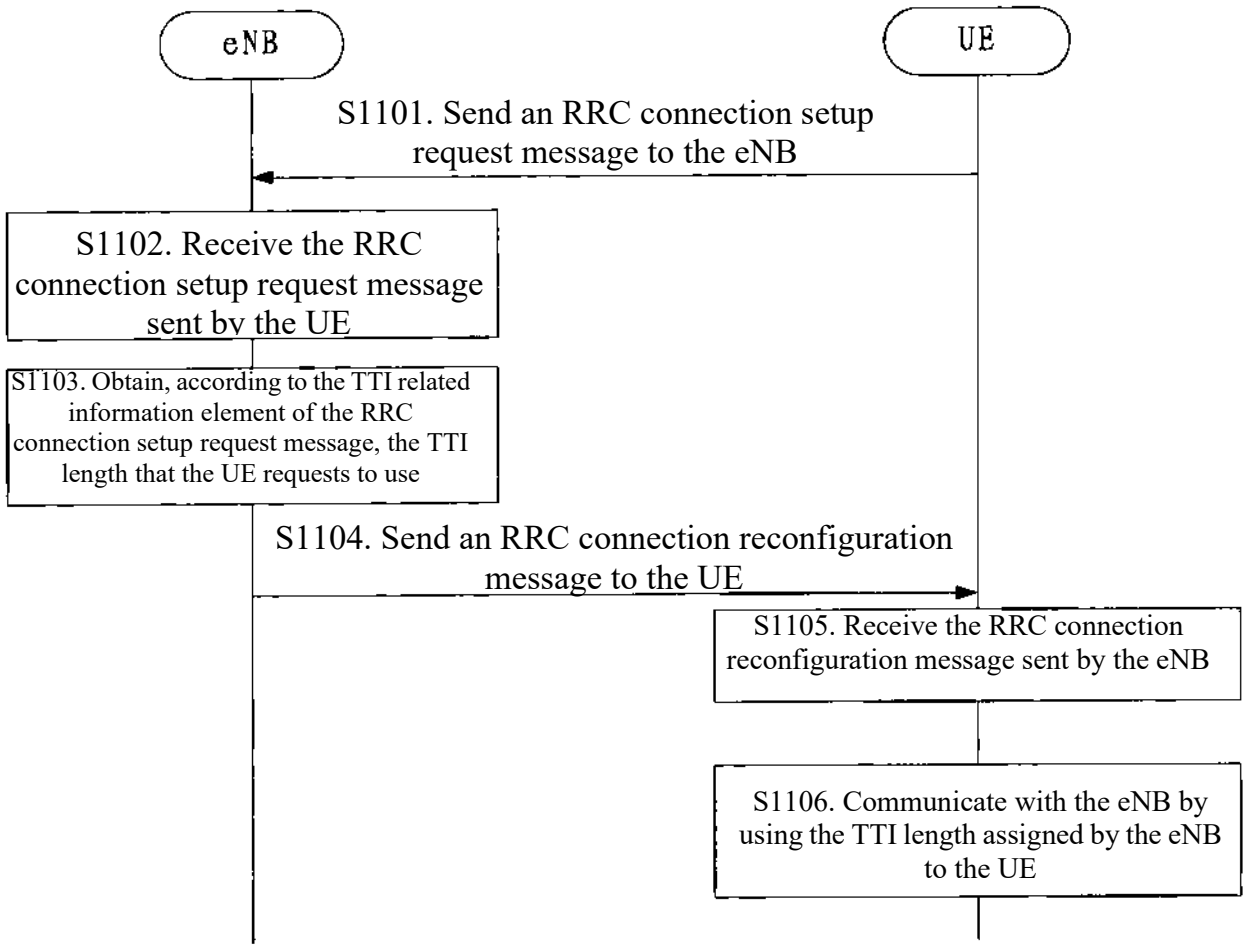

eNB
UE
S1101. Send an RRC connection setup request message to the eNB
S1102. Receive the RRC connection setup request message sent by the UE
S1103. Obtain, according to the TTI related information element of the RRC connection setup request message, the TTI length that the UE requests to use
S1104. Send an RRC connection reconfiguration message to the UE
S1105. Receive the RRC connection reconfiguration message sent by the eNB
S1106. Communicate with the eNB by using the TTI length assigned by the eNB to the UE

FIG. 11

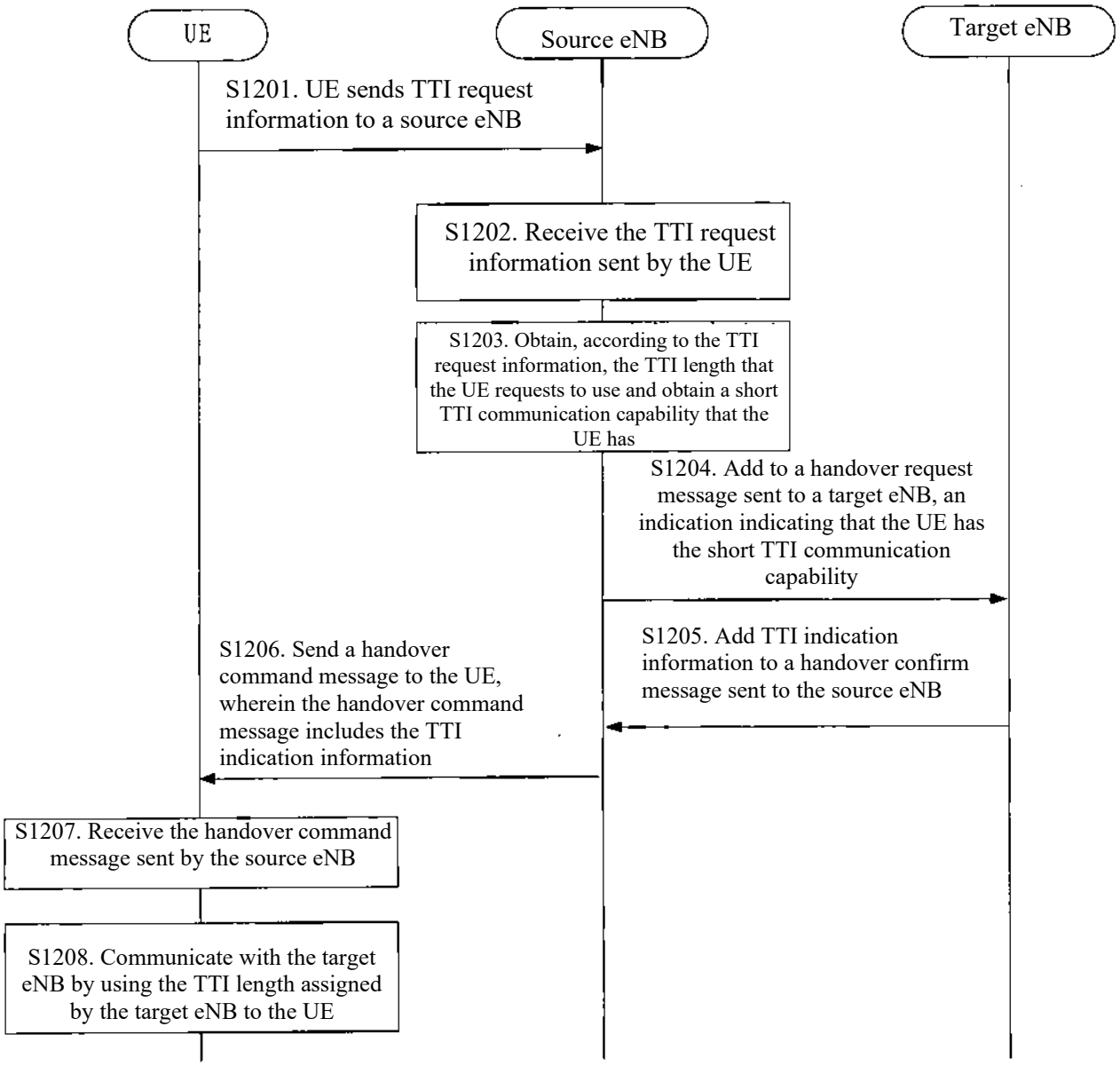

UE
Source eNB
Target eNB
S1201. UE sends TTI request information to a source eNB
S1202. Receive the TTI request information sent by the UE
S1203. Obtain, according to the TTI request information, the TTI length that the UE requests to use and obtain a short TTI communication capability that the UE has
S1204. Add to a handover request message sent to a target eNB, an indication indicating that the UE has the short TTI communication capability
S1205. Add TTI indication information to a handover confirm message sent to the source eNB
S1206. Send a handover command message to the UE, wherein the handover command message includes the TTI indication information
S1207. Receive the handover command message sent by the source eNB
S1208. Communicate with the target eNB by using the TTI length assigned by the target eNB to the UE

FIG. 12

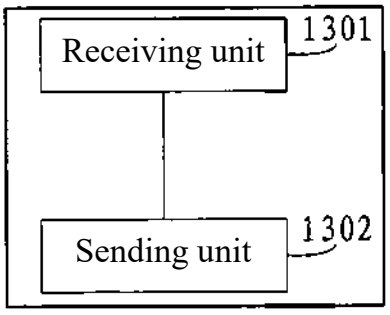

Receiving unit
1301
Sending unit
1302

FIG. 13

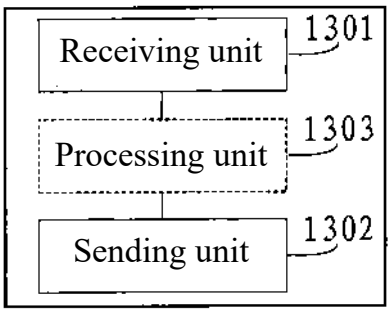


FIG. 14

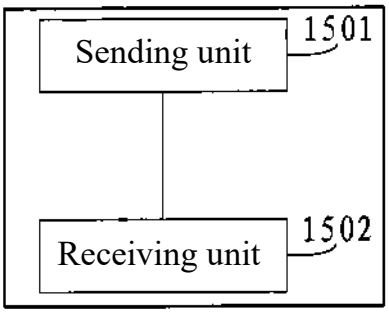


FIG. 15

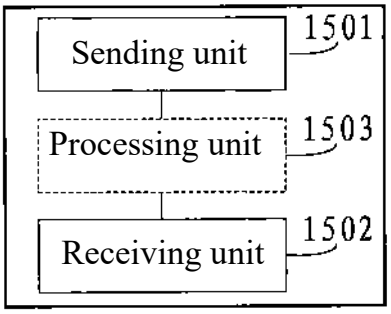


FIG. 16

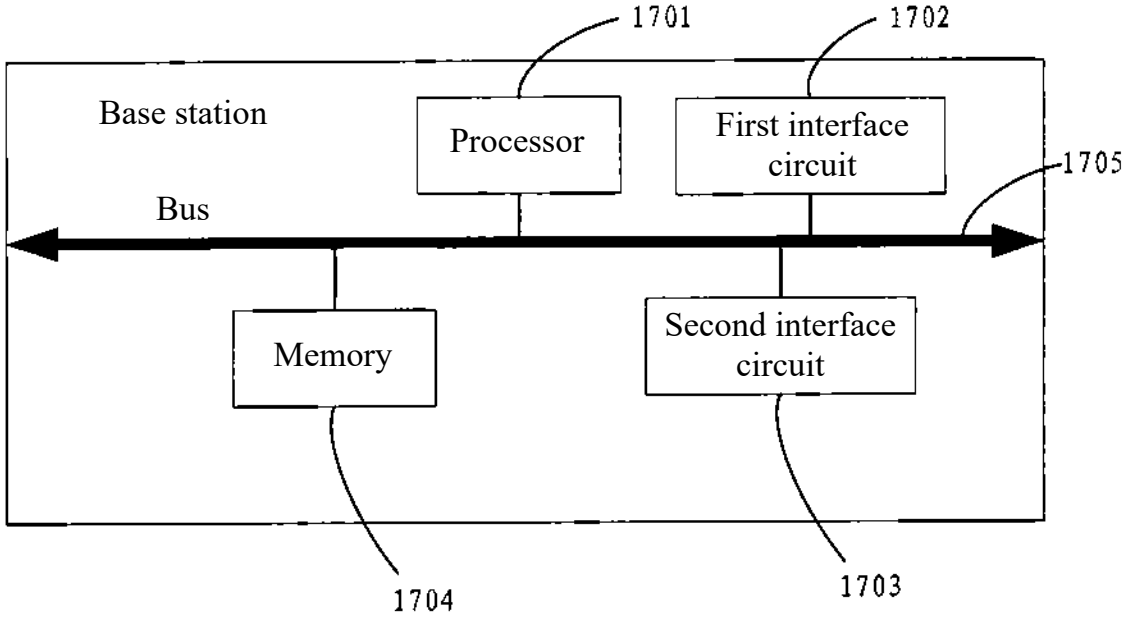

1701
1702
Base station
Processor
First interface circuit
1705
Bus
Memory
Second interface circuit
1704
1703

FIG. 17

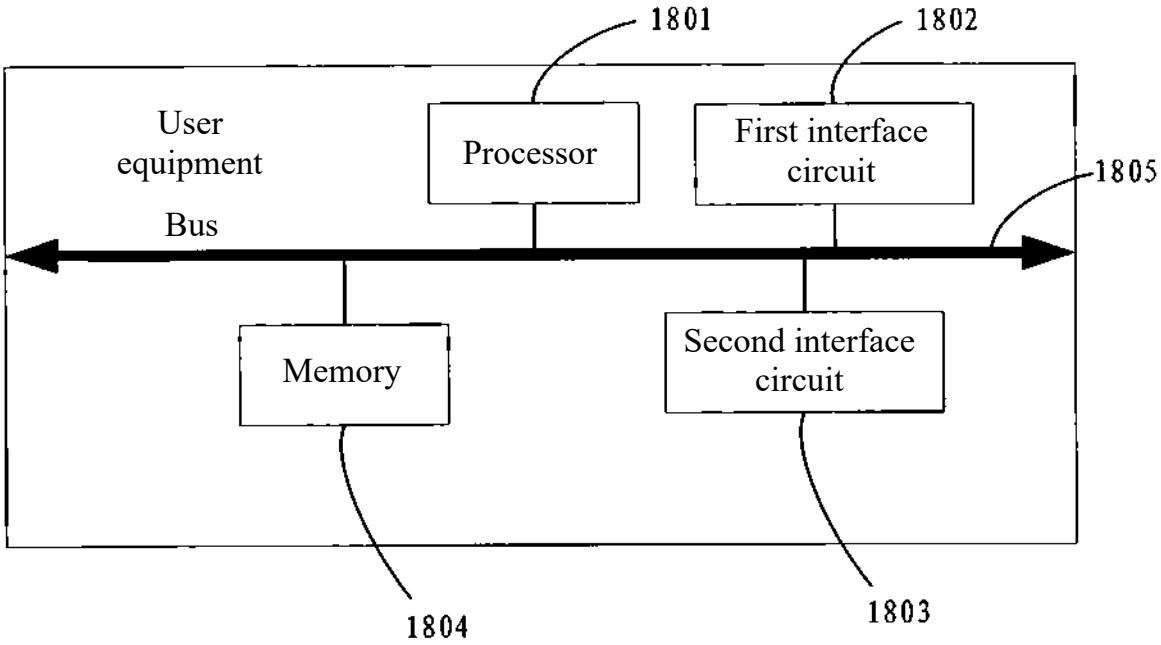

1801
1802
User equipment
Processor
First interface circuit
1805
Bus
Memory
Second interface circuit
1804
1803

FIG. 18

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/073234

A. CLASSIFICATION OF SUBJECT MATTER

H04W 16/10 (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)

H04W; H04Q; H04B

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)

CNPAT; CNKI; WPI; EPODOC: LTE, base station, NodeB, UE, request, configure, indicate, TTI, length

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 103167579 A (HUAWEI TECHNOLOGIES CO., LTD.) 19 June 2013 (19.06.2013) description, paragraph [0005]	1-73
A	CN 104303565 A (HUAWEI TECHNOLOGIES CO., LTD.) 21 January 2015 (21.01.2015) the whole document	1-73
A	CN 101272177 A (DA TANG MOBILE COMMUNICATIONS EQUIPMENT CO., LTD.) 24 September 2008 (24.09.2008) the whole document	1-73
A	US 2014071954 A1 (FUTUREWEI TECHNOLOGIES INC.) 13 March 2014 (13.03.2014) the whole document	1-73

☐ 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

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

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"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	Date of mailing of the international search report
27 September 2016	25 October 2016

Name and mailing address of the ISA	Authorized officer
State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	LIU, Cheng`en Telephone No. (86-10) 62413330

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2016/073234

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 103167579 A	19 June 2013	EP 2770790 A1	27 August 2014
		CN 103167579 B	16 December 2015
		EP 2770790 A4	22 October 2014
		US 2014286320 A1	25 September 2014
		WO 2013083001 A1	13 June 2013
		EP 2770790 B1	06 April 2016
CN 104303565 A	21 January 2015	WO 2014166122 A1	16 October 2014
CN 101272177 A	24 September 2008	CN 101272177 B	19 December 2012
US 2014071954 A1	13 March 2014	EP 2891357 A1	08 July 2015
		CN 104620629 A	13 May 2015
		US 2015351093 A1	03 December 2015
		EP 2891357 A4	05 August 2015
		WO 2014040531 A1	20 March 2014
		US 9131498 B2	08 September 2015

International Search Report	International Application No. PCT/CN2016/073234

A. Classification of Subject Matter
H04W 16/10 (01/2009) 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)
H04W; H04Q; H04B

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, wherein practicable, search terms used)
CNPAT, CNKI, WPI, EPODOC: LTE, base station, NodeB, UE, request, configure, indicate, TTI, length

C. Related Documents

Type*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim number
X	CN 103167579 A (Huawei Technologies Co., Ltd.) June 19, 2013 (06/19/2013) the paragraph [0005] of the Specification	1-73
A	CN 104303565 A (Huawei Technologies Co., Ltd.) January 21, 2015 (01/21/2015) the whole document	1-73
A	CN 101272177 A (Datang Mobile Communications Equipment Co., Ltd.) September 24, 2008 (09/24/2008) the whole document	1-73
A	US 2014071954 A1 (Futurewei Technologies Inc.) March 13, 2014 (03/13/2014) the whole document	1-73

☐ Further documents are listed in the continuation of Box C.

☑ See patent family annex.

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"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	Date of mailing of the international search report
September 27, 2016	October 25, 2016
Name and mailing address of ISA/CN China National Intellectual Property Administration (ISA/CN) No. 6 Xitucheng Road, Jimenqiao, Haidian District, Beijing, China, 100088 Fax number (86-10) 62019451	Authorized officer Liu Cheng'en Phone number (86-10) 62413330

Form PCT/ISA/210 (second sheet) (July 2009)

International Search Report
Information on patent family members

International Application No.
PCT/CN2016/073234

Patent document cited in search report			Publication date (month/day/year)	Patent family member(s)			Publication date (month/day/year)
CN	103167579	A	June 19, 2013	EP	2770790	A1	August 27, 2014
				CN	103167579	B	December 16, 2015
				EP	2770790	A4	October 22, 2014
				US	2014286320	A1	September 25, 2014
				WO	2013083001	A1	June 13, 2013
				EP	2770790	B1	April 06, 2016
CN	104303565	A	January 21, 2015	WO	2014166122	A1	October 16, 2014
CN	101272177	A	September 24, 2008	CN	101272177	B	December 19, 2012
US	2014071954	A1	March 13, 2014	EP	2891357	A1	July 08, 2015
				CN	104620629	A	May 13, 2015
				US	2015351093	A1	December 03, 2015
				EP	2891357	A4	August 05, 2015
				WO	2014040531	A1	March 20, 2014
				US	9131498	B2	September 08, 2015

Form PCT/ISA/210 (patent family annex) (July 2009)

(12) 按照专利合作条约所公布的国际申请

(19) 世界知识产权组织
国 际 局

(43) 国际公布日
2017 年 8 月 10 日 (10.08.2017)

WIPO | PCT

(10) 国际公布号
WO 2017/132848 A1

(51) 国际专利分类号:
H04W 16/10 (2009.01)

(21) 国际申请号: PCT/CN2016/073234

(22) 国际申请日: 2016 年 2 月 2 日 (02.02.2016)

(25) 申请语言: 中文

(26) 公布语言: 中文

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(81) 指定国 (除另有指明，要求每一种可提供的国家保护): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, 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。

(84) 指定国 (除另有指明，要求每一种可提供的地区保护): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), 欧亚 (AM, AZ, BY, KG, KZ, RU, TJ, TM), 欧洲 (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG)。

根据细则 4.17 的声明:
— 关于申请人有权申请并被授予专利(细则 4.17(ii))

本国际公布:
— 包括国际检索报告(条约第 21 条(3))。

(54) **Title**: TTI CONFIGURATION METHOD, DEVICE AND SYSTEM

(54) **发明名称**: 一种 TTI 配置方法、设备和系统

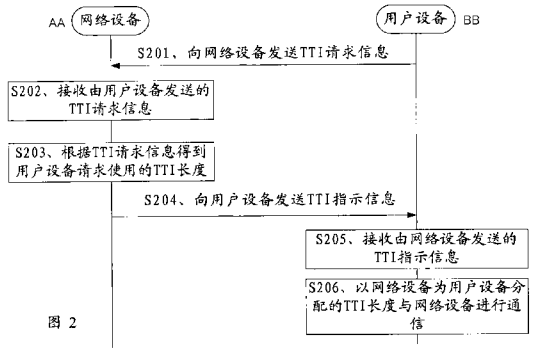


图 2

S201 SENDING TTI REQUEST INFORMATION TO A NETWORK DEVICE
S202 RECEIVING THE TTI REQUEST INFORMATION SENT BY A USER EQUIPMENT
S203 ACCORDING TO THE TTI REQUEST INFORMATION, OBTAINING A TTI LENGTH REQUESTED BY THE USER EQUIPMENT FOR USE
S204 SENDING TTI INDICATION INFORMATION TO THE USER EQUIPMENT
S205 RECEIVING THE TTI INDICATION INFORMATION SENT BY THE NETWORK DEVICE
S206 COMMUNICATING WITH THE NETWORK DEVICE HAVING THE TTI LENGTH ALLOCATED, BY THE NETWORK DEVICE, TO THE USER EQUIPMENT
AA NETWORK DEVICE
BB USER EQUIPMENT

(57) **Abstract**: Disclosed are a TTI configuration method, device and system, relating to the field of wireless communications, and used for solving the problem that there is no method for configuring a short TTI. The TTI configuration method comprises: a network device receiving TTI request information, wherein the TTI request information indicates a TTI length requested for use; and in response to the TTI request information, sending TTI indication information, wherein the TTI indication information contains at least one piece of the following information: a TTI length allocated by the network device, effective moment information, initial symbol position information, and enabled confirmation information about the TTI length. The embodiments of the present invention are applied to LTE communications.

