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Zhang et al.

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(54) **COMMUNICATION METHOD, DEVICE, AND SYSTEM**

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H04L 1/00 (2006.01)
H04W 72/04 (2009.01)
(Continued)

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(2013.01); **H04W 72/0413** (2013.01); **H04W**
16/32 (2013.01); **H04W 36/0016** (2013.01)

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H04W 36/18; H04W 36/30;
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Radio Access Network; Evolved Universal Terrestrial Radio Access
(E-UTRA) and Evolved Universal Terrestrial Radio Access Net-
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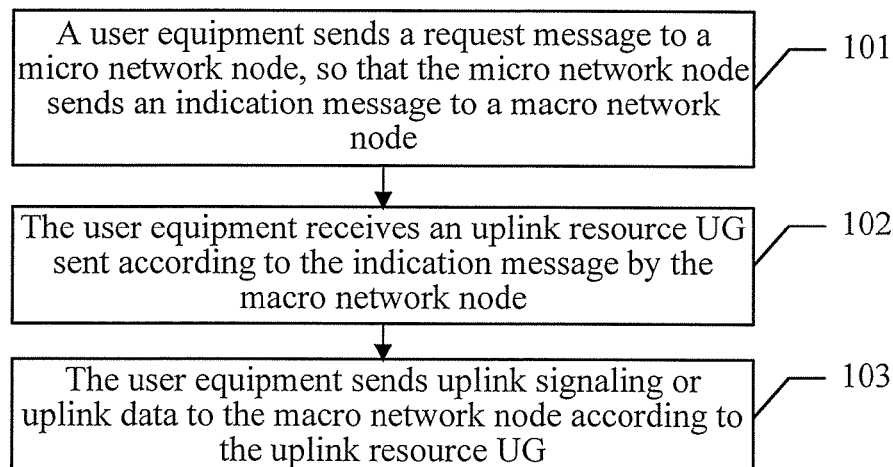
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Primary Examiner — Dady Chery

(57) **ABSTRACT**

The present invention discloses a communication method,
including: sending, by a user equipment, a request message
to a micro network node, so that the micro network node
sends an indication message to a macro network node;
receiving an uplink resource (UG) sent according to the
indication message by the macro network node; and sending
uplink signaling or uplink data to the macro network node
according to the uplink resource (UG). Embodiments of the
present invention further provide a corresponding device
and system. In technical solutions of the present invention,
the micro network node participates in accessing the user
equipment to a network, so that a UE can rapidly access the
network, which reduces an access delay of the UE.

16 Claims, 21 Drawing Sheets



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(58)	Field of Classification Search			JP	2011-211321	A	10/2011
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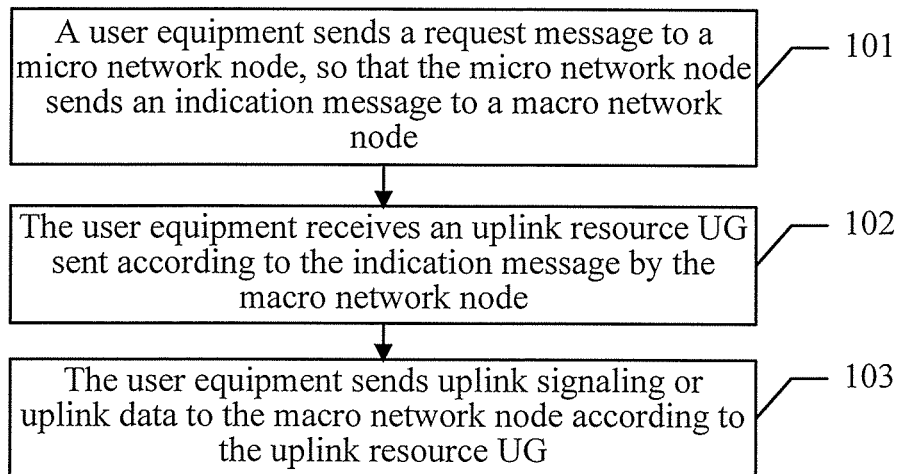


FIG. 1

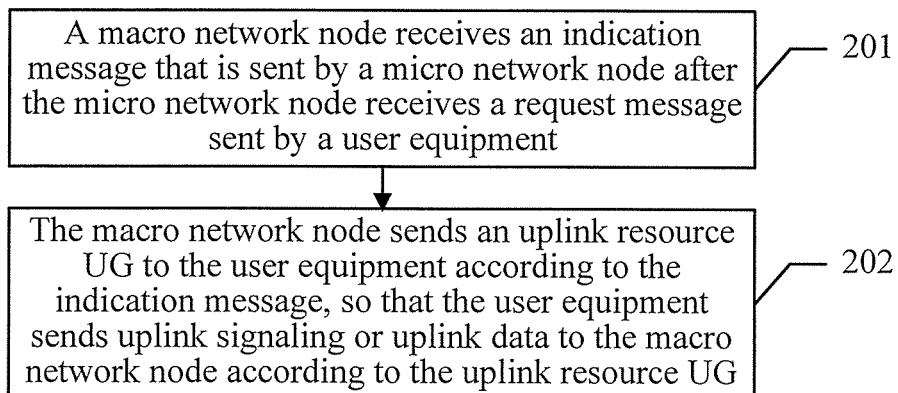


FIG. 2

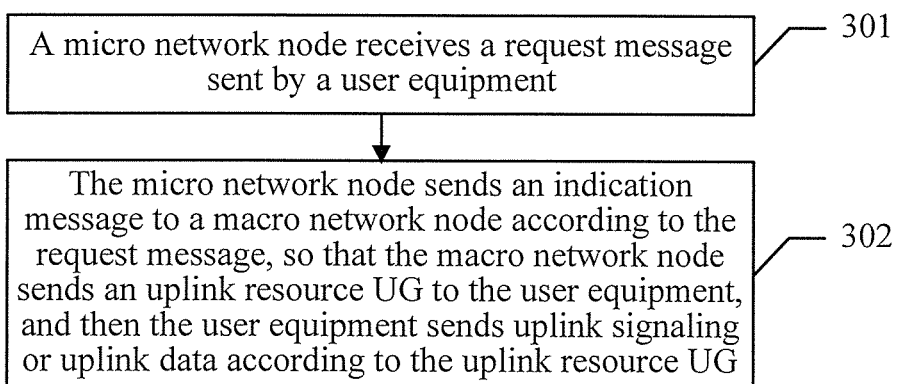


FIG. 3

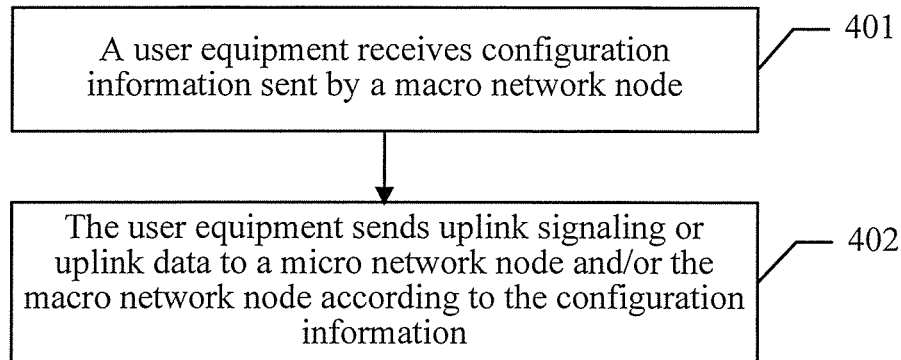


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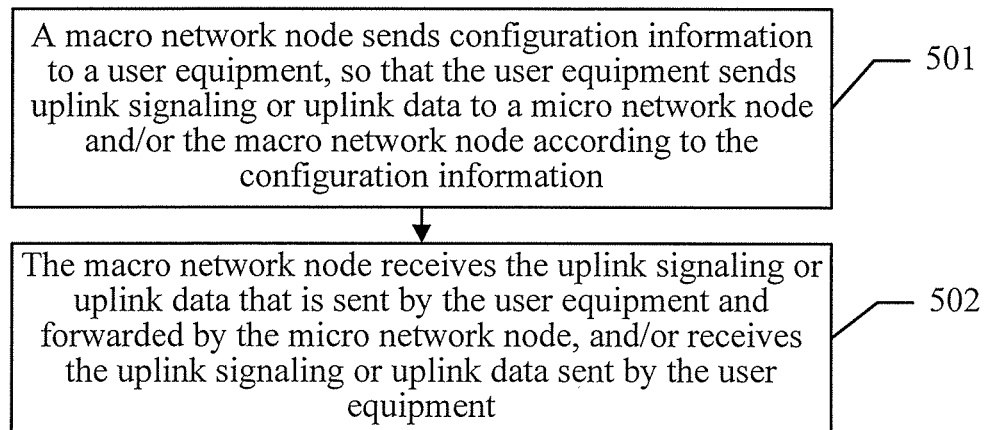


FIG. 5

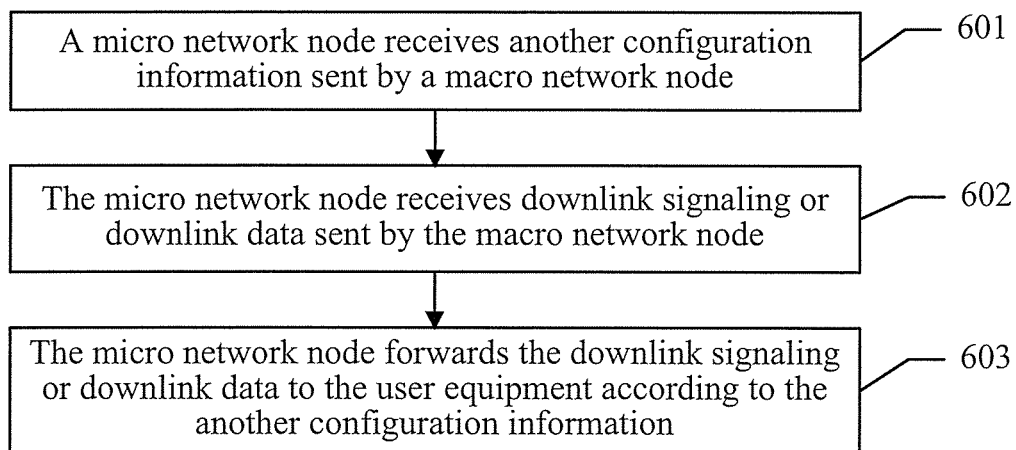


FIG. 6

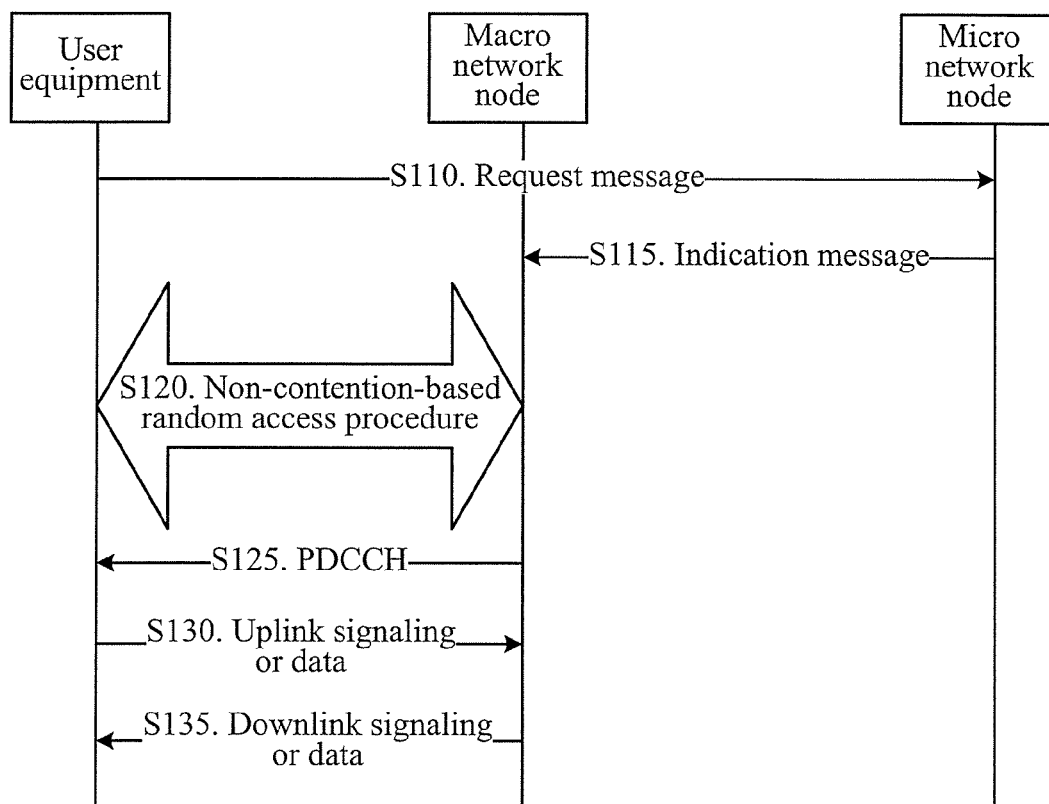


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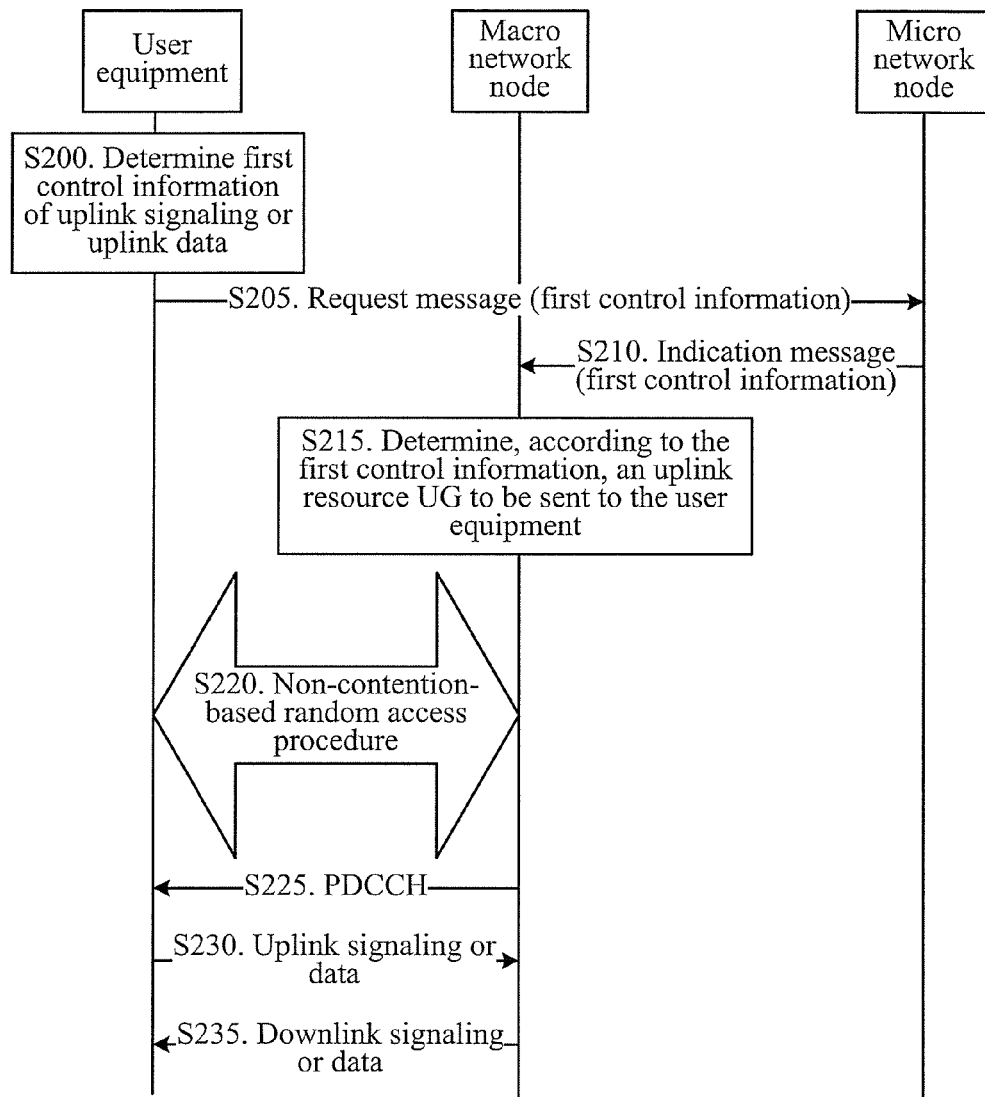


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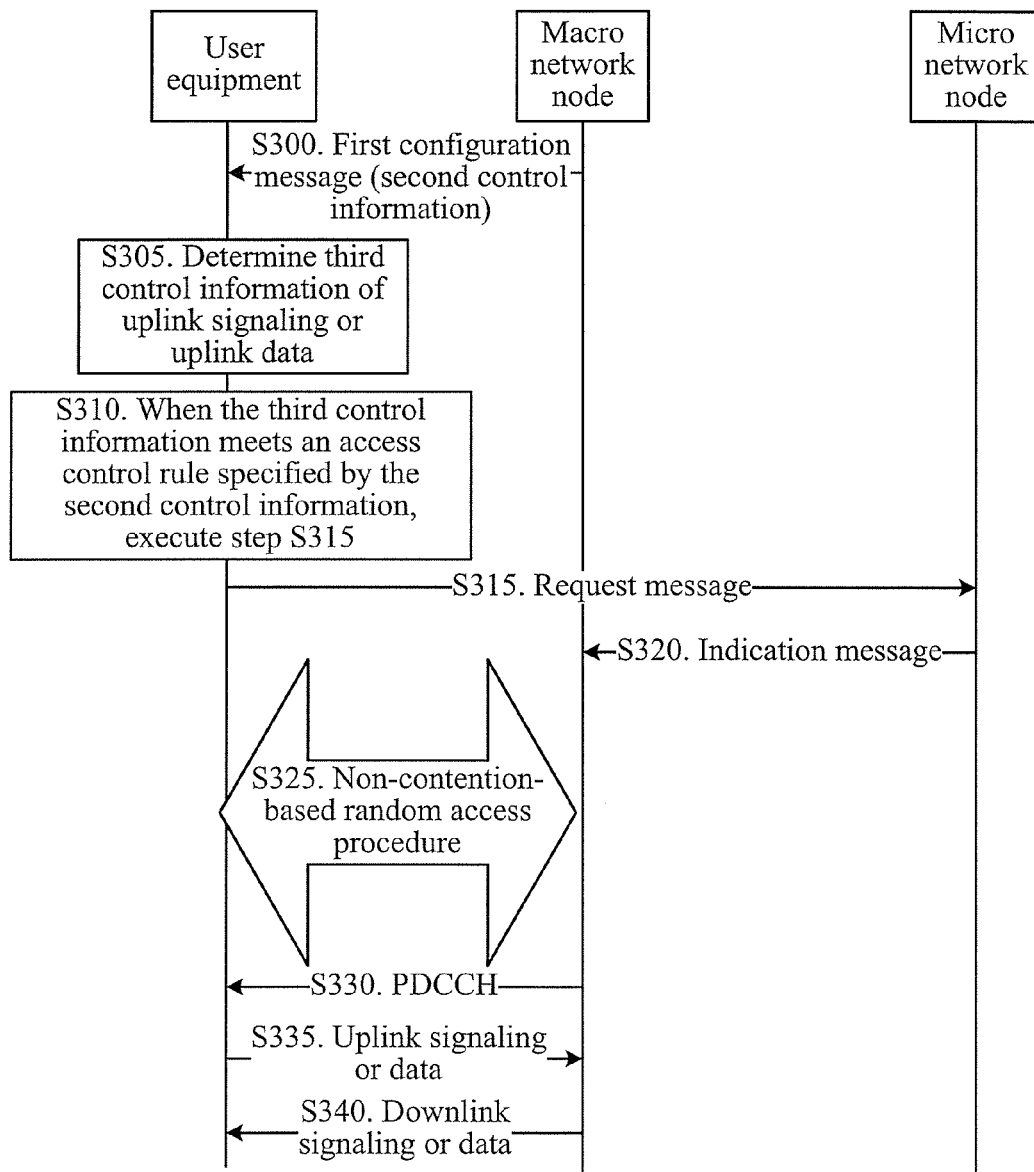


FIG. 9

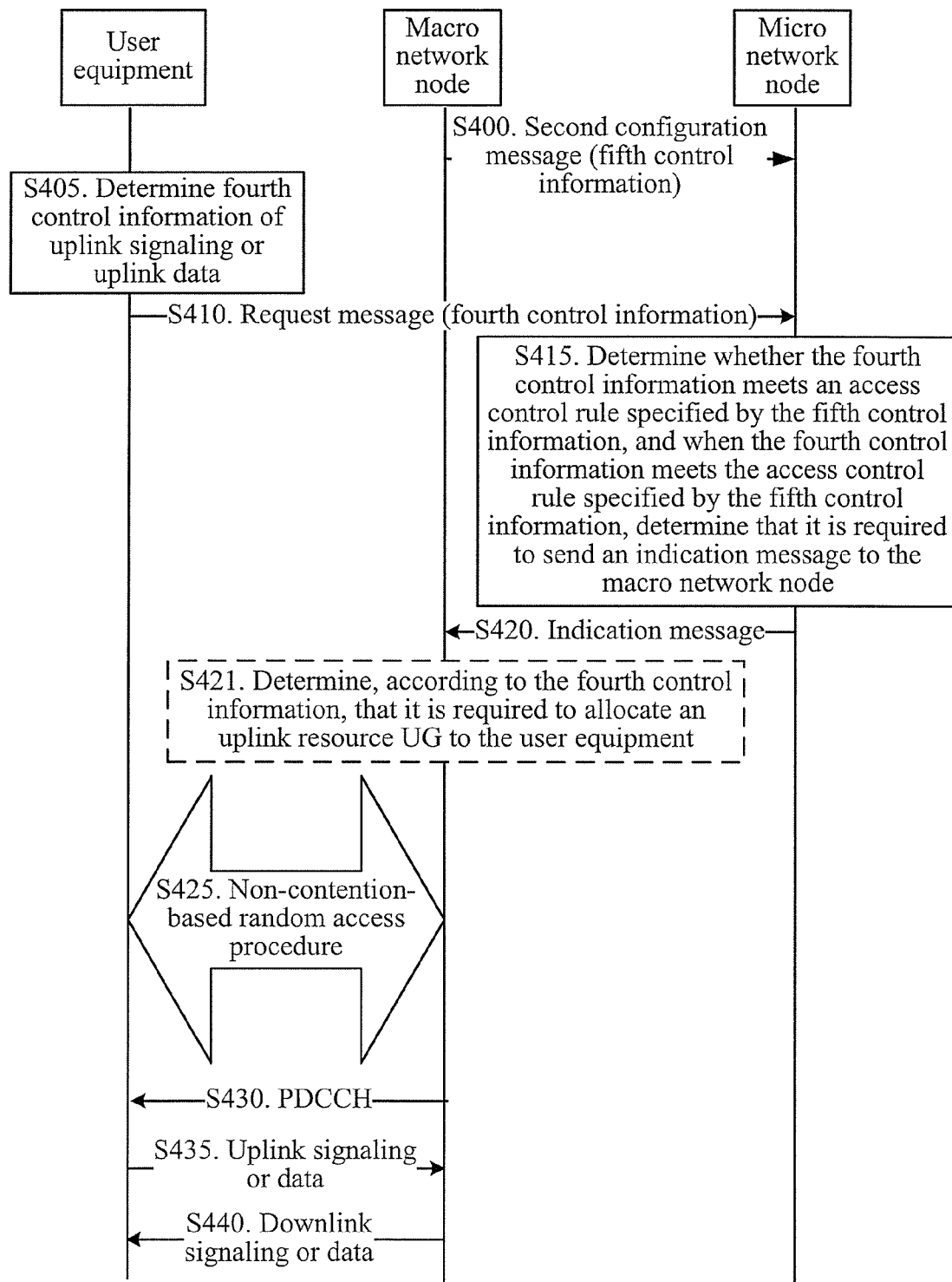


FIG. 10

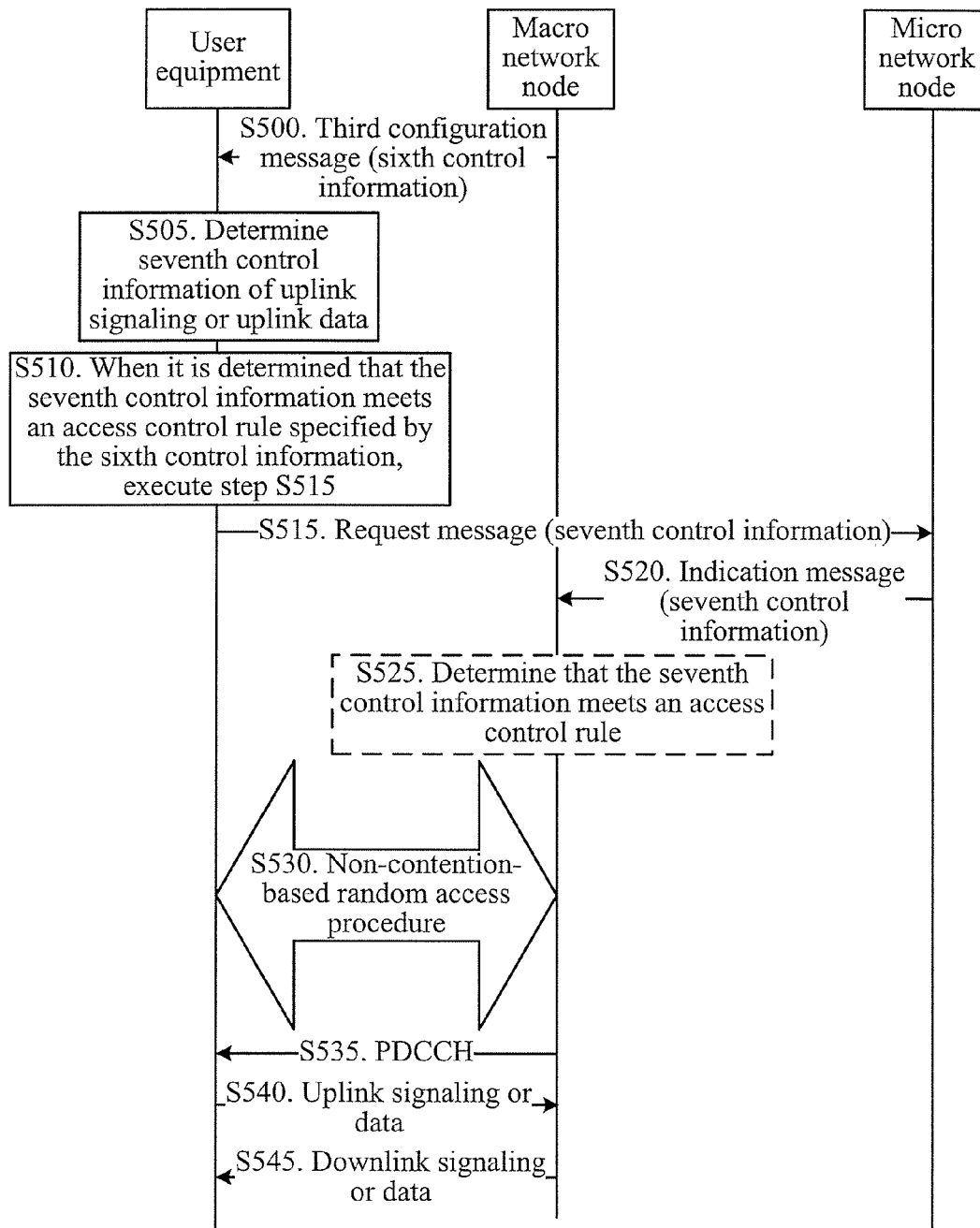


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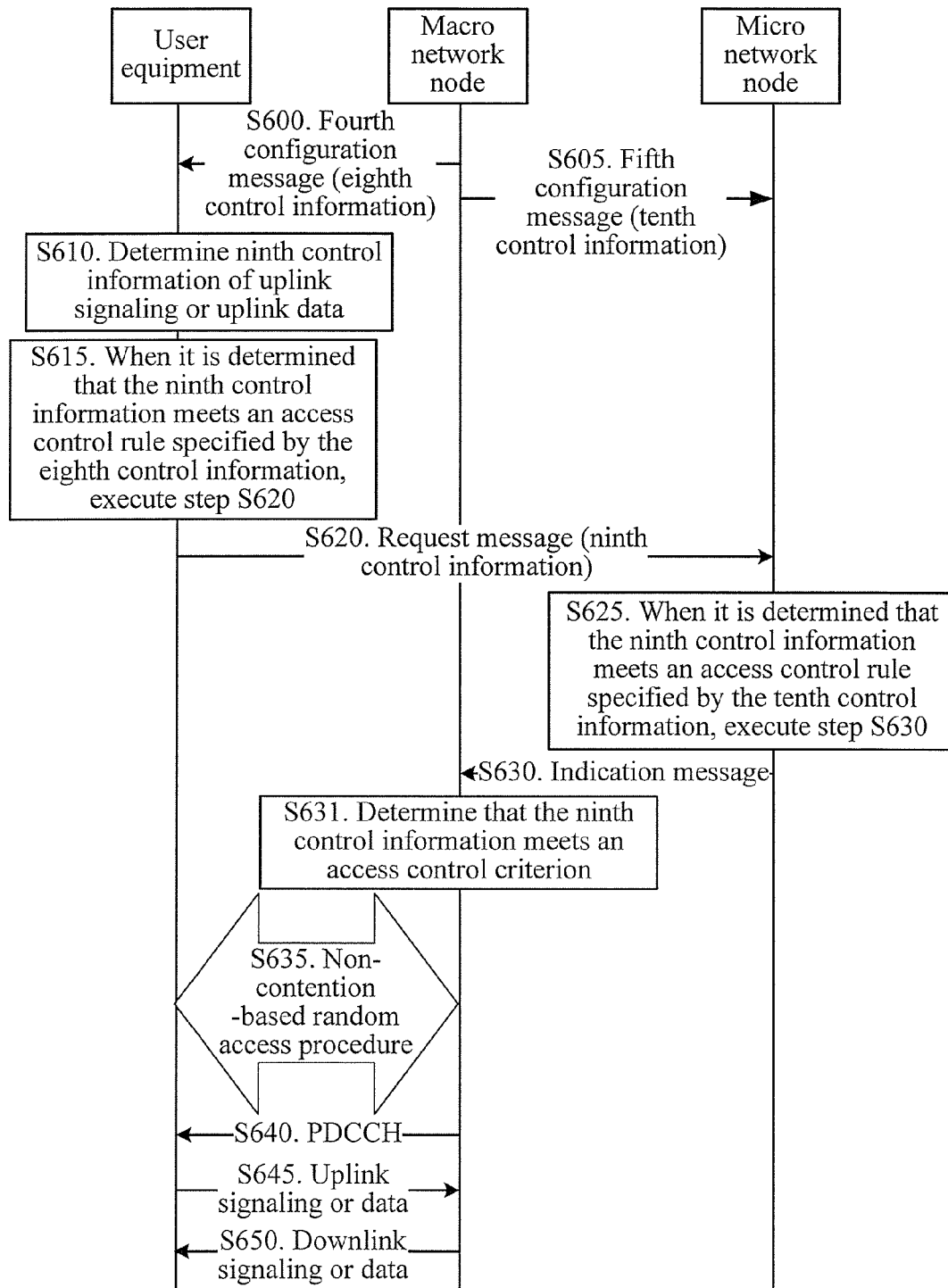