(57) **摘要**: 本发明公开了一种 TTI 配置方法、设备和系统，涉及无线通信领域，用于解决尚未有对短 TTI 进行配置的方法的问题。该 TTI 配置方法包括：网络设备接收 TTI 请求信息，其中，所述 TTI 请求信息指示请求使用的 TTI 长度；响应于所述 TTI 请求信息，发送 TTI 指示信息，其中，所述 TTI 指示信息包含以下信息中的至少一个：所述网络设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，所述 TTI 长度的使能确认信息。本发明的实施例应用于 LTE 通信。

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一种 TTI 配置方法、设备和系统

技术领域

本发明涉及无线通信领域，尤其涉及一种 TTI 配置方法、设备和系统。

背景技术

在现有 LTE（英文名称：long term evolution，中文名称：长期演进）通信协议中，TTI（英文名称：transmission time interval，中文名称：传输时间间隔）为 LTE 无线资源的时间域中的基本时间单位，其标准的时间长度为 1ms（下文中简称为 1ms TTI）。

目前，正在研究在 LTE 系统中采用更短时间长度的 TTI（相对于 1ms TTI 而言时间长度更短，下文中简称为短 TTI）。采用短 TTI 与采用 1ms TTI 相比，有以下益处：一方面，TTI 长度减少后，单个数据包的往返传输时延随之减少，对于 TCP 慢启动阶段的窗长度快速增长很有帮助，能够明显提升慢启动阶段的数据吞吐量，所以 TTI 长度减少后，能够明显降低小数据包的传输时延；另一方面，短 TTI 情况下，HARQ 反馈和 CSI 反馈都会更迅速，这样能够获得更好的链路自适应特性。

在后续 LTE 协议持续演进过程中，引入短 TTI 同时为了兼容 1ms TTI，将出现多种时间长度 TTI 共存的情况，因此必然面临如何对短 TTI 进行配置的问题，即 eNB（英文名称：evolved node basestation，中文名称：演进型基站）如何通知 UE（英文名称：user equipment，中文名称：用户设备）使用短 TTI 资源以及 UE 如何使用短 TTI 资源。目前，现有技术中尚未有对短 TTI 进行配置的方法。

发明内容

本发明的实施例提供一种 TTI 配置方法、设备和系统，以解决

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尚未有对短 TTI 进行配置的方法的问题。

为达到上述目的，本发明的实施例采用如下技术方案：

第一方面，提供一种 TTI 配置方法，具体包括如下步骤：

网络设备接收由用户设备发送的 TTI 请求信息，其中，所述 TTI 请求信息指示请求使用的 TTI 长度；

网络设备响应于所述 TTI 请求信息，向所述用户设备发送 TTI 指示信息，其中，所述 TTI 指示信息包含以下信息中的至少一个：

所述网络设备为所述用户设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，所述 TTI 长度的使能确认信息。

在该实现方式中，用户设备向网络设备发送 TTI 请求信息，其中，TTI 请求信息指示用户设备请求使用的 TTI 长度；网络设备接收由用户设备发送的 TTI 请求信息；网络设备根据 TTI 请求信息得到用户设备请求使用的 TTI 长度；网络设备向用户设备发送 TTI 指示信息，其中，TTI 指示信息包含以下信息中的至少一个：网络设备为用户设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息；用户设备以网络设备为用户设备分配的 TTI 长度和/或生效时刻和/或起始符号位置与网络设备进行通信。通过用户设备向网络设备请求使用 TTI 长度，其中，该 TTI 长度包括短 TTI，网络设备针对用户设备的请求分配相应的 TTI 长度，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第一方面，在第一种可能的实现方式中，在所述网络设备接收由用户设备发送的 TTI 请求信息之前，包括：

所述网络设备向用户设备广播所述网络设备支持的 TTI 长度。

结合第一方面，在第二种可能的实现方式中，所述响应于所述 TTI 请求信息，包括：

根据所述 TTI 请求信息的信息内容得到用户设备请求使用的 TTI 长度，其中，所述 TTI 请求信息的信息内容与所述用户设备请求使用的 TTI 长度相对应。

结合第一方面，在第三种可能的实现方式中，所述响应于所述

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TTI 请求信息，包括：

根据所述 TTI 请求信息所占用的资源得到用户设备请求使用的 TTI 长度，其中，所述所占用的资源与所述用户设备请求使用的 TTI 长度相对应。

结合第一方面的第二种可能的实现方式中，在第四种可能的实现方式中，

所述网络设备接收由用户设备发送的 TTI 请求信息包括：

所述网络设备接收由用户设备发送的随机接入前导码，其中，所述随机接入前导码指示所述请求使用的 TTI 长度；

所述响应于所述 TTI 请求信息包括：

根据所述随机接入前导码得到所述请求使用的 TTI 长度；

所述向所述用户设备发送 TTI 指示信息，包括：

向所述用户设备发送随机接入响应消息，其中，在所述随机接入响应消息中指示所述 TTI 指示信息。

在该实现方式中，通过在随机接入过程中，UE 通过随机接入前导码来指示 UE 请求的 TTI 长度，eNB 针对该请求通过随机接入响应消息指示为其分配的 TTI 长度，实现了在随机接入过程中通过随机接入前导码实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第一方面的第四种可能的实现方式，在第五种可能的实现方式中，所述在所述随机接入响应消息中指示所述 TTI 指示信息，包括：

在所述随机接入响应消息中增加字节来指示所述 TTI 指示信息；

或者，

通过复用所述随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示所述 TTI 指示信息。

结合第一方面的第三种可能的实现方式，在第六种可能的实现方式中，

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所述网络设备接收由用户设备发送的 TTI 请求信息包括:

所述网络设备接收所述用户设备在预设时频资源上的随机接入前导码，其中所述预设时频资源与所述用户设备请求使用的 TTI 长度相对应;

根据所述 TTI 请求信息所占用的资源得到所述用户设备请求使用的 TTI 长度包括:

根据所述随机接入前导码所占用的预设时频资源得到所述用户设备请求使用的 TTI 长度;

在该实现方式中，通过在随机接入过程中，UE 通过随机接入前导码所占用的资源来指示 UE 请求的 TTI 长度，eNB 针对该请求通过随机接入响应消息指示为其分配的 TTI 长度，在随机接入过程中通过随机接入前导码所占用的资源实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第一方面的第三种可能的实现方式，在第七种可能的实现方式中，

所述网络设备接收由用户设备发送的 TTI 请求信息包括:

所述网络设备接收由所述用户设备在预设调度请求资源上发送的调度请求信息，其中所述预设调度请求资源与所述请求使用的 TTI 长度相对应;

所述根据所述 TTI 请求信息所占用的资源得到所述请求使用的 TTI 长度包括:

根据所述调度请求信息所占用的预设时频资源得到所述请求使用的 TTI 长度。

在该实现方式中，通过在调度请求过程中，UE 通过将调度请求信息所占用预设调度请求资源指示 UE 请求的 TTI 长度，eNB 针对该请求通过上行调度授权消息指示为其分配的 TTI 长度，在用户设备调度请求过程中实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第一方面的第二种可能的实现方式，在第八种可能的实现

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方式中，

所述网络设备接收由用户设备发送的 TTI 请求信息包括：

所述网络设备接收由用户设备发送的缓存状态报告消息，其中，所述缓存状态报告消息的一个或多个保留比特位的值指示所述用户设备请求使用的 TTI 长度；

所述根据所述 TTI 请求信息的信息内容得到所述请求使用的 TTI 长度包括：

根据所述缓存状态报告消息的一个或多个保留比特位的值得到所述请求使用的 TTI 长度。

在该实现方式中，通过在缓存状态报告过程中，UE 通过将缓存状态报告消息的一个或多个保留比特位的值指示 UE 请求的 TTI 长度，eNB 针对该请求通过上行调度授权消息指示为其分配的 TTI 长度，在 UE 缓存状态报告过程中实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第一方面的第二种可能的实现方式，在第九种可能的实现方式中，

所述网络设备接收由用户设备发送的 TTI 请求信息包括：

所述网络设备接收由用户设备发送的 MAC CE，其中，所述 MAC CE 的消息头中的一个上行 LCID 值指示所述 MAC CE 的类型是 TTI 请求信息，所述 MAC CE 的消息体指示请求的 TTI 长度；

所述根据所述 TTI 请求信息的信息内容得到所述请求使用的 TTI 长度包括：

根据所述 MAC CE 的消息头和消息体得到所述请求使用的 TTI 长度；

所述向所述用户设备发送 TTI 指示信息，包括：

向所述用户设备发送 MAC CE，其中，所述 MAC CE 的消息头中的一个下行 LCID 值指示所述 MAC CE 的类型是 TTI 指示信息，所述 MAC CE 的消息体包含所述 TTI 指示信息。

在该实现方式中，通过 UE 通过将 MAC CE 的消息头和消息体

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指示 UE 请求的 TTI 长度，eNB 针对该请求通过 MAC CE 指示为其分配的 TTI 长度，对 BSR 消息所属的 MAC CE 进行扩展来实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第一方面的第二种可能的实现方式，在第十种可能的实现方式中，

所述网络设备接收由用户设备发送的 TTI 请求信息包括：

所述网络设备接收由用户设备发送的 RRC 连接建立请求消息，其中，所述 RRC 连接建立请求消息的 TTI 相关信元指示所述请求使用的 TTI 长度；

所述根据所述 TTI 请求信息的信息内容得到所述请求使用的 TTI 长度包括：

根据所述 RRC 连接建立请求消息的 TTI 相关信元得到所述请求使用的 TTI 长度；

所述向所述用户设备发送 TTI 指示信息，包括：

向所述用户设备发送 RRC 连接建立消息或 RRC 重配置消息，其中，所述 RRC 连接建立消息或所述 RRC 重配置消息包含所述 TTI 指示信息。

在该实现方式中，通过在 RRC 连接建立过程中，UE 通过将 RRC 连接建立请求消息的 TTI 相关信元指示 UE 请求的 TTI 长度，eNB 针对该请求通过 RRC 连接重配置消息指示为其分配的 TTI 长度，在 RRC 连接建立过程中实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第一方面的第二种可能的实现方式，在第十一种可能的实现方式中，

所述向所述用户设备发送 TTI 指示信息，包括：

向所述用户设备发送切换命令消息，其中，所述切换命令消息包含所述 TTI 指示信息。

在该实现方式中，通过在切换准备阶段中，源 eNB 可以在向目标 eNB 发送的切换请求消息中携带 UE 具有短 TTI 通信能力的指

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示，目标 eNB 在发给源 eNB 的切换确认消息中携带 TTI 指示信息，源 eNB 向 UE 发送切换命令消息，切换命令消息包含 TTI 指示信息，TTI 指示信息包含 eNB 为 UE 分配的 TTI 长度，在切换准备阶段中实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

第二方面，提供了一种 TTI 配置方法，具体包括如下步骤：

用户设备向网络设备发送 TTI 请求信息，所述 TTI 请求信息指示所述用户设备请求使用的 TTI 长度；

接收由所述网络设备发送的 TTI 指示信息，其中，所述 TTI 指示信息包含以下信息中的至少一个：

为所述用户设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，所述 TTI 长度的使能确认信息。

在该实现方式中，用户设备向网络设备发送 TTI 请求信息，其中，TTI 请求信息指示用户设备请求使用的 TTI 长度；网络设备接收由用户设备发送的 TTI 请求信息；网络设备根据 TTI 请求信息得到用户设备请求使用的 TTI 长度；网络设备向用户设备发送 TTI 指示信息，其中，TTI 指示信息包含以下信息中的至少一个：网络设备为用户设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息；用户设备以网络设备为用户设备分配的 TTI 长度和/或生效时刻和/或起始符号位置与网络设备进行通信。通过用户设备向网络设备请求使用 TTI 长度，其中，该 TTI 长度包括短 TTI，网络设备针对用户设备的请求分配相应的 TTI 长度，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第二方面，在第一种可能的实现方式中，在所述用户设备向网络设备发送 TTI 请求信息之前，包括：

接收所述网络设备支持的 TTI 长度。

结合第二方面，在第二种可能的实现方式中，所述 TTI 请求信息指示所述用户设备请求使用的 TTI 长度，包括：

所述 TTI 请求信息的信息内容指示所述用户设备请求使用的

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TTI 长度，其中，所述 TTI 请求信息的信息内容与所述用户设备请求使用的 TTI 长度相对应。

结合第二方面，在第三种可能的实现方式中，所述 TTI 请求信息指示所述用户设备请求使用的 TTI 长度，包括：

所述 TTI 请求信息所占用的资源指示所述用户设备请求使用的 TTI 长度，其中，所述所占用的资源与所述用户设备请求使用的 TTI 长度相对应。

结合第二方面的第二种可能的实现方式中，在第四种可能的实现方式中，

所述用户设备向所述网络设备发送 TTI 请求信息包括：

所述用户设备向所述网络设备发送随机接入前导码，其中，所述随机接入前导码指示所述用户设备请求使用的 TTI 长度；

所述接收由所述网络设备发送的 TTI 指示信息，包括：

接收由所述网络设备发送的随机接入响应消息，其中，在所述随机接入响应消息中指示所述 TTI 指示信息。

在该实现方式中，通过在随机接入过程中，UE 通过随机接入前导码来指示 UE 请求的 TTI 长度，eNB 针对该请求通过随机接入响应消息指示为其分配的 TTI 长度，实现了在随机接入过程中通过随机接入前导码实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第二方面的第四种可能的实现方式，在第五种可能的实现方式中，所述在所述随机接入响应消息中指示所述 TTI 指示信息，包括：

在所述随机接入响应消息中增加字节来指示所述 TTI 指示信息；

或者，

通过复用所述随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示所述 TTI 指示信息。

结合第二方面的第三种可能的实现方式，在第六种可能的实现

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方式中，

所述用户设备向网络设备发送 TTI 请求信息包括：

所述用户设备在预设时频资源上发送随机接入前导码，其中所述预设时频资源与所述用户设备请求使用的 TTI 长度相对应；

所述接收由所述网络设备发送的 TTI 指示信息，包括：

接收由所述网络设备发送的随机接入响应消息，其中，所述随机接入响应消息中包含所述 TTI 指示信息。

在该实现方式中，通过在随机接入过程中，UE 通过随机接入前导码所占用的资源来指示 UE 请求的 TTI 长度，eNB 针对该请求通过随机接入响应消息指示为其分配的 TTI 长度，在随机接入过程中通过随机接入前导码所占用的资源实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第二方面的第三种可能的实现方式，在第七种可能的实现方式中，

所述用户设备向网络设备发送 TTI 请求信息包括：

所述用户设备在预设调度请求资源上向所述网络设备发送调度请求信息，其中所述预设调度请求资源与所述用户设备请求使用的 TTI 长度相对应。

在该实现方式中，通过在调度请求过程中，UE 通过将调度请求信息所占用预设调度请求资源指示 UE 请求的 TTI 长度，eNB 针对该请求通过上行调度授权消息指示为其分配的 TTI 长度，在用户设备调度请求过程中实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第二方面的第二种可能的实现方式，在第八种可能的实现方式中，

所述用户设备向网络设备发送 TTI 请求信息包括：

所述用户设备向所述网络设备发送缓存状态报告消息，其中，所述缓存状态报告消息的一个或多个保留比特位的值指示所述用户设备请求使用的 TTI 长度。

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在该实现方式中，通过在缓存状态报告过程中，UE 通过将缓存状态报告消息的一个或多个保留比特位的值指示 UE 请求的 TTI 长度，eNB 针对该请求通过上行调度授权消息指示为其分配的 TTI 长度，在 UE 缓存状态报告过程中实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第二方面的第二种可能的实现方式，在第九种可能的实现方式中，

所述用户设备向网络设备发送 TTI 请求信息包括:

所述用户设备向所述网络设备发送MAC CE，其中，所述MAC CE 的消息头中的一个上行 LCID 值指示所述 MAC CE 的类型是 TTI 请求信息，所述 MAC CE 的消息体指示请求的 TTI 长度;

所述接收由所述网络设备发送的 TTI 指示信息，包括:

接收由所述网络设备发送的 MAC CE，其中，所述 MAC CE 的消息头中的一个下行 LCID 值指示所述 MAC CE 的类型是 TTI 指示信息，所述 MAC CE 的消息体包含所述 TTI 指示信息。

在该实现方式中，通过 UE 通过将 MAC CE 的消息头和消息体指示 UE 请求的 TTI 长度，eNB 针对该请求通过 MAC CE 指示为其分配的 TTI 长度，对 BSR 消息所属的 MAC CE 进行扩展来实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第二方面的第二种可能的实现方式，在第十种可能的实现方式中，

所述用户设备向网络设备发送 TTI 请求信息包括:

所述用户设备向所述网络设备发送 RRC 连接建立请求消息，其中，所述RRC连接建立请求消息的TTI相关信元指示所述用户设备请求使用的 TTI 长度;

所述接收由所述网络设备发送的 TTI 指示信息，包括:

接收由所述网络设备发送的 RRC 连接建立消息或 RRC 重配置消息，其中，所述 RRC 连接建立消息或所述 RRC 重配置消息包含所述 TTI 指示信息。

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在该实现方式中，通过在 RRC 连接建立过程中，UE 通过将 RRC 连接建立请求消息的 TTI 相关信元指示 UE 请求的 TTI 长度，eNB 针对该请求通过 RRC 连接重配置消息指示为其分配的 TTI 长度，在 RRC 连接建立过程中实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

结合第二方面的第二种可能的实现方式，在第十一种可能的实现方式中，

所述接收由所述网络设备发送的 TTI 指示信息，包括：

接收由所述网络设备发送的切换命令消息，其中，所述切换命令消息包含所述 TTI 指示信息。

在该实现方式中，通过在切换准备阶段中，源 eNB 可以在向目标 eNB 发送的切换请求消息中携带 UE 具有短 TTI 通信能力的指示，目标 eNB 在发给源 eNB 的切换确认消息中携带 TTI 指示信息，源 eNB 向 UE 发送切换命令消息，切换命令消息包含 TTI 指示信息，TTI 指示信息包含 eNB 为 UE 分配的 TTI 长度，在切换准备阶段中实现对 TTI 进行配置，解决了尚未有对短 TTI 进行配置的方法的问题。

第三方面，提供了一种网络设备，包括

接收单元，用于接收由用户设备发送的 TTI 请求信息，其中，所述 TTI 请求信息指示请求使用的 TTI 长度；

发送单元，用于响应于所述接收单元接收的 TTI 请求信息，向用户设备发送 TTI 指示信息，其中，所述 TTI 指示信息包含以下信息中的至少一个：

所述网络设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，所述 TTI 长度的使能确认信息。

结合第三方面，在第一种可能的实现方式中，

所述发送单元，还用于在所述接收单元接收 TTI 请求信息之前向用户设备广播所述网络设备支持的 TTI 长度。

结合第三方面，在第二种可能的实现方式中，所述网络设备，

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还包括:

处理单元，用于根据所述 TTI 请求信息的信息内容得到请求使用的 TTI 长度，其中，所述 TTI 请求信息的信息内容与所述请求使用的 TTI 长度相对应。

结合第三方面，在第三种可能的实现方式中，所述网络设备，还包括:

处理单元，用于根据所述 TTI 请求信息所占用的资源得到请求使用的 TTI 长度，其中，所述所占用的资源与所述请求使用的 TTI 长度相对应。

结合第三方面的第二种可能的实现方式中，在第四种可能的实现方式中，

所述接收单元，还用于接收由用户设备发送的随机接入前导码，其中，所述随机接入前导码指示所述请求使用的 TTI 长度;

所述处理单元，还用于根据所述随机接入前导码得到所述请求使用的 TTI 长度;

所述发送单元，还用于向用户设备发送随机接入响应消息，其中，在所述随机接入响应消息中指示所述 TTI 指示信息。

结合第三方面的第四种可能的实现方式，在第五种可能的实现方式中，所述发送单元，还用于:

在所述随机接入响应消息中增加字节来指示所述 TTI 指示信息;

或者，

通过复用所述随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示所述 TTI 指示信息。

结合第三方面的第三种可能的实现方式，在第六种可能的实现方式中，

所述接收单元，还用于接收用户设备在预设时频资源上发送的随机接入前导码，其中所述预设时频资源与所述请求使用的 TTI 长度相对应;

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所述处理单元，还用于根据所述随机接入前导码所占用的预设时频资源得到所述请求使用的 TTI 长度；

所述发送单元，还用于向用户设备发送随机接入响应消息，其中，所述随机接入响应消息中包含所述 TTI 指示信息。

结合第三方面的第三种可能的实现方式，在第七种可能的实现方式中，

所述接收单元，还用于接收用户设备在预设调度请求资源上发送的调度请求信息，其中所述预设调度请求资源与所述请求使用的 TTI 长度相对应；

所述处理单元，还用于根据所述调度请求信息所占用的预设时频资源得到所述请求使用的 TTI 长度。

结合第三方面的第二种可能的实现方式，在第八种可能的实现方式中，

所述接收单元，还用于接收由用户设备发送的缓存状态报告消息，其中，所述缓存状态报告消息的一个或多个保留比特位的值指示所述请求使用的 TTI 长度；

所述处理单元，还用于根据所述缓存状态报告消息的一个或多个保留比特位的值得到所述请求使用的 TTI 长度。

结合第三方面的第二种可能的实现方式，在第九种可能的实现方式中，

所述接收单元，还用于接收由用户设备发送的 MAC CE，其中，所述 MAC CE 的消息头中的一个上行 LCID 值指示所述 MAC CE 的类型是 TTI 请求信息，所述 MAC CE 的消息体指示请求的 TTI 长度；

所述处理单元，还用于根据所述 MAC CE 的消息头和消息体得到所述请求使用的 TTI 长度；

所述发送单元，还用于向用户设备发送 MAC CE，其中，所述 MAC CE 的消息头中的一个下行 LCID 值指示所述 MAC CE 的类型是 TTI 指示信息，所述 MAC CE 的消息体包含所述 TTI 指示信息。

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结合第三方面的第二种可能的实现方式，在第十种可能的实现方式中，