FIG. 12

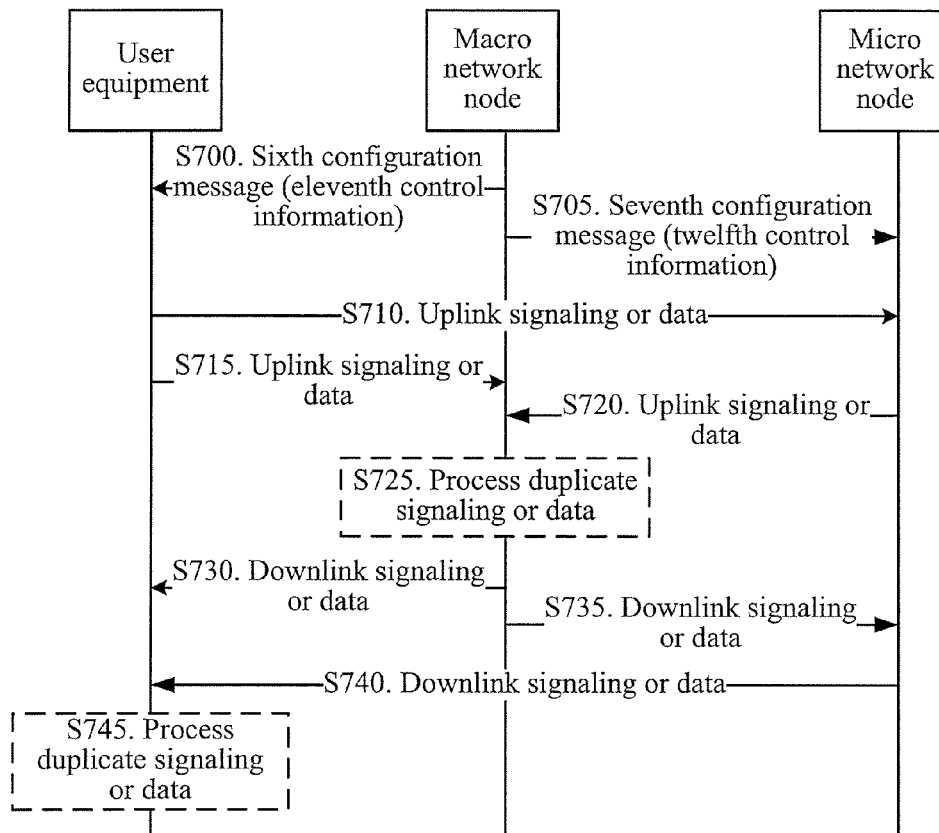


FIG. 13

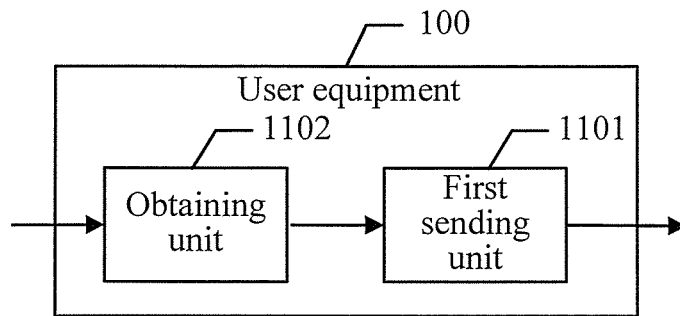


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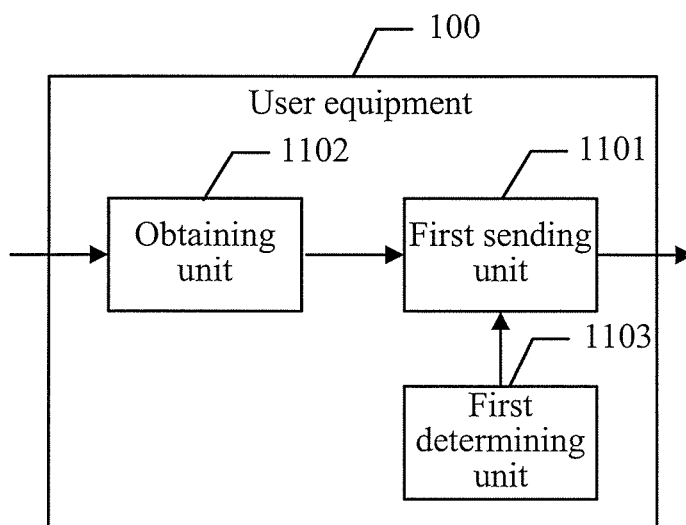


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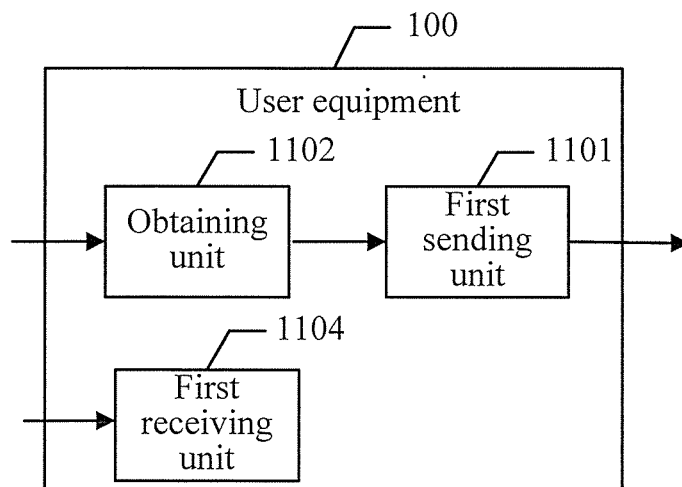


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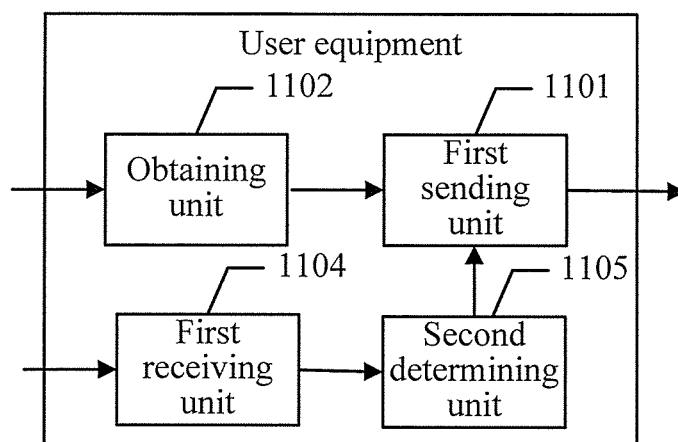


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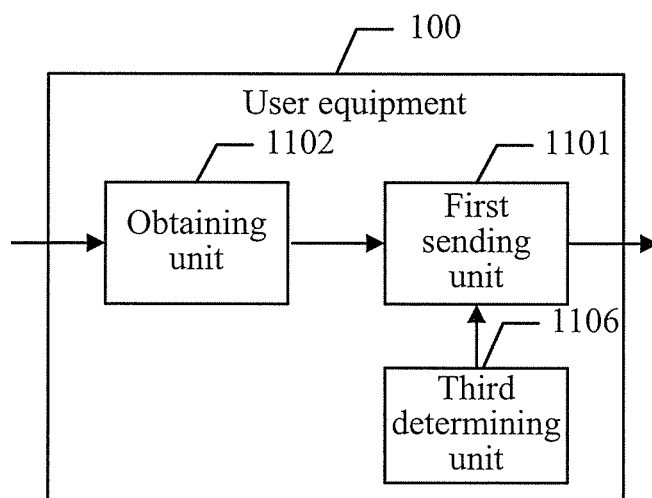


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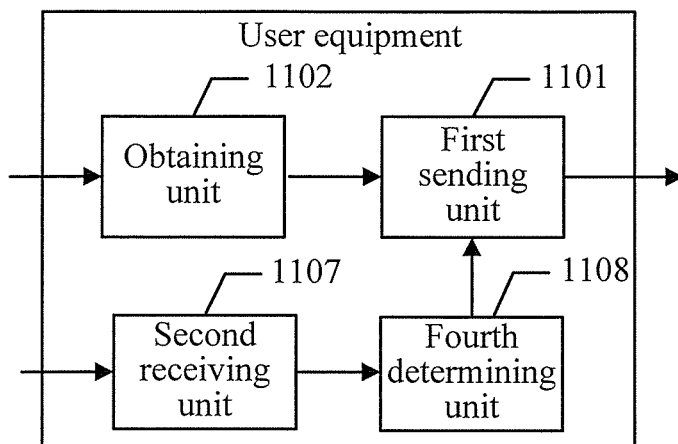


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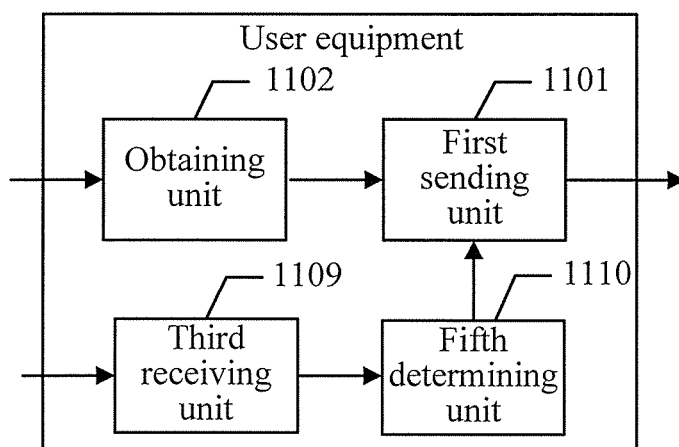


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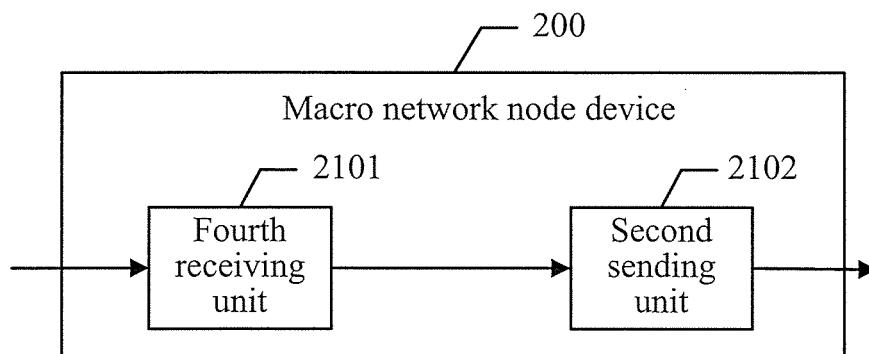


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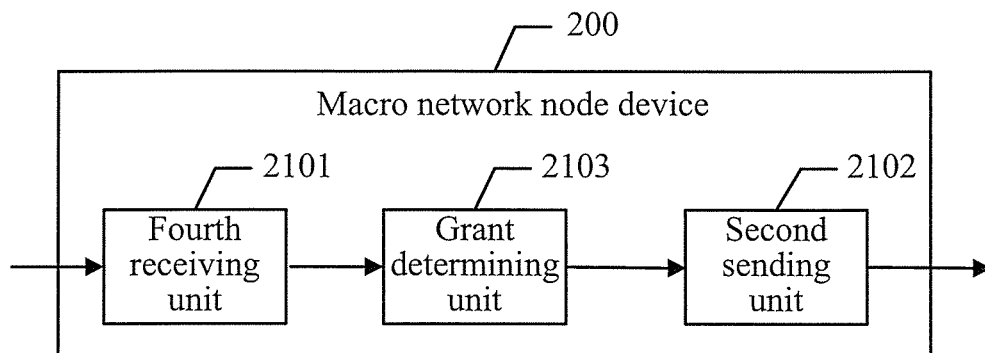


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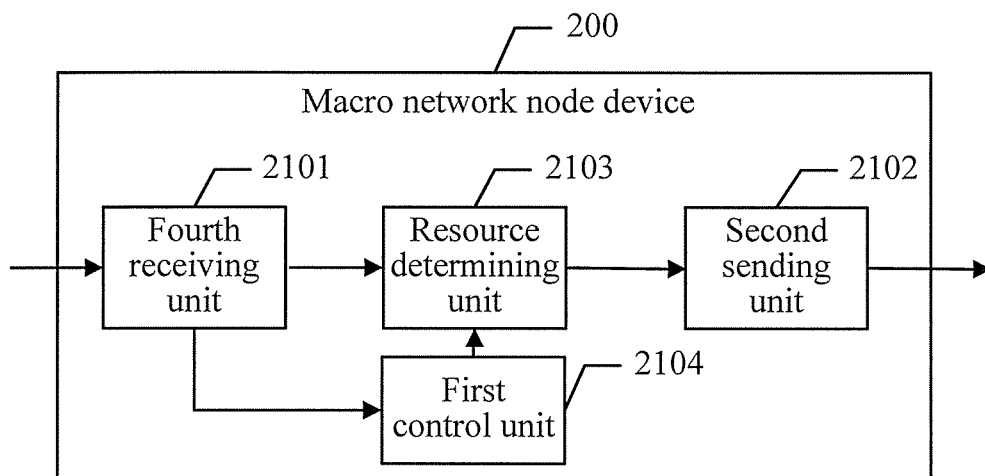


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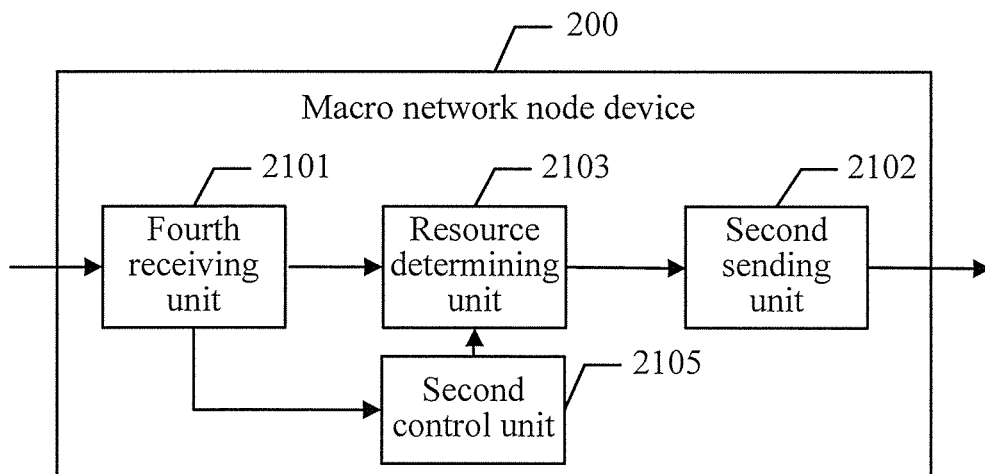


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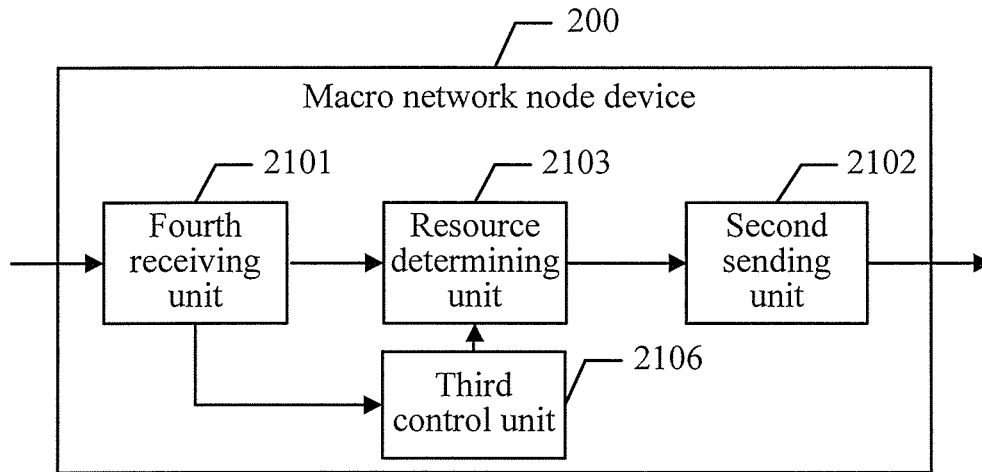


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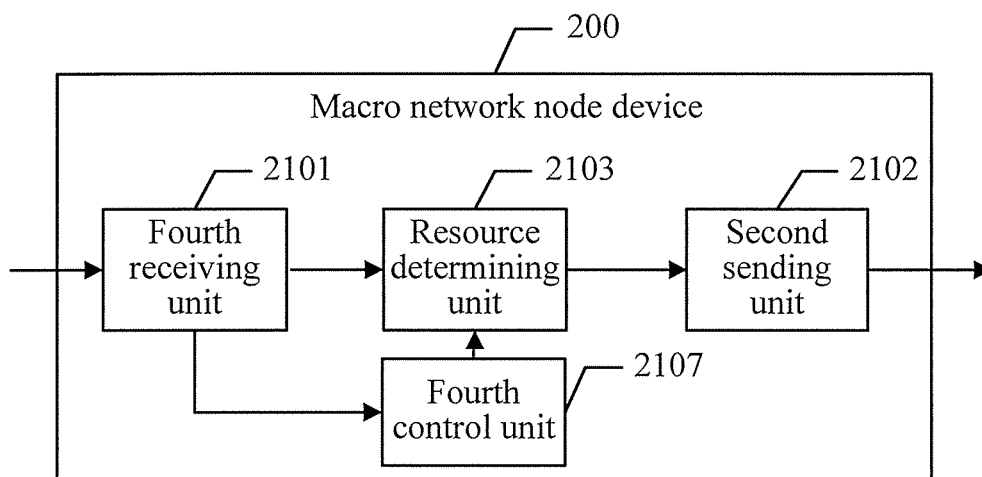


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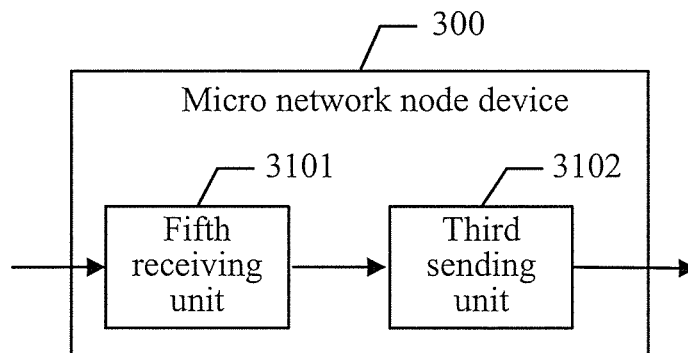


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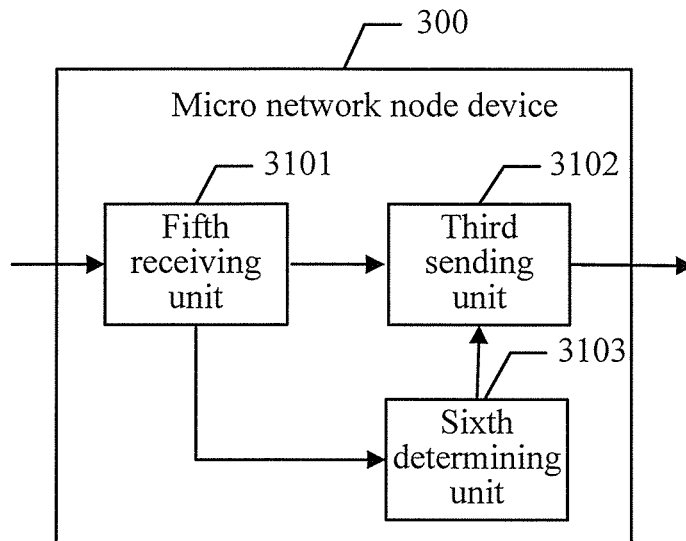


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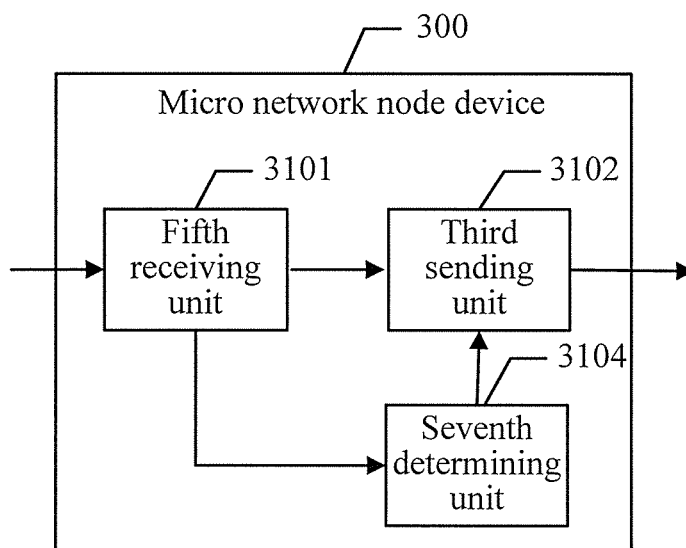


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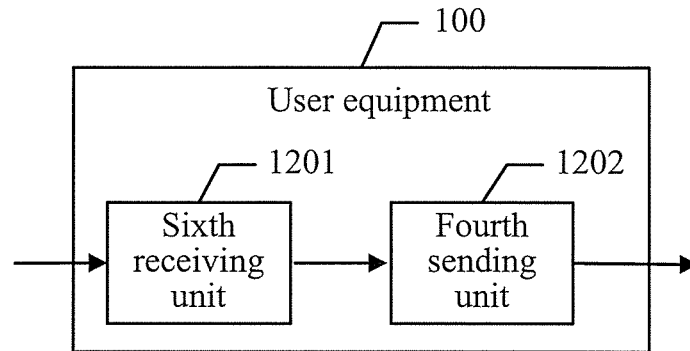


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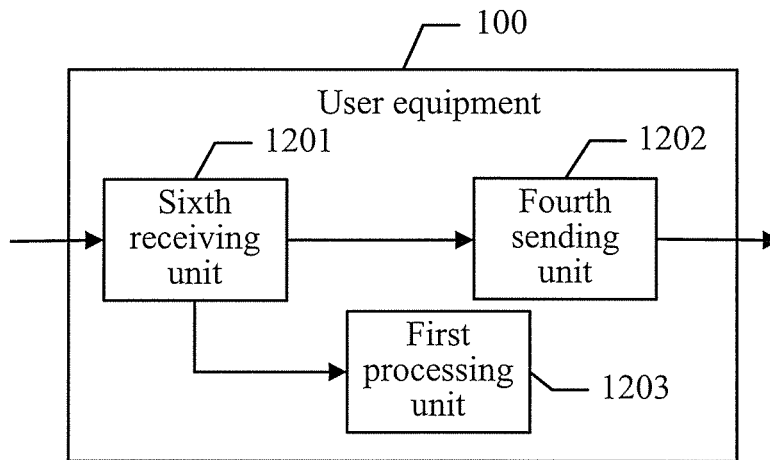


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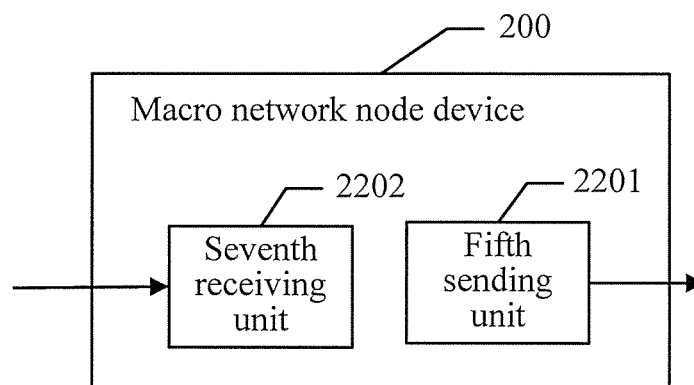


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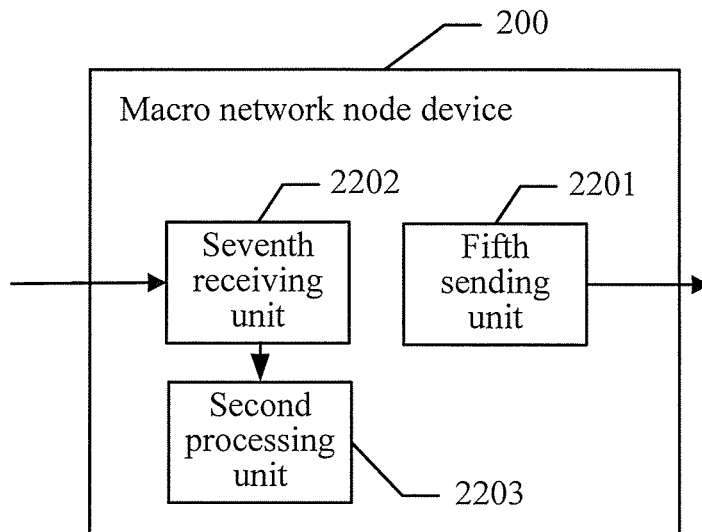


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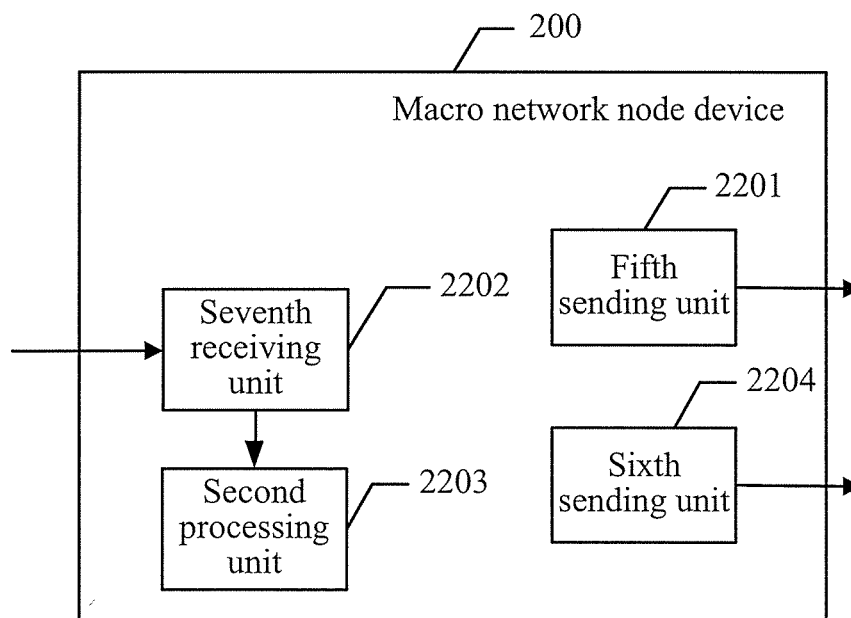


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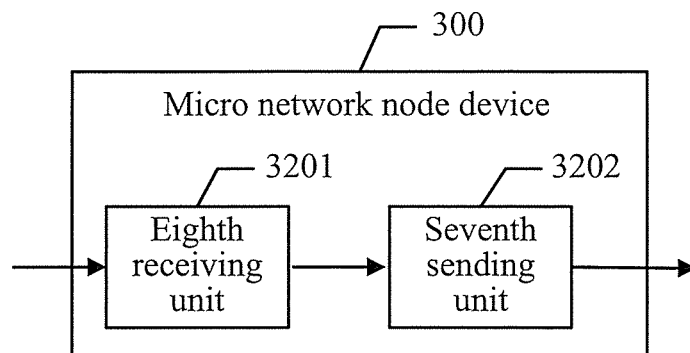


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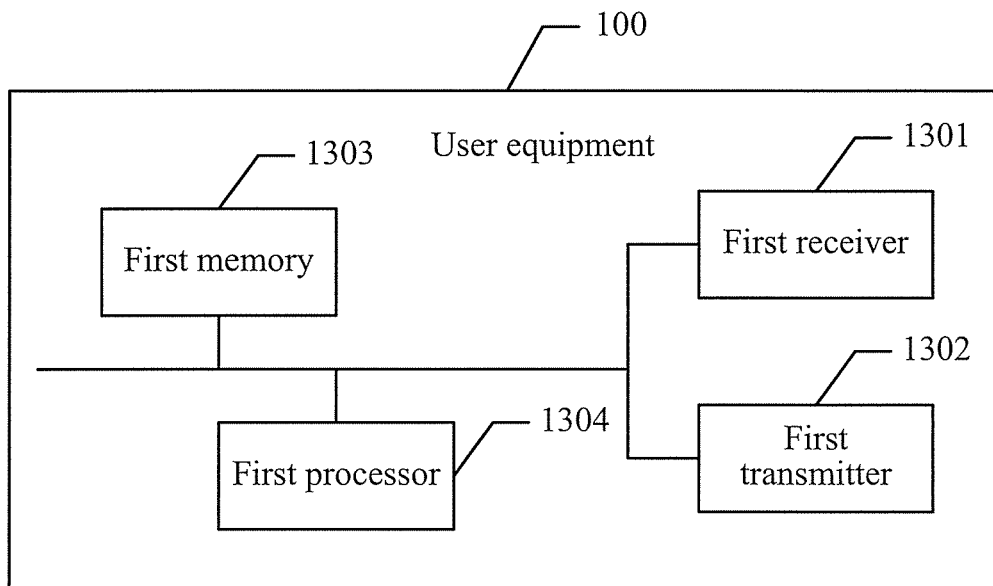


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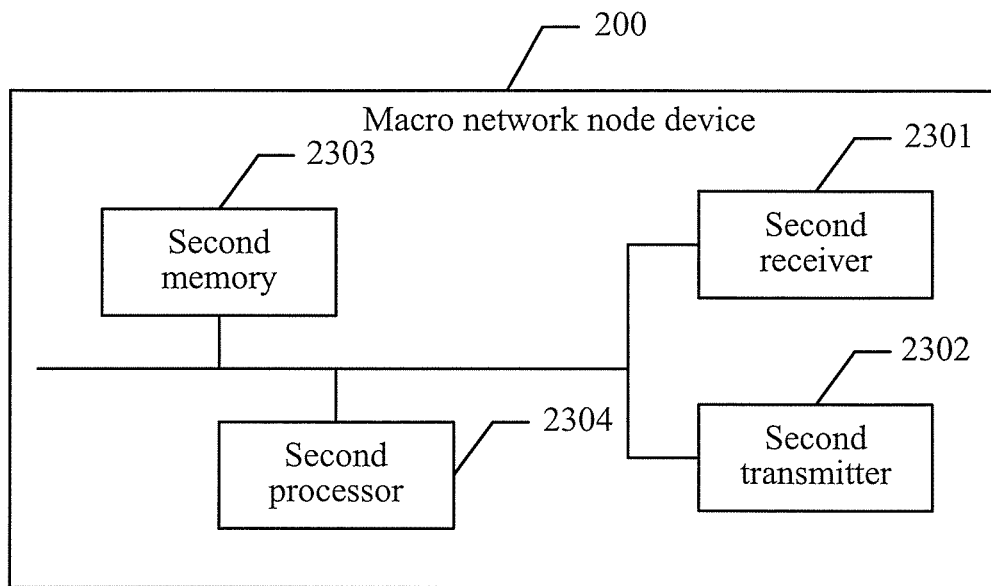


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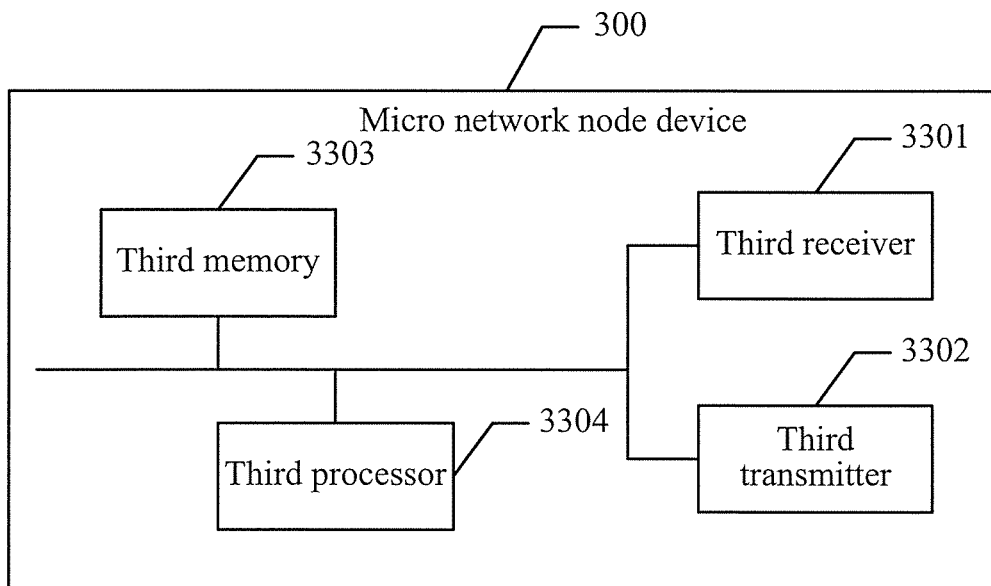


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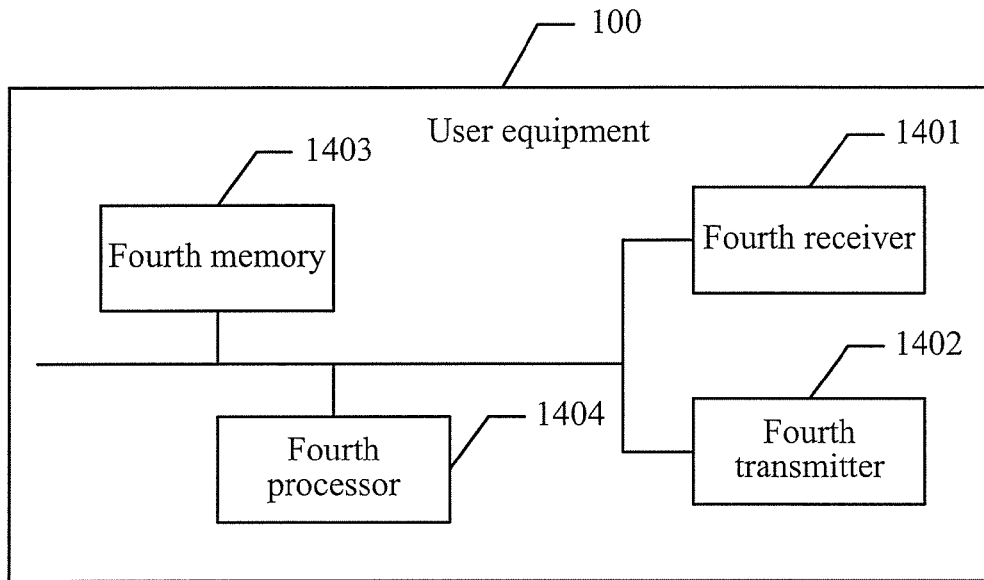


FIG. 39

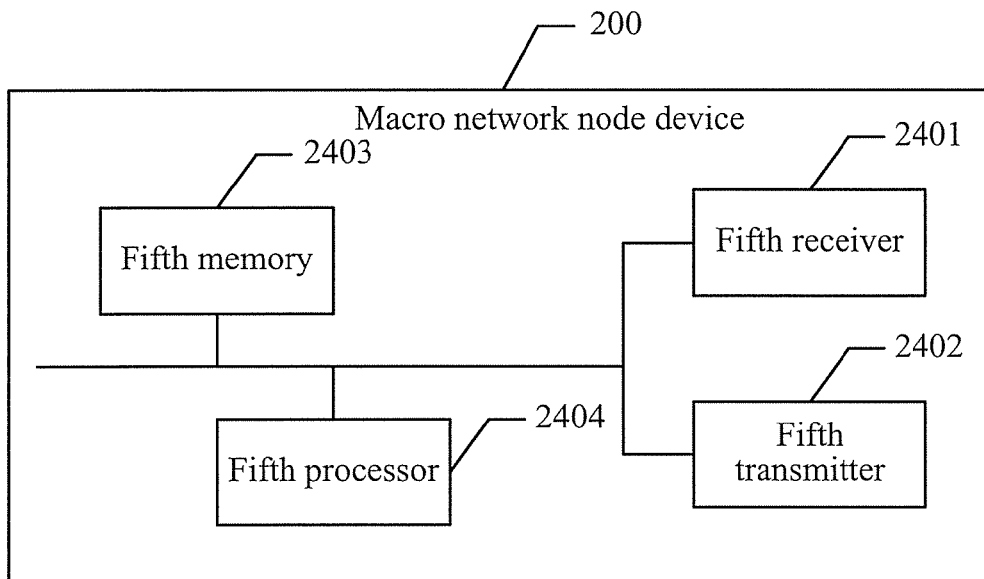


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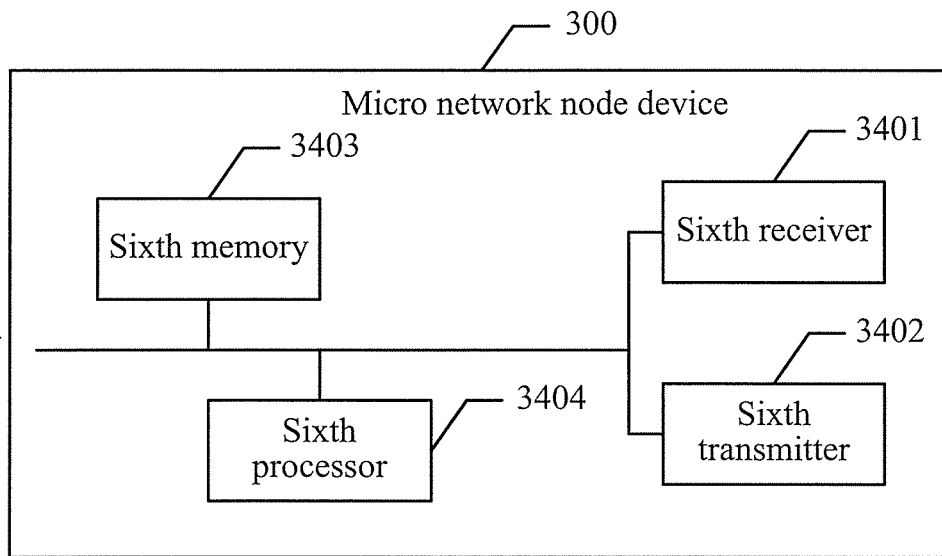


FIG. 41

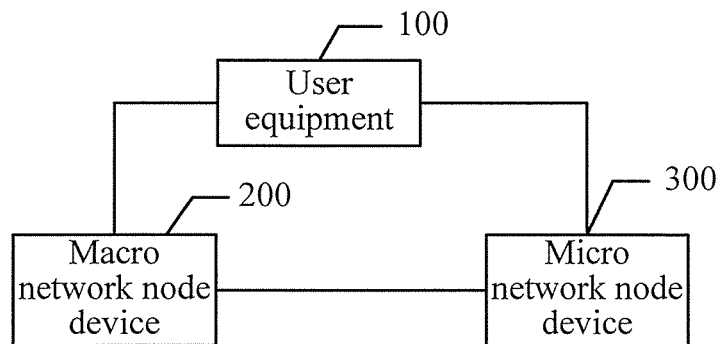


FIG. 42A

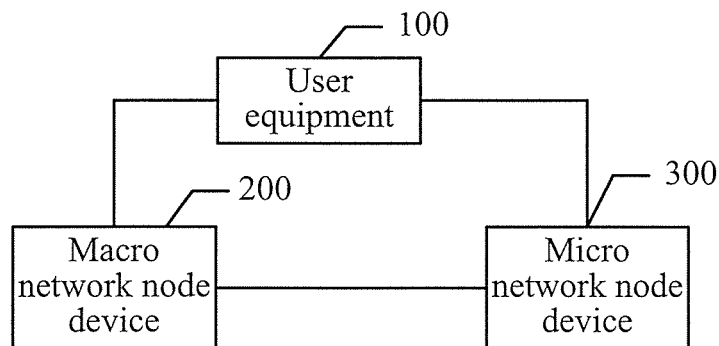


FIG. 42B

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COMMUNICATION METHOD, DEVICE, AND SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of International Application No. PCT/CN2013/071776, filed on Feb. 22, 2013, which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

The present invention relates to the field of communications technologies, and in particular, to a communication method, device, and system.

BACKGROUND

There are two different types of network nodes in a network deployment scenario, which are evolved base stations (Evolved NodeB, eNB) and small cell nodes (Small Cell Node, SCN). An eNB and an SCN separately control one or more cells, and a cell under the eNB and a cell under the SCN may use different frequencies. The cell under the eNB covers a larger area, and may be referred to as a macro cell; the cell under the SCN covers a smaller area, and may be referred to as a small cell.

In the prior art, any one of the following situations may occur:

a time alignment timer (Time Alignment Timer, TAT) set for a macro cell in a user equipment (User Equipment, UE) expires, and the UE needs to send uplink data or signaling to an eNB;

a UE does not have a resource for sending a scheduling request (Scheduling Request, SR) on a macro cell, and the UE needs to send uplink data or signaling to an eNB; and

a UE fails to send a dynamic scheduling request (Dynamic Scheduling Request, DSR) on the macro cell, where the DSR failure refers to that a quantity of times that the UE continuously sends an SR exceeds a preset maximum quantity of times.

When any one of the foregoing three situations occurs, the UE needs to first initiate a contention-based random access procedure to the eNB, and only after this procedure is completed, the UE can send the uplink data or signaling to the eNB, and then the eNB may send, to the UE, downlink data or signaling in response to the uplink data or signaling. The contention-based random access procedure is defined in detail in the 3rd Generation Partnership Project (3rd Generation Partnership Project, 3GPP) protocol TS 36.321.

The inventors of the present invention find that, the contention-based random access procedure used in the prior art is complex, and has a very long access delay.

SUMMARY

Embodiments of the present invention provide a communication method, which can ensure that a UE rapidly accesses a network, and reduce an access delay of the UE. The embodiments of the present invention further provide a corresponding device and system.

A first aspect of the present invention provides a communication method, including:

sending, by a user equipment, a request message to a micro network node, so that the micro network node sends an indication message to a macro network node;

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receiving an uplink resource (UG) sent according to the indication message by the macro network node; and sending uplink signaling or uplink data to the macro network node according to the uplink resource (UG).

5 With reference to the first aspect, in a first possible implementation manner, the receiving an uplink resource (UG) sent according to the indication message by the macro network node includes:

receiving a first timing advance (TA) and the uplink resource (UG) by using a non-contention-based random access procedure; and

correspondingly, the sending uplink signaling or uplink data to the macro network node according to the uplink resource (UG) includes:

15 sending the uplink signaling or uplink data to the macro network node according to the first timing advance (TA) and the uplink resource (UG).

With reference to the first aspect, in a second possible implementation manner, the receiving an uplink resource (UG) sent according to the indication message by the macro network node includes:

receiving, through a physical downlink control channel (PDCCH), the uplink resource (UG) sent by the macro network node;

25 correspondingly, the method further includes:

reading an existing second timing advance (TA); and the sending uplink signaling or uplink data to the macro network node according to the uplink resource (UG) includes:

30 sending uplink signaling or uplink data to the macro network node according to the second timing advance (TA) and the uplink resource (UG).

With reference to the first aspect or the first or second possible implementation manner of the first aspect, in a third possible implementation manner, both the request message and the indication message carry size of the uplink signaling or uplink data, and the size of the uplink signaling or uplink data is used by the macro network node to determine the uplink resource (UG).

40 With reference to the first aspect or any one of the first to the third possible implementation manners of the first aspect, in a fourth possible implementation manner, before the step of sending, by a user equipment, a request message to a micro network node, the method further includes:

45 determining first control information of the uplink signaling or uplink data, where

correspondingly, both the request message and the indication message carry the first control information, and the first control information is used by the macro network node to perform access control on the user equipment.

50 With reference to the first aspect or any one of the first to the third possible implementation manners of the first aspect, in a fifth possible implementation manner, before the step of sending a request message to a micro network node, the method further includes: receiving a first configuration message sent by the macro network node, where the first configuration message carries an uplink synchronization flag and/or second control information, and the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

55 With reference to the fifth possible implementation manner of the first aspect, in a sixth possible implementation manner, when the first configuration message carries the

second control information, after the step of receiving a first configuration message sent by the macro network node, the method further includes:

determining third control information of the uplink signaling or uplink data; and

when the third control information meets an access control rule specified by the second control information, sending the request message to the micro network node.

With reference to the first aspect or any one of the first to the third possible implementation manners of the first aspect, in a seventh possible implementation manner, before the step of sending a request message to a micro network node, the method further includes:

determining fourth control information of the uplink signaling or uplink data, where

the request message carries the fourth control information, so that after determining that the fourth control information meets an access control rule specified by fifth control information that is carried in a second configuration message sent by the macro network node, the micro network node sends the indication message to the macro network node.

With reference to the seventh possible implementation manner of the first aspect, in an eighth possible implementation manner, the indication message carries the fourth control information, and the fourth control information is further used by the macro network node to perform access control on the user equipment.

With reference to the first aspect or any one of the first to the third possible implementation manners of the first aspect, in a ninth possible implementation manner, before the step of sending a request message to a micro network node, the method further includes:

receiving a third configuration message sent by the macro network node, where the third configuration message carries sixth control information; and

determining seventh control information of the uplink signaling or uplink data;

the sending the request message to the micro network node includes:

when the seventh control information meets an access control rule specified by the sixth control information, sending the request message to the micro network node; and

correspondingly, both the request message and the indication message further carry the seventh control information, and the seventh control information is used by the macro network node to perform access control on the user equipment.

With reference to the first aspect or any one of the first to the third possible implementation manners of the first aspect, in a tenth possible implementation manner, before the step of sending a request message to a micro network node, the method further includes:

receiving a fourth configuration message sent by the macro network node, where the fourth configuration message carries eighth control information; and

determining ninth control information of the uplink signaling or uplink data;

the sending the request message to the micro network node includes:

when the ninth control information meets an access control rule specified by the eighth control information, sending the request message to the micro network node; and

correspondingly, the request message carries the ninth control information, so that after determining that the ninth control information meets an access control rule specified by tenth control information that is carried in a fifth configuration message sent by the macro network node to the micro

network node, the micro network node sends the indication message to the macro network node.

With reference to the tenth possible implementation manner of the first aspect, in an eleventh possible implementation manner, the indication message carries the ninth control information, and the ninth control information is further used by the macro network node to perform access control on the user equipment.

With reference to any one of the fourth to the eleventh possible implementation manners of the first aspect, in a twelfth possible implementation manner, the first control information, the second control information, the third control information, the fourth control information, the fifth control information, the sixth control information, the seventh control information, the eighth control information, the ninth control information, and the tenth control information each include at least one of emergency indication information, service type information, data/signaling information, quality of service (QoS) information, an identity of a radio bearer (RB), an identity of a logical channel (LCH), and an identity of a logical channel group to which the logical channel used by the radio bearer belongs.

A second aspect of the present invention provides a communication method, including:

receiving, by a macro network node, an indication message that is sent by a micro network node after the micro network node receives a request message sent by a user equipment; and

sending an uplink resource (UG) to the user equipment according to the indication message, so that the user equipment sends uplink signaling or uplink data to the macro network node according to the uplink resource (UG).

With reference to the second aspect, in a first possible implementation manner, the sending an uplink resource (UG) to the user equipment according to the indication message includes:

initiating a non-contention-based random access procedure to the user equipment according to the indication message, and sending a first timing advance (TA) and the uplink resource (UG) to the user equipment in the non-contention-based random access procedure, so that the user equipment sends the uplink signaling or uplink data to the macro network node according to the first timing advance (TA) and the uplink resource (UG).

With reference to the second aspect, in a second possible implementation manner, the sending an uplink resource (UG) to the user equipment according to the indication message includes:

sending the uplink resource (UG) to the user equipment through a physical downlink control channel (PDCCH) according to the indication message, so that the user equipment sends, after reading an existing second timing advance (TA), uplink signaling or uplink data according to the second timing advance (TA) and the uplink resource (UG).

With reference to the second aspect, and the first or the second possible implementation manner of the second aspect, in a third possible implementation manner, both the request message and the indication message carry size information of the uplink signaling or uplink data; and

before the sending an uplink resource (UG) to the user equipment, the method further includes:

determining the uplink resource (UG) according to the size information of the uplink signaling or uplink data.

With reference to the second aspect or any one of the first to the third possible implementation manners of the second aspect, in a fourth possible implementation manner, both the request message and the indication message further carry

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first control information, determined by the user equipment, of the uplink signaling or uplink data, and before the step of sending an uplink resource (UG) to the user equipment, the method further includes:

performing access control on the user equipment according to the first control information.

With reference to the second aspect or any one of the first to the third possible implementation manners of the second aspect, in a fifth possible implementation manner, before the step of receiving the indication message, the method further includes:

sending a first configuration message to the user equipment, where the first configuration message carries an uplink synchronization flag and/or second control information, and the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

With reference to the fifth possible implementation manner of the second aspect, in a sixth possible implementation manner, the first configuration message carries the second control information, so that the user equipment sends, after determining third control information of the uplink signaling or uplink data, the request message to the micro network node when the third control information meets an access control rule specified by the second control information.

With reference to the second aspect or any one of the first to the third possible implementation manners of the second aspect, in a seventh possible implementation manner, the request message carries fourth control information, determined by the user equipment, of the uplink signaling or uplink data; and

before the step of receiving the indication message, the method further includes:

sending a second configuration message to the micro network node, where the second configuration message carries fifth control information, so that after determining that the fourth control information meets an access control rule specified by the fifth control information, the micro network node sends the indication message to the macro network node.

With reference to the seventh possible implementation manner of the second aspect, in the eighth possible implementation manner, the indication message carries the fourth control information, and the fourth control information is further used by the macro network node to perform access control on the user equipment; and before the step of sending an uplink resource (UG) to the user equipment, the method further includes:

performing access control on the user equipment according to the fourth control information.

With reference to the second aspect or any one of the first to the third possible implementation manners of the second aspect, in a ninth possible implementation manner, before the step of receiving the indication message, the method further includes:

sending a third configuration message to the user equipment, where the third configuration message carries sixth control information, so that after determining that seventh control information of the uplink signaling or uplink data meets an access control rule specified by the sixth control information, the user equipment sends the request message to the micro network node; and

correspondingly, both the request message and the indication message further carry the seventh control information,

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and before the step of sending an uplink resource (UG) to the user equipment, the method further includes:

performing access control on the user equipment according to the seventh control information.

With reference to the second aspect or any one of the first to the third possible implementation manners of the second aspect, in a tenth possible implementation manner, before the step of receiving the indication message, the method further includes:

sending a fourth configuration message to the user equipment, where the fourth configuration message carries eighth control information, so that after determining that ninth control information of the uplink signaling or uplink data meets an access control rule specified by the eighth control information, the user equipment sends the request message to the micro network node, where

correspondingly, the request message carries the ninth control information; and

sending a fifth configuration message to the micro network node, where the fifth configuration message carries tenth control information, so that after determining that the ninth control information meets an access control rule specified by the tenth control information, the micro network node sends the indication message to the macro network node.

With reference to the tenth possible implementation manner of the second aspect, in an eleventh possible implementation manner, the indication message carries the ninth control information, and the ninth control information is further used by the macro network node to perform access control on the user equipment; and before the step of sending an uplink resource (UG) to the user equipment, the method further includes:

performing access control on the user equipment according to the ninth control information.