所述接收单元，还用于接收由用户设备发送的 RRC 连接建立请求消息，其中，所述RRC连接建立请求消息的TTI相关信元指示所述请求使用的TTI长度；

所述处理单元，还用于根据所述RRC连接建立请求消息的TTI相关信元得到所述请求使用的TTI长度；

所述发送单元，还用于向用户设备发送 RRC 连接建立消息或RRC 重配置消息，其中，所述 RRC 连接建立消息或所述 RRC 重配置消息包含所述TTI指示信息。

结合第三方面的第二种可能的实现方式，在第十一种可能的实现方式中，

所述发送单元，还用于向用户设备发送切换命令消息，其中，所述切换命令消息包含所述TTI指示信息。

由于本发明实施例提供的网络设备可以用于执行上述第一方面或者第一方面任意一种可能的实现方式的方法，因此，其所能获得的技术效果可以参考上述第一方面或者第一方面任意一种可能的实现方式提供的定位方法的技术效果，此处不再赘述。

第四方面，提供了一种用户设备，包括：

发送单元，用于向网络设备发送TTI请求信息，所述TTI请求信息指示所述用户设备请求使用的TTI长度；

接收单元，用于接收由网络设备发送的TTI指示信息，其中，所述TTI指示信息包含以下信息中的至少一个：

为所述用户设备分配的TTI长度，生效时刻信息，起始符号位置信息，所述TTI长度的使能确认信息。

结合第四方面，在第一种可能的实现方式中，

所述接收单元，还用于在所述发送单元向网络设备发送TTI请求信息之前接收网络设备支持的TTI长度。

结合第四方面，在第二种可能的实现方式中，所述用户设备，

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还包括:

处理单元，用于使所述 TTI 请求信息的信息内容指示所述用户设备请求使用的 TTI 长度，其中，所述 TTI 请求信息的信息内容与所述用户设备请求使用的 TTI 长度相对应。

结合第四方面，在第三种可能的实现方式中，所述用户设备，还包括:

处理单元，用于使所述 TTI 请求信息所占用的资源指示所述用户设备请求使用的 TTI 长度，其中，所述所占用的资源与所述用户设备请求使用的 TTI 长度相对应。

结合第四方面的第二种可能的实现方式中，在第四种可能的实现方式中，

所述发送单元，还用于向网络设备发送随机接入前导码，其中，所述随机接入前导码指示所述用户设备请求使用的 TTI 长度;

所述接收单元，还用于接收由网络设备发送的随机接入响应消息，其中，在所述随机接入响应消息中指示所述 TTI 指示信息。

结合第四方面的第四种可能的实现方式，在第五种可能的实现方式中，所述处理单元，还用于:

在所述随机接入响应消息中增加字节来指示所述 TTI 指示信息;

或者，

通过复用所述随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示所述 TTI 指示信息。

结合第四方面的第三种可能的实现方式，在第六种可能的实现方式中，

所述发送单元，还用于在预设时频资源上向网络设备发送随机接入前导码，其中所述预设时频资源与所述用户设备请求使用的 TTI 长度相对应;

所述接收单元，还用于接收由网络设备发送的随机接入响应消息，其中，所述随机接入响应消息中包含所述 TTI 指示信息。

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结合第四方面的第三种可能的实现方式，在第七种可能的实现方式中，

所述发送单元，还用于在预设调度请求资源上向网络设备发送调度请求信息，其中所述预设调度请求资源与所述用户设备请求使用的 TTI 长度相对应。

结合第四方面的第二种可能的实现方式，在第八种可能的实现方式中：

所述发送单元，还用于向网络设备发送缓存状态报告消息，其中，所述缓存状态报告消息的一个或多个保留比特位的值指示所述用户设备请求使用的 TTI 长度。

结合第四方面的第二种可能的实现方式，在第九种可能的实现方式中：

所述发送单元，还用于向网络设备发送 MAC CE，其中，所述 MAC CE 的消息头中的一个上行 LCID 值指示所述 MAC CE 的类型是 TTI 请求信息，所述 MAC CE 的消息体指示请求的 TTI 长度；

所述接收单元，还用于接收由网络设备发送的 MAC CE，其中，所述 MAC CE 的消息头中的一个下行 LCID 值指示所述 MAC CE 的类型是 TTI 指示信息，所述 MAC CE 的消息体包含所述 TTI 指示信息。

结合第四方面的第二种可能的实现方式，在第十种可能的实现方式中，

所述发送单元，还用于向网络设备发送 RRC 连接建立请求消息，其中，所述 RRC 连接建立请求消息的 TTI 相关信元指示所述用户设备请求使用的 TTI 长度；

所述接收单元，还用于接收由网络设备发送的 RRC 连接建立消息或 RRC 重配置消息，其中，所述 RRC 连接建立消息或所述 RRC 重配置消息包含所述 TTI 指示信息。

结合第四方面的第二种可能的实现方式，在第十一种可能的实现方式中

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所述接收单元，还用于接收由网络设备发送的切换命令消息，其中，所述切换命令消息包含所述 TTI 指示信息。

由于本发明实施例提供的用户设备可以用于执行上述第二方面或者第二方面任意一种可能的实现方式的方法，因此，其所能获得的技术效果可以参考上述第二方面或者第二方面任意一种可能的实现方式提供的定位方法的技术效果，此处不再赘述。

第五方面，提供一种网络设备，包括：处理器、第一接口电路、第二接口电路，存储器和总线；所述处理器、第一接口电路、存储器通过所述总线连接并完成相互间的通信；所述处理器用于执行存储器中的程序代码以控制第一接口电路和二接口电路执行上述第一方面或第一方面中可能的实现方式中所提供的方法。

可选的，所述处理器可以用于执行上述第三方面或第三方面中可能的实现方式中的处理单元的功能。

第一接口电路用于执行上述第三方面或第三方面中可能的实现方式中的接收单元的功能。

第二接口单元用于执行上述第三方面或第三方面中可能的实现方式中的发送单元的功能。

由于本发明实施例提供的网络设备可以用于执行上述第一方面或者第一方面任意一种可能的实现方式的方法，因此，其所能获得的技术效果可以参考上述第一方面或者第一方面任意一种可能的实现方式提供的定位方法的技术效果，此处不再赘述。

第六方面，提供一种用户设备，包括：处理器、第一接口电路、第二接口电路、存储器和总线；所述处理器、第一接口电路、第二接口电路、存储器通过所述总线连接并完成相互间的通信；所述处理器用于执行存储其中的程序以控制第一接口电路和二接口电路执行上述第二方面或第二方面中可能的实现方式中所提供的方法。

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可选的，所述处理器可以用于执行上述第四方面或第四方面中可能的实现方式中的检测单元、处理单元的功能。

第一接口电路用于执行上述第四方面或第四方面中可能的实现方式中的发送单元的功能。

第二接口单元用于执行上述第四方面或第四方面中可能的实现方式中的接收单元的功能。

由于本发明实施例提供的用户设备可以用于执行上述第二方面或者第二方面任意一种可能的实现方式的方法，因此，其所能获得的技术效果可以参考上述第二方面或者第二方面任意一种可能的实现方式提供的定位方法的技术效果，此处不再赘述。

第七方面，提供一种通信系统，包括如上述第三方面或第三方面中可能的实现方式中提供的任意一种 eNB，以及如上述第四方面或第四方面中可能的实现方式中提供的任意一种 UE;

或者，包括如上述第五方面提供的任意一种 eNB，以及如上述第六方面提供的任意一种 UE。

由于本发明实施例提供的通信系统包括如上述第三方面或第三方面中可能的实现方式中提供的任意一种 eNB，以及如上述第四方面或第四方面中可能的实现方式中提供的任意一种 UE；或者，包括如上述第五方面提供的任意一种 eNB，以及如上述第六方面提供的任意一种 UE，因此，其所能获得的技术效果可参考上述 eNB 和 UE 的技术效果，此处不再赘述。

附图说明

为了更清楚地说明本发明实施例或现有技术中的技术方案，下面将对实施例或现有技术描述中所需要使用的附图作简单地介绍，显而易见地，下面描述中的附图仅仅是本发明的一些实施例，对于本领域普通技术人员来讲，在不付出创造性劳动的前提下，还可以根据这些附图获得其他的附图。

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图 1 为本发明的实施例提供的一种通信系统的结构示意图;

图 2 为本发明的实施例提供的一种 TTI 配置方法的流程示意图;

图 3 为本发明的实施例提供的一种随机接入过程中通过随机接入前导码实现对 TTI 进行配置的流程示意图;

图 4 为本发明的实施例提供的随机接入响应消息的 MAC PDU 的结构示意图;

图 5 为本发明的实施例提供的随机接入响应消息的结构示意图;

图 6 为本发明的实施例提供的一种在随机接入过程中通过随机接入前导码所占用的资源实现对 TTI 进行配置的流程示意图;

图 7 为本发明的实施例提供的一种在调度请求过程中实现对 TTI 进行配置的流程示意图;

图 8 为本发明的实施例提供的一种在缓存状态报告过程中实现对 TTI 进行配置的流程示意图;

图 9 为本发明的实施例提供的 BSR 的消息头的结构示意图;

图 10 为本发明的实施例提供的一种对 BSR 消息所属的 MAC CE 进行扩展来实现对 TTI 进行配置的流程示意图;

图 11 为本发明的实施例提供的一种在 RRC 连接建立过程中实现对 TTI 进行配置的流程示意图;

图 12 为本发明的实施例提供的一种在切换准备阶段中实现对 TTI 进行配置的流程示意图;

图 13 为本发明的实施例提供的一种网络设备的结构示意图;

图 14 为本发明的实施例提供的另一种网络设备的结构示意图;

图 15 为本发明的实施例提供的一种用户设备的结构示意图;

图 16 为本发明的实施例提供的另一种用户设备的结构示意图;

图 17 为本发明的实施例提供的又一种网络设备的结构示意图;

图 18 为本发明的实施例提供的又一种用户设备的结构示意图。

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具体实施方式

下面将结合本发明实施例中的附图，对本发明实施例中的技术方案进行清楚、完整地描述，显然，所描述的实施例仅仅是本发明一部分实施例，而不是全部的实施例。基于本发明中的实施例，本领域普通技术人员在没有作出创造性劳动前提下所获得的所有其他实施例，都属于本发明保护的范围。

如本申请所使用的，术语“组件”、“模块”、“系统”等等旨在指代计算机相关实体，该计算机相关实体可以是硬件、固件、硬件和软件的结合、软件或者运行中的软件。例如，组件可以是，但不限于是：在处理器上运行的处理、处理器、对象、可执行文件、执行中的线程、程序和/或计算机。作为示例，在计算设备上运行的应用和该计算设备都可以是组件。一个或多个组件可以存在于执行中的过程和/或线程中，并且组件可以位于一个计算机中以及/或者分布在两个或更多个计算机之间。此外，这些组件能够从在其上具有各种数据结构的各种计算机可读介质中执行。这些组件可以通过诸如根据具有一个或多个数据分组(例如，来自一个组件的数据，该组件与本地系统、分布式系统中的另一个组件进行交互和/或以信号的方式通过诸如互联网之类的网络与其它系统进行交互)的信号，以本地和/或远程过程的方式进行通信。

此外，本申请结合无线网络设备来描述各个方面，该无线网络设备可以为基站，基站可以用于与一个或多个用户设备进行通信，也可以用于与一个或多个具有部分用户设备功能的基站进行通信（比如宏基站与微基站，如接入点，之间的通信）；该无线网络设备还可以为用户设备，用户设备可以用于一个或多个用户设备进行通信（比如 D2D 通信），也可以用于与一个或多个基站进行通信。用户设备还可以称为用户终端，并且可以包括系统、用户单元、用户站、移动站、移动无线终端、移动设备、节点、设备、远程站、远程终端、终端、无线通信设备、无线通信装置或用户代理的功能中的一些或者所有功能。用户设备可以是蜂窝电话、无绳电话、会

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话发起协议(英文全称：session initiation protocol，简称：SIP)电话、智能电话、无线本地环路(英文全称：wireless local loop，简称：WLL)站、个人数字助理(英文全称：personal digital assistant，简称：PDA)、膝上型计算机、手持式通信设备、手持式计算设备、卫星无线设备、无线调制解调器卡和/或用于在无线系统上进行通信的其它处理设备。基站还可以称为接入点、节点、节点B、演进节点B(eNB)或某种其它网络实体，并且可以包括以上网络实体的功能中的一些或所有功能。基站可以通过空中接口与无线终端进行通信。该通信可以通过一个或多个扇区来进行。基站可以通过将所接收的空中接口帧转换成IP分组，来用作无线终端和接入网络的其余部分之间的路由器，其中所述接入网络包括互联网协议(英文全称：internet protocol，简称：IP)网络。基站还可以对空中接口属性的管理进行协调，并且还可以是有线网络和无线网络之间的网关。

本申请将围绕可包括多个设备、组件、模块等的系统来呈现各个方面、实施例或特征。应当理解和明白的是，各个系统可以包括另外的设备、组件、模块等，并且/或者可以并不包括结合附图讨论的所有设备、组件、模块等。此外，还可以使用这些方案的组合。

另外，在本发明实施例中，“示例的”一词用于表示作例子、例证或说明。本申请中被描述为“示例”的任何实施例或设计方案不应被解释为比其它实施例或设计方案更优选或更具优势。确切而言，使用示例的一词旨在以具体方式呈现概念。

本发明实施例中，信息（information），信号（signal），消息（message），信道（channel）有时可以混用，应当指出的是，在不强调其区别时，其所要表达的含义是一致的。“的(of)”，“相应的（corresponding，relevant）”和“对应的(corresponding)”有时可以混用，应当指出的是，在不强调其区别时，其所要表达的含义是一致的。

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本发明实施例描述的网络架构以及业务场景是为了更加清楚的说明本发明实施例的技术方案，并不构成对于本发明实施例提供的技术方案的限定，本领域普通技术人员可知，随着网络架构的演变和新业务场景的出现，本发明实施例提供的技术方案对于类似的技术问题，同样适用。

本发明实施例既可以应用于时分双工（time division duplexing，TDD）的场景，也可以适用于频分双工（frequency division duplexing，FDD）的场景。

本发明实施例依托无线通信网络中 4G 网络的场景进行说明，应当指出的是，本发明实施例中的方案还可以应用于其他无线通信网络中，相应的名称也可以用其他无线通信网络中的对应功能的名称进行替代。

为了兼容 1ms TTI 和短 TTI，本发明的实施例通过不同的 TTI 长度来表示。其中，TTI 长度可以以符号数为单位，例如，1ms TTI 分为两个时隙（英文名称：slot），每个时隙包含 7 个符号（普通循环前缀）或 6 个符号（扩展循环前缀），因此 1ms TTI 的 TTI 长度为 12 或 14 个符号数，相应的，短 TTI 的 TTI 长度可以为 2 个或 7 个符号数等；TTI 长度也可以以时间长度为单元，例如，1ms TTI 的 TTI 长度可以为 1ms，短 TTI 的 TTI 长度可以为 0.1ms 或 0.5ms 等。

参照图 1 中所示，为本发明的实施例提供的一种 TTI 配置系统的结构示意图，该 TTI 配置系统包括：网络设备和用户设备，其中网络设备以 eNB 11 为例进行说明，用户设备以 UE 12 为例进行说明。UE 12 向 eNB 11 申请使用 TTI 资源，eNB 11 通知 UE 12 为其分配的 TTI 资源。

本发明的实施例提供了一种 TTI 配置方法，参照图 2 中所示，包括以下步骤：

S201、用户设备向网络设备发送 TTI 请求信息，用于网络设备根据 TTI 请求信息得到用户设备请求使用的 TTI 长度，其中，TTI 请求信息指示用户设备请求使用的 TTI 长度。

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用户设备向网络设备发送 TTI 请求信息以请求使用一种或多种 TTI 长度的短 TTI。对于支持多种短 TTI 长度的系统,可以在请求消息中指示需要的 TTI 长度;对于只支持一种短 TTI 长度的系统,TTI 请求信息也可以只是一个请求消息,直接表示请求系统所支持的短 TTI。同时要求用户设备必须具有相应的短 TTI 通信能力。

S202、网络设备接收由用户设备发送的 TTI 请求信息,其中,TTI 请求信息指示用户设备请求使用的 TTI 长度。

S203、网络设备根据 TTI 请求信息得到用户设备请求使用的 TTI 长度。

可选的,步骤 S203 具体包括:

S203a、网络设备可以根据 TTI 请求信息的信息内容得到用户设备请求使用的 TTI 长度,其中,TTI 请求信息的信息内容与用户设备请求使用的 TTI 长度相对应。

或者,

S203b、网络设备可以根据 TTI 请求信息所占用的资源得到用户设备请求使用的 TTI 长度,其中,TTI 请求信息所占用的资源与用户设备请求使用的 TTI 长度相对应。

S204、网络设备向用户设备发送 TTI 指示信息,其中,TTI 指示信息包含以下信息中的至少一个:网络设备为用户设备分配的 TTI 长度,生效时刻信息,起始符号位置信息,TTI 长度的使能确认信息。

网络设备针对用户设备请求使用的一种或多种 TTI 长度,根据本网络设备是否支持相应的 TTI 长度,以及当前无线网络中各 TTI 长度的使用情况,最终决定为用户设备分配的 TTI 长度,并将分配的 TTI 长度和该 TTI 长度的使能确认信息通过 TTI 指示信息发送给用户设备。另外,网络设备根据时频资源的使用情况,确定用户设备使用分配的 TTI 长度进行通信的生效时刻信息、起始符号位置信息,并将这些信息同样通过 TTI 指示信息发送给用户设备。

S205、用户设备接收由网络设备发送的 TTI 指示信息。

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S206、用户设备以网络设备为用户设备分配的 TTI 长度在生效时刻和/或起始符号位置处与网络设备进行通信。

本发明的实施例提供的 TTI 配置方法，用户设备向网络设备发送 TTI 请求信息，其中，TTI 请求信息指示用户设备请求使用的 TTI 长度；网络设备接收由用户设备发送的 TTI 请求信息；网络设备根据 TTI 请求信息得到用户设备请求使用的 TTI 长度；网络设备向用户设备发送 TTI 指示信息，其中，TTI 指示信息包含以下信息中的至少一个：网络设备为用户设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息；用户设备以网络设备为用户设备分配的 TTI 长度和/或生效时刻和/或起始符号位置与网络设备进行通信。通过用户设备向网络设备请求使用 TTI 长度，其中，该 TTI 长度包括短 TTI，网络设备针对用户设备的请求分配相应的 TTI 长度，解决了尚未有对短 TTI 进行配置的方法的问题。

下面将结合具体应用场景来说明上述 TTI 配置方法。

在一种可能的实现方式中，在随机接入过程中通过随机接入前导码实现对 TTI 进行配置，参照图 3 中所示，包括以下步骤：

S301、eNB 广播该 eNB 支持的 TTI 长度。

S302、UE 接收由 eNB 广播的 eNB 支持的 TTI 长度。

步骤 S301 和步骤 S302，用于 UE 在以下步骤中，根据 eNB 所支持的 TTI 长度以及该 UE 所支持的 TTI 长度来发送 TTI 请求信息，以提高相应 TTI 长度与 eNB 进行通信的成功率。当然步骤 S301 和 S302 为可选的步骤。

S303、UE 向 eNB 发送随机接入前导码，其中，随机接入前导码指示 UE 请求使用的 TTI 长度。

物理层可用的前导码一共有 64 个，分为竞争接入前导码和专用接入前导码两部分，其中，用信元 numberOfRA-Preambles 表示竞争接入前导码个数，如果 numberOfRA-Preambles 被配置为 64，则代表没有专用接入前导码，全部前导码均为竞争接入前导码；如果 numberOfRA-Preambles 被配置为小于 64，则竞争接入前导码的

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索引为[0,numberOfRA-Preambles-1]，专用接入前导码的索引为[numberOfRA-Preambles，63]。

在numberOfRA-Preambles被配置为小于64的前提下，即存在专用接入前导码的前提下，将专用接入前导码进行映射，方法如下：

在系统只支持一种TTI长度的情况下，示例性的，比如只支持2个符号的TTI长度时，可以定义一个信元numberOfRA-Preambles-2symbolTTI用于指示映射2个符号TTI长度的专用接入前导码，则位于区间[numberOfRA-Preambles，numberOfRA-Preambles+numberOfRA- Preambles - 2symbolTTI-1]的前导码专用于2个符号的TTI长度指示，当UE选择此范围的前导码发送时，就代表UE希望在后续传输过程中使用2个符号长度的TTI。在系统支持多种TTI长度的情况下，可以增加多个长度指示，示例性的，比如定义信元numberOfRA-Preambles-1symbolTTI用于指示映射1个符号TTI长度的专用接入前导码，numberOfRA-Preambles-7symbolTTI指示映射7个符号TTI长度的专用接入前导码。相应地，各长度TTI对应的前导码范围可以按从小到大的顺序，比如[numberOfRA-Preambles，numberOfRA-Preambles+numberOfRA-Preambles-1symbolTTI-1]区间的前导码专用于1个符号的TTI长度指示，[numberOfRA-Preambles+numberOfRA-Preambles-1symbolTTI，numberOfRA-Preambles+numberOfRA-Preambles-1symbolTTI+numberOfRA-Preambles-7symbolTTI-1]区间的前导码专用于7个符号的TTI长度指示，当然也可以采用预配置的其他顺序排列。

S304、eNB接收由UE发送的随机接入前导码。

S305、eNB根据随机接入前导码得到UE请求使用的TTI长度。

eNB根据随机接入前导码映射得到UE请求使用的TTI长度，具体方法见步骤S303。

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S306、eNB 向 UE 发送随机接入响应消息（英文全称：random access response，英文简称：RAR），其中，随机接入响应消息包含 TTI 指示信息，TTI 指示信息包含以下信息中的至少一个：eNB 为 UE 分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息。

可选的，步骤 S306 具体可以包括：eNB 向 UE 发送随机接入响应消息，其中，通过在随机接入响应消息中增加字节来指示 TTI 指示信息。

具体的，参照图 4 所示，为随机接入响应消息的 MAC（英文名称：media access control，中文名称：媒体访问控制） PDU（英文名称：protocol data unit，中文名称：协议数据单元）的结构，从中可以看出，在一个随机接入响应消息的 MAC PDU 中，包含多个 UE 的随机接入响应消息，这些 UE 均在相同的随机接入时频资源上发送的前导码。其中，参照图 5 所示，在单个 UE 的随机接入响应消息中，消息头包含了前导码索引（图 5 中的 R，英文简称 RAPID），在消息体中包含定时提前量（图 5 中的 Timing Advanced Command（中文名称：定时提前命令））、上行调度授权（图 5 中的 UL Grant（英文名称：uplink grant，中文名称：上行调度授权））和临时 C-RNTI（图 5 中的 Temporary C-RNTI）。