With reference to any one of the fourth to the eleventh possible implementation manners of the second aspect, in a twelfth possible implementation manner, the first control information, the second control information, the third control information, the fourth control information, the fifth control information, the sixth control information, the seventh control information, the eighth control information, the ninth control information, and the tenth control information each include at least one of emergency indication information, service type information, data/signaling information, quality of service (QoS) information, an identity of a radio bearer (RB), an identity of a logical channel (LCH), and an identity of a logical channel group to which the logical channel used by the radio bearer belongs.

A third aspect of the present invention provides a communication method, including:

receiving, by a micro network node, a request message sent by a user equipment; and

sending an indication message to a macro network node according to the request message, so that the macro network node sends an uplink resource (UG) to the user equipment, and then the user equipment sends uplink signaling or uplink data according to the uplink resource (UG).

With reference to the third aspect, in a first possible implementation manner, both the request message and the indication message carry first control information, determined by the user equipment, of the uplink signaling or uplink data, and the first control information is used by the macro network node to perform access control on the user equipment.

With reference to the third aspect, in a second possible implementation manner, the request message carries fourth

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control information, determined by the user equipment, of the uplink signaling or uplink data, and before the step of receiving a request message sent by a user equipment, the method further includes:

receiving a second configuration message sent by the macro network node, where the second configuration message carries fifth control information; and

correspondingly, the sending an indication message to a macro network node includes:

when the fourth control information meets an access control rule specified by the fifth control information, sending the indication message to the macro network node.

With reference to the second possible implementation manner of the third aspect, in a third possible implementation manner, the indication message further carries the fourth control information, and the fourth control information is further used by the macro network node to perform access control on the user equipment.

With reference to the third aspect, in a fourth possible implementation manner, the receiving a request message sent by a user equipment includes:

when seventh control information, determined by the user equipment, of the uplink signaling or uplink data meets an access control rule specified by sixth control information that is carried in a third configuration message sent by the macro network node, receiving the request message sent by the user equipment, where the request message carries the seventh control information, where

the indication message carries the seventh control information, and the seventh control information is used by the macro network node to perform access control on the user equipment.

With reference to the third aspect, in a fifth possible implementation manner, the receiving a request message sent by a user equipment includes:

when ninth control information, determined by the user equipment, of the uplink signaling or uplink data meets an access control rule specified by eighth control information that is carried in a fourth configuration message sent by the macro network node, receiving the request message sent by the user equipment, where the request message carries the ninth control information;

before the step of receiving a request message sent by a user equipment, the method further includes:

receiving a fifth configuration message sent by the macro network node, where the fifth configuration message carries tenth control information; and

correspondingly, the sending an indication message to a macro network node includes:

when the ninth control information meets an access control rule specified by the tenth control information, sending the indication message to the macro network node.

With reference to the fifth possible implementation manner of the third aspect, in a sixth possible implementation manner, the indication message carries the ninth control information, and the ninth control information is further used by the macro network node to perform access control on the user equipment.

With reference to any one of the first to the sixth possible implementation manners of the third aspect, in a seventh possible implementation manner, the first control information, the fourth control information, the fifth control information, the sixth control information, the seventh control information, the eighth control information, the ninth control information, and the tenth control information each include at least one of emergency indication information, service type information, data/signaling information, quality of ser-

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vice (QoS) information, an identity of a radio bearer (RB), an identity of a logical channel (LCH), and an identity of a logical channel group to which the logical channel used by the radio bearer belongs.

A fourth aspect of the present invention provides a communication method, including:

receiving, by a user equipment, configuration information sent by a macro network node; and

sending uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information.

With reference to the fourth aspect, in a first possible implementation manner, the method further includes:

receiving downlink signaling or downlink data sent by the macro network node and/or the micro network node; and

when the downlink signaling or downlink data sent by the macro network node and the micro network node is received, deleting duplicate signaling or data in the downlink signaling or downlink data sent by the macro network node and in the downlink signaling or downlink data sent by the micro network node.

With reference to the fourth aspect or the first possible implementation manner of the fourth aspect, in a second possible implementation manner, the configuration information includes an identity of a micro cell controlled by the micro network node and an identity of a radio bearer (RB) of the user equipment; and

the sending uplink signaling or uplink data to a micro network node according to the configuration information includes:

sending, to the micro network node, the uplink signaling or uplink data transmitted on a radio bearer corresponding to the identity of the RB, where the uplink signaling or uplink data is sent through a default logical channel by using a micro cell corresponding to the identity of the micro cell.

With reference to the second possible implementation manner, in a third possible implementation manner, the configuration information further includes an identity of a logical channel (LCH); and the sending uplink signaling or uplink data to a micro network node according to the configuration information includes:

sending, to the micro network node, the uplink signaling or uplink data transmitted on the radio bearer corresponding to the identity of the RB, where the uplink signaling or uplink data is sent through a logical channel corresponding to the identity of the LCH by using the micro cell corresponding to the identity of the micro cell.

With reference to the second or third possible implementation manner of the fourth aspect, in a fourth possible implementation manner, the configuration information further includes an uplink flag; and the receiving downlink signaling or downlink data sent by the macro network node and/or the micro network node includes:

receiving downlink signaling or downlink data sent by the macro network node.

With reference to any one of the second to the fourth possible implementation manners of the fourth aspect, in a fifth possible implementation manner, the configuration information further includes an uplink synchronization flag, where the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

With reference to the fourth aspect or any one of the first to the fifth possible implementation manners of the fourth

aspect, in a sixth possible implementation manner, the uplink signaling is an uplink radio resource control (RRC) message and the downlink signaling is a downlink radio resource control (RRC) message.

With reference to the sixth possible implementation manner of the fourth aspect, in a seventh possible implementation manner, the uplink RRC message includes an uplink measurement report message and an uplink information transfer message, and the downlink RRC message includes a handover command message and a downlink information transfer message.

A fifth aspect of the present invention provides a communication method, including:

sending, by a macro network node, configuration information to a user equipment, so that the user equipment sends uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information; and

receiving the uplink signaling or uplink data forwarded by the micro network node and sent by the user equipment, and/or receiving the uplink signaling or uplink data sent by the user equipment.

With reference to the fifth aspect, in a first possible implementation manner, when the uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node is received and the uplink signaling or uplink data sent by the user equipment is received, duplicate signaling or data in the uplink signaling or uplink data sent by the user equipment and in the uplink signaling or uplink data sent by the micro network node is deleted.

With reference to the fifth aspect or the first possible implementation manner of the fifth aspect, in a second possible implementation manner, the method further includes:

sending another configuration information to the micro network node, so that the micro network node forwards downlink signaling or downlink data to the user equipment according to the another configuration information; and

sending the downlink signaling or downlink data to the micro network node.

With reference to the second possible implementation manner of the fifth aspect, in a third possible implementation manner, the uplink signaling is an uplink radio resource control (RRC) message and the downlink signaling is a downlink radio resource control (RRC) message.

With reference to the third possible implementation manner of the fifth aspect, in a fourth possible implementation manner, the uplink RRC message includes an uplink measurement report message and an uplink information transfer message, and the downlink RRC message includes a handover command message and a downlink information transfer message.

A sixth aspect of the present invention provides a communication method, including:

receiving, by a micro network node, another configuration information sent by a macro network node;

receiving downlink signaling or downlink data sent by the macro network node; and

forwarding the downlink signaling or downlink data to a user equipment according to the another configuration information.

With reference to the sixth aspect, in a first possible implementation manner, the another configuration information includes an identity of the user equipment and an identity of a radio bearer (RB) of the user equipment; and

the forwarding the downlink signaling or downlink data to a user equipment according to the another configuration information includes:

sending, to the user equipment, the downlink signaling or downlink data transmitted on a radio bearer corresponding to the identity of the RB, where the downlink signaling or downlink data is sent through a default logical channel by using a micro cell corresponding to an identity of the micro cell.

With reference to the first possible implementation manner of the sixth aspect, in a second possible implementation manner, the another configuration information further includes an identity of a logical channel (LCH); and the forwarding the downlink signaling or downlink data to the user equipment according to the another configuration information includes:

sending, to the user equipment, the downlink signaling or downlink data transmitted on the radio bearer corresponding to the identity of the RB, where the downlink signaling or downlink data is sent through a logical channel corresponding to the identity of the LCH by using the micro cell corresponding to the identity of the micro cell.

With reference to the sixth aspect, and the first or the second possible implementation manner of the sixth aspect, in a third possible implementation manner, the downlink signaling is a downlink radio resource control (RRC) message.

With reference to the third possible implementation manner of the sixth aspect, in a fourth possible implementation manner, the downlink RRC message includes a handover command message and a downlink information transfer message.

A seventh aspect of the present invention provides a user equipment, including:

a first sending unit, configured to send a request message to a micro network node, so that the micro network node sends an indication message to a macro network node; and an obtaining unit, configured to receive an uplink resource (UG) sent according to the indication message by the macro network node, where

the first sending unit is configured to send uplink signaling or uplink data to the macro network node according to the uplink resource (UG) obtained by the obtaining unit.

With reference to the seventh aspect, in a first possible implementation manner:

the obtaining unit is configured to receive a first timing advance (TA) and the uplink resource (UG) by using a non-contention-based random access procedure; and

the first sending unit is configured to send uplink signaling or uplink data to the macro network node according to the first timing advance (TA) and the uplink resource (UG) obtained by the obtaining unit.

With reference to the seventh aspect, in a second possible implementation manner:

the obtaining unit is configured to read an existing second timing advance (TA), and receive, through a physical downlink control channel (PDCCH), the uplink resource (UG) sent by the macro network node; and

the first sending unit is configured to send uplink signaling or uplink data to the macro network node according to the second timing advance (TA) and the uplink resource (UG) obtained by the obtaining unit.

With reference to the seventh aspect, and the first or the second possible implementation manner of the seventh aspect, in a third possible implementation manner, the user equipment further includes:

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a first determining unit, configured to determine first control information of the uplink signaling or uplink data, where both the request message and the indication message carry the first control information, and the first control information is used by the macro network node to perform access control on the user equipment.

With reference to the seventh aspect, and the first or the second possible implementation manner of the seventh aspect, in a fourth possible implementation manner, the user equipment further includes:

a first receiving unit, configured to receive a first configuration message sent by the macro network node, where the first configuration message carries an uplink synchronization flag and/or second control information, and the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

With reference to the fourth possible implementation manner of the seventh aspect, in a fifth possible implementation manner, when the first configuration message carries the second control information, the user equipment further includes:

a second determining unit, configured to determine third control information of the uplink signaling or uplink data, and send the request message to the micro network node when the third control information meets an access control rule specified by the second control information.

With reference to the seventh aspect, and the first or the second possible implementation manner of the seventh aspect, in a sixth possible implementation manner, the user equipment further includes:

a third determining unit, configured to determine fourth control information of the uplink signaling or uplink data, where the request message carries the fourth control information, so that after determining that the fourth control information meets an access control rule specified by fifth control information that is carried in a second configuration message sent by the macro network node, the micro network node sends the indication message to the macro network node.

With reference to the seventh aspect, and the first or the second possible implementation manner of the seventh aspect, in a seventh possible implementation manner, the user equipment further includes:

a second receiving unit, configured to receive a third configuration message sent by the macro network node, where the third configuration message carries sixth control information; and

a fourth determining unit, configured to determine seventh control information of the uplink signaling or uplink data, where

the first sending unit is further configured to: when the seventh control information meets an access control rule specified by the sixth control information, send the request message to the micro network node.

With reference to the seventh aspect, and the first or the second possible implementation manner of the seventh aspect, in an eighth possible implementation manner, the user equipment further includes:

a third receiving unit, configured to receive a fourth configuration message sent by the macro network node, where the fourth configuration message carries eighth control information; and

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a fifth determining unit, configured to determine ninth control information of the uplink signaling or uplink data, where

the first sending unit is further configured to: when the ninth control information meets an access control rule specified by the eighth control information, send the request message to the micro network node.

An eighth aspect of the present invention provides a macro network node device, including:

a fourth receiving unit, configured to receive an indication message that is sent by a micro network node after the micro network node receives a request message sent by a user equipment; and

a second sending unit, configured to send an uplink resource (UG) to the user equipment according to the indication message, so that the user equipment sends uplink signaling or uplink data according to the uplink resource (UG).

With reference to the eighth aspect, in a first possible implementation manner:

the second sending unit is configured to initiate a non-contention-based random access procedure to the user equipment according to the indication message, and send a first timing advance (TA) and the uplink resource (UG) to the user equipment in the non-contention-based random access procedure, so that the user equipment sends uplink signaling or uplink data to the macro network node according to the first timing advance (TA) and the uplink resource (UG).

With reference to the eighth aspect, in a second possible implementation manner:

the second sending unit is configured to send the uplink resource (UG) to the user equipment through a physical downlink control channel (PDCCH) according to the indication message, so that the user equipment sends, after reading an existing second timing advance (TA), uplink signaling or uplink data to the macro network node according to the second timing advance (TA) and the uplink resource (UG).

With reference to the eighth aspect, and the first or the second possible implementation manner of the eighth aspect, in a third possible implementation manner, both the request message and the indication message carry size information of the uplink signaling or uplink data to be sent; and the macro network node device further includes: a resource determining unit, where

the resource determining unit is configured to determine the uplink resource (UG) according to the size information of the uplink signaling or uplink data.

With reference to the eighth aspect or any one of the first to the third possible implementation manners of the eighth aspect, in a fourth possible implementation manner, both the request message and the indication message further carry first control information, determined by the user equipment, of the uplink signaling or uplink data; and the macro network node device further includes:

a first control unit, configured to perform access control on the user equipment according to the first control information.

With reference to the eighth aspect or any one of the first to the third possible implementation manners of the eighth aspect, in a fifth possible implementation manner:

the second sending unit is further configured to send a first configuration message to the user equipment, where the first configuration message carries an uplink synchronization flag and/or second control information, and the uplink synchronization flag is used for instructing, after a time alignment

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timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

With reference to the eighth aspect or any one of the first to the third possible implementation manners of the eighth aspect, in a sixth possible implementation manner:

the request message carries fourth control information, determined by the user equipment, of the uplink signaling or uplink data; and

The second sending unit is further configured to send a second configuration message to the micro network node, where the second configuration message carries fifth control information, so that after determining that the fourth control information meets an access control rule specified by the fifth control information, the micro network node sends the indication message to the macro network node.

With reference to the sixth possible implementation manner of the eighth aspect, in a seventh possible implementation manner, the indication message further carries the fourth control information; and the macro network node device further includes:

a second control unit, configured to perform access control on the user equipment according to the fourth control information.

With reference to the eighth aspect or any one of the first to the third possible implementation manners of the eighth aspect, in an eighth possible implementation manner,

the second sending unit is further configured to send a third configuration message to the user equipment, where the third configuration message carries sixth control information, so that after determining that seventh control information of the uplink signaling or uplink data meets an access control rule specified by the sixth control information, the user equipment sends the request message to the micro network node; and the macro network node device further includes:

a third control unit, configured to: when both the request message and the indication message further carry the seventh control information, perform access control on the user equipment according to the seventh control information.

With reference to the eighth aspect or any one of the first to the third possible implementation manners of the eighth aspect, in a ninth possible implementation manner:

the second sending unit is further configured to send a fourth configuration message to the user equipment, where the fourth configuration message carries eighth control information, so that after determining that ninth control information of the uplink signaling or uplink data meets an access control rule specified by the eighth control information, the user equipment sends the request message to the micro network node;

the request message carries the ninth control information; and

the second sending unit is further configured to send a fifth configuration message to the micro network node, where the fifth configuration message carries tenth control information, so that after determining that the ninth control information meets an access control rule specified by the tenth control information, the micro network node sends the indication message to the macro network node.

With reference to the ninth possible implementation manner of the eighth aspect, in a tenth possible implementation manner, the indication message carries the ninth control information; and the macro network node device further includes:

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a fourth control unit, configured to perform access control on the user equipment according to the ninth control information.

A ninth aspect of the present invention provides a micro network node device, including:

a fifth receiving unit, configured to receive a request message sent by a user equipment; and

a third sending unit, configured to send an indication message to a macro network node, so that the macro network node allocates an uplink resource (UG) to the user equipment, and then the user equipment sends uplink signaling or uplink data to the macro network node according to the uplink resource (UG).

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

the fifth receiving unit is further configured to receive a second configuration message sent by the macro network node, where the second configuration message carries fifth control information; and the micro network node device further includes:

a sixth determining unit, configured to determine whether fourth control information meets an access control rule specified by the fifth control information, where

the third sending unit is further configured to: after the fourth control information meets an access control rule specified by the fifth control information, send the indication message to the macro network node.

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

the fifth receiving unit is configured to: when seventh control information, determined by the user equipment, of the uplink signaling or uplink data meets an access control rule specified by sixth control information that is carried in a third configuration message sent by the macro network node, receive the request message sent by the user equipment, where the request message carries the seventh control information.

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

the fifth receiving unit is configured to: when ninth control information, determined by the user equipment, of the uplink signaling or uplink data meets an access control rule specified by eighth control information that is carried in a fourth configuration message sent by the macro network node, receive the request message sent by the user equipment, where the request message carries the ninth control information; and

the fifth receiving unit is further configured to receive a fifth configuration message sent by the macro network node, where the fifth configuration message carries tenth control information; and the micro network node device further includes:

a seventh determining unit, configured to determine whether the ninth control information meets an access control rule specified by the tenth control information, where

the third sending unit is further configured to: when the ninth control information meets an access control rule specified by the tenth control information, send the indication message to the macro network node.

A tenth aspect of the present invention provides a user equipment, including:

a sixth receiving unit, configured to receive configuration information sent by a macro network node; and

a fourth sending unit, configured to send uplink signaling or uplink data to a micro network node and/or the macro

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network node according to the configuration information received by the sixth receiving unit.

With reference to the tenth aspect, in a first possible implementation manner:

the sixth receiving unit is configured to receive downlink signaling or downlink data sent by the macro network node and/or the micro network node; the user equipment further includes

a first processing unit, configured to: when the downlink signaling or downlink data sent by the macro network node and the micro network node is received, delete duplicate signaling or data in the downlink signaling or downlink data sent by the macro network node and in the downlink signaling or downlink data sent by the micro network node.

With reference to the tenth aspect or the first possible implementation manner of the tenth aspect, in a second possible implementation manner, the configuration information includes an identity of a micro cell controlled by the micro network node and an identity of a radio bearer (RB) of the user equipment; and

the fourth sending unit is configured to send, to the micro network node, the uplink signaling or uplink data transmitted on a radio bearer corresponding to the identity of the RB, where the uplink signaling or uplink data is sent through a default logical channel by using a micro cell corresponding to the identity of the micro cell.

With reference to the second possible implementation manner of the tenth aspect, in a third possible implementation manner, the configuration information further includes an identity of a logical channel (LCH); and

the fourth sending unit is configured to send, to the micro network node, the uplink signaling or uplink data transmitted on a radio bearer corresponding to the identity of the RB, where the uplink signaling or uplink data is sent through a logical channel corresponding to the identity of the LCH by using the micro cell corresponding to the identity of the micro cell.

With reference to the second or the third possible implementation manner of the tenth aspect, in a fourth possible implementation manner, the configuration information further includes an uplink flag; and

the sixth receiving unit is configured to receive downlink signaling or downlink data sent by the macro network node.

An eleventh aspect of the present invention provides a macro network node device, including:

a fifth sending unit, configured to send configuration information to a user equipment, so that the user equipment sends uplink signaling or uplink data to a micro network node and/or a macro network node according to the configuration information; and

a seventh receiving unit, configured to receive the uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node, and/or receive the uplink signaling or uplink data sent by the user equipment.

With reference to the eleventh aspect, in a first possible implementation manner, the macro network node device further includes:

a second processing unit, configured to: when the uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node is received and the uplink signaling or uplink data sent by the user equipment is received, delete duplicate signaling or data in the uplink signaling or uplink data sent by the user equipment and in the uplink signaling or uplink data sent by the micro network node.

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With reference to the eleventh aspect or the first possible implementation manner of the eleventh aspect, in a second possible implementation manner, the macro network node device further includes:

a sixth sending unit, configured to send another configuration information to the micro network node, so that the micro network node forwards downlink signaling or downlink data to the user equipment according to the another configuration information, where

the sixth sending unit is further configured to send the downlink signaling or downlink data to the micro network node.

A twelfth aspect of the present invention provides a micro network node device, including:

an eighth receiving unit, configured to receive another configuration information sent by a macro network node, where

the eighth receiving unit is further configured to receive downlink signaling or downlink data sent by the macro network node; and

a seventh sending unit, configured to forward the downlink signaling or downlink data to the user equipment according to the another configuration information.

With reference to the twelfth aspect, in a first possible implementation manner, the another configuration information includes an identity of the user equipment and an identity of a radio bearer (RB) of the user equipment; and

the seventh sending unit is configured to send, to the user equipment, the downlink signaling or downlink data transmitted on a radio bearer corresponding to the identity of the RB, where the downlink signaling or downlink data is sent through a default logical channel by using a micro cell corresponding to an identity of the micro cell.

With reference to the first possible implementation manner of the twelfth aspect, in a second possible implementation manner, the another configuration information further includes an identity of a logical channel (LCH); and

the seventh sending unit is configured to send, to the user equipment, the downlink signaling or downlink data transmitted on a radio bearer corresponding to the identity of the RB, where the downlink signaling or downlink data is sent through a logical channel corresponding to the identity of the LCH by using the micro cell corresponding to the identity of the micro cell.

A thirteenth aspect of the present invention provides a user equipment, including a first receiver, a first transmitter, a first memory, and a first processor, where

the first transmitter is configured to send a request message to a micro network node, so that the micro network node sends an indication message to a macro network node;

the first receiver is configured to receive an uplink resource (UG) sent according to the indication message by the macro network node; and

the first transmitter is further configured to send uplink signaling or uplink data to the macro network node according to the uplink resource (UG).

With reference to the thirteenth aspect, in a first possible implementation manner, the first receiver is configured to receive a first timing advance (TA) and the uplink resource (UG) by using a non-contention-based random access procedure; and

the first transmitter is configured to send uplink signaling or uplink data to the macro network node according to the first timing advance (TA) and the uplink resource (UG).

With reference to the thirteenth aspect, in a second possible implementation manner, the first receiver is configured to read an existing second timing advance (TA), and

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receive, through a physical downlink control channel (PD-CCH), the uplink resource (UG) sent by the macro network node; and

the first transmitter is configured to send uplink signaling or uplink data to the macro network node according to the second timing advance (TA) and the uplink resource (UG).

With reference to the thirteenth aspect, and the first or the second possible implementation manner of the thirteenth aspect, in a third possible implementation manner:

the first processor is configured to determine first control information of the uplink signaling or uplink data.

With reference to the thirteenth aspect or any one of the first to the third possible implementation manners of the thirteenth aspect, in a fourth possible implementation manner:

the first receiver is configured to receive a first configuration message sent by the macro network node, where the first configuration message carries an uplink synchronization flag and/or second control information, and the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

With reference to the fourth possible implementation manner of the thirteenth aspect, in a fifth possible implementation manner, the first processor is configured to determine third control information of the uplink signaling or uplink data; and

the first transmitter is configured to: when the third control information meets an access control rule specified by the second control information, send the request message to the micro network node.

With reference to the thirteenth aspect or any one of the first to the third possible implementation manners of the thirteenth aspect, in a sixth possible implementation manner:

the first processor is configured to determine fourth control information of the uplink signaling or uplink data, where the request message carries the fourth control information, so that after determining that the fourth control information meets an access control rule specified by fifth control information that is carried in a second configuration message sent by the macro network node, the micro network node sends the indication message to the macro network node.

With reference to the thirteenth aspect or any one of the first to the third possible implementation manners of the thirteenth aspect, in a seventh possible implementation manner:

the first receiver is configured to receive a third configuration message sent by the macro network node, where the third configuration message carries sixth control information;

the first processor is configured to determine seventh control information of the uplink signaling or uplink data; and

the first transmitter is configured to: when the seventh control information meets an access control rule specified by the sixth control information, send the request message to the micro network node.

With reference to the thirteenth aspect or any one of the first to the third possible implementation manners of the thirteenth aspect, in an eighth possible implementation manner:

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the first receiver is configured to receive a fourth configuration message sent by the macro network node, where the fourth configuration message carries eighth control information;

the first processor is configured to determine ninth control information of the uplink signaling or uplink data; and

the first transmitter is configured to: when the ninth control information meets an access control rule specified by the eighth control information, send the request message to the micro network node.

A fourteenth aspect of the present invention provides a macro network node device, including a second receiver, a second transmitter, a second memory, and a second processor, where

the second receiver is configured to receive an indication message that is sent by a micro network node after the micro network node receives a request message sent by a user equipment; and

the second transmitter is configured to send an uplink resource (UG) to the user equipment according to the indication message, so that the user equipment sends uplink signaling or uplink data according to the uplink resource (UG).

With reference to the fourteenth aspect, in a first possible implementation manner:

the second transmitter is configured to initiate a non-contention-based random access procedure to the user equipment according to the indication message, and send a first timing advance (TA) and the uplink resource (UG) to the user equipment in the non-contention-based random access procedure, so that the user equipment sends the uplink signaling or uplink data to the macro network node according to the first timing advance (TA) and the uplink resource (UG).

With reference to the fourteenth aspect, in a second possible implementation manner, the second transmitter is configured to send the uplink resource (UG) to the user equipment through a physical downlink control channel (PDCCCH) according to the indication message, so that the user equipment sends, after reading an existing second timing advance (TA), uplink signaling or uplink data to the macro network node according to the second timing advance (TA) and the uplink resource (UG).

With reference to the fourteenth aspect, and the first or the second possible implementation manner of the fourteenth aspect, in a third possible implementation manner, both the request message and the indication message carry size information of the uplink signaling or uplink data to be sent; and

the second processor is configured to determine the uplink resource (UG) according to the size information of the uplink signaling or uplink data.

With reference to the fourteenth aspect or any one of the first to the third possible implementation manners of the fourteenth aspect, in a fourth possible implementation manner:

both the request message and the indication message further carry first control information, determined by the user equipment, of the uplink signaling or uplink data; and

the second processor is configured to perform access control on the user equipment according to the first control information.

With reference to the fourteenth aspect or any one of the first to the third possible implementation manners of the fourteenth aspect, in a fifth possible implementation manner:

the second transmitter is configured to send a first configuration message to the user equipment, where the first

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configuration message carries an uplink synchronization flag and/or second control information, and the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

With reference to the fourteenth aspect, and any one of the first to the third possible implementation manners of the fourteenth aspect, in a sixth possible implementation manner:

the second transmitter is configured to send a second configuration message to the micro network node, where the second configuration message carries fifth control information, so that after determining that fourth control information meets an access control rule specified by the fifth control information, the micro network node sends the indication message to the macro network node; and

the second processor is further configured to: when the indication message carries the fourth control information, perform access control on the user equipment according to the fourth control information.

With reference to the sixth possible implementation manner of the fourteenth aspect, in a seventh possible implementation manner:

the second transmitter is configured to send a third configuration message to the user equipment, where the third configuration message carries sixth control information, so that after determining that seventh control information of the uplink signaling or uplink data meets an access control rule specified by the sixth control information, the user equipment sends the request message to the micro network node; and

the second processor is configured to: when both the request message and the indication message further carry the seventh control information, perform access control on the user equipment according to the seventh control information.

With reference to the fourteenth aspect or any one of the first to the third possible implementation manners of the fourteenth aspect, in an eighth possible implementation manner:

the second transmitter is configured to send a fourth configuration message to the user equipment, where the fourth configuration message carries eighth control information, so that after determining that ninth control information of the uplink signaling or uplink data meets an access control rule specified by the eighth control information, the user equipment sends the request message to the micro network node; and

the second transmitter is configured to send a fifth configuration message to the micro network node, where the fifth configuration message carries tenth control information, so that after determining that the ninth control information meets an access control rule specified by the tenth control information, the micro network node sends the indication message to the macro network node.

With reference to the eighth possible implementation manner of the fourteenth aspect, in a ninth possible implementation manner:

the second processor is configured to: when the indication message carries the ninth control information, perform access control on the user equipment according to the ninth control information.

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A fifteenth aspect of the present invention provides a micro network node device, including a third receiver, a third transmitter, a third memory, and a third processor, where

the third receiver is configured to receive a request message sent by a user equipment; and

the third transmitter is configured to send an indication message to a macro network node according to the request message, so that the macro network node sends an uplink resource (UG) to the user equipment, and then the user equipment sends uplink signaling or uplink data to the macro network node according to the uplink resource (UG).

With reference to the fifteenth aspect, in a first possible implementation manner, the request message carries fourth control information, determined by the user equipment, of the uplink signaling or uplink data;

the third receiver is configured to receive a second configuration message sent by the macro network node, where the second configuration message carries fifth control information;

the third processor is configured to determine whether the fourth control information meets an access control rule specified by the fifth control information; and

the third transmitter is configured to: after the fourth control information meets the access control rule specified by the fifth control information, send the indication message to the macro network node.

With reference to the fifteenth aspect, in a second possible implementation manner:

the third receiver is configured to: when seventh control information, determined by the user equipment, of the uplink signaling or uplink data meets an access control rule specified by sixth control information that is carried in a third configuration message sent by the macro network node, receive the request message sent by the user equipment, where the request message carries the seventh control information.

With reference to the fifteenth aspect, in a third possible implementation manner:

the third receiver is configured to: when ninth control information, determined by the user equipment, of the uplink signaling or uplink data meets an access control rule specified by eighth control information that is carried in a fourth configuration message sent by the macro network node, receive the request message sent by the user equipment, where the request message carries the ninth control information; and

the third receiver is further configured to receive a fifth configuration message sent by the macro network node, where the fifth configuration message carries tenth control information;

the third processor is configured to determine whether the ninth control information meets an access control rule of the tenth control information; and

the third transmitter is further configured to: when the ninth control information meets an access control rule specified by the tenth control information, send the indication message to the macro network node.

A sixteenth aspect of the present invention provides a user equipment, including a fourth receiver, a fourth transmitter, a fourth memory, and a fourth processor, where

the fourth receiver is configured to receive configuration information sent by a macro network node; and

the fourth transmitter is configured to send uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information.

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With reference to the sixteenth aspect, in a first possible implementation manner:

the fourth receiver is configured to receive downlink signaling or downlink data sent by the macro network node and/or the micro network node; and

the fourth processor is configured to: when the downlink signaling or downlink data sent by the macro network node and the micro network node is received, delete duplicate signaling or data in the downlink signaling or downlink data sent by the macro network node and in the downlink signaling or downlink data sent by the micro network node.

With reference to the sixteenth aspect or the first possible implementation manner of the sixteenth aspect, in a second possible implementation manner, the configuration information includes an identity of a micro cell controlled by the micro network node and an identity of a radio bearer (RB) of the user equipment; and

the fourth transmitter is configured to send, to the micro network node, the uplink signaling or uplink data transmitted on a radio bearer corresponding to the identity of the RB, where the uplink signaling or uplink data is sent through a default logical channel by using a micro cell corresponding to the identity of the micro cell.

With reference to the second possible implementation manner of the sixteenth aspect, in a third possible implementation manner:

the fourth transmitter is configured to send, to the micro network node, the uplink signaling or uplink data transmitted on a radio bearer corresponding to the identity of the RB, where the uplink signaling or uplink data is sent through a logical channel corresponding to the identity of the LCH by using the micro cell corresponding to the identity of the micro cell.

With reference to the second or the third possible implementation manner of the sixteenth aspect, in a fourth possible implementation manner, the configuration information further includes an uplink flag; and

the fourth receiver is configured to receive downlink signaling or downlink data sent by the macro network node.

A seventeenth aspect of the present invention provides a macro network node device, including a fifth receiver, a fifth transmitter, a fifth memory, and a fifth processor, where

the fifth transmitter is configured to send configuration information to a user equipment, so that the user equipment sends uplink signaling or uplink data to a micro network node and/or a macro network node according to the configuration information; and

the fifth receiver is configured to receive the uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node, and/or receive the uplink signaling or uplink data sent by the user equipment.

With reference to the seventeenth aspect, in a first possible implementation manner:

the fifth processor is configured to: when the uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node is received and the uplink signaling or uplink data sent by the user equipment is received, delete duplicate signaling or data in the uplink signaling or uplink data sent by the user equipment and in the uplink signaling or uplink data sent by the micro network node.

With reference to the seventeenth aspect or the first possible implementation manner of the seventeenth aspect, in a second possible implementation manner, the fifth transmitter is configured to send another configuration information to the micro network node, so that the micro network

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node forwards downlink signaling or downlink data to the user equipment according to the another configuration information; and

the fifth transmitter is configured to send the downlink signaling or downlink data to the micro network node.

An eighteenth aspect of the present invention provides a micro network node device, including a sixth receiver, a sixth transmitter, a sixth memory, and a sixth processor, where

the sixth receiver is configured to receive another configuration information sent by a macro network node;

the sixth receiver is further configured to receive downlink signaling or downlink data sent by the macro network node; and

the sixth transmitter is configured to forward the downlink signaling or downlink data to the user equipment according to the another configuration information.

With reference to the eighteenth aspect, in a first possible implementation manner, the another configuration information includes an identity of the user equipment and an identity of a radio bearer (RB) of the user equipment; and

the sixth transmitter is configured to send, to the user equipment, the downlink signaling or downlink data transmitted on a radio bearer corresponding to the identity of the RB, where the downlink signaling or downlink data is sent through a default logical channel by using a micro cell corresponding to an identity of the micro cell.

With reference to the first possible implementation manner of the eighteenth aspect, in a second possible implementation manner, when the another configuration information further includes an identity of a logical channel (LCH),

the sixth transmitter is configured to send, to the user equipment, the downlink signaling or downlink data transmitted on a radio bearer corresponding to the identity of the RB, where the downlink signaling or downlink data is sent through a logical channel corresponding to the identity of the LCH by using the micro cell corresponding to the identity of the micro cell.

A nineteenth aspect of the present invention provides a communication system, including: a user equipment, a macro network node device, and a micro network node device, where

the user equipment is the user equipment described in the foregoing first set of technical solutions;

the macro network node device is the macro network node device described in the foregoing first set of technical solutions; and

the micro network node device is the micro network node device described in the foregoing first set of technical solutions.

A twentieth aspect of the present invention provides a communication system, including: a user equipment, a macro network node device, and a micro network node device, where

the user equipment is the user equipment described in the foregoing second set of technical solutions;

the macro network node device is the macro network node device described in the foregoing second set of technical solutions; and

the micro network node device is the micro network node device described in the foregoing second set of technical solutions.

In the embodiments of the present invention, a user equipment sends a request message to a micro network node, so that the micro network node sends an indication message to a macro network node; receives an uplink resource (UG) sent according to the indication message by the macro

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network node; and sends uplink signaling or uplink data to the macro network node according to the uplink resource (UG). Compared with the prior art where a contention-based random access procedure is directly used for UE access without participation of a micro network node, the solutions provided by the embodiments of the present invention can enable a UE to more rapidly access a network, thereby reducing an access delay of the UE.

BRIEF DESCRIPTION OF THE DRAWINGS

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

FIG. 1 is a schematic diagram of an embodiment of a communication method according to an embodiment of the present invention;

FIG. 2 is a schematic diagram of another embodiment of a communication method according to an embodiment of the present invention;

FIG. 3 is a schematic diagram of another embodiment of a communication method according to an embodiment of the present invention;

FIG. 4 is a schematic diagram of another embodiment of a communication method according to an embodiment of the present invention;

FIG. 5 is a schematic diagram of another embodiment of a communication method according to an embodiment of the present invention;

FIG. 6 is a schematic diagram of another embodiment of a communication method according to an embodiment of the present invention;

FIG. 7 is a schematic diagram of an embodiment of an application scenario according to an embodiment of the present invention;

FIG. 8 is a schematic diagram of another embodiment of an application scenario according to an embodiment of the present invention;

FIG. 9 is a schematic diagram of another embodiment of an application scenario according to an embodiment of the present invention;

FIG. 10 is a schematic diagram of another embodiment of an application scenario according to an embodiment of the present invention;

FIG. 11 is a schematic diagram of another embodiment of an application scenario according to an embodiment of the present invention;

FIG. 12 is a schematic diagram of another embodiment of an application scenario according to an embodiment of the present invention;

FIG. 13 is a schematic diagram of another embodiment of an application scenario according to an embodiment of the present invention;

FIG. 14 is a schematic diagram of an embodiment of a user equipment according to an embodiment of the present invention;

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

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

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FIG. 17 is a schematic diagram of another embodiment of a user equipment according to an embodiment of the present invention;

FIG. 18 is a schematic diagram of another embodiment of a user equipment according to an embodiment of the present invention;

FIG. 19 is a schematic diagram of another embodiment of a user equipment according to an embodiment of the present invention;

FIG. 20 is a schematic diagram of another embodiment of a user equipment according to an embodiment of the present invention;

FIG. 21 is a schematic diagram of an embodiment of a macro network node device according to an embodiment of the present invention;

FIG. 22 is a schematic diagram of another embodiment of a macro network node device according to an embodiment of the present invention;

FIG. 23 is a schematic diagram of another embodiment of a macro network node device according to an embodiment of the present invention;

FIG. 24 is a schematic diagram of another embodiment of a macro network node device according to an embodiment of the present invention;

FIG. 25 is a schematic diagram of another embodiment of a macro network node device according to an embodiment of the present invention;

FIG. 26 is a schematic diagram of another embodiment of a macro network node device according to an embodiment of the present invention;

FIG. 27 is a schematic diagram of an embodiment of a micro network node device according to an embodiment of the present invention;

FIG. 28 is a schematic diagram of another embodiment of a micro network node device according to an embodiment of the present invention;

FIG. 29 is a schematic diagram of another embodiment of a micro network node device according to an embodiment of the present invention;

FIG. 30 is a schematic diagram of another embodiment of a user equipment according to an embodiment of the present invention;

FIG. 31 is a schematic diagram of another embodiment of a user equipment according to an embodiment of the present invention;

FIG. 32 is a schematic diagram of an embodiment of a macro network node device according to an embodiment of the present invention;

FIG. 33 is a schematic diagram of an embodiment of a macro network node device according to an embodiment of the present invention;

FIG. 34 is a schematic diagram of an embodiment of a macro network node device according to an embodiment of the present invention;

FIG. 35 is a schematic diagram of another embodiment of a micro network node device according to an embodiment of the present invention;

FIG. 36 is a schematic diagram of another embodiment of a user equipment according to an embodiment of the present invention;

FIG. 37 is a schematic diagram of an embodiment of a macro network node device according to an embodiment of the present invention;

FIG. 38 is a schematic diagram of another embodiment of a micro network node device according to an embodiment of the present invention;

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FIG. 39 is a schematic diagram of another embodiment of a user equipment according to an embodiment of the present invention;

FIG. 40 is a schematic diagram of an embodiment of a macro network node device according to an embodiment of the present invention;

FIG. 41 is a schematic diagram of another embodiment of a micro network node device according to an embodiment of the present invention;

FIG. 42A is a schematic diagram of an embodiment of a communication system according to an embodiment of the present invention; and

FIG. 42B is a schematic diagram of another embodiment of a communication system according to an embodiment of the present invention.

DETAILED DESCRIPTION

Embodiments of the present invention provide a communication method, which can ensure that a UE rapidly accesses a network, and reduce an access delay of the UE. The embodiments of the present invention further provide a corresponding device and system. The following describes the method, device, and system in detail separately.

In the embodiments of the present invention, a user equipment (user equipment, UE) may be a device capable of communication, such as a mobile phone, a personal digital assistant (Personal Digital Assistant, PDA), a notebook computer, or a personal computer (Personal computer, PC). A micro network node may be a relay node (Relay Node, RN), a home base station (Home eNB or Home NB), a micro base station (Micro eNB), a pico base station (Pico eNB), a femto base station (Femto eNB), a WiFi access point (Access Point, AP), or the like, and may also be a user equipment capable of implementing functions of the foregoing micro network node. A macro network node may be an evolved base station (evolved NodeB, eNB), and may also be a base station (Node B, NB), a donor base station (Donor eNB, DeNB), a HeNB gateway, an HNB gateway, or the like.

An uplink resource (Uplink Grant, UG) may also be referred to as an uplink grant.

The following clearly describes the technical solutions in the embodiments of the present invention with reference to the accompanying drawings in the embodiments of the present invention. Apparently, the described embodiments are merely a part rather than all of the embodiments of the present invention. All other embodiments obtained by a person skilled in the art based on the embodiments of the present invention without creative efforts shall fall within the protection scope of the present invention.

Referring to FIG. 1, a communication method according to an embodiment of the present invention includes:

101: A user equipment sends a request message to a micro network node, so that the micro network node sends an indication message to a macro network node.

The request message in the embodiment of the present invention may be an access request message, a scheduling request message, a connection request message, a request message for sending new data or signaling, or a radio resource control (Radio Resource Control, RRC) message; and may also be a physical signal or a control information element.

102: The user equipment receives an uplink resource (UG) sent according to the indication message by the macro network node.

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103: The user equipment sends uplink signaling or uplink data to the macro network node according to the uplink resource (UG).

In the embodiment of the present invention, a UE sends a request message to a micro network node, so that the micro network node sends an indication message to a macro network node; and the UE receives an uplink resource (UG) sent according to the indication message by the macro network node, and sends uplink signaling or uplink data to the macro network node according to the uplink resource (UG). Compared with the prior art where no micro network node participates and a UE directly uses a contention-based random access procedure to perform access, the solution provided by the embodiment of the present invention can enable a UE to more rapidly access a network, thereby reducing an access delay of the UE.

During implementation of the present invention, none of the user equipment, the macro network node, and the micro network node controls sending, by the UE, the uplink data or uplink signaling; as long as the user initiates an access request, and after the macro network node receives an indication from the micro network node, the macro network node allocates the uplink resource to the user equipment.

Optionally, based on the embodiment corresponding to FIG. 1, in a first optional embodiment of the communication method according to the embodiment of the present invention, the receiving an uplink resource (UG) sent according to the indication message by the macro network node includes:

receiving a first timing advance (TA) and the uplink resource (UG) by using a non-contention-based random access procedure.

Correspondingly, the sending uplink signaling or uplink data to the macro network node according to the uplink resource (UG) includes:

sending the uplink signaling or uplink data to the macro network node according to the first timing advance (TA) and the uplink resource (UG).

In the embodiment of the present invention, the non-contention-based random access procedure is defined in detail in the 3rd Generation Partnership Project (The 3rd Generation Partnership Project, 3GPP) protocol TS 36.321, and specifically includes the following: the macro network node sends a non-contention-based random access command to the UE, the UE responds to the non-contention-based random access command by sending a random access request to the macro network node, and the macro network node sends a random access response to the UE, where the random access response includes the uplink channel resource (UG) and the timing advance (Time Advance, TA) which are allocated. In this way, the UE can obtain an uplink sending time according to the TA, and sends the uplink signaling or uplink data at the uplink sending time by using the UG.

Optionally, based on the embodiment corresponding to FIG. 1, in a second optional embodiment of the communication method according to the embodiment of the present invention, the receiving an uplink resource (UG) sent according to the indication message by the macro network node includes:

receiving, through a physical downlink control channel (PDCCH), the uplink resource (UG) sent by the macro network node.

Correspondingly, the method further includes: reading an existing second timing advance (TA).

The sending uplink signaling or uplink data to the macro network node according to the uplink resource (UG) includes:

sending the uplink signaling or uplink data to the macro network node according to the second timing advance (TA) and the uplink resource (UG).

In the embodiment of the present invention, when a TA has existed in the UE, the UE does not need to obtain a TA from the macro network node. Therefore, without using non-contention-based random access procedure, the macro network node can still allocate the UG to the UE, for example, the macro network node sends the UE a UG allocated to the UE directly through the physical downlink control channel (Physical Downlink Control Channel, PDCCH).

Optionally, based on the embodiment corresponding to FIG. 1 and the first or the second optional embodiment corresponding to FIG. 1, in a third optional embodiment of the communication method according to the embodiment of the present invention, both the request message and the indication message carry size information of the uplink signaling or uplink data, and the size information of the uplink signaling or uplink data is used by the macro network node to determine the uplink resource (UG).

In the embodiment of the present invention, the UE may add size of the uplink signaling or uplink data sent in the foregoing embodiment to the sent request message, so that the macro network node may determine size of the UG according to the size of the uplink signaling or uplink data. Therefore, compared with the UG randomly allocated in the foregoing embodiment, the UG allocated in the embodiment of the present invention exactly adapts to the uplink signaling or uplink data to be sent. In this way, it is avoided that the allocated uplink resource is inadequate to send the uplink signaling or uplink data and that excessive UGs are allocated to cause a waste of UGs.

Optionally, based on the embodiment corresponding to FIG. 1 and the first to the third optional embodiments corresponding to FIG. 1, in a fourth optional embodiment of the communication method according to the embodiment of the present invention, before the step of sending a request message to a micro network node, the method further includes:

determining first control information of the uplink signaling or uplink data, where

both the request message and the indication message carry the first control information, and the first control information is used by the macro network node to perform access control on the user equipment.

In the embodiment of the present invention, the first control information is used by the macro network node to perform access control on the user equipment, which is specifically as follows: only after determining, according to the first control information, that the uplink signaling or uplink data meets a preset access control rule, the macro network node sends the uplink resource (UG) to the user equipment.

In the embodiment of the present invention, before sending the request message, the UE may determine the first control information of the uplink signaling or uplink data according to the uplink signaling or uplink data to be sent. For example, when the UE is about to send signaling for an emergency call, it may be determined that the first control information includes: emergency indication information, a service type being an emergency call service, or what is to be sent being signaling.

The first control information may be at least one of emergency indication information, service type information, data information or signaling information, quality of service (Quality of Service, QoS) information, an identity of a radio

bearer (Radio Bearer, RB), an identity of a logical channel (Logical CHannel, LCH), and an identity of a logical channel group to which the logical channel used by the radio bearer belongs.

The emergency indication information indicates whether the data or signaling that needs to be sent by the UE is emergent.

Specifically, the emergency indication may be expressed by a bit. When the bit is 1, it indicates that the data or signaling is emergent; and when the bit is 0, it indicates that the data or signaling is not emergent, and vice versa.

The service type indicates a type of a service to be initiated by the UE, and the information is specifically any one of the following: an emergency call, a high-priority service, a delay-insensitive service, and the like.

The data or signaling indicates whether data or signaling is to be sent by the UE.

The quality of service (Quality of Service, QoS) information includes a QoS parameter of a service to be initiated by the UE, and may specifically include a QoS class identifier (QoS Class Identifier, QCI), an allocation and retention priority (Allocation and Retention Priority, ARP), and the like.

The identity of a radio bearer (Radio Bearer, RB), or the identity of a logical channel (Logical CHannel, LCH) used by the RB, or the identity of an LCH group to which the LCH used by the RB belongs indicates one or more established RBs which the uplink data or signaling to be sent by the UE is from.

In the embodiment of the present invention, the macro network node controls the access of the UE, and when the indication message includes the first control information, the macro network node determines that it is required to allocate the uplink resource (UG) to the user equipment when determining that the first control information meets an access control rule.

The access control rule in the embodiment of the present invention may be as follows: it is required to allocate an uplink resource for an emergency call, to allocate an uplink resource for signaling, to allocate an uplink resource for a high-priority service, or the like. For example, when the first control information is an emergency call, the macro network node determines that the emergency call meets the access control rule, and then determines that it is required to allocate the uplink resource (UG) to the user equipment.

Optionally, based on the embodiment corresponding to FIG. 1, and the first to the third optional embodiments corresponding to FIG. 1, in a fifth optional embodiment of the communication method according to the embodiment of the present invention, before the step of sending a request message to a micro network node, the method further includes: receiving a first configuration message sent by the macro network node, where the first configuration message carries an uplink synchronization flag and/or second control information, and the uplink synchronization flag is used for instructing, after a time alignment timer (Time Alignment Timer, TAT) of a timing advance group (Timing advance group, TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

Optionally, based on the fifth optional embodiment corresponding to FIG. 1, in a sixth optional embodiment according to the embodiment of the present invention, when the first configuration message carries the second control

information, after the step of receiving a first configuration message sent by the macro network node, the method further includes:

determining third control information of the uplink signaling or uplink data; and

when the third control information meets an access control rule specified by the second control information, sending the access request message to the micro network node.

In the embodiment of the present invention, in order to control the access of the UE, the macro network node sends the first configuration message to the UE, where the first configuration message carries the second control information; the UE determines whether third control information of the uplink signaling or uplink data meets an access control rule specified by the second control information, and when the third control information meets the access control rule specified by the second control information, the UE determines that it is required to send the request message to the micro network node.

In the embodiment of the present invention, the control rule may vary in multiple situations. For example, the second control information includes emergency indication information and emergency call information, and the specified access control rule indicates that, when the second control information includes one piece of information in the third control information, the request message can be sent. For example, when the third control information only includes the emergency indication information, the request message can be sent. Alternatively, when the third control information includes the emergency indication information and a signaling identity, and the second control information includes the emergency indication information, the request message may also be sent. If the specified access control rule is that the request message can be sent only when the information in the third control information is completely identical with the information in the second control information; then, in the example, only when the third control information includes the emergency indication information and the emergency call information, the request message can be sent.

Optionally, based on the embodiment corresponding to FIG. 1 and the first to the third optional embodiments corresponding to FIG. 1, in a seventh optional embodiment of the communication method according to the embodiment of the present invention, before the step of sending a request message to a micro network node, the method may further include:

determining fourth control information of the uplink signaling or uplink data.

The request message carries the fourth control information, so that after determining that the fourth control information meets an access control rule specified by fifth control information that is carried in a second configuration message sent by the macro network node, the micro network node sends the indication message to the macro network node.

In the embodiment of the present invention, the micro network node performs access control. The UE determines the fourth control information according to the uplink signaling or uplink data, and adds the fourth control information to the request message; in this way, the micro network node can determine whether the fourth control information meets the access control rule specified by the fifth control information that is carried in the second configuration message sent by the macro network node, and when the fourth control information meets the access control rule specified by the fifth control information, the micro network node sends the indication message to the macro network node.

In the embodiment of the present invention, the specified access control rule may vary in multiple situations. For example, the fifth control information includes emergency indication information and emergency call information, and the specified access control rule indicates that, when the second control information includes one piece of information in the fourth control information, the indication message can be sent. For example, when the fourth control information only includes the emergency indication information, the indication message can be sent. Alternatively, when the fourth control information includes the emergency indication information and a signaling identity, and the fifth control information includes the emergency indication information, the indication message may also be sent. If the specified access control rule is that the indication message can be sent only when the information in the fourth control information is completely identical with the information in the fifth control information; then, in the example, only when the fourth control information includes the emergency indication information and the emergency call information, the indication message can be sent.

Optionally, based on the embodiment corresponding to FIG. 1 and the seventh optional embodiment corresponding to FIG. 1, in an eighth optional embodiment of the communication method according to the embodiment of the present invention, the indication message carries the fourth control information, and the fourth control information is further used by the macro network node to perform access control on the user equipment.

In the embodiment of the present invention, the indication message carries the fourth control information, the macro network node determines, according to the fourth control information, whether the uplink signaling or data meets the preset access control rule, and only after the macro network node determines that the uplink signaling or data meets the preset access control rule, the macro network node sends the uplink resource (UG) to the user equipment.

In the embodiment of the present invention, the micro network node and the macro network node perform access control at the same time. When the micro network node determines that the fourth control information meets the access control rule specified by the fifth control information, the micro network node adds the fourth control information to the indication message; and after determining that the fourth control information meets the access control rule, the macro network node sends the uplink resource (UG) to the user equipment.

Optionally, based on the embodiment corresponding to FIG. 1 and the first to the third optional embodiments corresponding to FIG. 1, in a ninth optional embodiment of the communication method according to the embodiment of the present invention, before the step of sending a request message to a micro network node, the method further includes:

receiving a third configuration message sent by the macro network node, where the third configuration message carries sixth control information; and

determining seventh control information of the uplink signaling or uplink data.

The sending an access request message to the micro network node includes:

when the seventh control information meets an access control rule specified by the sixth control information, sending the access request message to the micro network node.

Correspondingly, both the request message and the indication message further carry the seventh control information.

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tion, and the seventh control information is used by the macro network node to perform access control on the user equipment.

In the embodiment of the present invention, only after determining that the uplink signaling or data meets the preset access control rule, the macro network node sends the uplink resource (UG) to the user equipment.

In the embodiment of the present invention, the UE and the macro network node control access at the same time. For a relationship between the sixth control information and the seventh control information, reference may be made to a relationship between the third control information and the second control information for understanding.

Optionally, based on the embodiment corresponding to FIG. 1 and the first to the third optional embodiments corresponding to FIG. 1, in a tenth optional embodiment of the communication method according to the embodiment of the present invention, before the step of sending a request message to a micro network node, the method further includes:

receiving a fourth configuration message sent by the macro network node, where the fourth configuration message carries eighth control information; and

determining ninth control information of the uplink signaling or uplink data.

The sending an access request message to the micro network node includes:

when the ninth control information meets an access control rule specified by the eighth control information, sending the access request message to the micro network node.

Correspondingly, the request message carries the ninth control information, so that after determining that the ninth control information meets a control rule specified by tenth control information that is carried in a fifth configuration message sent by the macro network node to the micro network node, the micro network node sends the indication message to the macro network node.

In the embodiment of the present invention, the UE and the micro network node control access at the same time. In the embodiment of the present invention, for a relationship between the eighth control information and the ninth control information, reference may be made to the relationship between the second control information and the third control information for understanding; and for a relationship between the ninth control information and the tenth control information, reference may be made to a relationship between the fourth control information and the fifth control information for understanding.

Optionally, based on the tenth optional embodiment, in an eleventh optional embodiment according to the embodiment of the present invention, the indication message carries the ninth control information, and the ninth control information is further used by the macro network node to perform access control on the user equipment.

In the embodiment of the present invention, the process of performing, by the macro network node, access control is as follows: the macro network node determines, according to the ninth control information, whether the uplink signaling or uplink data meets an access control rule, and after determining that the uplink signaling or uplink data meets the access control rule, the macro network node sends the uplink resource (UG) to the user equipment.

In the embodiment of the present invention, the UE, the macro network node, and the micro network node perform access control at the same time. When the indication message carries the ninth control information, when determining

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that the ninth control information meets the access control rule, the macro network node determines that it is required to allocate the uplink resource (UG) to the user equipment.

Optionally, in the foregoing multiple optional embodiments, the first control information, the second control information, the third control information, the fourth control information, the fifth control information, the sixth control information, the seventh control information, the eighth control information, the ninth control information, and the tenth control information each include at least one of emergency indication information, service type information, data information or signaling information, quality of service (QoS) information, an identity of a radio bearer (RB), an identity of a logical channel (LCH), and an identity of a logical channel group to which the logical channel used by the radio bearer belongs.

In the embodiment of the present invention, the first control information, the second control information, the third control information, the fourth control information, the fifth control information, the sixth control information, the seventh control information, the eighth control information, the ninth control information, and the tenth control information each may be an information set, and each set may include at least one information parameter.