在支持不同 TTI 长度的系统中，需要在随机接入响应消息中增加相关指示，可能但不限于包含 TTI 使能信息、TTI 长度和子帧起始位置信息，其中，子帧起始位置信息包含起始的子帧号以及在子帧内的符号索引，比如 TTI 使能信息 1 比特，TTI 长度占 3bit（示例性的，有 8 种 TTI 长度，可选的，取值 1-7 分别对应 1 个至 7 个符号长度的 TTI），子帧起始位置信息占 4bit（可选的，用于指示 UE 开始采用分配的 TTI 长度进行数据传输的起始符号位置），因此相比现有技术中 1ms TTI 的随机接入响应消息一共多出一个字节。

对于根据将专用接入前导码与不同 TTI 长度映射来实现对 TTI 进行配置的方法，由于常规的 1ms TTI UE 和短 TTI UE 可能在相同

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的时频资源上发送前导码，所以在随机接入响应消息中，这两种用户的随机接入响应消息可能共存。在常规的随机接入响应消息寻址机制中，各用户的消息体都是 6 个字节，只需要按照长度寻址即可，但是在存在短 TTI 配置的情况下，短 TTI UE 的消息体长度可能是 7 个字节，所以为保持常规的 1ms TTI UE 的寻址方式不变，在随机接入响应消息中，需要将常规的 1ms TTI UE 的随机接入响应消息放在前面，短 TTI UE 的随机接入响应消息放在后面。对于短 TTI UE，首先通过 RAPID 识别出哪些 UE 是常规的 1ms TTI UE，哪些是短 TTI UE，然后在随机接入响应消息寻址中，常规的 1ms TTI UE 按照 6 字节寻址，短 TTI UE 按照 7 字节寻址。

另外，可选的，步骤 S306 具体还可以包括：eNB 向 UE 发送随机接入响应消息，其中，通过复用随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示 TTI 指示信息。

具体的，不增加随机接入响应消息的消息体的数据量，而是复用其他信息位来表示 TTI 指示信息。示例性的，在 20 比特的上行调度授权消息（图 5 中的 UL Grant）中，包括如下消息：

1）跳频标志（英文名称：hopping flag）——占 1 bit

2）资源块分配指示（英文名称：fixed size resource block assignment ）——占 10 bits

3）调制解调方案指示（英文名称：truncated modulation and coding scheme）——占 4 bits

4）功控指示（英文名称：TPC（英文名称：transmitter power control，中文名称：发射功率控制）command for scheduled PUSCH（英文名称：physical uplink shared channel，中文名称：物理上行共享信道））——占 3 bits

5）上行延迟发送指示（英文名称：UL（英文名称：uplink，中文名称：上行链路） delay）——占 1 bit

6）信道状态信息请求指示（英文名称：CSI（英文名称：channel state information，中文名称：信道状态信息） request）——占 1 bit

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在以上信息中2）、3）、4）为必选项，1）、5）、6）为可选项，所以，可以复用1）、5）、6）这3bit信息，即将这3bit组合作为TTI指示信息。同时，由于没有改变随机接入响应消息的消息体的大小，所以所有用户都按照6字节寻址，无需将常规1ms TTIUE的随机接入响应消息放在短TTI UE的随机接入响应消息的前面。

S307、UE接收由eNB发送的随机接入响应消息，其中，随机接入响应消息中包含TTI指示信息，TTI指示信息以下信息中的至少一个：eNB为UE分配的TTI长度，生效时刻信息，起始符号位置信息，TTI长度的使能确认信息，其中，子帧起始位置信息包含起始的子帧号以及在子帧内的符号索引。

S308、UE以eNB为UE分配的TTI长度在生效时刻和/或起始符号位置处开始与eNB进行通信。

本发明的实施例提供的TTI配置方法，通过在随机接入过程中，UE通过随机接入前导码来指示UE请求的TTI长度，eNB针对该请求通过随机接入响应消息指示为其分配的TTI长度，其中，该TTI长度包括短TTI，解决了尚未有对短TTI进行配置的方法的问题。

在一种可能的实现方式中，在随机接入过程中通过随机接入前导码所占用的资源实现对TTI进行配置，参照图6所示，包括以下步骤：

S601、UE在预设时频资源上向eNB发送随机接入前导码，其中预设时频资源与UE请求使用的TTI长度相对应。

在LTE系统中，随机接入的时频资源由以下两个参数决定，prach-ConfigIndex和prach-FrequencyOffset，其中prach-ConfigIndex表示随机接入资源所在的时域帧号和子帧号，prach-FrequencyOffset表示在一个子帧内的随机接入资源的频域RB（英文名称：resource block，中文名称：资源块）起始位置。

在时域区分的方案中，可以针对不同的TTI长度配置不同的prach-ConfigIndex，UE以不同的随机接入时域资源接入eNB，即表

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示请求使用对应的 TTI 长度。根据 3GPP TS36.211 表格 5.7.1-2，主要利用其中的 PRACH（英文名称：physical random access channel，中文名称：物理随机接入信道） Configuration Index（中文名称：PRACH 配置索引）和 Subframe number（中文名称：子帧号）两列（具体见表 1），不同的 prach-ConfigIndex（见表 1 中的 PRACH Configuration Index）代表了不同的随机接入资源的时域位置，所以只要配置不同 TTI 长度对应的时域位置不重叠即可。比如常规的 1ms TTI 长度的 prach-ConfigIndex 配置为 3，表明随机接入资源出现的子帧索引（见表 1 中的 Subframe number）为 1；1 符号长度 TTI 对应的 prach-ConfigIndex-1symbolTTI 配置为 4，表明随机接入资源出现的子帧索引为 4；7 符号长度 TTI 对应的 prach-ConfigIndex-1symbolTTI 配置为 5，表明随机接入资源出现的子帧索引为 7，以此类推。

表一

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PRACH Configuration Index	Preamble Format	System frame number	Subframe number	PRACH Configuration Index	Preamble Format	System frame number	Subframe number
0	0	Even	1	32	2	Even	1
1	0	Even	4	33	2	Even	4
2	0	Even	7	34	2	Even	7
3	0	Any	1	35	2	Any	1
4	0	Any	4	36	2	Any	4
5	0	Any	7	37	2	Any	7
6	0	Any	1, 6	38	2	Any	1, 6
7	0	Any	2 ,7	39	2	Any	2 ,7
8	0	Any	3, 8	40	2	Any	3, 8
9	0	Any	1, 4, 7	41	2	Any	1, 4, 7
10	0	Any	2, 5, 8	42	2	Any	2, 5, 8
11	0	Any	3, 6, 9	43	2	Any	3, 6, 9
12	0	Any	0, 2, 4, 6, 8	44	2	Any	0, 2, 4, 6, 8
13	0	Any	1, 3, 5, 7, 9	45	2	Any	1, 3, 5, 7, 9
14	0	Any	0, 1, 2, 3, 4, 5, 6, 7, 8, 9	46	N/A	N/A	N/A
15	0	Even	9	47	2	Even	9
16	1	Even	1	48	3	Even	1
17	1	Even	4	49	3	Even	4
18	1	Even	7	50	3	Even	7
19	1	Any	1	51	3	Any	1
20	1	Any	4	52	3	Any	4
21	1	Any	7	53	3	Any	7
22	1	Any	1, 6	54	3	Any	1, 6
23	1	Any	2 ,7	55	3	Any	2 ,7
24	1	Any	3, 8	56	3	Any	3, 8
25	1	Any	1, 4, 7	57	3	Any	1, 4, 7
26	1	Any	2, 5, 8	58	3	Any	2, 5, 8
27	1	Any	3, 6, 9	59	3	Any	3, 6, 9
28	1	Any	0, 2, 4, 6, 8	60	N/A	N/A	N/A
29	1	Any	1, 3, 5, 7, 9	61	N/A	N/A	N/A
30	N/A	N/A	N/A	62	N/A	N/A	N/A
31	1	Even	9	63	3	Even	9

其中上表中，PRACH Configuration Index 表示 PRACH 配置索引；PreambleFormat 表示前导码格式，该参数有 0、1、2、3、4 共有 5 种有效格式或 N/A(英文名称：not applicable，中文名称：不适用)；System frame number（中文名称：系统帧号）表示系统帧号，其中，参数 Even（中文名称：偶数）表示偶数，Any（中文名称：任意）表示奇偶均可，N/A 表示不适用；Subframe number 表示子帧号共有 0-9 十种有效值以及 N/A(不适用)。

在频域位置区分的方案中，可以针对不同的 TTI 长度配置不同的 prach-FrequencyOffset，UE 以不同的随机接入频域资源接入 eNB，即表示请求使用对应的 TTI 长度。由于每个随机接入资源固定占用 6 个 RB，所以不同的 TTI 长度对应的 prach-FrequencyOffset 间隔需要大于 6RB。比如在 20M 带宽下，RB 总数为 100，可以配置

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常规 TTI 长度的不同的 TTI 长度配置不同的 prach-FrequencyOffset 为 50，配置 1 符号长度 TTI 对应的 prach-FrequencyOffset-1symbolTTI 为 56，配置 7 符号长度 TTI 对应的 prach-FrequencyOffset-7symbolTTI 为 62。

S602、eNB 接收由 UE 在预设时频资源上发送的随机接入前导码，其中预设时频资源与 UE 请求使用的 TTI 长度相对应。

S603、eNB 根据随机接入前导码所占用的预设时频资源得到 UE 请求使用的 TTI 长度，其中，随机接入前导码所占用的资源与 UE 请求使用的 TTI 长度相对应。

根据随机接入前导码所占用的资源得到 UE 请求使用的 TTI 长度，具体方法参照步骤 S601。

S604、eNB 向 UE 发送随机接入响应消息，其中，随机接入响应消息中包含 TTI 指示信息，其中，TTI 指示信息包含以下信息中的至少一个：eNB 为 UE 分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息。

S605、UE 接收由 eNB 发送的随机接入响应消息，其中，随机接入响应消息中包含 TTI 指示信息。

采用专用的时频资源后，在相同时频资源发送前导码的 UE 都是希望使用相同长度 TTI 的 UE，所以在随机接入响应消息中每个 UE 的消息体都是相同长度，不再存在寻址问题。

S606、UE 以 eNB 为 UE 分配的 TTI 长度在生效时刻和/或起始符号位置处开始与 eNB 进行通信。

本领域的技术人员可以理解，可以将上述在随机接入过程中实现对 TTI 进行配置的多种方法进行组合，即首先对于短 TTI 分配专用的时频资源，通过 prach-ConfigIndex-shortTTI 或 prach-FrequencyOffset-shortTTI 指定所有申请短 TTI 配置的用户都在这些资源上发送前导码。同时在这些专用的时频资源内部，由于不再考虑对常规的 1ms TTI 长度的 UE 的兼容，可以将全部 64 个前导码进行分组，针对每种 TTI 长度都有跟多的前导码可用。

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本发明的实施例提供的 TTI 配置方法，通过在随机接入过程中，UE 通过随机接入前导码所占用的资源来指示 UE 请求的 TTI 长度，eNB 针对该请求通过随机接入响应消息指示为其分配的 TTI 长度，其中，该 TTI 长度包括短 TTI，解决了尚未有对短 TTI 进行配置的方法的问题。

在另一种可能的实现方式中，在 UE 调度请求（英文全称：scheduling request，英文简称：SR）过程中实现对 TTI 进行配置，参照图 7 所示，包括以下步骤：

S701、UE 在预设调度请求资源上向 eNB 发送调度请求信息，其中预设调度请求资源与 UE 请求使用的 TTI 长度相对应

SR 资源由系统 RRC（英文名称：radio resource control，中文名称：无线资源控制协议）连接建立消息中的 SchedulingRequestConfig 信元配置，其中包含 sr-ConfigIndex 和 sr-PUCCH-ResourceIndex 两个值。sr-ConfigIndex 表示 SR 资源的周期和子帧位置，sr-PUCCH-ResourceIndex 表示一个子帧内的 SR 资源索引号。在此基础上，可以为不同的 TTI 长度指定不同的 sr-ConfigIndex 和/或不同的 sr-PUCCH-ResourceIndex。用户使用专用的 SR 资源向 eNB 发送 SR，就代表希望使用相应长度的 TTI。

S702、eNB 接收由 UE 在预设调度请求资源上发送的调度请求信息，其中预设调度请求资源与 UE 请求使用的 TTI 长度相对应。

S703、eNB 根据调度请求信息所占用的预设调度请求资源得到 UE 请求使用的 TTI 长度，其中，调度请求信息所占用的预设调度请求资源与 UE 请求使用的 TTI 长度相对应。

根据调度请求信息所占用的预设调度请求资源得到 UE 请求使用的 TTI 长度，具体方法参照步骤 S701。

S704、eNB 向 UE 发送上行调度授权消息，其中，上行调度授权消息中包含 TTI 指示信息，其中，TTI 指示信息包含以下信息中的至少一个：eNB 为 UE 分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息。

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S705、UE 接收由 eNB 发送的上行调度授权消息，其中，上行调度授权消息中包含 TTI 指示信息。

S706、UE 以 eNB 为 UE 分配的 TTI 长度在生效时刻和/或起始符号位置处开始与 eNB 进行通信。

本发明的实施例提供的 TTI 配置方法，通过在调度请求过程中，UE 通过将调度请求信息所占用预设调度请求资源指示 UE 请求的 TTI 长度，eNB 针对该请求通过上行调度授权消息指示为其分配的 TTI 长度，其中，该 TTI 长度包括短 TTI，解决了尚未有对短 TTI 进行配置的方法的问题。

在另一种可能的实现方式中，在 UE 缓存状态报告（英文全称：buffer status report，英文简称：BSR）过程中实现对 TTI 进行配置，参照图 8 所示，包括以下步骤：

S801、UE 向 eNB 发送缓存状态报告消息，其中，缓存状态报告消息的一个或多个保留比特位的值指示 UE 请求使用的 TTI 长度。

具体的，UE 向 eNB 发送 BSR，表明 UE 当前的缓存中有多少数据需要发送，eNB 据此向 UE 发送上行调度授权。参照图 9 所示，为 BSR 的消息头。可以将 BSR 的消息头中一个或多个保留位（图 9 中的 R）置 1，表明当前 BSR 消息中包含 TTI 使用请求，同时可以在 BSR 消息体中增加希望使用的 TTI 长度的指示。

S802、eNB 接收由 UE 发送的缓存状态报告消息，其中，缓存状态报告消息的一个或多个保留比特位的值指示UE请求使用的TTI长度。

S803、eNB 根据缓存状态报告消息的一个或多个保留比特位的值得到 UE 请求使用的 TTI 长度，其中，缓存状态报告消息的一个或多个保留比特位的值与 UE 请求使用的 TTI 长度相对应，具体方法参照步骤 S801。

S804、eNB 向 UE 发送上行调度授权消息，其中，上行调度授权消息中包含 TTI 指示信息，其中，TTI 指示信息包含以下信息中

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的至少一个：eNB 为 UE 分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息。

S805、UE 接收由 eNB 发送的上行调度授权消息，其中，上行调度授权消息中包含 TTI 指示信息。

S806、UE 以 eNB 为 UE 分配的 TTI 长度在生效时刻和/或起始符号位置处开始与 eNB 进行通信。

本发明的实施例提供的 TTI 配置方法，通过在缓存状态报告过程中，UE 通过将缓存状态报告消息的一个或多个保留比特位的值指示 UE 请求的 TTI 长度，eNB 针对该请求通过上行调度授权消息指示为其分配的 TTI 长度，其中，该 TTI 长度包括短 TTI，解决了尚未有对短 TTI 进行配置的方法的问题。

在又一种可能的实现方式中，对 BSR 消息所属的 MAC CE 进行扩展来实现对 TTI 进行配置，参照图 10 所示，包括以下步骤：

S1001、UE 向 eNB 发送 MAC CE（英文名称：control element，中文名称：控制单元），其中，MAC CE 的消息头中的一个上行空闲 LCID 值指示 MAC CE 的类型是 TTI 请求信息，MAC CE 的消息体指示请求的 TTI 长度。

具体的，BSR 是 MAC CE 的一种，可以对其进一步扩展，即设计一种新的 MAC CE，由 UE 发送给 eNB，表示 TTI 请求信息。MAC CE 包括消息头和消息体。消息头格式为常规的 MAC CE 头格式，只是其中的 LCID（英文名称：logical channel identify，中文名称：逻辑信道标识）需要采用不同值以指示该 MAC CE 的类型是 TTI 请求信息，根据 3GPP TS36.321 6.2 节描述，目前上行空闲的 LCID 值范围是 01100-10101，可从此范围中任选一个。MAC CE 的消息体包含 TTI 请求信息的具体内容，比如指示请求的 TTI 长度。

S1002、eNB 接收由 UE 发送的 MAC CE，其中，MAC CE 的消息头中的一个上行空闲 LCID 值指示 MAC CE 的类型是 TTI 请求信息，MAC CE 的消息体指示请求的 TTI 长度。

S1003、eNB 根据 MAC CE 的消息头和消息体得到 UE 请求使用

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的 TTI 长度，具体方式参照步骤 S1001。

S1004、eNB 向 UE 发送 MAC CE，其中，MAC CE 的消息头中的一个下行空闲 LCID 指示 MAC CE 的类型是 TTI 指示信息，MAC CE 的消息体包含以下信息中的至少一个：eNB 为 UE 分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息，其中，子帧起始位置信息包含起始的子帧号以及在子帧内的符号索引。

具体的，由 eNB 将 MAC CE 发送给 UE，目前 MAC CE 的消息头中的下行空闲的 LCID 值范围是 01011-11001，可从此范围中任选一个以指示该 MAC CE 的类型是 TTI 指示信息。MAC CE 的消息体包含 eNB 为 UE 分配的 TTI 长度和可能需要的子帧起始位置信息，其中，子帧起始位置信息包含起始的子帧号以及在子帧内的符号索引。

S1005、UE 接收由 eNB 发送的 MAC CE，其中，MAC CE 的消息头中的一个下行空闲 LCID 指示 MAC CE 的类型是 TTI 指示信息，MAC CE 的消息体包含以下信息中的至少一个：eNB 为 UE 分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息，其中，子帧起始位置信息包含起始的子帧号以及在子帧内的符号索引。

S1006、UE 以 eNB 为 UE 分配的 TTI 长度在生效时刻和/或起始符号位置处开始与 eNB 进行通信。

本发明的实施例提供的 TTI 配置方法，UE 通过将 MAC CE 的消息头和消息体指示 UE 请求的 TTI 长度，eNB 针对该请求通过 MAC CE 指示为其分配的 TTI 长度，其中，该 TTI 长度包括短 TTI，解决了尚未有对短 TTI 进行配置的方法的问题。

在又一种可能的实现方式中，在 RRC 连接建立过程中实现对 TTI 进行配置，参照图 11 所示，包括以下步骤：

S1101、UE 向 eNB 发送 RRC 连接建立请求消息，其中，RRC 连接建立请求消息的 TTI 相关信元指示 UE 请求使用的 TTI 长度。

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具体的，在上行方向，UE 可以在 RRC 连接建立请求中携带 TTI 请求信息相关信元，其中，包含希望使用的 TTI 长度；

S1102、eNB 接收由 UE 发送的 RRC 连接建立请求消息，其中，RRC 连接建立请求消息的 TTI 相关信元指示 UE 请求使用的 TTI 长度。

S1103、eNB 根据 RRC 连接建立请求消息的 TTI 相关信元得到 UE 请求使用的 TTI 长度，其中，RRC 连接建立请求消息的 TTI 相关信元与 UE 请求使用的 TTI 长度相对应，具体方法参照步骤 S1101。

S1104、向 UE 发送 RRC 连接重配置消息，其中，RRC 连接重配置消息包含 TTI 指示信息，TTI 指示信息包含 eNB 为 UE 分配的 TTI 长度，具体的，TTI 指示信息包含以下信息中的至少一个：eNB 为 UE 分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息，其中，子帧起始位置信息包含起始的子帧号以及在子帧内的符号索引。

具体的，在下行方向，eNB 可以在 RRC 连接重配置消息中携带 TTI 指示信息相关信元，包含分配给 UE 的 TTI 长度和/或子帧起始位置信息，其中，子帧起始位置信息包含起始的子帧号以及在子帧内的符号索引。

S1105、UE 接收由 eNB 发送的 RRC 连接重配置消息，其中，RRC 连接重配置消息包含 TTI 指示信息，TTI 指示信息包含 eNB 为 UE 分配的 TTI 长度，具体的，TTI 指示信息包含以下信息中的至少一个：eNB 为 UE 分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息，其中，子帧起始位置信息包含起始的子帧号以及在子帧内的符号索引。

S1106、UE 以 eNB 为 UE 分配的 TTI 长度在生效时刻和/或起始符号位置处开始与 eNB 进行通信。

本发明的实施例提供的 TTI 配置方法，通过在 RRC 连接建立过程中，UE 通过将 RRC 连接建立请求消息的 TTI 相关信元指示 UE

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请求的TTI长度，eNB针对该请求通过RRC连接重配置消息指示为其分配的TTI长度，其中，该TTI长度包括短TTI，解决了尚未有对短TTI进行配置的方法的问题。

在再一种可能的实现方式中，在切换准备阶段中实现对TTI进行配置，参照图12所示，包括以下步骤：

S1201、UE向源eNB发送TTI请求信息，用于源eNB根据TTI请求信息得到UE请求使用的TTI长度，其中，TTI请求信息指示UE请求使用的TTI长度。

UE向源eNB发送TTI请求信息以请求使用一种或多种TTI长度，因此既可以包括1ms TTI也可以包括短TTI。同时要求UE必须具有相应的短TTI通信能力。

S1202、源eNB接收由UE发送的TTI请求信息，其中，TTI请求信息指示UE请求使用的TTI长度。

S1203、源eNB根据TTI请求信息得到UE请求使用的TTI长度，同时获得UE具有的短TTI通信能力。

上述步骤S1201至步骤S1203，由源eNB通过本发明的实施例提供的任一种TTI配置方法来获取UE请求使用的TTI长度，由于UE根据本UE的支持能力来发送TTI请求信息，所以相当于源eNB获取了UE具有的短TTI通信能力。

S1204、源eNB可以在向目标eNB发送的切换请求（英文名称：handover request)消息中携带UE具有短TTI通信能力的指示。

S1205、目标eNB在发给源eNB的切换确认(英文名称:handover confirm）消息中携带TTI指示信息，TTI指示信息包含eNB为UE分配的TTI长度，具体的，TTI指示信息包含以下信息中的至少一个：eNB为UE分配的TTI长度，生效时刻信息，起始符号位置信息，TTI长度的使能确认信息，其中，子帧起始位置信息包含起始的子帧号以及在子帧内的符号索引。