Referring to FIG. 2, a communication method according to an embodiment of the present invention includes:

201: A macro network node receives an indication message that is sent by a micro network node after the micro network node receives a request message sent by a user equipment.

202: The macro network node sends an uplink resource (UG) to the user equipment according to the indication message, so that the user equipment sends uplink signaling or uplink data to the macro network node according to the uplink resource (UG).

In the embodiment of the present invention, a macro network node receives an indication message that is sent by a micro network node after the micro network node receives a request message sent by a user equipment; and sends an uplink resource (UG) to the user equipment according to the indication message, so that the user equipment sends uplink signaling or uplink data to the macro network node according to the uplink resource (UG). Compared with the prior art where no micro network node participates and a UE directly uses a contention-based random access procedure to perform access, the solution provided by the embodiment of the present invention can enable a UE to more rapidly access a network, thereby reducing an access delay of the UE.

During implementation of the present invention, none of the user equipment, the macro network node, and the micro network node controls sending, by the UE, the uplink data or uplink signaling; as long as the user initiates an access request, and after the macro network node receives an indication from the micro network node, the macro network node allocates the uplink resource to the user equipment.

Optionally, based on the embodiment corresponding to FIG. 2, in a first optional embodiment of the communication method according to the embodiment of the present invention, the sending the uplink resource (UG) to the user equipment according to the indication message includes:

initiating a non-contention-based random access procedure to the user equipment according to the indication message, and sending a first timing advance (TA) and the uplink resource (UG) to the user equipment in the non-contention-based random access procedure, so that the user equipment sends the uplink signaling or uplink data to the

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macro network node according to the first timing advance (TA) and the uplink resource (UG).

In the embodiment of the present invention, no matter whether a TA exists in the UE or not, the macro network node can initiate the non-contention-based random access procedure, so that the UE obtains the UG and the TA used for sending the uplink signaling or uplink data.

Optionally, based on the embodiment corresponding to FIG. 2, in a second optional embodiment of the communication method according to the embodiment of the present invention, the sending the uplink resource (UG) to the user equipment includes:

sending the uplink resource (UG) to the user equipment through a physical downlink control channel (PDCCH) according to the indication message, so that the user equipment sends, after reading an existing second timing advance (TA), uplink signaling or uplink data to the macro network node according to the second timing advance (TA) and the uplink resource (UG).

In the embodiment of the present invention, when determining that a TA has existed in the UE, the macro network node may not need to initiate the contention-based random access procedure, but only needs to send the uplink resource (UG) to the user equipment through the physical downlink control channel (PDCCH); then, after reading the existing second timing advance (TA), the UE may send uplink signaling or uplink data to the macro network node according to the second timing advance (TA) and the uplink resource (UG).

Optionally, based on FIG. 2 and the first or the second optional embodiment corresponding to FIG. 2, in a third optional embodiment of the communication method according to the embodiment of the present invention, both the request message and the indication message carry size information of the uplink signaling or uplink data to be sent.

Before the sending an uplink resource (UG) to the user equipment, the method may further include:

determining the uplink resource (UG) according to the size information of the uplink signaling or uplink data.

In the embodiment of the present invention, when the indication message carries the size information of the uplink signaling or uplink data, the macro network node may determine, according to the size information of the uplink signaling or uplink data, the UG required for the size information of the uplink signaling or uplink data. Therefore, compared with the UG randomly allocated in the foregoing embodiment, the UG allocated in the embodiment of the present invention exactly adapts to the uplink signaling or uplink data to be sent. In this way, it is avoided that the allocated uplink resource is inadequate to send the uplink signaling or uplink data and that excessive UGs are allocated to cause a waste of UGs.

Optionally, based on FIG. 2 and any one of the first to the third optional embodiments corresponding to FIG. 2, in a fourth optional embodiment of the communication method according to the embodiment of the present invention:

both the request message and the indication message further carry first control information, determined by the user equipment, of the uplink signaling or uplink data; and before the step of sending an uplink resource (UG) to the user equipment, the method further includes:

performing access control on the user equipment according to the first control information.

In the embodiment of the present invention, an access control process is as follows: only after determining, according to the first control information, that the uplink signaling

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or data meets an access control rule, the macro network node sends the uplink resource (UG) to the user equipment.

In the embodiment of the present invention, the macro network node performs access control. When determining, according to the first control information carried in the indication message, that the first control information meets an access control rule, the macro network node allocates the uplink resource (UG) to the user equipment, where the access control rule may be, for example, as follows: allocating an uplink resource for an emergency call, allocating an uplink resource for signaling, allocating an uplink resource for a high-priority service, or the like. For example, when the first control information is an emergency call, the macro network node determines that the emergency call meets the access control rule, and then determines that it is required to allocate the uplink resource (UG) to the user equipment.

Optionally, based on FIG. 2 and any one of the first to the third optional embodiments corresponding to FIG. 2, in a fifth optional embodiment of the communication method according to the embodiment of the present invention, before the step of receiving the indication message, the method further includes:

sending a first configuration message to the user equipment, where the first configuration message carries an uplink synchronization flag and/or second control information, and the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

In the embodiment of the present invention, the uplink synchronization flag is used for notifying that, when the time alignment timer (TAT) of the timing advance group (TAG) to which the macro cell belongs expires, the UE still can send the request message to the micro cell controlled by the micro network node.

Optionally, based on the fifth optional embodiment corresponding to FIG. 2, in a sixth optional embodiment of the communication method according to the embodiment of the present invention, the first configuration message carries the second control information, so that the user equipment sends, after determining third control information of the uplink signaling or uplink data, the request message to the micro network node when the third control information meets an access control rule specified by the second control information.

In the embodiment of the present invention, the UE performs access control. For a relationship between the second control information and the third control information, reference may be made to the relationship between the second control information and the third control information in the UE-side embodiment for understanding.

Optionally, based on FIG. 2 and any one of the first to the third optional embodiments corresponding to FIG. 2, in a seventh optional embodiment of the communication method according to the embodiment of the present invention, the request message carries fourth control information, determined by the user equipment, of the uplink signaling or uplink data.

Before the step of receiving the indication message, the method further includes:

sending a second configuration message to the micro network node, where the second configuration message carries fifth control information, so that after determining whether the fourth control information meets an access

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control rule specified by the fifth control information, the micro network node sends the indication message to the macro network node.

In the embodiment of the present invention, the micro network node performs access control. For a relationship between the fourth control information and the fifth control information, reference may be made to the relationship between the fourth control information and the fifth control information in the UE-side embodiment for understanding.

Optionally, based on the seventh optional embodiment corresponding to FIG. 2, in an eighth optional embodiment of the communication method according to the embodiment of the present invention, the indication message carries the fourth control information; and before the step of sending an uplink resource (UG) to the user equipment, the method further includes:

performing access control on the user equipment according to the fourth control information.

In the embodiment of the present invention, an access control process is as follows: only after determining, according to the fourth control information, that the uplink signaling or data meets an access control rule, the macro network node sends the uplink resource (UG) to the user equipment.

In the embodiment of the present invention, the micro network node and the macro network node perform access control at the same time.

Optionally, based on FIG. 2 and any one of the first to the third optional embodiments corresponding to FIG. 2, in a ninth optional embodiment of the communication method according to the embodiment of the present invention, before the step of receiving the indication message, the method further includes:

sending a third configuration message to the user equipment, where the third configuration message carries sixth control information, so that after determining that seventh control information of the uplink signaling or uplink data meets an access control rule specified by the sixth control information, the user equipment sends the access request message to the micro network node.

Correspondingly, both the request message and the indication message further carry the seventh control information, and before the step of sending the uplink resource (UG) to the user equipment, the method further includes:

performing access control on the user equipment according to the seventh control information.

In the embodiment of the present invention, the access control process of the macro network node is as follows: the macro network node determines, according to the seventh control information, whether the uplink signaling or data meets an access control rule, and only after determining that the uplink signaling or data meets the access control rule, the macro network node sends the uplink resource (UG) to the user equipment.

In the embodiment of the present invention, the UE and the macro network node perform access control at the same time. For a relationship between the seventh control information and the sixth control information, reference may be made to the relationship between the seventh control information and the sixth control information in the UE-side embodiment for understanding.

Optionally, based on FIG. 2 and any one of the first to the third optional embodiments corresponding to FIG. 2, in a tenth optional embodiment of the communication method according to the embodiment of the present invention, before the step of receiving the indication message, the method further includes:

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sending a fourth configuration message to the user equipment, where the fourth configuration message carries eighth control information, so that after determining that ninth control information of the uplink signaling or uplink data meets an access control rule specified by the eighth control information, the user equipment sends the access request message to the micro network node, where

correspondingly, the request message carries the ninth control information; and

sending a fifth configuration message to the micro network node, where the fifth configuration message carries tenth control information, so that after determining that the ninth control information meets an access control rule specified by the tenth control information, the micro network node sends the indication message to the macro network node.

In the embodiment of the present invention, the UE and the micro network node perform access control at the same time. For a relationship between the ninth control information and the eighth control information and a relationship between the ninth control information and the tenth control information, reference may be made to the relationship between the ninth control information and the eighth control information and the relationship between the ninth control information and the tenth control information in the UE-side embodiment for understanding.

Optionally, based on the tenth optional embodiment corresponding to FIG. 2, in an eleventh optional embodiment according to the embodiment of the present invention, the indication message carries the ninth control information; and before the step of sending an uplink resource (UG) to the user equipment, the method further includes:

performing access control on the user equipment according to the ninth control information.

In the embodiment of the present invention, an access control process is as follows: the macro network node determines, according to the ninth control information, whether the uplink signaling or data meets an access control rule, and only after determining that the uplink signaling or data meets the access control rule, the macro network node sends the uplink resource (UG) to the user equipment.

In the embodiment of the present invention, the UE, the macro network node, and the micro network node perform access control at the same time.

Optionally, in the foregoing multiple optional embodiments corresponding to FIG. 2, the first control information, the second control information, the third control information, the fourth control information, the fifth control information, the sixth control information, the seventh control information, the eighth control information, the ninth control information, and the tenth control information each include at least one of emergency indication information, service type information, data information or signaling information, quality of service (QoS) information, an identity of a radio bearer (RB), an identity of a logical channel (LCH), and an identity of a logical channel group to which the logical channel used by the radio bearer belongs.

Referring to FIG. 3, a communication method according to an embodiment of the present invention includes:

301: A micro network node receives a request message sent by a user equipment.

302: The micro network node sends an indication message to a macro network node according to the request message, so that the macro network node sends an uplink resource (UG) to the user equipment, and then the user equipment sends uplink signaling or uplink data according to the uplink resource (UG).

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In the embodiment of the present invention, a micro network node receives a request message sent by a user equipment; and sends an indication message to a macro network node according to the request message, so that the macro network node sends an uplink resource (UG) to the user equipment, and then the user equipment sends uplink signaling or uplink data according to the uplink resource (UG). Compared with the prior art where no micro network node participates and a UE directly uses a contention-based random access procedure to perform access, the solution provided by the embodiment of the present invention can enable a UE to more rapidly access a network, thereby reducing an access delay of the UE.

During implementation of the present invention, none of the user equipment, the macro network node, and the micro network node controls sending, by the UE, the uplink data or uplink signaling; as long as the user initiates an access request, and after the macro network node receives an indication from the micro network node, the macro network node allocates the uplink resource to the user equipment.

Optionally, based on the embodiment corresponding to FIG. 3, in a first optional embodiment according to the embodiment of the present invention, both the request message and the indication message carry first control information, determined by the user equipment, of the uplink signaling or uplink data, and the first control information is used by the macro network node to perform access control on the user equipment.

In the embodiment of the present invention, the macro network node performs access control as follows: the macro network node determines, according to the first control information, whether the uplink signaling or data meets an access control rule, and only after determining that the uplink signaling or data meets the access control rule, the macro network node allocates the uplink resource (UG) to the user equipment.

In the embodiment of the present invention, the macro network node performs access control.

Optionally, based on the embodiment corresponding to FIG. 3, in a second optional embodiment according to the embodiment of the present invention, the request message carries fourth control information, determined by the user equipment, of the uplink signaling or uplink data; and before the step of receiving a request message sent by a user equipment, the method further includes:

receiving a second configuration message sent by the macro network node, where the second configuration message carries fifth control information.

Correspondingly, the sending an indication message to a macro network node includes:

when the fourth control information meets an access control rule specified by the fifth control information, sending the indication message to the macro network node.

In the embodiment of the present invention, the micro network node performs access control.

Optionally, based on the second optional embodiment corresponding to FIG. 3, in a third optional embodiment according to the embodiment of the present invention, the indication message further carries the fourth control information, and the fourth control information is further used by the macro network node to perform access control on the user equipment.

In the embodiment of the present invention, the macro network node performs access control as follows: the macro network node determines, according to the fourth control information, whether the uplink signaling or uplink data meets an access control rule, and only after determining that

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the uplink signaling or uplink data meets the access control rule, the macro network node sends the uplink resource (UG) to the user equipment.

In the embodiment of the present invention, the micro network node and the macro network node perform access control at the same time.

Optionally, based on the embodiment corresponding to FIG. 3, in a fourth optional embodiment according to the embodiment of the present invention, the receiving a request message sent by a user equipment includes:

when seventh control information, determined by the user equipment, of the uplink signaling or uplink data meets an access control rule specified by sixth control information that is carried in a third configuration message sent by the macro network node, receiving an access request message sent by the user equipment, where the access request message carries the seventh control information, where

the indication message carries the seventh control information, and the seventh control information is used by the macro network node to perform access control on the user equipment.

In the embodiment of the present invention, the process of performing, by the macro network node, access control is as follows: the macro network node determines, according to the seventh control information, whether the uplink signaling or uplink data meets an access control rule, and when determining that the uplink signaling or uplink data meets the access control rule, the macro network node sends the uplink resource (UG) to the user equipment.

In the embodiment of the present invention, the UE and the macro network node perform access control at the same time.

Optionally, based on the embodiment corresponding to FIG. 3, in a fifth optional embodiment according to the embodiment of the present invention, the receiving a request message sent by a user equipment includes:

when ninth control information, determined by the user equipment, of the uplink signaling or uplink data meets an access control rule specified by eighth control information that is carried in a fourth configuration message sent by the macro network node, receiving an access request message sent by the user equipment, where the access request message carries the ninth control information.

Before the step of receiving a request message sent by a user equipment, the method further includes:

receiving a fifth configuration message sent by the macro network node, where the fifth configuration message carries tenth control information.

Correspondingly, the sending an indication message to a macro network node includes:

when the ninth control information meets an access control rule specified by the tenth control information, sending the indication message to the macro network node.

In the embodiment of the present invention, the UE and the micro network node perform access control at the same time.

Optionally, based on the fifth optional embodiment corresponding to FIG. 3, in a sixth optional embodiment according to the embodiment of the present invention, the indication message carries the ninth control information, and the ninth control information is further used by the macro network node to perform access control on the user equipment.

In the embodiment of the present invention, the process of performing, by the macro network node, access control is as follows: the macro network node determines, according to the ninth control information, whether the uplink signaling

or uplink data meets an access control rule, and after determining that the uplink signaling or uplink data meets the access control rule, the macro network node sends the uplink resource (UG) to the user equipment.

In the embodiment of the present invention, the UE, the micro network node, and the macro network node perform access control at the same time.

Optionally, based on the multiple embodiments corresponding to FIG. 3, the first control information, the fourth control information, the fifth control information, the sixth control information, the seventh control information, the eighth control information, the ninth control information, and the tenth control information each include at least one of emergency indication information, service type information, data information or signaling information, quality of service (QoS) information, an identity of a radio bearer (RB), an identity of a logical channel (LCH), and an identity of a logical channel group to which the logical channel used by the radio bearer belongs.

Referring to FIG. 4, a communication method according to an embodiment of the present invention includes:

401: A user equipment receives configuration information sent by a macro network node.

The configuration information in the embodiment of the present invention may be carried in a configuration message for transmission.

402: The user equipment sends uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information.

In the embodiment of the present invention, a user equipment receives configuration information sent by a macro network node, and sends uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information. Compared with the prior art where no micro network node participates and a UE directly uses a contention-based random access procedure to perform access, the solution provided by the embodiment of the present invention can enable a UE to more rapidly access a network, thereby reducing an access delay of the UE.

Optionally, based on the embodiment corresponding to FIG. 4, in a first optional embodiment of the communication method according to the embodiment of the present invention, the method may further include:

receiving downlink signaling or downlink data sent by the macro network node and/or the micro network node; and

when the downlink signaling or downlink data sent by the macro network node and the micro network node is received, deleting duplicate signaling or data in the downlink signaling or downlink data sent by the macro network node and in the downlink signaling or downlink data sent by the micro network node.

In the embodiment of the present invention, when the user equipment simultaneously receives the downlink signaling or downlink data sent by the macro network node and the micro network node, the user equipment needs to delete the duplicate signaling or data and only reserve one copy of the signaling or data.

Optionally, based on the embodiment corresponding to FIG. 4 and the first optional embodiment corresponding to FIG. 4, in a second optional embodiment of the communication method according to the embodiment of the present invention, the configuration information includes an identity of a micro cell controlled by the micro network node and an identity of a radio bearer (RB) of the user equipment.

The sending uplink signaling or uplink data to a micro network node according to the configuration information includes:

sending, to the micro network node, the uplink signaling or uplink data transmitted on a radio bearer corresponding to the identity of the RB, where the uplink signaling or uplink data is sent by using a default logical channel and through a micro cell corresponding to the identity of the micro cell.

In the embodiment of the present invention, when the configuration information includes the identity of the micro cell controlled by the micro network node and the identity of the radio bearer (RB) of the user equipment, the uplink signaling or uplink data is transmitted on a default logical channel corresponding to the radio bearer.

Optionally, based on the second optional embodiment corresponding to FIG. 4, in a third optional embodiment of the communication method according to the embodiment of the present invention, when the configuration information further includes the identity of the logical channel (LCH), the sending uplink signaling or uplink data to a micro network node according to the configuration information includes:

sending, to the micro network node, the uplink signaling or uplink data transmitted on the radio bearer corresponding to the identity of the RB, where the uplink signaling or uplink data is sent by using a logical channel corresponding to the identity of the LCH and through the micro cell corresponding to the identity of the micro cell.

In the embodiment of the present invention, when the configuration information further includes the identity of the logical channel (LCH), the uplink signaling or uplink data is sent to the micro cell corresponding to the identity of the micro cell through the logical channel corresponding to the identity of the LCH.

Optionally, based on the second or the third optional embodiment corresponding to FIG. 4, in a fourth optional embodiment of the communication method according to the embodiment of the present invention, when the configuration information further includes an uplink flag, the receiving downlink signaling or downlink data sent by the macro network node and/or the micro network node includes:

receiving downlink signaling or downlink data sent by the macro network node.

The uplink flag is used for indicating that uplink signaling or uplink data can be sent to the macro network node and the micro network node in an uplink direction, but in a downlink direction, signaling or data can only be received from the macro network node.

Optionally, based on the second, third, or fourth optional embodiment corresponding to FIG. 4, in a fifth optional embodiment of the communication method according to the embodiment of the present invention, the configuration information further includes an uplink synchronization flag, where the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

Optionally, based on the embodiment corresponding to FIG. 4 and any one of the first to the fifth optional embodiments corresponding to FIG. 4, in a sixth optional embodiment of the communication method according to the embodiment of the present invention,

the uplink signaling is an uplink radio resource control (RRC) message, and the downlink signaling is a downlink radio resource control (RRC) message.

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Optionally, based on the sixth optional embodiment corresponding to FIG. 4, in a seventh optional embodiment of the communication method according to the embodiment of the present invention, the uplink RRC message includes an uplink measurement report (Measurement Report, MR) message and an uplink information transfer (Uplink Information Transfer, UIT) message, and the downlink RRC message includes a handover command message and a downlink information transfer message.

Referring to FIG. 5, a communication method according to an embodiment of the present invention includes:

501: A macro network node sends configuration information to a user equipment, so that the user equipment sends uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information.

502: The macro network node receives the uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node, and/or receives the uplink signaling or uplink data sent by the user equipment.

In the embodiment of the present invention, a macro network node sends configuration information to a user equipment, so that the user equipment sends uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information; and the macro network node receives uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node, and/or, receives the uplink signaling or uplink data sent by the user equipment. Compared with the prior art where no micro network node participates and a UE directly uses a contention-based random access procedure to perform access, the solution provided by the embodiment of the present invention can enable a UE to more rapidly access a network, thereby reducing an access delay of the UE.

Optionally, based on the embodiment corresponding to FIG. 5, in a first optional embodiment of the communication method according to the embodiment of the present invention, when the uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node is received and the uplink signaling or uplink data sent by the user equipment is received, duplicate signaling or data in the uplink signaling or uplink data sent by the user equipment and in the uplink signaling or uplink data sent by the micro network node is deleted.

In the embodiment of the present invention, when the macro network node simultaneously receives the signaling or data sent by the UE and the micro network node, the macro network node needs to delete the duplicate signaling or data and only reserve one copy of the signaling or data.

Optionally, based on the embodiment corresponding to FIG. 5 and a first optional embodiment corresponding to FIG. 5, in a second optional embodiment of the communication method according to the embodiment of the present invention, the method may further include:

sending a seventh configuration message to the micro network node, where the seventh configuration message carries another configuration information, so that the micro network node forwards downlink signaling or downlink data to the user equipment according to the another configuration information; and

sending the downlink signaling or downlink data to the micro network node.

Optionally, based on the second optional embodiment corresponding to FIG. 5, in a third optional embodiment of the communication method according to the embodiment of the present invention, the uplink signaling is an uplink radio

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resource control (RRC) message, and the downlink signaling is a downlink radio resource control (RRC) message.

Optionally, based on the third optional embodiment corresponding to FIG. 5, in a fourth optional embodiment of the communication method according to the embodiment of the present invention, the uplink RRC message includes an uplink measurement report message and an uplink information transfer message, and the downlink RRC message includes a handover command message and a downlink information transfer message.

Referring to FIG. 6, an embodiment of a communication method according to an embodiment of the present invention includes:

601: A micro network node receives another configuration information sent by a macro network node.

602: The micro network node receives downlink signaling or downlink data sent by the macro network node.

603: The micro network node forwards the downlink signaling or downlink data to a user equipment according to the another configuration information.

In the embodiment of the present invention, a micro network node receives another configuration information sent by a macro network node, and receives downlink signaling or downlink data sent by the macro network node; and the micro network node forwards the downlink signaling or downlink data to the user equipment according to the another configuration information. Compared with the prior art where no micro network node participates and a UE directly uses a contention-based random access procedure to perform access, the solution provided by the embodiment of the present invention can enable a UE to more rapidly access a network, thereby reducing an access delay of the UE.

Optionally, based on the embodiment corresponding to FIG. 6, in a first optional embodiment of the communication method according to the embodiment of the present invention, the another configuration information includes an identity of the user equipment and an identity of a radio bearer (RB) of the user equipment.

The forwarding the downlink signaling or downlink data to the user equipment according to the another configuration information includes:

sending, to the user equipment, the downlink signaling or downlink data transmitted on a radio bearer corresponding to the identity of the RB, where the downlink signaling or downlink data is sent by using a default logical channel and through a micro cell corresponding to an identity of the micro cell.

In the embodiment of the present invention, when no identity of an LCH exists in the another configuration information, the sent uplink signaling or uplink data is received on the default logical channel corresponding to a radio bearer corresponding to the identity of the radio bearer (RB).

Optionally, based on the embodiment corresponding to FIG. 6 and the first optional embodiment corresponding to FIG. 6, in a second optional embodiment of the communication method according to the embodiment of the present invention, the another configuration information further includes the identity of the logical channel (LCH); and the forwarding the downlink signaling or downlink data to the user equipment according to the another configuration information includes:

sending, to the user equipment, the downlink signaling or downlink data transmitted on the radio bearer corresponding to the identity of the RB, where the downlink signaling or downlink data is sent by using a logical channel correspond-

ing to the identity of the LCH and through the micro cell corresponding to the identity of the micro cell.

In the embodiment of the present invention, when the another configuration information further includes the identity of the logical channel (LCH), the uplink signaling or uplink data is received in the logical channel corresponding to the identity of the LCH.

The downlink signaling is a downlink radio resource control (RRC) message. The downlink RRC message includes a handover command message and a downlink information transfer message.

For ease of understanding, several application scenarios are used as examples in the following to elaborate a communication process in the embodiment of the present invention:

Referring to FIG. 7, FIG. 7 shows a communication process when none of a user equipment, a macro network node, and a micro network node performs access control, and the communication process includes:

S110: The user equipment sends a request message to the micro network node.

The request message in the embodiment of the present invention may be an access request message, a scheduling request message, a connection request message, a request message for sending new data or signaling, or a radio resource control (Radio Resource Control, RRC) message; and may also be a physical signal or a control information element.

S115: The micro network node sends an indication message to the macro network node.

S120: The macro network node initiates a non-contention-based random access procedure, so that the UE obtains an uplink resource (UG) and a TA that are allocated by the macro network node.

In the embodiment of the present invention, the non-contention-based random access procedure is defined in detail in the 3rd Generation Partnership Project (The 3rd Generation Partnership Project, 3GPP) protocol TS 36.321, and specifically includes the following: the macro network node sends a non-contention-based random access command to the UE, the UE responds to the non-contention-based random access command and sends a random access request to the macro network node, and the macro network node sends a random access response to the UE, where the random access response includes the uplink resource (UG) and the timing advance (Time Advance, TA) which are allocated.

S125: The user equipment receives, through a physical downlink control channel (PDCCH), the uplink resource (UG) sent by the macro network node.

In this step, the user equipment may read an existing TA.

It is unnecessary to execute both step **S120** and step **S125**. If step **S120** is executed, step **S125** is not executed; and if step **S125** is executed, step **S120** is not executed.

S130: The user equipment sends uplink signaling or uplink data to the macro network node.

In this way, the UE can obtain an uplink sending time according to the TA, and sends the uplink signaling or uplink data at the uplink sending time by using the UG.

S135: The macro network node sends downlink signaling or downlink data to the user equipment.

Step **S135** is optional.

In the embodiment of the present invention, neither the request message nor the indication message carries any information; in this case, the macro network node randomly allocates the UG to the user equipment for the uplink signaling or uplink data to be sent. If the request message

and the indication message both carry size information of the uplink signaling or uplink data, the macro network node allocates an appropriate UG to the user equipment according to the size information, so as to avoid resource shortage or resource waste in randomly allocating the UG.

Referring to FIG. 8, FIG. 8 shows a situation where only a macro network node performs access control. A communication process in the embodiment of the present invention includes:

S200: A user equipment determines first control information of uplink signaling or uplink data to be sent.

In this step, the first control information may be determined from multiple aspects such as an emergency situation, a service type, whether it is data information or signaling information, and quality of service; specifically, a rule for determining the first control information may be preset.

For example, when the UE is about to send signaling of an emergency call, the UE may determine that the first control information includes: emergency indication information, a service type being an emergency call service, or what is to be sent being signaling.

The first control information may be at least one of emergency indication information, service type information, data/signaling information, quality of service (Quality of Service, QoS) information, an identity of a radio bearer (Radio Bearer, RB), an identity of a logical channel (Logical CHannel, LCH), and an identity of a logical channel group to which the logical channel used by the radio bearer belongs.

The emergency indication information indicates whether the data or signaling that needs to be sent by the UE is emergent.

Specifically, the emergency indication may be expressed by a bit. When the bit is 1, it indicates that the data or signaling is emergent; and when the bit is 0, it indicates that the data or signaling is not emergent, and vice versa.

The service type indicates a type of a service to be initiated by the UE, and the information is specifically any one of the following: an emergency call, a high-priority service, a delay-insensitive service, and the like.