如果目标eNB接受切换请求，则可以在切换确认消息中向源eNB指示TTI长度和可能需要的子帧起始位置信息。

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S1206、源 eNB 向 UE 发送切换命令消息（英文名称：handover command），其中，切换命令消息包含 TTI 指示信息，TTI 指示信息包含 eNB 为 UE 分配的 TTI 长度，具体的，TTI 指示信息包含以下信息中的至少一个：eNB 为 UE 分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息，其中，子帧起始位置信息包含起始的子帧号以及在子帧内的符号索引。

S1207、UE 接收由源 eNB 发送的切换命令消息，其中，切换命令消息包含 TTI 指示信息，TTI 指示信息包含以下信息中的至少一个：eNB 为 UE 分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息，其中，子帧起始位置信息包含起始的子帧号以及在子帧内的符号索引。

S1208、UE 以目的 eNB 为 UE 分配的 TTI 长度在生效时刻和/或起始符号位置处开始与目的 eNB 进行通信。

本发明的实施例提供的 TTI 配置方法，通过在切换准备阶段中，源 eNB 可以在向目标 eNB 发送的切换请求消息中携带 UE 具有短 TTI 通信能力的指示，目标 eNB 在发给源 eNB 的切换确认消息中携带 TTI 指示信息，源 eNB 向 UE 发送切换命令消息，切换命令消息包含 TTI 指示信息，TTI 指示信息包含 eNB 为 UE 分配的 TTI 长度，其中，该 TTI 长度包括短 TTI，解决了尚未有对短 TTI 进行配置的方法的问题。

本发明的实施例提供了一种网络设备，用于执行上述 TTI 配置方法，参照图 13 中所示，包括：

接收单元 1301，用于接收由用户设备发送的 TTI 请求信息，其中，该 TTI 请求信息指示请求使用的 TTI 长度；

发送单元 1302，用于响应于接收单元 1301 接收的 TTI 请求信息，向用户设备发送 TTI 指示信息，其中，该 TTI 指示信息包含以下信息中的至少一个：

网络设备为用户设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，该 TTI 长度的使能确认信息。

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可选的，在一种可能的实现方式中，发送单元 1302，还用于在接收单元1301接收由用户设备发送的TTI请求信息之前，广播该网络设备支持的TTI长度。

可选的，参照图 14 所示，网络设备，还包括：

处理单元1303，用于根据TTI请求信息的信息内容得到用户设备请求使用的 TTI 长度，其中，TTI 请求信息的信息内容与用户设备请求使用的TTI长度相对应。

或者可选的，处理单元 1303 用于根据由用户设备发送的 TTI 请求信息所占用的资源得到用户设备请求使用的 TTI 长度，其中，所占用的资源与用户设备请求使用的TTI长度相对应。

可选的，在一种可能的实现方式中，接收单元 1301，还用于接收由用户设备发送的随机接入前导码，其中，随机接入前导码指示用户设备请求使用的TTI长度；

处理单元 1303，还用于根据随机接入前导码得到用户设备请求使用的TTI长度；

发送单元 1302，还用于向用户设备发送随机接入响应消息，其中，在随机接入响应消息中指示TTI指示信息。

可选的，在一种可能的实现方式中，发送单元1302，还用于：

在随机接入响应消息中增加字节来指示TTI指示信息；

或者，

通过复用随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示TTI指示信息。

可选的，在一种可能的实现方式中，

接收单元 1301，还用于接收用户设备在预设时频资源上发送的随机接入前导码，其中预设时频资源与用户设备请求使用的 TTI 长度相对应；

处理单元 1303，还用于根据随机接入前导码所占用的预设时频资源得到请求使用的TTI长度；

发送单元 1302，还用于向用户设备发送随机接入响应消息，

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其中，随机接入响应消息中包含 TTI 指示信息。

可选的，在一种可能的实现方式中，

接收单元 1301，还用于接收用户设备在预设调度请求资源上发送的调度请求信息，其中预设调度请求资源与用户设备请求使用的 TTI 长度相对应；

处理单元 1303，还用于根据由用户设备发送的调度请求信息所占用的预设时频资源得到用户设备请求使用的 TTI 长度。

可选的，在一种可能的实现方式中，

接收单元 1301，还用于接收由用户设备发送的缓存状态报告消息，其中，缓存状态报告消息的一个或多个保留比特位的值指示用户设备请求使用的 TTI 长度；

处理单元 1303，还用于根据缓存状态报告消息的一个或多个保留比特位的值得到用户设备请求使用的 TTI 长度。

可选的，在一种可能的实现方式中，

接收单元 1301，还用于接收 MAC CE，其中，MAC CE 的消息头中的一个上行 LCID 值指示该 MAC CE 的类型是 TTI 请求信息，MAC CE 的消息体指示用户设备请求的 TTI 长度；

处理单元 1303，还用于根据 MAC CE 的消息头和消息体得到用户设备请求使用的 TTI 长度；

发送单元 1302，还用于向用户设备发送 MAC CE，其中，MAC CE 的消息头中的一个下行 LCID 值指示 MAC CE 的类型是 TTI 指示信息，MAC CE 的消息体包含 TTI 指示信息。

可选的，在一种可能的实现方式中，

接收单元 1301，还用于接收由用户设备发送的 RRC 连接建立请求消息，其中，RRC 连接建立请求消息的 TTI 相关信元指示用户设备请求使用的 TTI 长度；

处理单元 1303，还用于根据 RRC 连接建立请求消息的 TTI 相关信元得到用户设备请求使用的 TTI 长度；

发送单元 1302，还用于向用户设备发送 RRC 连接建立消息或

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RRC 重配置消息，其中，RRC 连接建立消息或 RRC 重配置消息包含 TTI 指示信息。

可选的，在一种可能的实现方式中，

发送单元 1302，还用于向用户设备发送切换命令消息，其中，切换命令消息包含 TTI 指示信息。

需要说明的是，本实施例中的发送单元 1302，可以为 eNB 上具备发送功能的接口电路，如发射机或信息发送接口；接收单元 1301 可以为 eNB 上具备接收功能的接口电路，如接收机或信息接收接口。处理单元 1303 可以为单独设立的处理器，也可以集成在 eNB 的某一个处理器中实现，此外，也可以以程序代码的形式存储于 eNB 的存储器中，由 eNB 的某一个处理器调用并执行以上处理单元 1303 的功能。这里所述的处理器可以是一个中央处理器（英文全称：central processing unit，英文简称：CPU），或者是特定集成电路（英文全称：application specific integrated circuit，英文简称：ASIC），或者是被配置成实施本发明实施例的一个或多个集成电路。

由于本发明实施例中的网络设备可以用于执行上述方法流程，因此，其所能获得的技术效果也可参考上述方法实施例，本发明实施例在此不再赘述。

本发明的实施例提供了一种用户设备，用于执行上述 TTI 配置方法，参照图 15 中所示，包括：

发送单元 1501，用于向网络设备发送 TTI 请求信息，该 TTI 请求信息指示该用户设备请求使用的 TTI 长度；

接收单元 1502，用于接收由网络设备发送的 TTI 指示信息，其中，TTI 指示信息包含以下信息中的至少一个：

为用户设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，TTI 长度的使能确认信息。

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可选的，在一种可能的实现方式中，

接收单元 1502，还用于在发送单元 1501 发送 TTI 请求信息之前接收网络设备支持的 TTI 长度。

可选的，参照图 16 所示，用户设备，还包括：

处理单元 1503，用于使 TTI 请求信息的信息内容指示用户设备请求使用的 TTI 长度，其中，TTI 请求信息的信息内容与用户设备请求使用的 TTI 长度相对应。

或者可选的，处理单元 1503，用于使 TTI 请求信息所占用的资源指示用户设备请求使用的 TTI 长度，其中，所占用的资源与用户设备请求使用的 TTI 长度相对应。

可选的，在一种可能的实现方式中，

发送单元 1501，还用于向网络设备发送随机接入前导码，其中，随机接入前导码指示用户设备请求使用的 TTI 长度；

接收单元 1502，还用于接收由网络设备发送的随机接入响应消息，其中，在随机接入响应消息中指示 TTI 指示信息。

可选的，在一种可能的实现方式中，处理单元 1503，还用于：

在随机接入响应消息中增加字节来指示 TTI 指示信息；

或者，

通过复用随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示 TTI 指示信息。

可选的，在一种可能的实现方式中，

发送单元 1501，还用于在预设时频资源上向网络设备发送随机接入前导码，其中预设时频资源与用户设备请求使用的 TTI 长度相

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对应；

接收单元 1502，还用于接收由网络设备发送的随机接入响应消息，其中，随机接入响应消息中包含 TTI 指示信息。

可选的，在一种可能的实现方式中，

发送单元 1501，还用于在预设调度请求资源上向网络设备发送调度请求信息，其中预设调度请求资源与用户设备请求使用的 TTI 长度相对应。

可选的，在一种可能的实现方式中，

发送单元 1501，还用于向网络设备发送缓存状态报告消息，其中，缓存状态报告消息的一个或多个保留比特位的值指示用户设备请求使用的 TTI 长度。

可选的，在一种可能的实现方式中，

发送单元 1501，还用于向网络设备发送 MAC CE，其中，MAC CE 的消息头中的一个上行 LCID 值指示 MAC CE 的类型是 TTI 请求信息，MAC CE 的消息体指示请求的 TTI 长度；

接收单元 1502，还用于接收由网络设备发送的 MAC CE，其中，MAC CE 的消息头中的一个下行 LCID 值指示 MAC CE 的类型是 TTI 指示信息，MAC CE 的消息体包含 TTI 指示信息。

可选的，在一种可能的实现方式中，

发送单元 1501，还用于向网络设备发送 RRC 连接建立请求消息，其中，RRC 连接建立请求消息的 TTI 相关信元指示用户设备请求使用的 TTI 长度；

接收单元 1502，还用于接收由网络设备发送的 RRC 连接建立消息或 RRC 重配置消息，其中，RRC 连接建立消息或 RRC 重配置消息包含 TTI 指示信息。

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可选的，在一种可能的实现方式中，

接收单元 1502，还用于接收由网络设备发送的切换命令消息，其中，切换命令消息包含 TTI 指示信息。

需要说明的是，本实施例中的发送单元 1501，可以为 UE 上具备发送功能的接口电路，如发射机或信息发送接口；接收单元 1502 可以为 UE 上具备接收功能的接口电路，如接收机或信息接收接口。处理单元 1503 可以为单独设立的处理器，也可以集成在 UE 的某一个处理器中实现，此外，也可以以程序代码的形式存储于 UE 的存储器中，由 UE 的某一个处理器调用并执行以上处理单元 1503 的功能。这里所述的处理器可以是一个中央处理器（英文全称：central processing unit，英文简称：CPU），或者是特定集成电路（英文全称：application specific integrated circuit，英文简称：ASIC），或者是被配置成实施本发明实施例的一个或多个集成电路。

由于本发明实施例中的用户设备可以用于执行上述方法流程，因此，其所能获得的技术效果也可参考上述方法实施例，本发明实施例在此不再赘述。

参照图 17 所示，本发明的实施例提供了一种网络设备，用于实施上述的 TTI 配置方法，该装置可以为 eNB，其可以包括：处理器 1701、第一接口电路 1702、第二接口电路 1703、存储器 1704 和总线 1705；处理器 1701、第一接口电路 1702、第二接口电路 1703、存储器 1704 通过总线 1705 连接并完成相互间的通信；

需要说明的是，这里的处理器 1701 可以是一个处理器，也可以是多个处理元件的统称。例如，该处理器可以是中央处理器 CPU，也可以是特定集成电路 ASIC，或者是被配置成实施本发明实施例的一个或多个集成电路，例如：一个或多个微处理器（英文全称：digital singnal processor，英文简称：DSP），或，一个或者多个现场可编程门阵列（英文全称：field programmable aate array，英文简称：FPGA）。

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存储器1704可以是一个存储装置，也可以是多个存储元件的统称，且用于存储可执行程序代码或接入网管理设备运行所需要参数、数据等。且存储器 1704 可以包括随机存储器（英文全称：random-access memory，英文简称： RAM），也可以包括非易失性存储器（英文全称：non-volatile memory，英文简称： NVRAM），例如磁盘存储器，闪存（Flash）等。

总线 1705 可以是工业标准体系结构（英文全称：industry standard architecture，英文简称：ISA）总线、外部设备互连（英文全称：peripheral component，英文简称：PCI）总线或扩展工业标准体系结构（英文全称：extended industry standard architecture，英文简称：EISA)总线等。该总线 1705 可以分为地址总线、数据总线、控制总线等。为便于表示，图 17 中仅用一条粗线表示，但并不表示仅有一根总线或一种类型的总线。

处理器 1701 用于执行存储其中的程序，以结合第一接口电路 1702 和二接口电路 1703 执行上述方法实施例中所提供的方法。

具体的，处理器1701用于执行存储器中的程序执行上述实施例中 eNB 的处理单元的功能。

第一接口电路1702用于执行上述实施例中eNB的接收单元的功能。

第二接口单元1703用于执行上述实施例中eNB的发送单元的功能。

由于本发明实施例中的网络设备可以用于执行上述方法流程，因此，其所能获得的技术效果也可参考上述方法实施例，本发明实施例在此不再赘述。

参照图 18 所示，本发明的实施例提供了一种用户设备，用于实施上述的 TTI 配置方法，该装置可以为 eNB，其可以包括：处理器 1801、第一接口电路 1802、第二接口电路 1803、存储器 1804 和

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总线 1805；处理器 1801、第一接口电路 1802、第二接口电路 1803、存储器 1804 通过总线 1805 连接并完成相互间的通信；

需要说明的是，这里的处理器 1801 可以是一个处理器，也可以是多个处理元件的统称。例如，该处理器可以是中央处理器 CPU，也可以是特定集成电路 ASIC，或者是被配置成实施本发明实施例的一个或多个集成电路，例如：一个或多个微处理器（英文全称：digital singnal processor，英文简称：DSP），或，一个或者多个现场可编程门阵列（英文全称：field programmable aate array，英文简称： FPGA）。

存储器 1804 可以是一个存储装置，也可以是多个存储元件的统称，且用于存储可执行程序代码或接入网管理设备运行所需要参数、数据等。且存储器 1804 可以包括随机存储器（英文全称：random-access memory，英文简称： RAM），也可以包括非易失性存储器（英文全称：non-volatile memory，英文简称： NVRAM），例如磁盘存储器，闪存（Flash）等。

总线 1805 可以是工业标准体系结构（英文全称：industry standard architecture，英文简称：ISA）总线、外部设备互连（英文全称：peripheral component，英文简称：PCI）总线或扩展工业标准体系结构（英文全称：extended industry standard architecture，英文简称：EISA)总线等。该总线 1805 可以分为地址总线、数据总线、控制总线等。为便于表示，图 18 中仅用一条粗线表示，但并不表示仅有一根总线或一种类型的总线。

处理器 1801 用于执行存储其中的程序，以结合第一接口电路 1802 和二接口电路 1803 执行上述方法实施例中所提供的方法。

具体的，处理器 1801 用于执行存储器中的程序执行上述实施例中 eNB 的处理单元的功能。

第一接口电路 1802 用于执行上述实施例中 UE 的发送单元的功能。

第二接口单元 1803 用于执行上述实施例中 UE 的接收单元的功

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能。

由于本发明实施例中的用户设备可以用于执行上述方法流程，因此，其所能获得的技术效果也可参考上述方法实施例，本发明实施例在此不再赘述。

应理解，在本发明的各种实施例中，上述各过程的序号的大小并不意味着执行顺序的先后，各过程的执行顺序应以其功能和内在逻辑确定，而不应对本发明实施例的实施过程构成任何限定。

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发明的范围。

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、设备和方法，可以通过其它的方式实现。例如，以上所描述的设备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，设备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。

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另外，在本发明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时，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，本发明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）执行本发明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（英文全称:read-only memory，英文简称：ROM）、随机存取存储器（英文全称：random access memory，英文简称：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，仅为本发明的具体实施方式，但本发明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发明揭露的技术范围内，可轻易想到变化或替换，都应涵盖在本发明的保护范围之内。因此，本发明的保护范围应所述以权利要求的保护范围为准。

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权 利 要 求 书

1、一种 TTI 配置方法，其特征在于，包括：

网络设备接收 TTI 请求信息，其中，所述 TTI 请求信息指示请求使用的 TTI 长度；

响应于所述 TTI 请求信息，发送 TTI 指示信息，其中，所述 TTI 指示信息包含以下信息中的至少一个：

所述网络设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，所述 TTI 长度的使能确认信息。

2、根据权利要求 1 所述的 TTI 配置方法，其特征在于，在所述网络设备接收 TTI 请求信息之前，包括：

所述网络设备广播所述网络设备支持的 TTI 长度。

3、根据权利要求 1 所述的 TTI 配置方法，其特征在于，所述响应于所述 TTI 请求信息，包括：

根据所述 TTI 请求信息的信息内容得到请求使用的 TTI 长度，其中，所述 TTI 请求信息的信息内容与所述请求使用的 TTI 长度相对应。

4、根据权利要求 1 所述的 TTI 配置方法，其特征在于，所述响应于所述 TTI 请求信息，包括：

根据所述 TTI 请求信息所占用的资源得到请求使用的 TTI 长度，其中，所述所占用的资源与所述请求使用的 TTI 长度相对应。

5、根据权利要求 3 所述的 TTI 配置方法，其特征在于，

所述网络设备接收 TTI 请求信息包括：

所述网络设备接收随机接入前导码，其中，所述随机接入前导码指示所述请求使用的 TTI 长度；

所述响应于所述 TTI 请求信息包括：

根据所述随机接入前导码得到所述请求使用的 TTI 长度；

所述发送 TTI 指示信息，包括：

发送随机接入响应消息，其中，在所述随机接入响应消息中指示所述 TTI 指示信息。

6、根据权利要求 5 所述的 TTI 配置方法，其特征在于，所述在

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所述随机接入响应消息中指示所述 TTI 指示信息，包括：

在所述随机接入响应消息中增加字节来指示所述 TTI 指示信息；

或者，

通过复用所述随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示所述 TTI 指示信息。

7、根据权利要求 4 所述的 TTI 配置方法，其特征在于，

所述网络设备接收 TTI 请求信息包括：

所述网络设备接收在预设时频资源上的随机接入前导码，其中所述预设时频资源与所述请求使用的 TTI 长度相对应；

根据所述 TTI 请求信息所占用的资源得到所述请求使用的 TTI 长度包括：

根据所述随机接入前导码所占用的预设时频资源得到所述请求使用的 TTI 长度；

所述发送 TTI 指示信息，包括：

发送随机接入响应消息，其中，所述随机接入响应消息中包含所述 TTI 指示信息。

8、根据权利要求 4 所述的 TTI 配置方法，其特征在于，

所述网络设备接收 TTI 请求信息包括：

所述网络设备接收在预设调度请求资源上的调度请求信息，其中所述预设调度请求资源与所述请求使用的 TTI 长度相对应；

所述根据所述 TTI 请求信息所占用的资源得到所述请求使用的 TTI 长度包括：

根据所述调度请求信息所占用的预设时频资源得到所述请求使用的 TTI 长度。

9、根据权利要求 3 所述的 TTI 配置方法，其特征在于，包括：

所述网络设备接收 TTI 请求信息包括：

所述网络设备接收缓存状态报告消息，其中，所述缓存状态报告消息的一个或多个保留比特位的值指示所述用户设备请求使用的 TTI 长度；

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所述根据所述TTI请求信息的信息内容得到所述请求使用的TTI长度包括:

根据所述缓存状态报告消息的一个或多个保留比特位的值得到所述请求使用的TTI长度。

10、根据权利要求3所述的TTI配置方法，其特征在于，包括:

所述网络设备接收TTI请求信息包括:

所述网络设备接收MAC CE，其中，所述MAC CE的消息头中的一个上行LCID值指示所述MAC CE的类型是TTI请求信息，所述MAC CE的消息体指示请求的TTI长度;

所述根据所述TTI请求信息的信息内容得到所述请求使用的TTI长度包括:

根据所述MAC CE的消息头和消息体得到所述请求使用的TTI长度;

所述发送TTI指示信息，包括:

发送MAC CE，其中，所述MAC CE的消息头中的一个下行LCID值指示所述MAC CE的类型是TTI指示信息，所述MAC CE的消息体包含所述TTI指示信息。

11、根据权利要求3所述的TTI配置方法，其特征在于，包括:

所述网络设备接收TTI请求信息包括:

所述网络设备接收RRC连接建立请求消息，其中，所述RRC连接建立请求消息的TTI相关信元指示所述请求使用的TTI长度;

所述根据所述TTI请求信息的信息内容得到所述请求使用的TTI长度包括:

根据所述RRC连接建立请求消息的TTI相关信元得到所述请求使用的TTI长度;

所述发送TTI指示信息，包括:

发送RRC连接建立消息或RRC重配置消息，其中，所述RRC连接建立消息或所述RRC重配置消息包含所述TTI指示信息。

12、根据权利要求3所述的TTI配置方法，其特征在于，包括:

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所述发送 TTI 指示信息，包括：

发送切换命令消息，其中，所述切换命令消息包含所述 TTI 指示信息。

13、一种 TTI 配置方法，其特征在于，包括：

用户设备发送 TTI 请求信息，所述 TTI 请求信息指示所述用户设备请求使用的 TTI 长度；

接收 TTI 指示信息，其中，所述 TTI 指示信息包含以下信息中的至少一个：

为所述用户设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，所述 TTI 长度的使能确认信息。

14、根据权利要求 13 所述的 TTI 配置方法，其特征在于，在所述用户设备发送 TTI 请求信息之前，包括：

接收支持的 TTI 长度。

15、根据权利要求 13 所述的 TTI 配置方法，其特征在于，所述 TTI 请求信息指示所述用户设备请求使用的 TTI 长度，包括：

所述 TTI 请求信息的信息内容指示所述用户设备请求使用的 TTI 长度，其中，所述 TTI 请求信息的信息内容与所述用户设备请求使用的 TTI 长度相对应。

16、根据权利要求 13 所述的 TTI 配置方法，其特征在于，所述 TTI 请求信息指示所述用户设备请求使用的 TTI 长度，包括：

所述 TTI 请求信息所占用的资源指示所述用户设备请求使用的 TTI 长度，其中，所述所占用的资源与所述用户设备请求使用的 TTI 长度相对应。

17、根据权利要求 15 所述的 TTI 配置方法，其特征在于，

所述用户设备发送 TTI 请求信息包括：

所述用户设备发送随机接入前导码，其中，所述随机接入前导码指示所述用户设备请求使用的 TTI 长度；

所述接收 TTI 指示信息，包括：

接收随机接入响应消息，其中，在所述随机接入响应消息中指示

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所述 TTI 指示信息。

18、根据权利要求 17 所述的 TTI 配置方法，其特征在于，所述在所述随机接入响应消息中指示所述 TTI 指示信息，包括：

在所述随机接入响应消息中增加字节来指示所述 TTI 指示信息；

或者，

通过复用所述随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示所述 TTI 指示信息。

19、根据权利要求 16 所述的 TTI 配置方法，其特征在于，

所述用户设备发送 TTI 请求信息包括：

所述用户设备在预设时频资源上发送随机接入前导码，其中所述预设时频资源与所述用户设备请求使用的 TTI 长度相对应；

所述接收 TTI 指示信息，包括：

接收随机接入响应消息，其中，所述随机接入响应消息中包含所述 TTI 指示信息。

20、根据权利要求 16 所述的 TTI 配置方法，其特征在于，

所述用户设备发送 TTI 请求信息包括：

所述用户设备在预设调度请求资源上发送调度请求信息，其中所述预设调度请求资源与所述用户设备请求使用的 TTI 长度相对应。

21、根据权利要求 15 所述的 TTI 配置方法，其特征在于，包括：

所述用户设备发送 TTI 请求信息包括：

所述用户设备发送缓存状态报告消息，其中，所述缓存状态报告消息的一个或多个保留比特位的值指示所述用户设备请求使用的 TTI 长度。

22、根据权利要求 15 所述的 TTI 配置方法，其特征在于，包括：

所述用户设备发送 TTI 请求信息包括：

所述用户设备发送 MAC CE，其中，所述 MAC CE 的消息头中的一个上行 LCID 值指示所述 MAC CE 的类型是 TTI 请求信息，所述 MAC CE 的消息体指示请求的 TTI 长度；

所述接收 TTI 指示信息，包括：

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接收 MAC CE，其中，所述 MAC CE 的消息头中的一个下行 LCID 值指示所述 MAC CE 的类型是 TTI 指示信息，所述 MAC CE 的消息体包含所述 TTI 指示信息。

23、根据权利要求 15 所述的 TTI 配置方法，其特征在于，包括：

所述用户设备发送 TTI 请求信息包括：

所述用户设备发送 RRC 连接建立请求消息，其中，所述 RRC 连接建立请求消息的 TTI 相关信元指示所述用户设备请求使用的 TTI 长度；

所述接收由所述网络设备发送的 TTI 指示信息，包括：

接收 RRC 连接建立消息或 RRC 重配置消息，其中，所述 RRC 连接建立消息或所述 RRC 重配置消息包含所述 TTI 指示信息。

24、根据权利要求 15 所述的 TTI 配置方法，其特征在于，包括：

所述接收 TTI 指示信息，包括：

接收切换命令消息，其中，所述切换命令消息包含所述 TTI 指示信息。

25、一种网络设备，其特征在于，包括：

接收单元，用于接收 TTI 请求信息，其中，所述 TTI 请求信息指示请求使用的 TTI 长度；

发送单元，用于响应于所述接收单元接收的 TTI 请求信息，发送 TTI 指示信息，其中，所述 TTI 指示信息包含以下信息中的至少一个：

所述网络设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，所述 TTI 长度的使能确认信息。

26、根据权利要求 25 所述的网络设备，其特征在于，

所述发送单元，还用于在所述接收单元接收 TTI 请求信息之前广播所述网络设备支持的 TTI 长度。

27、根据权利要求 25 所述的网络设备，其特征在于，所述网络设备，还包括：

处理单元，用于根据所述 TTI 请求信息的信息内容得到请求使用的 TTI 长度，其中，所述 TTI 请求信息的信息内容与所述请求使用的

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TTI 长度相对应。

28、根据权利要求 25 所述的网络设备，其特征在于，所述网络设备，还包括：

处理单元，用于根据所述 TTI 请求信息所占用的资源得到请求使用的 TTI 长度，其中，所述所占用的资源与所述请求使用的 TTI 长度相对应。

29、根据权利要求 27 所述的网络设备，其特征在于，

所述接收单元，还用于接收随机接入前导码，其中，所述随机接入前导码指示所述请求使用的 TTI 长度；

所述处理单元，还用于根据所述随机接入前导码得到所述请求使用的 TTI 长度；

所述发送单元，还用于发送随机接入响应消息，其中，在所述随机接入响应消息中指示所述 TTI 指示信息。

30、据权利要求 29 所述的网络设备，其特征在于，所述发送单元，还用于：

在所述随机接入响应消息中增加字节来指示所述 TTI 指示信息；

或者，

通过复用所述随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示所述 TTI 指示信息。

31、根据权利要求 28 所述的网络设备，其特征在于，

所述接收单元，还用于接收在预设时频资源上的随机接入前导码，其中所述预设时频资源与所述请求使用的 TTI 长度相对应；

所述处理单元，还用于根据所述随机接入前导码所占用的预设时频资源得到所述请求使用的 TTI 长度；

所述发送单元，还用于发送随机接入响应消息，其中，所述随机接入响应消息中包含所述 TTI 指示信息。

32、根据权利要求 28 所述的网络设备，其特征在于，

所述接收单元，还用于接收在预设调度请求资源上的调度请求信息，其中所述预设调度请求资源与所述请求使用的 TTI 长度相对应；

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所述处理单元，还用于根据所述调度请求信息所占用的预设时频资源得到所述请求使用的 TTI 长度。

33、根据权利要求 27 所述的网络设备，其特征在于，包括：

所述接收单元，还用于接收缓存状态报告消息，其中，所述缓存状态报告消息的一个或多个保留比特位的值指示所述请求使用的 TTI 长度；

所述处理单元，还用于根据所述缓存状态报告消息的一个或多个保留比特位的值得到所述请求使用的 TTI 长度。

34、根据权利要求 27 所述的网络设备，其特征在于，包括：

所述接收单元，还用于接收 MAC CE，其中，所述 MAC CE 的消息头中的一个上行 LCID 值指示所述 MAC CE 的类型是 TTI 请求信息，所述 MAC CE 的消息体指示请求的 TTI 长度；

所述处理单元，还用于根据所述 MAC CE 的消息头和消息体得到所述请求使用的 TTI 长度；

所述发送单元，还用于发送 MAC CE，其中，所述 MAC CE 的消息头中的一个下行 LCID 值指示所述 MAC CE 的类型是 TTI 指示信息，所述 MAC CE 的消息体包含所述 TTI 指示信息。

35、根据权利要求 27 所述的网络设备，其特征在于，包括：

所述接收单元，还用于接收 RRC 连接建立请求消息，其中，所述 RRC 连接建立请求消息的 TTI 相关信元指示所述请求使用的 TTI 长度；

所述处理单元，还用于根据所述 RRC 连接建立请求消息的 TTI 相关信元得到所述请求使用的 TTI 长度；

所述发送单元，还用于发送 RRC 连接建立消息或 RRC 重配置消息，其中，所述 RRC 连接建立消息或所述 RRC 重配置消息包含所述 TTI 指示信息。

36、根据权利要求 27 所述的网络设备，其特征在于，包括：

所述发送单元，还用于发送切换命令消息，其中，所述切换命令消息包含所述 TTI 指示信息。

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37、一种用户设备，其特征在于，包括：

发送单元，用于发送 TTI 请求信息，所述 TTI 请求信息指示所述用户设备请求使用的 TTI 长度；

接收单元，用于接收 TTI 指示信息，其中，所述 TTI 指示信息包含以下信息中的至少一个：

为所述用户设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，所述 TTI 长度的使能确认信息。

38、根据权利要求 37 所述的用户设备，其特征在于，

所述接收单元，还用于在所述发送单元发送 TTI 请求信息之前接收支持的 TTI 长度。

39、根据权利要求 37 所述的用户设备，其特征在于，所述用户设备，还包括：

处理单元，用于使所述 TTI 请求信息的信息内容指示所述用户设备请求使用的 TTI 长度，其中，所述 TTI 请求信息的信息内容与所述用户设备请求使用的 TTI 长度相对应。

40、根据权利要求 37 所述的用户设备，其特征在于，所述用户设备，还包括：

处理单元，用于使所述 TTI 请求信息所占用的资源指示所述用户设备请求使用的 TTI 长度，其中，所述所占用的资源与所述用户设备请求使用的 TTI 长度相对应。

41、根据权利要求 39 所述的用户设备，其特征在于，

所述发送单元，还用于发送随机接入前导码，其中，所述随机接入前导码指示所述用户设备请求使用的 TTI 长度；

所述接收单元，还用于接收随机接入响应消息，其中，在所述随机接入响应消息中指示所述 TTI 指示信息。

42、根据权利要求 41 所述的用户设备，其特征在于，所述处理单元，还用于：

在所述随机接入响应消息中增加字节来指示所述 TTI 指示信息；

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通过复用所述随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示所述 TTI 指示信息。

43、根据权利要求 40 所述的用户设备，其特征在于，

所述发送单元，还用于在预设时频资源上发送随机接入前导码，其中所述预设时频资源与所述用户设备请求使用的 TTI 长度相对应；

所述接收单元，还用于接收随机接入响应消息，其中，所述随机接入响应消息中包含所述 TTI 指示信息。

44、根据权利要求 40 所述的用户设备，其特征在于，

所述发送单元，还用于在预设调度请求资源上发送调度请求信息，其中所述预设调度请求资源与所述用户设备请求使用的 TTI 长度相对应。

45、根据权利要求 39 所述的用户设备，其特征在于，包括：

所述发送单元，还用于发送缓存状态报告消息，其中，所述缓存状态报告消息的一个或多个保留比特位的值指示所述用户设备请求使用的 TTI 长度。

46、根据权利要求 39 所述的用户设备，其特征在于，包括：

所述发送单元，还用于发送 MAC CE，其中，所述 MAC CE 的消息头中的一个上行 LCID 值指示所述 MAC CE 的类型是 TTI 请求信息，所述 MAC CE 的消息体指示请求的 TTI 长度；

所述接收单元，还用于接收 MAC CE，其中，所述 MAC CE 的消息头中的一个下行 LCID 值指示所述 MAC CE 的类型是 TTI 指示信息，所述 MAC CE 的消息体包含所述 TTI 指示信息。

47、根据权利要求 39 所述的用户设备，其特征在于，包括：

所述发送单元，还用于发送 RRC 连接建立请求消息，其中，所述 RRC 连接建立请求消息的 TTI 相关信元指示所述用户设备请求使用的 TTI 长度；

所述接收单元，还用于接收 RRC 连接建立消息或 RRC 重配置消息，其中，所述 RRC 连接建立消息或所述 RRC 重配置消息包含所述 TTI 指示信息。

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48、根据权利要求 39 所述的用户设备，其特征在于，包括：

所述接收单元，还用于接收切换命令消息，其中，所述切换命令消息包含所述 TTI 指示信息。

49、一种网络设备，其特征在于，包括处理器、第一接口电路、第二接口电路、存储器和总线；所述处理器、第一接口电路、第二接口电路、存储器通过所述总线连接并完成相互间的通信；所述处理器用于执行存储器中的程序代码以控制所述第一接口电路和所述第二接口电路执行以下操作：

所述第一接口电路用于接收TTI请求信息，其中，所述TTI请求信息指示请求使用的 TTI 长度；

所述第二接口电路用于响应于所述第一接口电路接收的 TTI 请求信息，向所述用户设备发送 TTI 指示信息，其中，所述 TTI 指示信息包含以下信息中的至少一个：

所述网络设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，所述 TTI 长度的使能确认信息。

50、根据权利要求 49 所述的网络设备，其特征在于，

所述第二接口电路，还用于在所述接收单元接收 TTI 请求信息之前广播所述网络设备支持的 TTI 长度。

51、根据权利要求 49 所述的网络设备，其特征在于，所述处理器，还用于：

根据所述 TTI 请求信息的信息内容得到请求使用的 TTI 长度，其中，所述 TTI 请求信息的信息内容与所述请求使用的 TTI 长度相对应。

52、根据权利要求 49 所述的网络设备，其特征在于，所述处理器，还用于：

根据所述 TTI 请求信息所占用的资源得到请求使用的 TTI 长度，其中，所述所占用的资源与所述请求使用的 TTI 长度相对应。

53、根据权利要求 51 所述的网络设备，其特征在于，

所述第一接口电路，还用于接收随机接入前导码，其中，所述随机接入前导码指示所述请求使用的 TTI 长度；

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所述第二接口电路，还用于根据所述随机接入前导码得到所述请求使用的 TTI 长度；

所述发送单元，还用于发送随机接入响应消息，其中，在所述随机接入响应消息中指示所述 TTI 指示信息。

54、根据权利要求 53 所述的网络设备，其特征在于，所述第二接口电路，还用于：

在所述随机接入响应消息中增加字节来指示所述 TTI 指示信息；

或者，

通过复用所述随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示所述 TTI 指示信息。

55、根据权利要求 52 所述的网络设备，其特征在于，

所述第一接口电路，还用于接收在预设时频资源上的随机接入前导码，其中所述预设时频资源与所述请求使用的 TTI 长度相对应；

所述处理器，还用于根据所述随机接入前导码所占用的预设时频资源得到所述请求使用的 TTI 长度；

所述第二接口电路，还用于发送随机接入响应消息，其中，所述随机接入响应消息中包含所述 TTI 指示信息。

56、根据权利要求 52 所述的网络设备，其特征在于，

所述第一接口电路，还用于接收在预设调度请求资源上的调度请求信息，其中所述预设调度请求资源与所述请求使用的 TTI 长度相对应；

所述处理器，还用于根据所述调度请求信息所占用的预设时频资源得到所述请求使用的 TTI 长度。

57、根据权利要求 51 所述的网络设备，其特征在于，包括：

所述第一接口电路，还用于接收缓存状态报告消息，其中，所述缓存状态报告消息的一个或多个保留比特位的值指示所述请求使用的 TTI 长度；

所述处理单元，还用于根据所述缓存状态报告消息的一个或多个保留比特位的值得到所述请求使用的 TTI 长度。

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58、根据权利要求 51 所述的网络设备，其特征在于，包括：

所述第一接口电路，还用于接收 MAC CE，其中，所述 MAC CE 的消息头中的一个上行 LCID 值指示所述 MAC CE 的类型是 TTI 请求信息，所述 MAC CE 的消息体指示请求的 TTI 长度；

所述处理器，还用于根据所述 MAC CE 的消息头和消息体得到所述请求使用的 TTI 长度；

所述第二接口电路，还用于发送 MAC CE，其中，所述 MAC CE 的消息头中的一个下行 LCID 值指示所述 MAC CE 的类型是 TTI 指示信息，所述 MAC CE 的消息体包含所述 TTI 指示信息。

59、根据权利要求 51 所述的网络设备，其特征在于，包括：

所述第一接口电路，还用于接收 RRC 连接建立请求消息，其中，所述 RRC 连接建立请求消息的 TTI 相关信元指示所述请求使用的 TTI 长度；

所述处理器，还用于根据所述 RRC 连接建立请求消息的 TTI 相关信元得到所述请求使用的 TTI 长度；

所述第二接口电路，还用于发送 RRC 连接建立消息或 RRC 重配置消息，其中，所述 RRC 连接建立消息或所述 RRC 重配置消息包含所述 TTI 指示信息。

60、根据权利要求 51 所述的网络设备，其特征在于，包括：

所述第二接口电路，还用于发送切换命令消息，其中，所述切换命令消息包含所述 TTI 指示信息。

61、一种用户设备，其特征在于，包括处理器、第一接口电路、第二接口电路、存储器和总线；所述处理器、第一接口电路、第二接口电路、存储器通过所述总线连接并完成相互间的通信；所述处理器用于执行存储器中的程序代码控制第一接口电路和第二接口电路执行以下操作：

所述第一接口电路用于发送 TTI 请求信息，所述 TTI 请求信息指示所述用户设备请求使用的 TTI 长度；

所述第二接口电路用于接收 TTI 指示信息，其中，所述 TTI 指示

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信息包含以下信息中的至少一个:

为所述用户设备分配的 TTI 长度，生效时刻信息，起始符号位置信息，所述 TTI 长度的使能确认信息。

62、根据权利要求 61 所述的用户设备，其特征在于，

所述第二接口电路,还用于在所述发送单元发送 TTI 请求信息之前接收支持的 TTI 长度。

63、根据权利要求 61 所述的用户设备，其特征在于，所述处理器，还用于:

使所述 TTI 请求信息的信息内容指示所述用户设备请求使用的 TTI 长度，其中，所述 TTI 请求信息的信息内容与所述用户设备请求使用的 TTI 长度相对应。

64、根据权利要求 61 所述的用户设备，其特征在于，所述处理器，还用于:

使所述 TTI 请求信息所占用的资源指示所述用户设备请求使用的 TTI 长度，其中，所述所占用的资源与所述用户设备请求使用的 TTI 长度相对应。

65、根据权利要求 63 所述的用户设备，其特征在于，

所述第一接口电路，还用于发送随机接入前导码，其中，所述随机接入前导码指示所述用户设备请求使用的 TTI 长度;

所述第二接口电路，还用于接收随机接入响应消息，其中，在所述随机接入响应消息中指示所述 TTI 指示信息。

66、根据权利要求 65 所述的用户设备，其特征在于，所述处理器，还用于:

在所述随机接入响应消息中增加字节来指示所述 TTI 指示信息;

或者，

通过复用所述随机接入响应消息中的上行调度授权消息的一个或多个可选比特位来指示所述 TTI 指示信息。

67、根据权利要求 64 所述的用户设备，其特征在于，

所述第一接口电路,还用于在预设时频资源上发送随机接入前导

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码，其中所述预设时频资源与所述用户设备请求使用的 TTI 长度相对应；

所述第二接口电路，还用于接收随机接入响应消息，其中，所述随机接入响应消息中包含所述 TTI 指示信息。

68、根据权利要求 64 所述的用户设备，其特征在于，

所述第一接口电路，还用于在预设调度请求资源上发送调度请求信息，其中所述预设调度请求资源与所述用户设备请求使用的 TTI 长度相对应。

69、根据权利要求 63 所述的用户设备，其特征在于，包括：

所述第一接口电路，还用于发送缓存状态报告消息，其中，所述缓存状态报告消息的一个或多个保留比特位的值指示所述用户设备请求使用的 TTI 长度。

70、根据权利要求 63 所述的用户设备，其特征在于，包括：

所述第一接口电路，还用于发送 MAC CE，其中，所述 MAC CE 的消息头中的一个上行 LCID 值指示所述 MAC CE 的类型是 TTI 请求信息，所述 MAC CE 的消息体指示请求的 TTI 长度；

所述第二接口电路，还用于接收 MAC CE，其中，所述 MAC CE 的消息头中的一个下行 LCID 值指示所述 MAC CE 的类型是 TTI 指示信息，所述 MAC CE 的消息体包含所述 TTI 指示信息。

71、根据权利要求 63 所述的用户设备，其特征在于，包括：

所述第一接口电路，还用于发送 RRC 连接建立请求消息，其中，所述 RRC 连接建立请求消息的 TTI 相关信元指示所述用户设备请求使用的 TTI 长度；

所述第二接口电路，还用于接收 RRC 连接建立消息或 RRC 重配置消息，其中，所述 RRC 连接建立消息或所述 RRC 重配置消息包含所述 TTI 指示信息。

72、根据权利要求 63 所述的用户设备，其特征在于，包括：

所述第二接口电路，还用于接收切换命令消息，其中，所述切换命令消息包含所述 TTI 指示信息。

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73、一种通信系统，包括如权利要求 25-36 任一项所述的网络设备以及如权利要求 37-48 任一项所述的用户设备；

或者，

包括如权利要求 49-60 任一项所述的网络设备以及如权利要求 61-72 任一项所述的用户设备。

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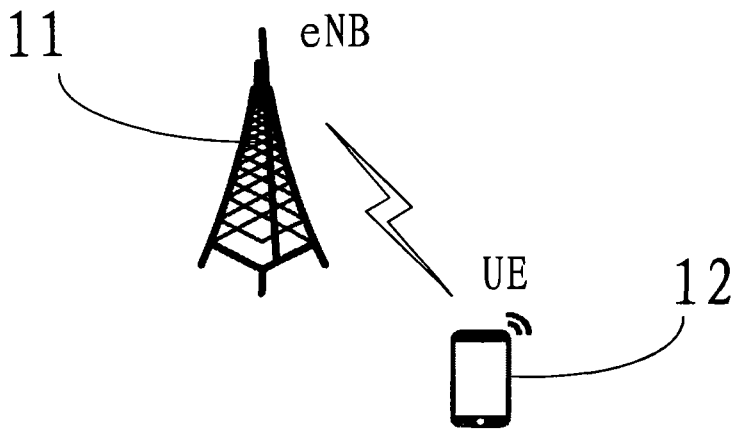