The data/signaling information indicates whether data or signaling is to be sent by the UE.

The quality of service (Quality of Service, QoS) information includes a QoS parameter of a service to which the uplink signaling or uplink data to be sent by the UE belongs, and may specifically include a QoS class identifier (QoS Class Identifier, QCI), an allocation and retention priority (Allocation and Retention Priority, ARP), and the like.

The identity of the radio bearer (Radio Bearer, RB), or the identity of the logical channel (Logical CHannel, LCH) used by the RB, or the identity of the LCH group to which the LCH used by the RB belongs indicates one or more established RBs, or one or more established LCHs which the uplink data or signaling to be sent by the UE is from.

S205: The user equipment sends a request message to the micro network node, where the request message carries the first control information.

S210: The micro network node sends an indication message to the macro network node, where the indication message carries the first control information.

S215: The macro network node determines, according to the first control information, an uplink resource (UG) to be sent to the user equipment.

In step **S215**, the macro network node first determines whether the first control information meets an access control rule, and when the first control information meets the access control rule, determines that it is required to allocate the

uplink resource (UG) to the user equipment, where the access control rule is preset and stored in the macro network node by the system.

S220: The macro network node initiates a non-contention-based random access procedure, so that the UE obtains the uplink resource (UG) and a TA that are allocated by the macro network node.

In step **S220**, the non-contention-based random access procedure is the same as that in step **S120**, so the details are not described herein again.

S225: The user equipment receives, through a physical downlink control channel (PDCCH), the uplink resource (UG) sent by the macro network node.

In this step, the UE may read an existing TA.

It is unnecessary to execute both step **S220** and step **S225**. If step **S220** is executed, step **S225** is not executed; and if step **S225** is executed, step **S220** is not executed.

S230: The user equipment sends uplink signaling or uplink data to the macro network node.

S235: The macro network node sends downlink signaling or downlink data to the user equipment.

Step **S235** is an optional step.

Referring to FIG. 9, FIG. 9 shows a situation where only a user equipment performs access control. A communication process in the embodiment of the present invention includes:

S300: A macro network node sends a first configuration message to the user equipment, where the first configuration message carries second control information.

S305: The user equipment determines third control information of uplink signaling or uplink data.

S310: When the third control information meets an access control rule specified by the second control information, execute step **S315**.

For step **S305** and step **S310**, specifically, the user equipment generates the third control information according to the second control information, and determines, according to whether a value of the third control information and a value of the second control information are identical, whether the third control information meets the access control rule specified by the second control information. For example, when the second control information includes emergency indication information, and the value of the emergency indication information is "emergency", the third control information determined by the user equipment is emergency indication information of the uplink signaling or uplink data; if the value of the emergency indication information of the uplink signaling or uplink data is also "emergency", the user equipment may send a request message. For another example, when the second control information includes service type information and data/signaling information, and the value of the service type information is an "emergency call" and the value of the data/signaling information is "signaling", the third control information determined by the user equipment is service type information and data/signaling information of the uplink signaling or uplink data; when the value of the service type information of the uplink signaling or uplink data is an "emergency call" or the value of the data/signaling information of the uplink signaling or uplink data is "signaling", the user equipment may send the request message. For still another example, when the second control information includes an identity of a radio bearer (RB), and values of the identity of the radio bearer (RB) are "SRB 1" and "DRB 2", the third control information determined by the user equipment is the identity of the radio bearer (RB) of the uplink signaling or uplink data; when the value of the identity of the radio bearer (RB) of the uplink signaling or uplink data is "SRB 1" or "DRB 2", the user

equipment may send the request message. For yet another example, when the second control information includes QoS information, the QoS information includes a QCI and an ARP, and a value of the QCI is "1" and a value of the ARP is "2", the third control information determined by the user equipment is the QoS information of the uplink signaling or uplink data; when the value of the QCI in the QoS information of the uplink signaling or uplink data is "1" and the value of the ARP is "2", the user equipment may send the request message.

S315: Send the request message to the micro network node.

S320: The micro network node sends an indication message to the macro network node.

S325: The macro network node initiates a non-contention-based random access procedure, so that the UE obtains an uplink resource (UG) and a TA that are allocated by the macro network node.

S330: The user equipment receives, through a physical downlink control channel (PDCCH), the uplink resource (UG) sent by the macro network node.

The premise of this step is that the user equipment may read an existing TA.

It is unnecessary to execute both step **S325** and step **S330**. If step **S325** is executed, step **S330** is not executed; and if step **S330** is executed, step **S325** is not executed.

S335: The user equipment sends uplink signaling or uplink data to the macro network node.

S340: The macro network node sends downlink signaling or downlink data to the user equipment.

Step **S340** is an optional step.

In the embodiment of the present invention, neither of the request message and the indication message carries control information, and both of them may carry the size information of the uplink signaling or uplink data.

Referring to FIG. 10, FIG. 10 shows a situation where only a micro network node performs access control. A communication process in the embodiment of the present invention includes:

S400: A macro network node sends a second configuration message to the micro network node, where the second configuration message carries fifth control information.

S405: The user equipment determines fourth control information of the uplink signaling or uplink data.

A process of determining the fourth control information in this step is basically the same as the process of determining the first control information in step **S200**, and reference may be made to the process of determining the first control information in step **S200** for understanding.

S410: The user equipment sends a request message to the micro network node, where the request message carries the fourth control information.

S415: The micro network node determines whether the fourth control information meets an access control rule specified by the fifth control information, and when the fourth control information meets the access control rule specified by the fifth control information, the micro network node determines that it is required to send an indication message to the macro network node.

A process of determining that the fourth information meets the access control rule specified by the fifth control information in this step is basically the same as the process of determining that the third information meets the access control rule specified by the second control information in step **S310**, and reference may be made to the process in step **S310** for understanding.

S420: The micro network node sends an indication message to the macro network node.

S425: The macro network node initiates a non-contention-based random access procedure, so that the UE obtains an uplink resource (UG) and a TA that are allocated by the macro network node.

S430: The user equipment receives, through a physical downlink control channel (PDCCH), the uplink resource (UG) sent by the macro network node.

The premise of this step is that the UE may read an existing TA.

It is unnecessary to execute both step **S425** and step **S430**. If step **S425** is executed, step **S430** is not executed; and if step **S430** is executed, step **S425** is not executed.

S435: The user equipment sends uplink signaling or uplink data to the macro network node.

S440: The macro network node sends downlink signaling or downlink data to the user equipment.

Step **S440** is an optional step.

In the embodiment of the present invention, only the micro network node performs access control. The indication message in step **S420** does not carry any control information, and when the indication message in step **S420** carries the fourth control information, the communication process further includes:

Step **S421:** The macro network node determines, according to the fourth control information, that it is required to allocate the uplink resource (UG) to the user equipment.

In this way, in the embodiment of the communication process including step **S421**, the macro network node and the micro network node perform access control at the same time.

Referring to FIG. 11, FIG. 11 shows a situation where a user equipment and a macro network node perform access control at the same time. A communication process in the embodiment of the present invention includes:

S500: The macro network node sends a third configuration message to the user equipment, where the third configuration message carries sixth control information.

S505: The user equipment determines seventh control information of uplink signaling or uplink data to be sent.

S510: After the user equipment determines that the seventh control information meets an access control rule specified by the sixth control information, execute step **S515**.

A process of determining the seventh control information in the embodiment of the present invention is basically the same as the process of determining the third control information in step **S305**, and a process of determining that the seventh control information meets the access control rule specified by the sixth control information in the embodiment of the present invention is basically the same as the process of determining that the third control information meets the access control rule specified by the second control information in step **S310**, and reference may be made to processes of the corresponding steps separately for understanding.

S515: Send the request message to the micro network node, where the request message carries the seventh control information.

S520: The micro network node sends an indication message to the macro network node, where the indication message carries the seventh control information.

S525: The macro network node determines that the seventh control information meets an access control rule.

S530: The macro network node initiates a non-contention-based random access procedure, so that the UE obtains an uplink resource (UG) and a TA that are allocated by the macro network node.

S535: The user equipment receives, through a physical downlink control channel (PDCCH), the uplink resource (UG) sent by the macro network node.

The premise of this step is that the UE may read an existing TA.

It is unnecessary to execute both step **S530** and step **S535**. If step **S530** is executed, step **S535** is not executed; and if step **S535** is executed, step **S530** is not executed.

S540: The user equipment sends uplink signaling or uplink data to the macro network node.

S545: The macro network node sends downlink signaling or downlink data to the user equipment.

Step **S545** is an optional step.

Referring to FIG. 12, FIG. 12 shows a situation where a user equipment and a micro network node perform access control at the same time. A communication process in the embodiment of the present invention includes:

S600: A macro network node sends a fourth configuration message to the user equipment, where the fourth configuration message carries eighth control information.

S605: The macro network node sends a fifth configuration message to the micro network node, where the fifth configuration message carries tenth control information.

The sequence of step **S600** and step **S605** is not limited.

S610: The user equipment determines ninth control information of uplink signaling or uplink data to be sent.

S615: When the user equipment determines that the ninth control information meets an access control rule specified by the eighth control information, execute step **S620**. In this step, for a relationship between the eighth control information and the ninth control information, reference may be made to the relationship between the second control information and the third control information in the foregoing embodiment for understanding, and the details are not described herein again.

S620: Send the request message to the micro network node, where the request message carries the ninth control information.

S625: After the micro network node determines that the ninth control information meets an access control rule specified by the tenth control information, execute step **S630**.

S630: Send the indication message to the macro network node.

S635: The macro network node initiates a non-contention-based random access procedure, so that the UE obtains an uplink resource (UG) and a TA that are sent by the macro network node.

S640: The user equipment receives, through a physical downlink control channel (PDCCH), the uplink resource (UG) sent by the macro network node.

The premise of this step is that the UE may read an existing TA.

It is unnecessary to execute both step **S635** and step **S640**. If step **S635** is executed, step **S640** is not executed; and if step **S640** is executed, step **S635** is not executed.

S645: The user equipment sends uplink signaling or uplink data to the macro network node.

S650: The macro network node sends downlink signaling or downlink data to the user equipment.

Step **S640** is an optional step.

The indication message in step **S630** in the embodiment corresponding to FIG. 12 does not carry any control information, and when the indication message in step **S630** carries the ninth control information, the communication process further includes:

Step **S631**: The macro network node determines that the ninth control information meets an access control rule.

When the embodiment includes step **S631**, it indicates that the user equipment, the macro network node, and the micro network node perform access control at the same time.

In embodiments of the foregoing multiple application scenarios, the first control information, the second control information, the third control information, the fourth control information, the fifth control information, the sixth control information, the seventh control information, the eighth control information, the ninth control information, and the tenth control information each include at least one of emergency indication information, service type information, data/signaling information, quality of service (QoS) information, an identity of a radio bearer (RB), an identity of a logical channel (LCH), and an identity of a logical channel group to which the logical channel used by the radio bearer belongs.

The emergency indication information indicates whether the data or signaling that needs to be sent by the UE is emergent.

Specifically, the emergency indication may be expressed by a bit. When the bit is 1, it indicates that the data or signaling is emergent; and when the bit is 0, it indicates that the data or signaling is not emergent, and vice versa.

The service type indicates a type of a service to be initiated by the UE, and the information may be specifically any one of the following: an emergency call, a high-priority service, a delay-insensitive service, and the like.

The data/signaling information indicates whether data or signaling is to be sent by the UE.

The quality of service (Quality of Service, QoS) information includes a QoS parameter of a service to which the data or signaling to be sent by the UE belongs, and may specifically include a QoS class identifier (QoS Class Identifier, QCI), an allocation and retention priority (Allocation and Retention Priority, ARP), and the like.

The identity of the radio bearer (Radio Bearer, RB), or the identity of the logical channel (Logical Channel, LCH) used by the RB, or the identity of the LCH group to which the LCH used by the RB belongs indicates one or more established RBs, or one or more established LCHs which the uplink data or signaling to be sent by the UE is from.

Moreover, the access request message and the indication message in the foregoing multiple embodiments may both carry the size information of the uplink signaling or uplink data. In this way, in each application scenario, the macro network node needs to determine, according to the size information, the size of the UG to be allocated to the user equipment for the uplink signaling or uplink data to be sent.

In the multiple embodiments of the present invention, the first configuration message may carry an uplink synchronization flag, where the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

In the embodiment of the present invention, when the TAT of the macro cell expires, the user equipment further needs to send uplink data or uplink signaling to the macro network node. In the foregoing multiple embodiments, the UG and the TA can be allocated to the user equipment only by the macro network node by initiating a non-contention-based random access procedure. If the user equipment does not have a resource for sending a scheduling request (Schedul-

ing Request, SR) on the macro cell, and needs to send uplink signaling or uplink data to the macro network node, and moreover, the user equipment fails to send a dynamic scheduling request (Dynamic Scheduling Request, DSR) on the macro cell, that is, a quantity of times that the user equipment continuously sends an SR exceeds a predetermined maximum quantity of times, the macro network node may send the UG to the user equipment through the physical downlink control channel (PDCCH). In these two situations, since a TA has existed in the user equipment, and the user equipment does not need to depend on the non-contention-based random access procedure to obtain a TA.

Referring to FIG. 13, FIG. 13 shows another application scenario embodiment of a communication method according to an embodiment of the present invention, and the method includes:

S700: A macro network node sends a sixth configuration message to a user equipment, where the sixth configuration message carries configuration information.

The configuration information includes an identity of a micro cell controlled by a micro network node and an identity of a radio bearer (RB) of the user equipment.

The configuration information may further include any one or more of an identity of a logical channel (LCH), an uplink flag, configuration related to an RLC (Radio Link Control), and configuration related to the LCH.

S705: The macro network node sends a seventh configuration message to the micro network node, where the seventh configuration message carries another configuration information.

The another configuration information includes an identity of the user equipment and the identity of the radio bearer (RB) of the user equipment.

The another configuration information may further include any one or more of the identity of the logical channel (LCH), the configuration related to the RLC (Radio Link Control), and the configuration related to the LCH.

The execution sequence of step **S700** and step **S705** is not limited.

S710: The user equipment sends uplink signaling or uplink data to the micro network node.

Specifically, the user equipment sends, to the micro network node, uplink signaling or uplink data transmitted on the radio bearer corresponding to the identity of the radio bearer (RB), where the uplink signaling or uplink data is sent through a micro cell corresponding to the identity of the micro cell. Optionally, the user equipment sends the uplink signaling or uplink data by using the LCH corresponding to the identity of the LCH, the configuration related to the RLC and/or the configuration related to the LCH.

In the embodiment of the present invention, the uplink signaling may be an uplink radio resource control (Radio Resource Control, RRC) message, and the uplink RRC message includes a measurement report (Measurement Report, MR) message, an uplink information transfer (Uplink Information Transfer, UIT) message, and the like.

S715: The user equipment sends uplink signaling or uplink data to the macro network node.

S720: The micro network node forwards, to the macro network node, the uplink signaling or uplink data sent by the user equipment.

In the embodiment of the present invention, both step **S710** and step **S715** may be executed, or only one of the steps may be executed. When the two steps are both executed, step **S725** needs to be further executed; and when one of the steps is executed, step **S725** does not need to be executed. When step **S710** is executed, step **S720** needs to

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be further executed; and when step S710 is not executed, step S720 does not need to be executed.

S725: The macro network node deletes duplicate signaling or data in the uplink signaling or uplink data sent by the user equipment and in the uplink signaling or uplink data sent by the micro network node.

S730: The macro network node sends downlink signaling or downlink data to the user equipment.

In the embodiment of the present invention, the downlink signaling may be a downlink radio resource control (RRC) message, and the downlink RRC message includes a handover command (Handover Command, HC) message, a downlink information transfer (Downlink Information Transfer, DIT) message, and the like.

S735: The macro network node sends downlink signaling or downlink data to the micro network node.

S740: The micro network node forwards, to the user equipment, the downlink signaling or downlink data sent by the macro network node.

Specifically, the micro network node sends, to the user equipment, downlink signaling or downlink data transmitted on the radio bearer corresponding to the identity of the radio bearer (RB), where the downlink signaling or downlink data is sent through a micro cell corresponding to the identity of the micro cell. Optionally, the micro network node sends the downlink signaling or downlink data by using the LCH corresponding to the identity of the LCH, the configuration related to the RLC and/or the configuration related to the LCH.

In the embodiment of the present invention, both step S730 and step S735 may be executed, or only one of the steps may be executed. When the two steps are both executed, step S740 needs to be further executed; and when one of the steps is executed, step S740 does not need to be executed. When step S735 is executed, step S740 needs to be further executed; and when step S735 is not executed, step S740 does not need to be executed. When the configuration information includes an uplink flag, step S735 and step S740 are not executed, and only step S730 is executed, that is, the user equipment receives the downlink signaling or downlink data from the macro network node, and does not receive the downlink signaling or downlink data from the micro network node.

S745: The user equipment deletes duplicate signaling or data in the downlink signaling or downlink data sent by the macro network node and in the downlink signaling or downlink data sent by the micro network node.

The present invention elaborates the communication process among the user equipment, the macro network node, and the micro network node by using the foregoing multiple application scenarios.

Referring to FIG. 14, a user equipment according to an embodiment of the present invention includes:

a first sending unit 1101, configured to send a request message to a micro network node, so that the micro network node sends an indication message to a macro network node; and

an obtaining unit 1102, configured to receive an uplink resource (UG) sent according to the indication message by the macro network node, where

the first sending unit 1101 is further configured to send uplink signaling or uplink data to the macro network node according to the uplink resource (UG) obtained by the obtaining unit.

In the embodiment of the present invention, the first sending unit 1101 sends a request message to a micro network node, so that the micro network node sends an

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indication message to a macro network node; the obtaining unit 1102 receives an uplink resource (UG) sent according to the indication message by the macro network node; and the first sending unit 1101 sends uplink signaling or uplink data to the macro network node according to the uplink resource (UG) obtained by the obtaining unit. Compared with the prior art, the user equipment provided by the embodiment of the present invention more rapidly accesses a network with the participation of the micro network node, thereby reducing an access delay.

Based on the embodiment corresponding to FIG. 14, in a first optional embodiment of the user equipment according to the embodiment of the present invention,

the obtaining unit 1102 is configured to receive, by using a non-contention-based random access procedure, a first timing advance (TA) and the uplink resource (UG) in the non-contention-based random access procedure; and

the first sending unit 1101 is configured to send the uplink signaling or uplink data to the macro network node according to the first timing advance (TA) and the uplink resource (UG) obtained by the obtaining unit 1102.

Based on the embodiment corresponding to FIG. 14, in a second optional embodiment of the user equipment according to the embodiment of the present invention,

the obtaining unit 1102 is configured to read an existing second timing advance (TA), and receive, through a physical downlink control channel (PDCCH), the uplink resource (UG) sent by the macro network node; and

the first sending unit 1101 is configured to send the uplink signaling or uplink data to the macro network node according to the second timing advance (TA) and the uplink resource (UG) obtained by the obtaining unit 1102.

Based on the embodiment corresponding to FIG. 14 and the first or the second optional embodiment corresponding to FIG. 14, referring to FIG. 15, in a third optional embodiment of the user equipment according to the embodiment of the present invention, the user equipment further includes:

a first determining unit 1103, configured to: before the first sending unit 1101 sends the request message, determine first control information of the uplink signaling or uplink data, where both the request message and the indication message carry the first control information, and the first control information is used by the macro network node to perform access control on the user equipment.

Based on the embodiment corresponding to FIG. 14 and the first or the second optional embodiment corresponding to FIG. 14, referring to FIG. 16, in a fourth optional embodiment of the user equipment according to the embodiment of the present invention, the user equipment further includes:

a first receiving unit 1104, configured to receive a first configuration message sent by the macro network node, where the first configuration message carries an uplink synchronization flag and/or second control information, the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

Based on the fourth optional embodiment, referring to FIG. 17, in a fifth optional embodiment of the user equipment according to the embodiment of the present invention, the user equipment further includes:

a second determining unit 1105, configured to determine third control information of the uplink signaling or uplink data, and send the request message to the micro network

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node when the third control information meets an access control rule specified by the second control information.

Based on the embodiment corresponding to FIG. 14 and the first or the second optional embodiment corresponding to FIG. 14, referring to FIG. 18, in a sixth optional embodiment of the user equipment according to the embodiment of the present invention, the user equipment further includes:

a third determining unit **1106**, configured to determine fourth control information of the uplink signaling or uplink data, where the request message carries the fourth control information, so that after determining that the fourth control information meets an access control rule specified by fifth control information that is carried in a second configuration message sent by the macro network node, the micro network node sends the indication message to the macro network node.

Based on the embodiment corresponding to FIG. 14 and the first or the second optional embodiment corresponding to FIG. 14, referring to FIG. 19, in a seventh optional embodiment of the user equipment according to the embodiment of the present invention, the user equipment further includes:

a second receiving unit **1107**, configured to receive a third configuration message sent by the macro network node, where the third configuration message carries sixth control information; and

a fourth determining unit **1108**, configured to determine seventh control information of the uplink signaling or uplink data, where

the first sending unit **1101** is further configured to: when the seventh control information meets an access control rule specified by the sixth control information, send the request message to the micro network node.

Based on the embodiment corresponding to FIG. 14 and the first or the second optional embodiment corresponding to FIG. 14, referring to FIG. 20, in an eighth optional embodiment of the user equipment according to the embodiment of the present invention, the user equipment further includes:

a third receiving unit **1109**, configured to receive a fourth configuration message sent by the macro network node, where the fourth configuration message carries eighth control information; and

a fifth determining unit **1110**, configured to determine ninth control information of the uplink signaling or uplink data, where

the first sending unit **1101** is further configured to: when the ninth control information meets an access control rule specified by the eighth control information, send the request message to the micro network node.

Referring to FIG. 21, a macro network node device according to an embodiment of the present invention includes:

a fourth receiving unit **2101**, configured to receive an indication message that is sent by a micro network node after the micro network node receives a request message sent by a user equipment; and

a second sending unit **2102**, configured to send an uplink resource (UG) to the user equipment according to the indication message, so that the user equipment sends uplink signaling or uplink data according to the uplink resource (UG).

In the embodiment of the present invention, the fourth receiving unit **2101** receives an indication message that is sent by a micro network node after the micro network node receives a request message sent by a user equipment; and the second sending unit **2102** sends an uplink resource (UG) to the user equipment according to the indication message, so that the user equipment sends uplink signaling or uplink data

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according to the uplink resource (UG). Compared with the prior art, the macro network node device provided by the embodiment of the present invention can help the UE more rapidly access a network, thereby reducing an access delay of the UE.

Based on the embodiment corresponding to FIG. 21, in a first optional embodiment of the macro network node device according to the embodiment of the present invention,

the second sending unit **2102** is configured to initiate a non-contention-based random access procedure to the user equipment according to the indication message, and send a first timing advance (TA) and the uplink resource (UG) to the user equipment in the non-contention-based random access procedure, so that the user equipment sends uplink signaling or uplink data to the macro network node according to the first timing advance (TA) and the uplink resource (UG).

Based on the embodiment corresponding to FIG. 21, in a second optional embodiment of the macro network node device according to the embodiment of the present invention,

the second sending unit **2102** is configured to send the uplink resource (UG) to the user equipment through a physical downlink control channel (PDCCH) according to the indication message, so that the user equipment sends, after reading an existing second timing advance (TA), uplink signaling or uplink data to the macro network node according to the second timing advance (TA) and the uplink resource (UG).

Based on the embodiment corresponding to FIG. 21 and the first or the second optional embodiment, referring to FIG. 22, in a third optional embodiment of the macro network node device according to the embodiment of the present invention, both the request message and the indication message carry size information of the uplink signaling or uplink data to be sent; the macro network node device further includes: a resource determining unit **2103**, where

the resource determining unit **2103** is configured to determine the uplink resource (UG) required for the uplink signaling or uplink data according to the size information of the uplink signaling or uplink data, and allocate the determined uplink resource (UG) to the user equipment.

Based on the embodiment corresponding to FIG. 21 and any one of the first to the third optional embodiments, in a fourth optional embodiment of the macro network node device according to the embodiment of the present invention, both the request message and the indication message further carry first control information, determined by the user equipment, of the uplink signaling or uplink data. Referring to FIG. 23, the macro network node device further includes:

a first control unit **2104**, configured to perform access control on the user equipment according to the first control information.

Based on the embodiment corresponding to FIG. 21 and any one of the first to the fourth optional embodiments, in a fifth optional embodiment of the macro network node device according to the embodiment of the present invention,

the second sending unit **2102** is further configured to send a first configuration message to the user equipment, where the first configuration message carries an uplink synchronization flag and/or second control information, and the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain con-

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tinuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

Based on the embodiment corresponding to FIG. 21 and any one of the first to the fourth optional embodiments, in a sixth optional embodiment of the macro network node device according to the embodiment of the present invention,

the second sending unit **2012** is further configured to send a second configuration message to the micro network node, where the second configuration message carries fifth control information, so that after determining that the fourth control information meets an access control rule specified by the fifth control information, the micro network node sends the indication message to the macro network node.

Based on the sixth optional embodiment, referring to FIG. 24, in a seventh optional embodiment of the macro network node device according to the embodiment of the present invention, the macro network node device further includes:

a second control unit **2105**, configured to perform access control on the user equipment according to the fourth control information.

Based on the embodiment corresponding to FIG. 21 and any one of the first to the fourth optional embodiments, in an eighth optional embodiment of the macro network node device according to the embodiment of the present invention, referring to FIG. 25, the macro network node device further includes:

the second sending unit **2102** is further configured to send a third configuration message to the user equipment, where the third configuration message carries sixth control information, so that after determining that seventh control information of the uplink signaling or uplink data meets an access control rule specified by the sixth control information, the user equipment sends the request message to the micro network node;

a third control unit **2106**, configured to: when both the request message and the indication message further carry the seventh control information, perform access control on the user equipment according to the seventh control information.

Based on the embodiment corresponding to FIG. 21 and any one of the first to the fourth optional embodiments, in a ninth optional embodiment of the macro network node device according to the embodiment of the present invention,

the second sending unit **2102** is further configured to send a fourth configuration message to the user equipment, where the fourth configuration message carries eighth control information, so that after determining that ninth control information of the uplink signaling or uplink data meets an access control rule specified by the eighth control information, the user equipment sends the request message to the micro network node;

the request message carries the ninth control information; and

the second sending unit **2102** is further configured to send a fifth configuration message to the micro network node, where the fifth configuration message carries tenth control information, so that after determining that the ninth control information meets an access control rule specified by the tenth control information, the micro network node sends the indication message to the macro network node.

Based on the ninth optional embodiment, and referring to FIG. 26, in a tenth optional embodiment of the macro network node device according to the embodiment of the present invention,

the macro network node device further includes:

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a fourth control unit **2107**, configured to perform access control on the user equipment according to the ninth control information.

Referring to FIG. 27, a micro network node device according to an embodiment of the present invention includes:

a fifth receiving unit **3101**, configured to receive a request message sent by a user equipment; and

a third sending unit **3102**, configured to send an indication message to a macro network node, so that the macro network node allocates an uplink resource (UG) to the user equipment, and then the user equipment sends uplink signaling or uplink data to the macro network node by using the uplink resource (UG).

In the embodiment of the present invention, the fifth receiving unit **3101** receives a request message sent by a user equipment; and the third sending unit **3102** sends an indication message to a macro network node, so that the macro network node allocates an uplink resource (UG) to the user equipment, and then the user equipment sends uplink signaling or uplink data to the macro network node by using the uplink resource (UG). Compared with the prior art, the micro network node device provided by the embodiment of the present invention can help the UE more rapidly access a network, thereby reducing an access delay of the UE.