11
eNB
UE
12

图 1

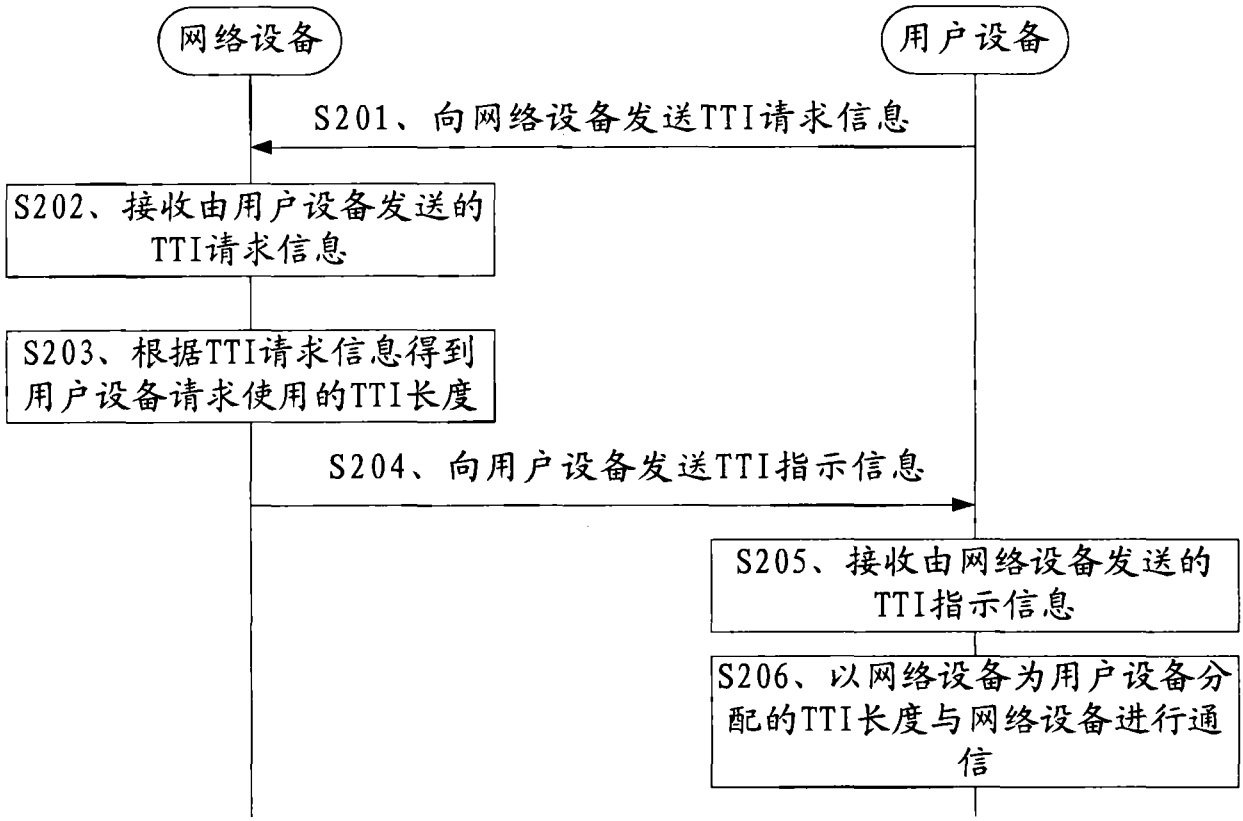

网络设备
用户设备
S201、向网络设备发送TTI请求信息
S202、接收由用户设备发送的TTI请求信息
S203、根据TTI请求信息得到用户设备请求使用的TTI长度
S204、向用户设备发送TTI指示信息
S205、接收由网络设备发送的TTI指示信息
S206、以网络设备为用户设备分配的TTI长度与网络设备进行通信

图 2

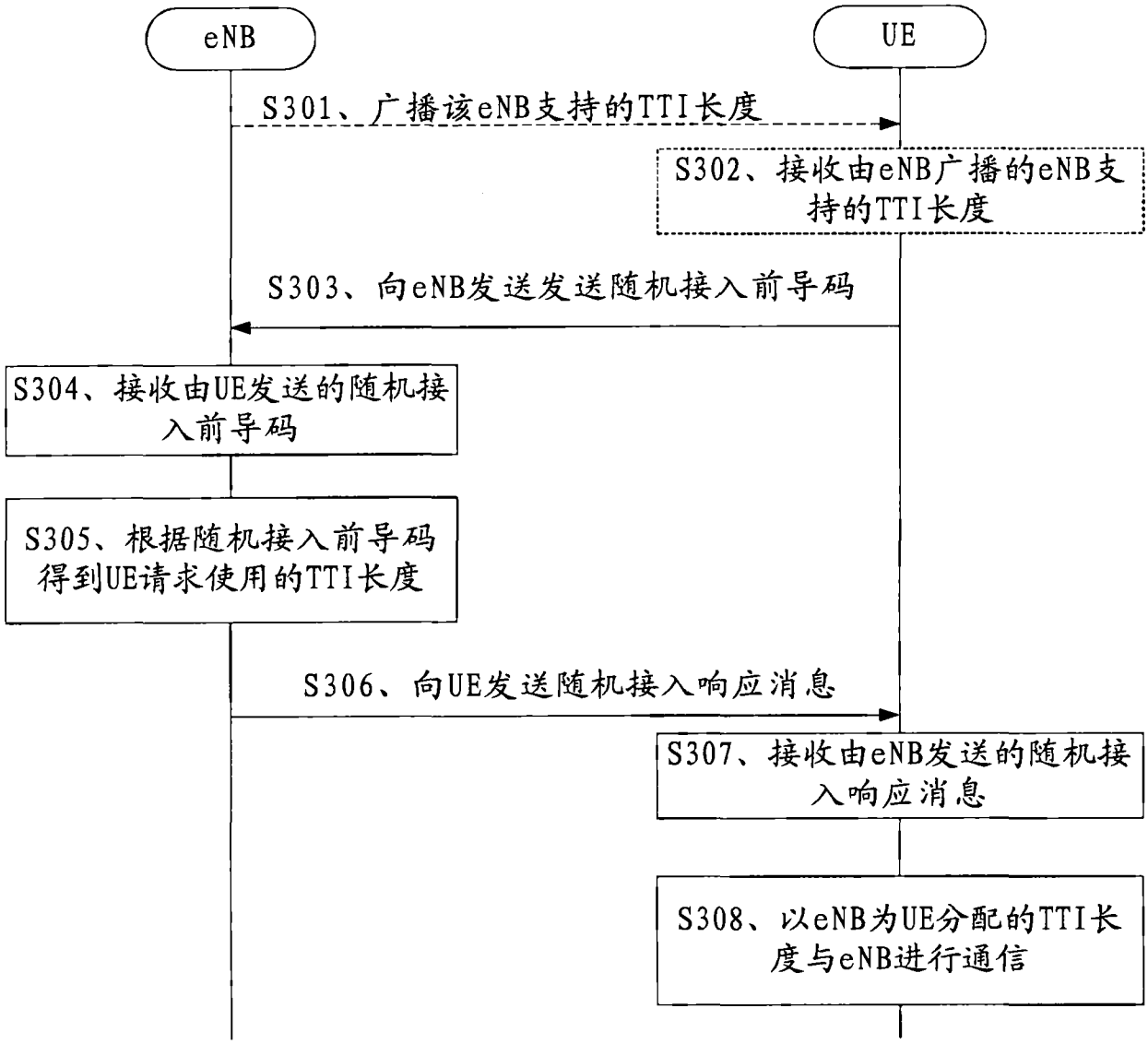

eNB
UE
S301、广播该eNB支持的TTI长度
S302、接收由eNB广播的eNB支持的TTI长度
S303、向eNB发送发送随机接入前导码
S304、接收由UE发送的随机接入前导码
S305、根据随机接入前导码得到UE请求使用的TTI长度
S306、向UE发送随机接入响应消息
S307、接收由eNB发送的随机接入响应消息
S308、以eNB为UE分配的TTI长度与eNB进行通信

图 3

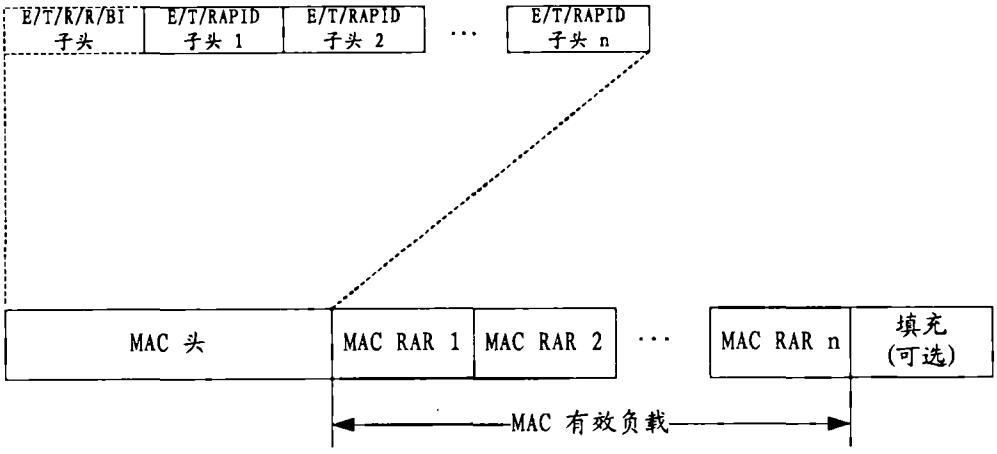

E/T/R/R/BI 子头
E/T/RAPID 子头 1
E/T/RAPID 子头 2
E/T/RAPID 子头 n
MAC 头
MAC RAR 1
MAC RAR 2
MAC RAR n
填充 (可选)
MAC 有效负载

图4

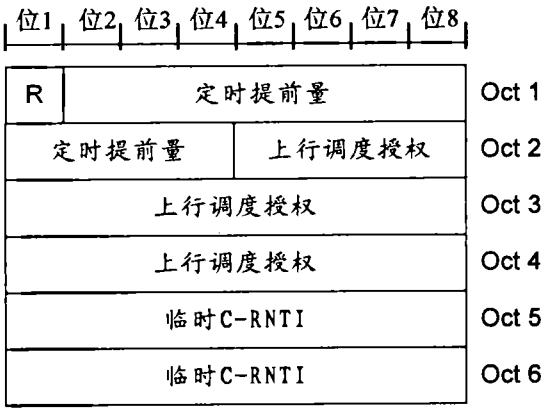

位1 位2 位3 位4 位5 位6 位7 位8
R
定时提前量
Oct 1
定时提前量
上行调度授权
Oct 2
上行调度授权
Oct 3
上行调度授权
Oct 4
临时C-RNTI
Oct 5
临时C-RNTI
Oct 6

图 5

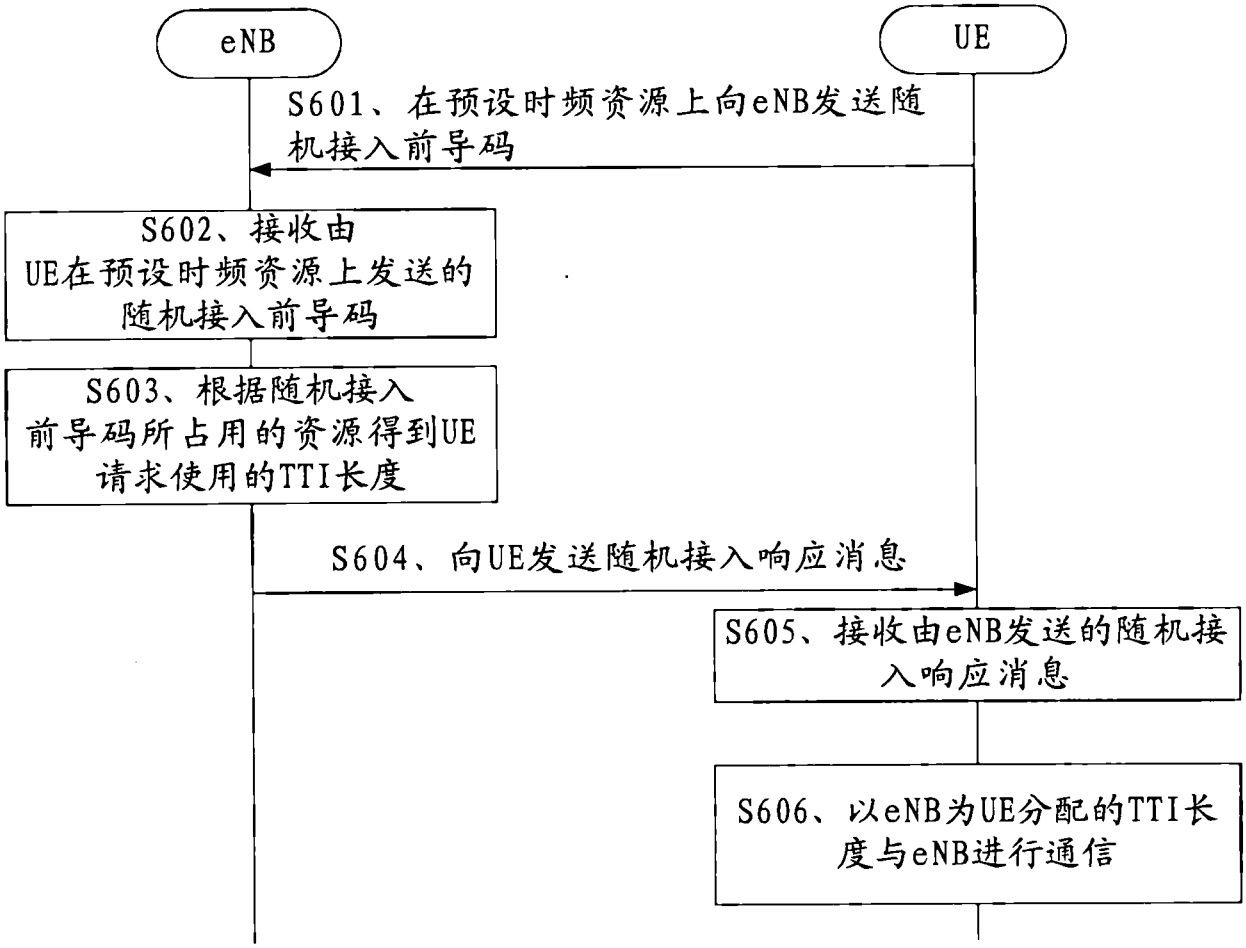

eNB
UE
S601、在预设时频资源上向eNB发送随机接入前导码
S602、接收由UE在预设时频资源上发送的随机接入前导码
S603、根据随机接入前导码所占用的资源得到UE请求使用的TTI长度
S604、向UE发送随机接入响应消息
S605、接收由eNB发送的随机接入响应消息
S606、以eNB为UE分配的TTI长度与eNB进行通信

图6

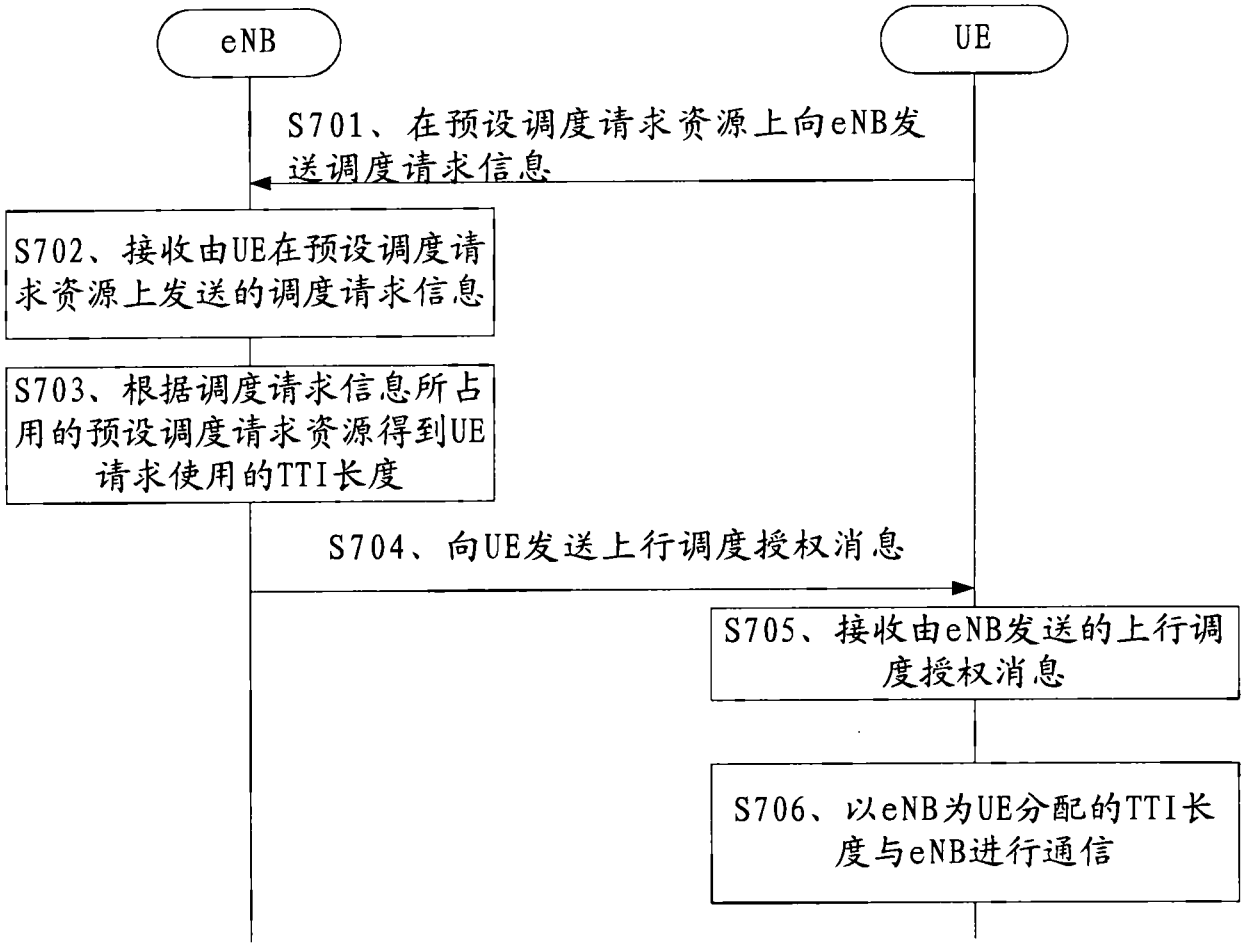

eNB
UE
S701、在预设调度请求资源上向eNB发送调度请求信息
S702、接收由UE在预设调度请求资源上发送的调度请求信息
S703、根据调度请求信息所占用的预设调度请求资源得到UE请求使用的TTI长度
S704、向UE发送上行调度授权消息
S705、接收由eNB发送的上行调度授权消息
S706、以eNB为UE分配的TTI长度与eNB进行通信

图 7

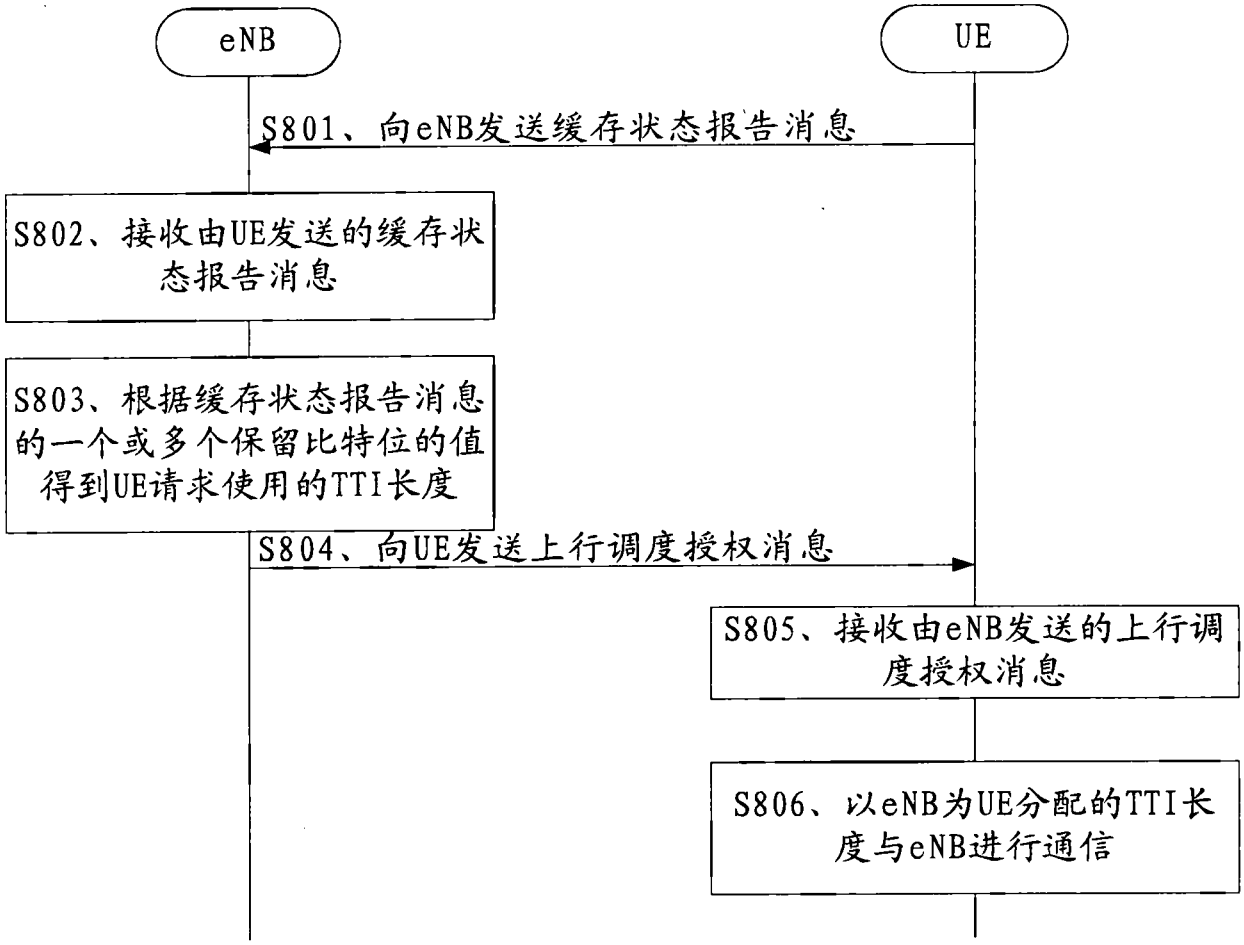
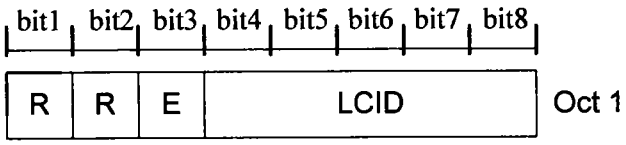


图 8



R/R/E/LCID 子头

图 9

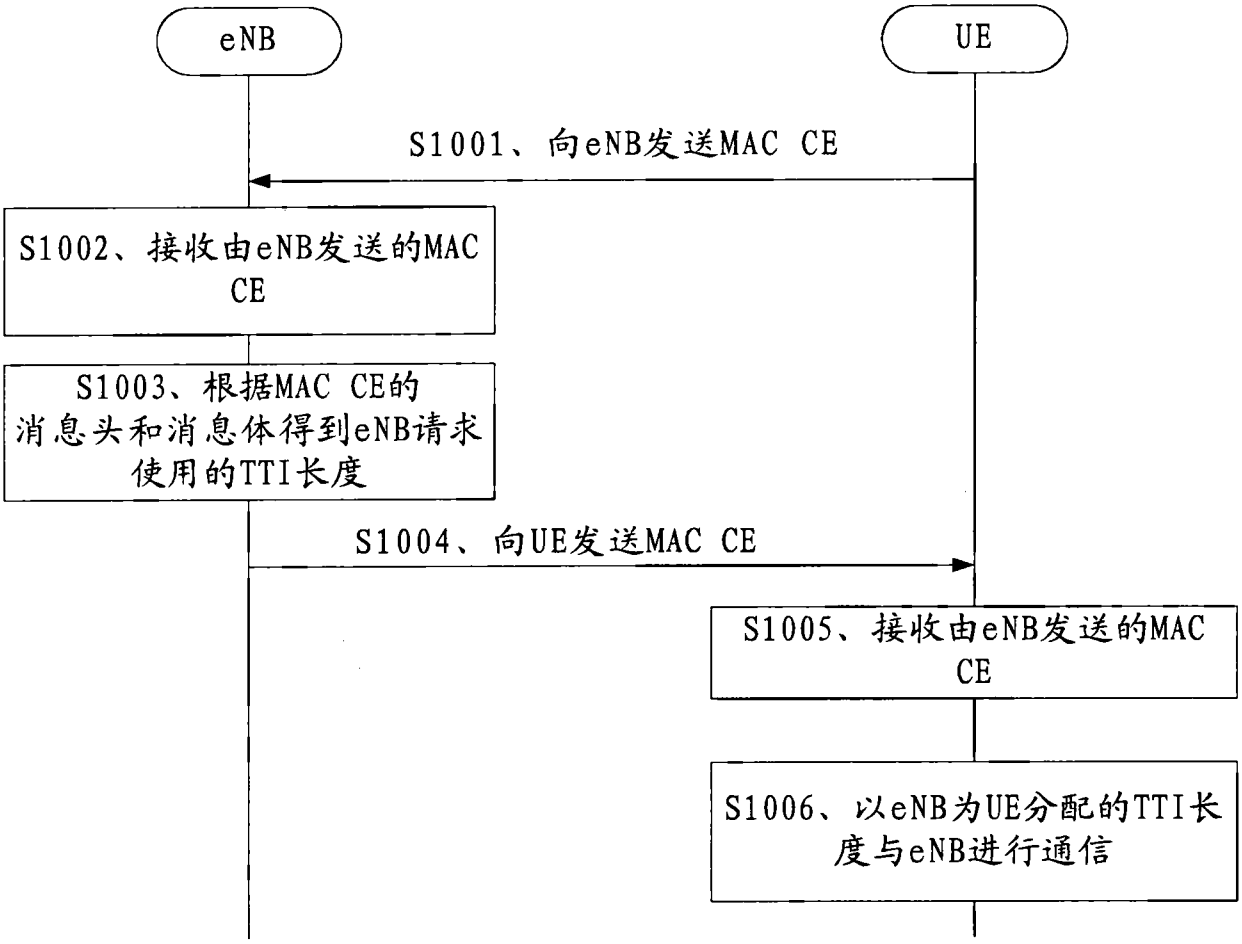

eNB
UE
S1001、向eNB发送MAC CE
S1002、接收由eNB发送的MAC CE
S1003、根据MAC CE的消息头和消息体得到eNB请求使用的TTI长度
S1004、向UE发送MAC CE
S1005、接收由eNB发送的MAC CE
S1006、以eNB为UE分配的TTI长度与eNB进行通信

图 10

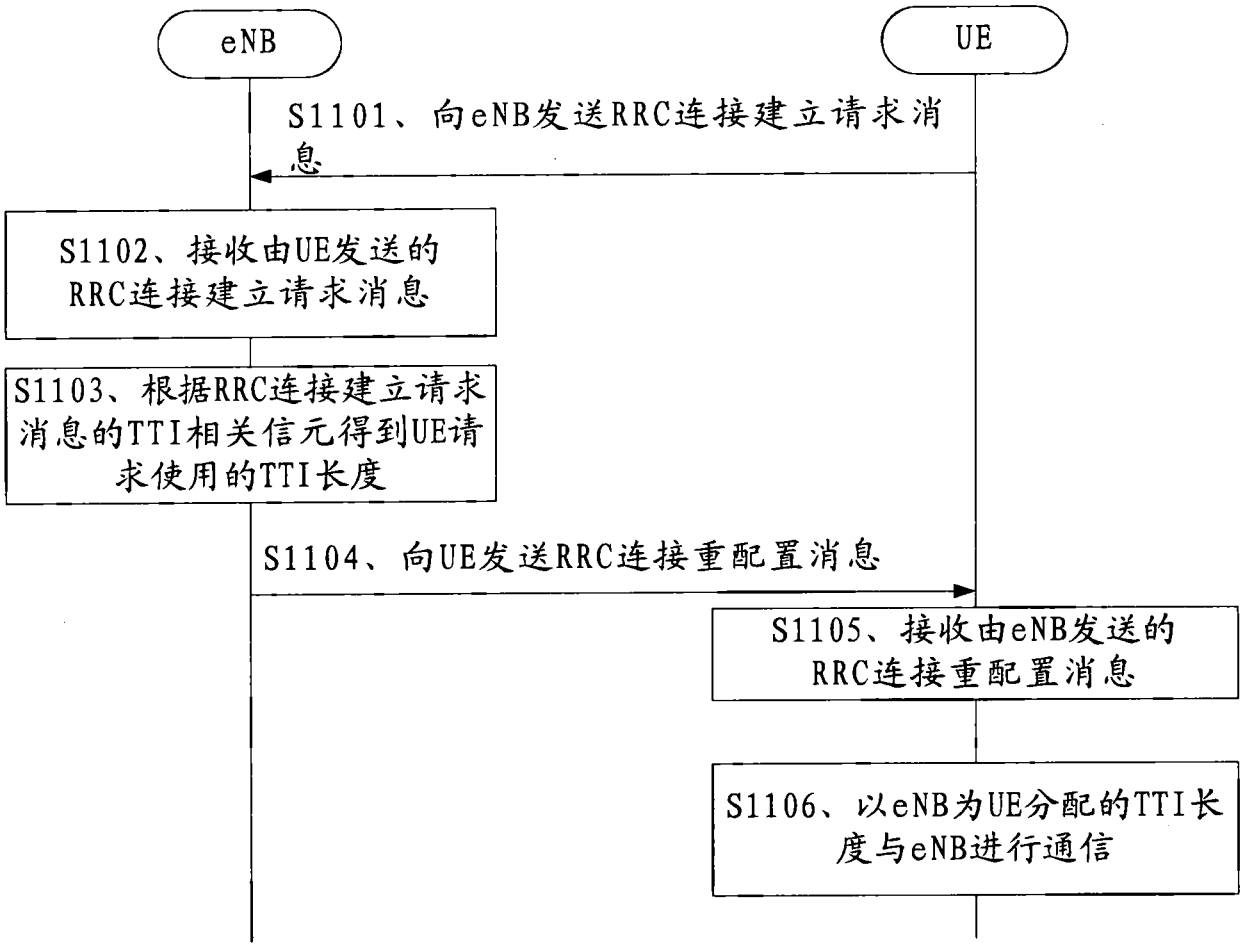

eNB
UE
S1101、向eNB发送RRC连接建立请求消息
S1102、接收由UE发送的RRC连接建立请求消息
S1103、根据RRC连接建立请求消息的TTI相关信元得到UE请求使用的TTI长度
S1104、向UE发送RRC连接重配置消息
S1105、接收由eNB发送的RRC连接重配置消息
S1106、以eNB为UE分配的TTI长度与eNB进行通信

图 11

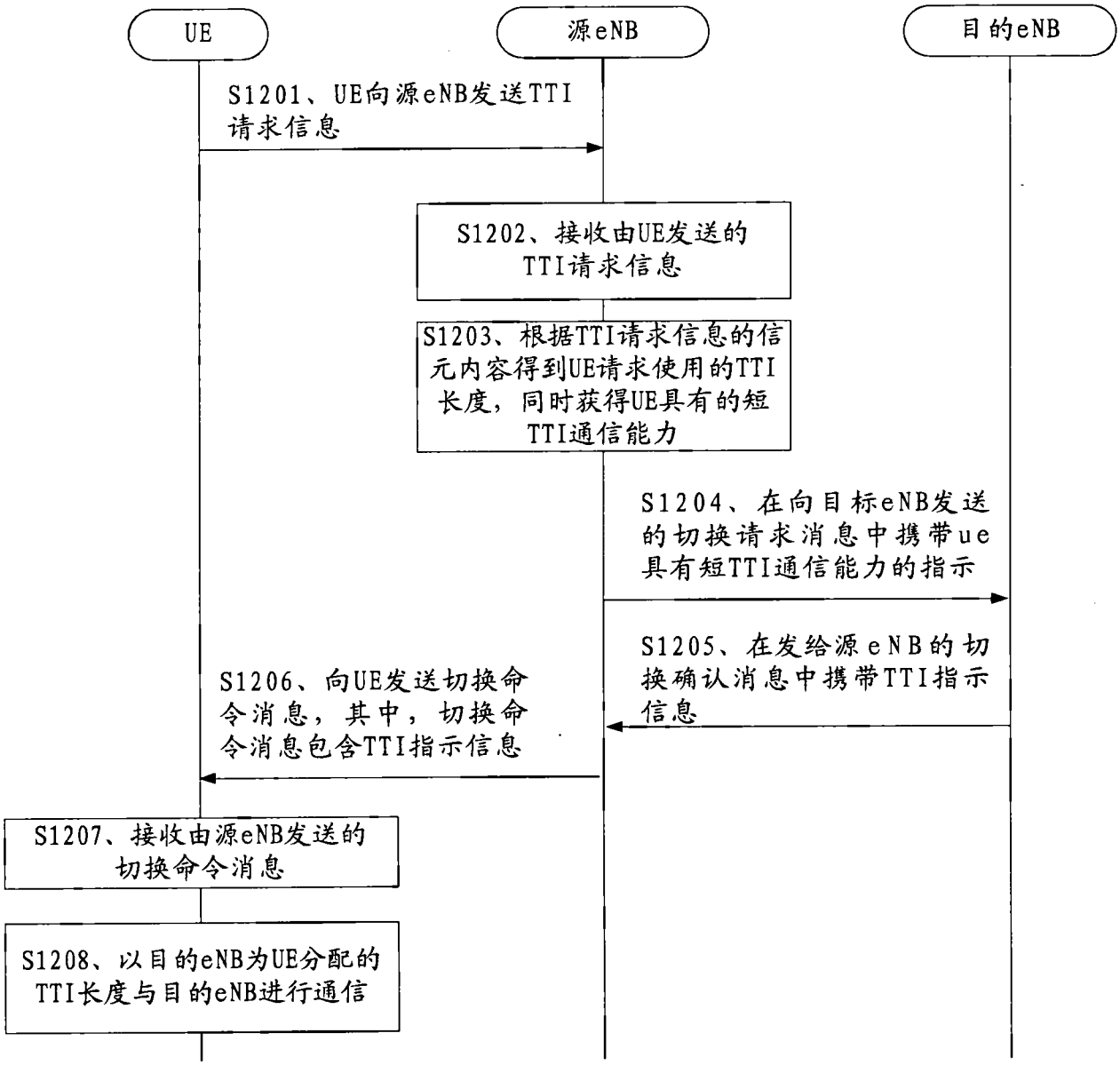

UE
源eNB
目的eNB
S1201、UE向源eNB发送TTI请求信息
S1202、接收由UE发送的TTI请求信息
S1203、根据TTI请求信息的信元内容得到UE请求使用的TTI长度，同时获得UE具有的短TTI通信能力
S1204、在向目标eNB发送的切换请求消息中携带ue具有短TTI通信能力的指示
S1205、在发给源eNB的切换确认消息中携带TTI指示信息
S1206、向UE发送切换命令消息，其中，切换命令消息包含TTI指示信息
S1207、接收由源eNB发送的切换命令消息
S1208、以目的eNB为UE分配的TTI长度与目的eNB进行通信

图 12

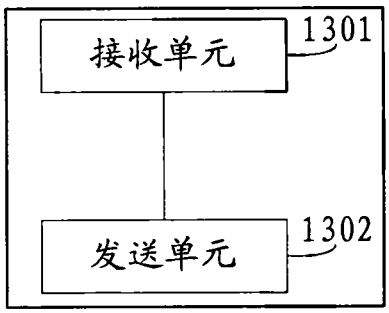

接收单元
1301
发送单元
1302

图 13

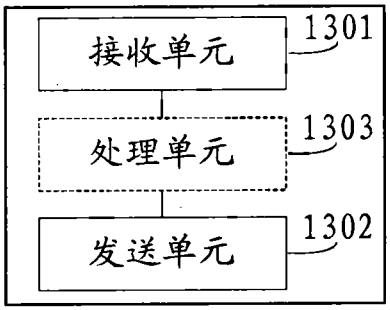

接收单元
1301
处理单元
1303
发送单元
1302

图 14

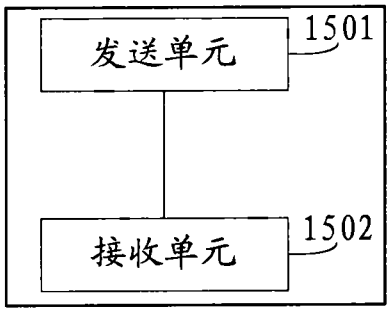

发送单元
1501
接收单元
1502

图 15

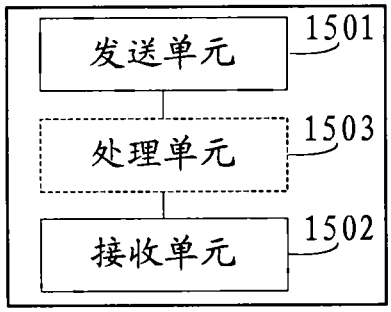

发送单元
1501
处理单元
1503
接收单元
1502

图 16

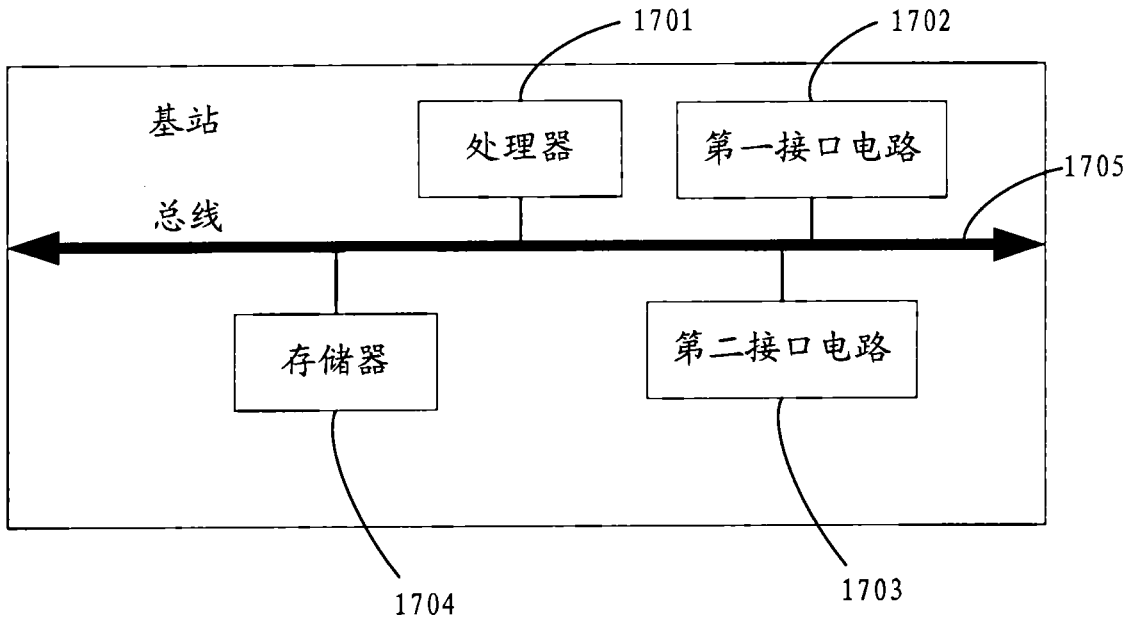

1701
1702
基站
处理器
第一接口电路
1705
总线
存储器
第二接口电路
1704
1703

图 17

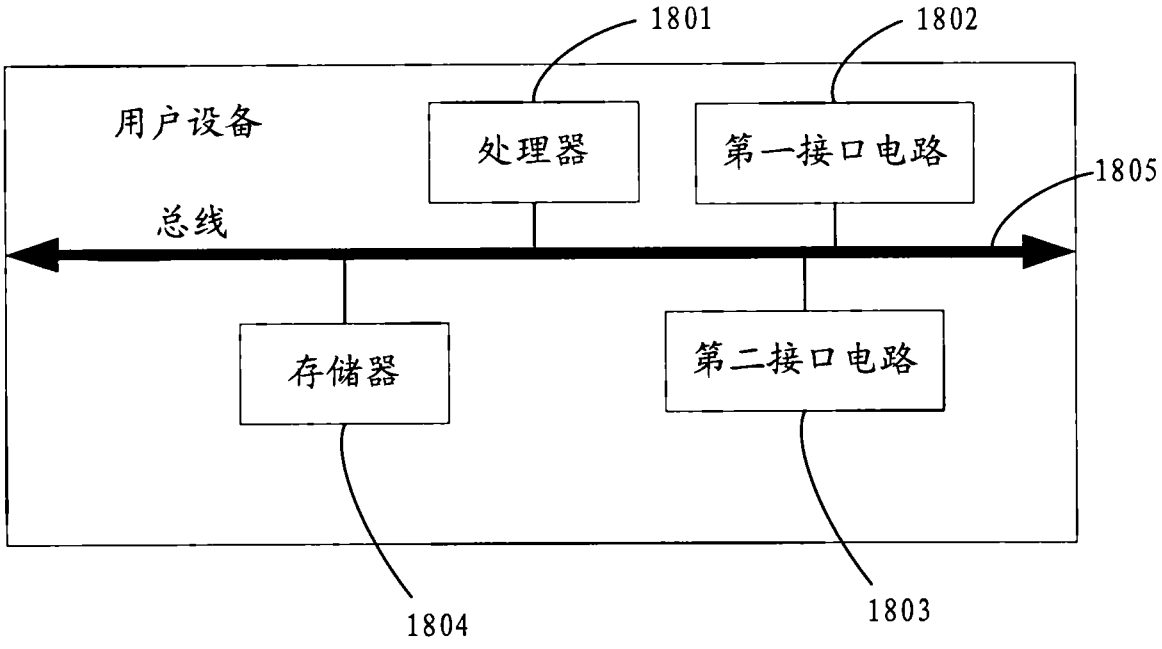

1801
1802
用户设备
处理器
第一接口电路
1805
总线
存储器
第二接口电路
1804
1803

图 18

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/073234

A. CLASSIFICATION OF SUBJECT MATTER

H04W 16/10 (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)

H04W; H04Q; H04B

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)

CNPAT; CNKI; WPI; EPODOC: LTE, base station, NodeB, UE, request, configure, indicate, TTI, length

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 103167579 A (HUAWEI TECHNOLOGIES CO., LTD.) 19 June 2013 (19.06.2013) description, paragraph [0005]	1-73
A	CN 104303565 A (HUAWEI TECHNOLOGIES CO., LTD.) 21 January 2015 (21.01.2015) the whole document	1-73
A	CN 101272177 A (DA TANG MOBILE COMMUNICATIONS EQUIPMENT CO., LTD.) 24 September 2008 (24.09.2008) the whole document	1-73
A	US 2014071954 A1 (FUTUREWEI TECHNOLOGIES INC.) 13 March 2014 (13.03.2014) the whole document	1-73

☐ 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	Date of mailing of the international search report
27 September 2016	25 October 2016
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer LIU, Cheng'en Telephone No. (86-10) 62413330

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2016/073234

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 103167579 A	19 June 2013	EP 2770790 A1	27 August 2014
		CN 103167579 B	16 December 2015
		EP 2770790 A4	22 October 2014
		US 2014286320 A1	25 September 2014
		WO 2013083001 A1	13 June 2013
		EP 2770790 B1	06 April 2016
CN 104303565 A	21 January 2015	WO 2014166122 A1	16 October 2014
CN 101272177 A	24 September 2008	CN 101272177 B	19 December 2012
US 2014071954 A1	13 March 2014	EP 2891357 A1	08 July 2015
		CN 104620629 A	13 May 2015
		US 2015351093 A1	03 December 2015
		EP 2891357 A4	05 August 2015
		WO 2014040531 A1	20 March 2014
		US 9131498 B2	08 September 2015

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IPR2024-01036

国际检索报告

国际申请号
PCT/CN2016/073234

A. 主题的分类

H04W 16/10(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)

H04W; H04Q; H04B

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））

CNPAT,CNKI,WPI,EPODOC: 长期演进, LTE, 基站, NodeB, 用户设备, UE, 请求, request, 配置, configure, 指示, indicate, 传输时间间隔, TTI, 长度, length

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 103167579 A (华为技术有限公司) 2013年 6月 19日 (2013-06-19) 说明书第[0005]段	1-73
A	CN 104303565 A (华为技术有限公司) 2015年 1月 21日 (2015-01-21) 全文	1-73
A	CN 101272177 A (大唐移动通信设备有限公司) 2008年 9月 24日 (2008-09-24) 全文	1-73
A	US 2014071954 A1 (FUTUREWEI TECHNOLOGIES INC.) 2014年 3月 13日 (2014-03-13) 全文	1-73

☐ 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	国际检索报告邮寄日期
2016年 9月 27日	2016年 10月 25日
ISA/CN的名称和邮寄地址 中华人民共和国国家知识产权局(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 刘承恩 电话号码 (86-10)62413330

表 PCT/ISA/210 (第2页) (2009年7月)

国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2016/073234

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	103167579	A	2013年 6月 19日	EP	2770790	A1	2014年 8月 27日
				CN	103167579	B	2015年 12月 16日
				EP	2770790	A4	2014年 10月 22日
				US	2014286320	A1	2014年 9月 25日
				WO	2013083001	A1	2013年 6月 13日
				EP	2770790	B1	2016年 4月 6日
CN	104303565	A	2015年 1月 21日	WO	2014166122	A1	2014年 10月 16日
CN	101272177	A	2008年 9月 24日	CN	101272177	B	2012年 12月 19日
US	2014071954	A1	2014年 3月 13日	EP	2891357	A1	2015年 7月 8日
				CN	104620629	A	2015年 5月 13日
				US	2015351093	A1	2015年 12月 3日
				EP	2891357	A4	2015年 8月 5日
				WO	2014040531	A1	2014年 3月 20日
				US	9131498	B2	2015年 9月 8日

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