Based on the embodiment corresponding to FIG. 27, and referring to FIG. 28, a first optional embodiment of the micro network node device according to the embodiment of the present invention includes:

the fifth receiving unit **3101** is further configured to receive a second configuration message sent by the macro network node, where the second configuration message carries fifth control information;

a sixth determining unit **3103**, configured to determine whether the fourth control information meets an access control rule specified by the fifth control information.

The third sending unit **3102** is further configured to: after the fourth control information meets an access control rule specified by the fifth control information, send the indication message to the macro network node.

Based on the first optional embodiment, in a second optional embodiment of the micro network node device according to the embodiment of the present invention,

the fifth receiving unit **3101** is configured to: after seventh control information, determined by the user equipment, of the uplink signaling or uplink data meets an access control rule specified by sixth control information that is carried in a third configuration message sent by the macro network node, receive the request message sent by the user equipment, where the request message carries the seventh control information.

Based on the embodiment corresponding to FIG. 27, and referring to FIG. 29, a third optional embodiment of the micro network node device according to the embodiment of the present invention includes:

the fifth receiving unit **3101** is configured to: after ninth control information, determined by the user equipment, of the uplink signaling or uplink data meets an access control rule specified by eighth control information that is carried in a fourth configuration message sent by the macro network node, receive the request message sent by the user equipment, where the request message carries the ninth control information; and

the fifth receiving unit **3101** is further configured to receive a fifth configuration message sent by the macro network node, where the fifth configuration message carries tenth control information;

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a seventh determining unit **3105**, configured to determine whether the ninth control information meets an access control rule specified by the tenth control information.

The third sending unit **3102** is further configured to: after the ninth control information meets an access control rule specified by the tenth control information, send the indication message to the macro network node.

Referring to FIG. 30, a user equipment according to an embodiment of the present invention includes:

a sixth receiving unit **1201**, configured to receive configuration information sent by a macro network node; and

a fourth sending unit **1202**, configured to send uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information received by the sixth receiving unit **1201**.

In the embodiment of the present invention, the sixth receiving unit **1201** receives configuration information sent by a macro network node, and the fourth sending unit **1202** sends uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information received by the sixth receiving unit **1201**. Compared with the prior art, the user equipment according to the embodiment of the present invention can more rapidly access a network.

Based on the embodiment corresponding to FIG. 30, and referring to FIG. 31, a first optional embodiment of the user equipment according to the embodiment of the present invention includes:

the sixth receiving unit **1201** is configured to receive downlink signaling or downlink data sent by the macro network node and/or the micro network node;

a first processing unit **1203**, configured to: when the downlink signaling or downlink data sent by the macro network node and the micro network node is received, delete duplicate signaling or data in the downlink signaling or downlink data sent by the macro network node and in the downlink signaling or downlink data sent by the micro network node.

Based on the embodiment corresponding to FIG. 30 or FIG. 31, in a second optional embodiment of the user equipment provided by the embodiment of the present invention,

the fourth sending unit **1202** is configured to send, to the micro network node, the uplink signaling or uplink data transmitted on a radio bearer corresponding to an identity of the RB, where the uplink signaling or uplink data is sent by using a default logical channel and through a micro cell corresponding to an identity of the micro cell.

Based on the second optional embodiment, in a third optional embodiment of the user equipment according to the embodiment of the present invention,

the fourth sending unit **1202** is configured to send, to the micro network node, the uplink signaling or uplink data transmitted on a radio bearer corresponding to the identity of the RB, where the uplink signaling or uplink data is sent by using a logical channel corresponding to an identity of the LCH and through the micro cell corresponding to the identity of the micro cell.

Based on the second or the third optional embodiment, in a fourth optional embodiment of the user equipment according to the embodiment of the present invention,

the sixth receiving unit **1201** is configured to receive downlink signaling or downlink data sent by the macro network node.

Referring to FIG. 32, an embodiment of a macro network node device according to an embodiment of the present invention includes:

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a fifth sending unit **2201**, configured to send configuration information to a user equipment, so that the user equipment sends uplink signaling or uplink data to a micro network node and/or a macro network node according to the configuration information; and

a seventh receiving unit **2202**, configured to receive the uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node, and/or receive the uplink signaling or uplink data sent by the user equipment.

In the embodiment of the present invention, the fifth sending unit **2201** sends configuration information to a user equipment, so that the user equipment sends uplink signaling or uplink data to a micro network node and/or a macro network node according to the configuration information; and the seventh receiving unit **2202** receives uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node and/or receives uplink signaling or uplink data sent by the user equipment. Compared with the prior art, the macro network node device provided by the embodiment of the present invention can help the UE more rapidly access a network, thereby reducing an access delay of the UE.

Based on the embodiment corresponding to FIG. 32, and referring to FIG. 33, a first optional embodiment of the macro network node device according to the embodiment of the present invention further includes:

a second processing unit **2203**, configured to: when the uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node is received and the uplink signaling or uplink data sent by the user equipment is received, delete duplicate signaling or data in the uplink signaling or uplink data sent by the user equipment and in the uplink signaling or uplink data sent by the micro network node.

Based on the embodiment corresponding to FIG. 33, and referring to FIG. 34, a second optional embodiment of the macro network node device according to the embodiment of the present invention further includes:

a sixth sending unit, configured to send another configuration information to the micro network node, so that the micro network node forwards downlink signaling or downlink data to the user equipment according to the another configuration information, where

the sixth sending unit is further configured to send the downlink signaling or downlink data to the micro network node.

Referring to FIG. 35, a micro network node device according to an embodiment of the present invention includes:

an eighth receiving unit **3201**, configured to receive another configuration information sent by a macro network node, where

the eighth receiving unit **3201** is further configured to receive downlink signaling or downlink data sent by the macro network node; and

a seventh sending unit **3202**, configured to forward the downlink signaling or downlink data to the user equipment according to the another configuration information.

In the embodiment of the present invention, the eighth receiving unit **3201** receives another configuration information sent by a macro network node; the eighth receiving unit **3201** is further configured to receive downlink signaling or downlink data sent by the macro network node; and the seventh sending unit **3202** forwards the downlink signaling or downlink data to the user equipment according to the another configuration information. Compared with the prior

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art, the micro network node device provided by the embodiment of the present invention can help the UE more rapidly access a network, thereby reducing an access delay of the UE.

Based on the embodiment corresponding to FIG. 35, in a first optional embodiment of the micro network node device according to the embodiment of the present invention,

the another configuration information includes an identity of the user equipment and an identity of a radio bearer (RB) of the user equipment; and

the seventh sending unit 3202 is configured to send, to the user equipment, the downlink signaling or downlink data transmitted on a radio bearer corresponding to the identity of the RB, where the downlink signaling or downlink data is sent by using a default logical channel and through a micro cell corresponding to an identity of the micro cell.

Based on the first optional embodiment, in a second optional embodiment of the micro network node device according to the embodiment of the present invention, when the another configuration information further includes an identity of a logical channel (LCH),

the seventh sending unit 3202 is configured to send, to the user equipment, the downlink signaling or downlink data transmitted on a radio bearer corresponding to the identity of the RB, where the downlink signaling or downlink data is sent through a logical channel corresponding to the identity of the LCH by using the micro cell corresponding to the identity of the micro cell.

Referring to FIG. 36, a user equipment according to an embodiment of the present invention includes: a first receiver 1301, a first transmitter 1302, a first memory 1303, and a first processor 1304.

The first transmitter 1302 is configured to send a request message to a micro network node, so that the micro network node sends an indication message to a macro network node.

The first receiver 1301 is configured to receive an uplink resource (UG) sent according to the indication message by the macro network node.

The first transmitter 1302 is further configured to send uplink signaling or uplink data to the macro network node according to the uplink resource (UG).

In some embodiments of the present invention, the first receiver 1301 is configured to obtain, by using a non-contention-based random access procedure, a first timing advance (TA) and the uplink resource (UG) in the non-contention-based random access procedure; and

the first transmitter 1302 is configured to send uplink signaling or uplink data to the macro network node according to the first timing advance (TA) and the uplink resource (UG).

In some embodiments of the present invention, the first receiver 1301 is configured to read an existing second timing advance (TA), and receive, through a physical downlink control channel (PDCCH), the uplink resource (UG) sent by the macro network node; and

the first transmitter 1302 is configured to send the uplink signaling or uplink data to the macro network node according to the second timing advance (TA) and the uplink resource (UG).

In some embodiments of the present invention, the first processor 1304 is configured to determine first control information of the uplink signaling or uplink data.

In some embodiments of the present invention, the first receiver 1301 is configured to receive a first configuration message sent by the macro network node, where the first configuration message carries an uplink synchronization flag and/or second control information, and the uplink synchro-

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nization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

In some embodiments of the present invention, the first processor 1304 is configured to determine third control information of the uplink signaling or uplink data; and

the first transmitter 1302 is configured to: when the third control information meets an access control rule specified by the second control information, send the request message to the micro network node.

In some embodiments of the present invention, the first processor 1304 is configured to determine fourth control information of the uplink signaling or uplink data, where the request message carries the fourth control information, so that after determining that the fourth control information meets an access control rule specified by fifth control information that is carried in a second configuration message sent by the macro network node, the micro network node sends the indication message to the macro network node.

In some embodiments of the present invention, the first receiver 1301 is configured to receive a third configuration message sent by the macro network node, where the third configuration message carries sixth control information;

the first processor 1304 is configured to determine seventh control information of the uplink signaling or uplink data; and

the first transmitter 1302 is configured to: when the seventh control information meets an access control rule specified by the sixth control information, send the request message to the micro network node.

In some embodiments of the present invention, the first receiver 1301 is configured to receive a fourth configuration message sent by the macro network node, where the fourth configuration message carries eighth control information;

the first processor 1304 is configured to determine ninth control information of the uplink signaling or uplink data; and

the first transmitter 1302 is configured to: when the ninth control information meets an access control rule specified by the eighth control information, send the request message to the micro network node.

Referring to FIG. 37, a macro network node device according to an embodiment of the present invention includes: a second receiver 2301, a second transmitter 2302, a second memory 2303, and a second processor 2304.

The second receiver 2301 is configured to receive an indication message that is sent by a micro network node after the micro network node receives a request message sent by a user equipment.

The second transmitter 2302 is configured to send an uplink resource (UG) to the user equipment according to the indication message, so that the user equipment sends uplink signaling or uplink data according to the uplink resource (UG).

In some embodiments of the present invention, the second transmitter 2302 is configured to initiate a non-contention-based random access procedure to the user equipment according to the indication message, and send a first timing advance (TA) and the uplink resource (UG) to the user equipment in the non-contention-based random access procedure, so that the user equipment sends uplink signaling or uplink data to the macro network node according to the first timing advance (TA) and the uplink resource (UG).

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In some embodiments of the present invention, the second transmitter **2302** is configured to send the uplink resource (UG) to the user equipment through a physical downlink control channel (PDCCH) according to the indication message, so that the user equipment sends, after reading an existing second timing advance (TA), uplink signaling or uplink data to the macro network node according to the second timing advance (TA) and the uplink resource (UG).

In some embodiments of the present invention, both the request message and the indication message carry size information of the uplink signaling or uplink data to be sent; and

the second processor **2304** is configured to determine the uplink resource (UG) according to the size information of the uplink signaling or uplink data.

In some embodiments of the present invention, both the request message and the indication message further carry first control information, determined by the user equipment, of the uplink signaling or uplink data; and

the second processor **2304** is configured to perform access control on the user equipment according to the first control information.

In some embodiments of the present invention, the second transmitter **2302** is configured to send a first configuration message to the user equipment, where the first configuration message carries an uplink synchronization flag and/or second control information, and the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

In some embodiments of the present invention, the second transmitter **2302** is configured to send a second configuration message to the micro network node, where the second configuration message carries fifth control information, so that after determining that fourth control information meets an access control rule specified by the fifth control information, the micro network node sends the indication message to the macro network node; and

the second processor **2304** is further configured to: when the indication message carries the fourth control information, perform access control on the user equipment according to the fourth control information.

In some embodiments of the present invention, the second transmitter **2302** is configured to send a third configuration message to the user equipment, where the third configuration message carries sixth control information, so that after determining that seventh control information of the uplink signaling or uplink data meets an access control rule specified by the sixth control information, the user equipment sends the request message to the micro network node; and

the second processor **2304** is configured to: when both the request message and the indication message further carry the seventh control information, perform access control on the user equipment according to the seventh control information.

In some embodiments of the present invention, the second transmitter **2302** is configured to send a fourth configuration message to the user equipment, where the fourth configuration message carries eighth control information, so that after determining that ninth control information of the uplink signaling or uplink data meets an access control rule specified by the eighth control information, the user equipment sends the request message to the micro network node; and

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the second transmitter **2302** is configured to send a fifth configuration message to the micro network node, where the fifth configuration message carries tenth control information, so that after determining that the ninth control information meets an access control rule specified by the tenth control information, the micro network node sends the indication message to the macro network node.

In some embodiments of the present invention, the second processor **2304** performs access control on the user equipment according to the ninth control information.

Referring to FIG. 38, a micro network node device according to an embodiment of the present invention includes: a third receiver **3301**, a third transmitter **3302**, a third memory **3303**, and a third processor **3304**.

The third receiver **3301** is configured to receive a request message sent by a user equipment; and

the third transmitter **3302** is configured to send an indication message to a macro network node according to the request message, so that the macro network node sends an uplink resource (UG) to the user equipment, and then the user equipment sends uplink signaling or uplink data to the macro network node according to the uplink resource (UG).

In some embodiments of the present invention, the request message carries fourth control information, determined by the user equipment, of the uplink signaling or uplink data.

The third receiver **3301** is configured to receive a second configuration message sent by the macro network node, where the second configuration message carries fifth control information.

The third processor **3304** is configured to determine whether the fourth control information meets an access control rule of the fifth control information.

The third transmitter **3302** is configured to: after the fourth control information meets the access control rule specified by the fifth control information, send the indication message to the macro network node.

In some embodiments of the present invention, the third receiver **3301** is configured to: when seventh control information, determined by the user equipment, of the uplink signaling or uplink data meets an access control rule specified by sixth control information that is carried in a third configuration message sent by the macro network node, receive the request message sent by the user equipment, where the request message carries the seventh control information.

In some embodiments of the present invention, the third receiver **3301** is configured to: when ninth control information, determined by the user equipment, of the uplink signaling or uplink data meets an access control rule specified by eighth control information that is carried in a fourth configuration message sent by the macro network node, receive the request message sent by the user equipment, where the request message carries the ninth control information.

The third receiver **3301** is further configured to receive a fifth configuration message sent by the macro network node, where the fifth configuration message carries tenth control information.

The third processor **3304** is configured to determine whether the ninth control information meets an access control rule of the tenth control information.

The third transmitter **3302** is further configured to: when the ninth control information meets an access control rule specified by the tenth control information, send the indication message to the macro network node.

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Referring to FIG. 39, a user equipment according to an embodiment of the present invention includes: a fourth receiver **1401**, a fourth transmitter **1402**, a fourth memory **1403**, and a fourth processor **1404**.

The fourth receiver **1401** is configured to receive configuration information sent by a macro network node.

The fourth transmitter **1402** is configured to send uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information.

In some embodiments of the present invention, the fourth receiver **1401** is configured to receive downlink signaling or downlink data sent by the macro network node and/or the micro network node.

The fourth processor **1404** is configured to: when the downlink signaling or downlink data sent by the macro network node and the micro network node is received, delete duplicate signaling or data in the downlink signaling or downlink data sent by the macro network node and in the downlink signaling or downlink data sent by the micro network node.

In some embodiments of the present invention, the configuration information includes an identity of a micro cell controlled by the micro network node and an identity of a radio bearer (RB) of the user equipment.

The fourth transmitter **1402** is configured to send, to the micro network node, the uplink signaling or uplink data transmitted on a radio bearer corresponding to the identity of the RB, where the uplink signaling or uplink data is sent by using a default logical channel and through a micro cell corresponding to the identity of the micro cell.

In some embodiments of the present invention, the fourth transmitter **1402** is configured to send, to the micro network node, the uplink signaling or uplink data transmitted on a radio bearer corresponding to the identity of the RB, where the uplink signaling or uplink data is sent by using a logical channel corresponding to the identity of the LCH and through the micro cell corresponding to the identity of the micro cell.

In some embodiments of the present invention, when the configuration information further includes an uplink flag,

the fourth receiver **1401** is configured to receive the downlink signaling or downlink data sent by the macro network node.

Referring to FIG. 40, an embodiment of a macro network node device according to an embodiment of the present invention includes: a fifth receiver **2401**, a fifth transmitter **2402**, a fifth memory **2403**, and a fifth processor **2404**.

The fifth transmitter **2402** is configured to send configuration information to a user equipment, so that the user equipment sends uplink signaling or uplink data to a micro network node and/or a macro network node according to the configuration information; and

the fifth receiver **2401** is configured to receive the uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node, and/or receive the uplink signaling or uplink data sent by the user equipment.

In some embodiments of the present invention, the fifth processor **2404** is configured to: when the uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node is received and the uplink signaling or uplink data sent by the user equipment is received, delete the duplicate signaling or data in the uplink signaling or uplink data sent by the user equipment and in the uplink signaling or uplink data sent by the micro network node.

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In some embodiments of the present invention, the fifth transmitter **2402** is configured to send another configuration information to the micro network node, so that the micro network node forwards downlink signaling or downlink data to the user equipment according to the another configuration information; and

the fifth transmitter **2402** is configured to send the downlink signaling or downlink data to the micro network node.

Referring to FIG. 41, an embodiment of a micro network node device according to an embodiment of the present invention includes: a sixth receiver **3401**, a sixth transmitter **3402**, a sixth memory **3403**, and a sixth processor **3404**.

The sixth receiver **3401** is configured to receive another configuration information sent by a macro network node.

The sixth transmitter **3402** is further configured to receive downlink signaling or downlink data sent by the macro network node.

The sixth transmitter **3402** is configured to forward the downlink signaling or downlink data to the user equipment according to the another configuration information.

In some embodiments of the present invention, the sixth transmitter **3402** is configured to send, to the user equipment, the downlink signaling or downlink data transmitted on a radio bearer corresponding to the identity of the RB, where the downlink signaling or downlink data is sent by using a default logical channel and through a micro cell corresponding to an identity of the micro cell.

In some embodiments of the present invention, when the another configuration information further includes an identity of the logical channel (LCH),

the sixth transmitter **3402** is configured to send, to the user equipment, the downlink signaling or downlink data transmitted on a radio bearer corresponding to the identity of the RB, where the downlink signaling or downlink data is sent by using a logical channel corresponding to the identity of the LCH and through the micro cell corresponding to the identity of the micro cell.

Referring to FIG. 42A, an embodiment of a communication system according to an embodiment of the present invention includes: a user equipment **100**, a macro network node device **200**, and a micro network node device **300**.

The user equipment **100** is configured to send a request message to a micro network node, so that the micro network node sends an indication message to a macro network node; and receive an uplink resource (UG) sent according to the indication message by the macro network node, and send uplink signaling or uplink data to the macro network node according to the uplink resource (UG).

The macro network node device **200** is configured to receive the indication message that is sent by the micro network node after the micro network node receives the request message sent by the user equipment; and send an uplink resource (UG) to the user equipment according to the indication message, so that the user equipment sends uplink signaling or uplink data according to the uplink resource (UG).

The micro network node device **300** is configured to receive the request message sent by the user equipment; and send the indication message to the macro network node according to the request message, so that the macro network node sends an uplink resource (UG) to the user equipment, and then the user equipment sends the uplink signaling or uplink data according to the uplink resource (UG).

Referring to FIG. 42B, another embodiment of the communication system according to the embodiment of the

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present invention includes: a user equipment **100**, a macro network node device **200**, and a micro network node device **300**.

The user equipment **100** is configured to receive configuration information sent by a macro network node, and send uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information.

The macro network node device **200** is configured to send configuration information to the user equipment, so that the user equipment sends uplink signaling or uplink data to the micro network node and/or the macro network node according to the configuration information; and receive uplink signaling or uplink data that is sent by the user equipment and forwarded by the micro network node and/or receive uplink signaling or uplink data sent by the user equipment.

The micro network node device **300** is configured to receive another configuration information sent by the macro network node; receive downlink signaling or downlink data sent by the macro network node; and forward the downlink signaling or downlink data to the user equipment according to the another configuration information.

A person of ordinary skill in the art may understand that all or a part of the steps of the methods in the foregoing embodiments may be implemented by a program instructing relevant hardware. The program may be stored in a computer readable storage medium. The storage medium may include a ROM, a RAM, a magnetic disk, or an optical disc.

The communication method, device, and system according to the embodiments of the present invention are introduced in detail above. Specific examples are used for describing principles and implementation manners of the present invention. The foregoing descriptions of the embodiments are merely for understanding a method and a core idea of the present invention. Meanwhile, a person of ordinary skill in the art may make modifications to the specific implementation manners and application ranges according to the idea of the present invention. To sum up, the content of the specification shall not be regarded as a limitation to the present invention.

What is claimed is:

1. A communication method, comprising:

receiving, by a user equipment, configuration information sent by a macro network node;

sending uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information;

receiving downlink signaling or downlink data sent by the macro network node and downlink signaling or downlink data sent by the micro network node; and

deleting duplicate signaling or data in the downlink signaling or downlink data sent by the macro network node and in the downlink signaling or downlink data sent by the micro network node.

2. The method according to claim 1, wherein:

the configuration information comprises an identity of a micro cell controlled by the micro network node and an identity of a radio bearer (RB) of the user equipment; and

sending uplink signaling or uplink data to a micro network node according to the configuration information comprises:

sending, to the micro network node, the uplink signaling or uplink data transmitted on a radio bearer corresponding to the identity of the RB, wherein the uplink signaling or uplink data is sent by using a

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default logical channel and through a micro cell corresponding to the identity of the micro cell.

3. The method according to claim 1, wherein:

the configuration information comprises an identity of a micro cell controlled by the micro network node, an identity of a radio bearer (RB) of the user equipment, and an identity of a logical channel (LCH); and sending uplink signaling or uplink data to a micro network node according to the configuration information comprises:

sending, to the micro network node, the uplink signaling or uplink data transmitted on the radio bearer corresponding to the identity of the RB, wherein the uplink signaling or uplink data is sent by using a logical channel corresponding to the identity of the LCH and through the micro cell corresponding to the identity of the micro cell.

4. The method according to claim 1, wherein the configuration information comprises an uplink synchronization flag, and the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

5. The method according to claim 1, wherein the uplink signaling is an uplink radio resource control (RRC) message, and the downlink signaling is a downlink radio resource control (RRC) message.

6. The method according to claim 5, wherein the uplink RRC message comprises an uplink measurement report message and an uplink information transfer message, and the downlink RRC message comprises a handover command message and a downlink information transfer message.

7. A user equipment, comprising a processor and a non-transitory computer readable storage medium, wherein the non-transitory computer readable storage medium comprises a program stored therein, and when the program runs, the user equipment is configured to:

receive configuration information sent by a macro network node;

send uplink signaling or uplink data to a micro network node and/or the macro network node according to the configuration information;

receive downlink signaling or downlink data sent by the macro network node and downlink signaling or downlink data sent by the micro network node; and

delete duplicate signaling or data in the downlink signaling or downlink data sent by the macro network node and in the downlink signaling or downlink data sent by the micro network node.

8. The user equipment according to claim 7, wherein:

the configuration information comprises an identity of a micro cell controlled by the micro network node and an identity of a radio bearer (RB) of the user equipment; and

the uplink signaling or uplink data is transmitted on a radio bearer corresponding to the identity of the RB, and the uplink signaling or uplink data is sent by using a default logical channel and through a micro cell corresponding to the identity of the micro cell.

9. The user equipment according to claim 7, wherein:

the configuration information comprises an identity of a micro cell controlled by the micro network node, an identity of a radio bearer (RB) of the user equipment, and an identity of a logical channel (LCH); and

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the uplink signaling or uplink data is transmitted on a radio bearer corresponding to the identity of the RB, and the uplink signaling or uplink data is sent by using a logical channel corresponding to the identity of the LCH and through the micro cell corresponding to the identity of the micro cell.

10. The user equipment according to claim 7, wherein the configuration information comprises an uplink synchronization flag, and the uplink synchronization flag is used for instructing, after a time alignment timer (TAT) of a timing advance group (TAG) to which a macro cell controlled by the macro network node belongs expires, the user equipment to still maintain continuous running of a TAT of a TAG to which a micro cell controlled by the micro network node belongs.

11. The user equipment according to claim 7, wherein the uplink signaling is an uplink radio resource control (RRC) message, and the downlink signaling is a downlink radio resource control (RRC) message.

12. The user equipment according to claim 11, wherein the uplink RRC message comprises an uplink measurement report message and an uplink information transfer message, and the downlink RRC message comprises a handover command message and a downlink information transfer message.

13. A macro network node device, comprising a processor and a non-transitory computer readable storage medium, wherein the non-transitory computer readable storage medium comprises a program stored therein, and when the program runs, the macro network node device is configured to:

send configuration information to a user equipment, so that the user equipment sends uplink signaling or uplink data to a micro network node and/or a macro network node according to the configuration information;

receive the uplink signaling or uplink data that is sent by the user equipment to the micro network node and forwarded by the micro network node, and/or, receive the uplink signaling or uplink data sent by the user equipment; and

when the uplink signaling or uplink data that is sent by the user equipment to the micro network node and forwarded by the micro network node is received and the uplink signaling or uplink data sent by the user equipment is received, delete duplicate signaling or data in the uplink signaling or uplink data sent by the user equipment and in the uplink signaling or uplink data sent by the micro network node.

14. A macro network node device, comprising a processor and a non-transitory computer readable storage medium, wherein the non-transitory computer readable storage medium comprises a program stored therein, and when the program runs, the macro network node device is configured to:

send configuration information to a user equipment, so that the user equipment sends uplink signaling or uplink data to a micro network node and/or a macro network node according to the configuration information;

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receive the uplink signaling or uplink data that is sent by the user equipment to the micro network node and forwarded by the micro network node, and/or, receive the uplink signaling or uplink data sent by the user equipment;

send another configuration information to the micro network node, so that the micro network node forwards downlink signaling or downlink data to the user equipment according to the another configuration information; and

send the downlink signaling or downlink data to the micro network node.

15. A micro network node device, comprising a processor and a non-transitory computer readable storage medium, wherein the non-transitory computer readable storage medium comprises a program stored therein, and when the program runs, the micro network node device is configured to:

receive a configuration information sent by a macro network node;

receive downlink signaling or downlink data sent by the macro network node;

forward the downlink signaling or downlink data to a user equipment according to the configuration information; wherein:

the configuration information comprises an identity of a micro cell controlled by the micro network node and an identity of a radio bearer (RB) of the user equipment; and

the downlink signaling or downlink data is transmitted on a radio bearer corresponding to the identity of the RB, and the downlink signaling or downlink data is sent by using a default logical channel and through a micro cell corresponding to an identity of the micro cell.

16. A micro network node device, comprising a processor and a non-transitory computer readable storage medium, wherein the non-transitory computer readable storage medium comprises a program stored therein, and when the program runs, the micro network node device is configured to:

receive a configuration information sent by a macro network node;

receive downlink signaling or downlink data sent by the macro network node;

forward the downlink signaling or downlink data to a user equipment according to the configuration information; wherein:

the configuration information comprises an identity of a micro cell controlled by the micro network node, an identity of a radio bearer (RB) of the user equipment, and an identity of a logical channel (LCH); and

the downlink signaling or downlink data is transmitted on a radio bearer corresponding to the identity of the RB, and the downlink signaling or downlink data is sent by using a logical channel corresponding to the identity of the LCH and through the micro cell corresponding to the identity of the micro cell.

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